The Deposit Franchise and the Risk-Taking Channel of Monetary Policy*

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*These are our views and not those of the Federal Reserve Board, or the Federal Reserve System.

Motivation

- **Monetary policy directly impacts financial stability through bank behaviour**
  - The *"risk-taking channel"* is key: changes in interest rates alter banks' incentives to take risk

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  - We identify a new source of heterogeneity linked to banks' *deposit franchise*

- **Why it matters:**
  - Banks' response to monetary policy is crucial for understanding monetary policy transmission
  - Banks' risk-taking incentives shape how monetary policy and financial stability interact

Our Contributions

- **Theory: New mechanism links monetary policy, deposit franchise, and risk-taking**
  - Banks with *stronger deposit franchise* raise deposits rates less when policy rates rise
  - They experience larger increases in deposit spreads and *deposit profitability* $\rightarrow$ *skin in the game*

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- **Empirics: Directly test our mechanism with supervisory loan-level data**
  - Identification: monetary policy shocks interacted with *pre-determined deposit betas*
  - Control for credit demand with *borrower-time fixed effects*

  $\Rightarrow$ Banks with lower deposit betas cut risk more aggressively following rate hikes

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- **Key contribution:**
  - This paper formalizes and tests a *new mechanism* for the risk-taking channel of monetary policy driven by endogenous bank incentives to protect the deposit franchise

Literature Review

- **Risk-Taking Channel of Monetary Policy: Interest Rate $\uparrow \Longrightarrow$ Risk-Taking $\downarrow$**
  - Rajan 06; Adrian & Shin 11; Maddaloni & Peydro 11; Borio & Zhu 12; Jiménez et al. 14; Ioannidou et al. 15; Dell'Ariccia et al. 17; Delis et al. 17; Altunbas et al. 18; Bonfim & Soares 18; Li et al. 24
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- **Deposit Franchise Influences Funding Costs and Lending Behaviour**
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- **Bank Competition and Financial Stability**
  - Keeley 90; Demsetz et al. 96; Allen & Gale 00, 04; Boyd & De Nicolo 05; Beck et al. 06; Martinez-Miera & Repullo 10; Jimenez et al. 13; Vives 16; Berger et al. 17; Carlson et al. 22
  - *Our contribution:* Isolate *deposit-specific franchise* — not general competition — as a key margin for *monetary policy transmission to bank risk*

Model

- **Deposit Franchise:** banks' deposit rates are lower than the policy rate (Drechsler et al., 2021)

$$r_i^D = \beta_i^D r$$

  - r is the policy rate, $0 < \beta_i^D < 1$ is the bank's *deposit beta*
  - Deposit spread $r - r_i^D = (1 - \beta_i^D) r > 0$

PV

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- **Banks' Problem:** Bank i solves the following profit maximization problem

$$\max_{\theta_i} \quad p(\theta_i) \left[\theta_i + r - r_i^D \right]$$

  - Following Allen and Gale (2004), θ_i is the *risk (loan risk premium)* of bank i
  - $p(\theta_i)$ is the bank's *survival probability*
  - A higher θ_i increases the bank's profit margin $(\theta_i + r - r_i^D) \uparrow$, at the cost of higher default risk $(p(\theta_i) \downarrow)$

Predictions

- **Prediction 1 (The Risk-Taking Channel):** banks with a positive deposit franchise (i.e., $\beta_i^D < 1$) take on less risk following increases in the policy rate,

$$\frac{\partial \theta_i}{\partial r} < 0.$$

Intuition: $r \uparrow \implies$ deposit spread $\uparrow \implies$ profit $\uparrow \implies \downarrow$ risk to preserve the deposit franchise

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- **Prediction 2 (The Role of Deposit Franchise):** banks with lower deposit betas (i.e., less pass-through, stronger franchises) reduce risk more strongly when interest rates increase,

$$\frac{\partial}{\partial(-\beta_i^D)}\left(\frac{\partial \theta_i}{\partial r}\right) < 0.$$

Intuition: $r \uparrow \implies$ deposit spread $\uparrow$ more for low-beta (high-franchise) banks $\implies$ risk $\downarrow$ more

Data

Data

- **Source:** U.S. Federal Reserve Y-14 loan-level regulatory data
  - Covers large bank holding companies (BHCs), 2015–2024
  - Captures over two-thirds of all bank C&I lending
  - Includes detailed information on the individual loans
- **Structure:**
  - Multiple loans per borrower, across banks and time
- **Variables of Interest**
  - *Loan-level:* probability of default (PD), loan size, interest rate, collateral, maturity
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- **Key Feature:** Ex ante loan-level risk-taking measured using internal PDs

Empirics

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- For $h = 0, \ldots 8$, we estimate a series of Jordà local projections from 2015 to 2024:

$$z_{k,i,t+h} = \alpha_i + \delta_b + \sum_{l=0}^{4} \beta_{h,l} \, \text{Shock}_{t-l} + \varepsilon_{k,i,t+h} \tag{1}$$

  - $z_{k,i,t+h}$: ex ante risk (PD) for loan k by bank i
  - Shock_{t-l}: monetary policy shock (Jarociński & Karadi, 2020)
  - α_i : bank fixed effects
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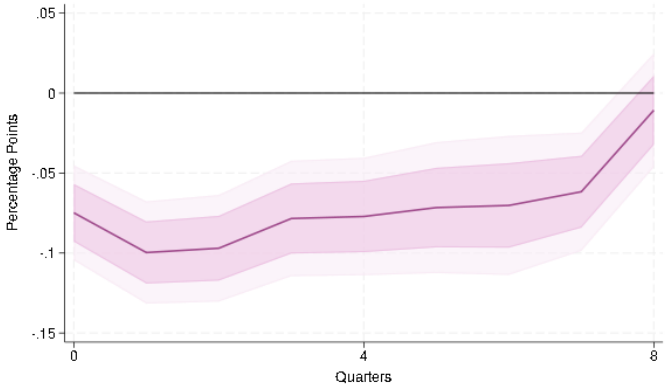
- IRF is the sequence $\{\beta_{h,0}\}_{h=0}^{8}$ which traces the response of z at $t+h$ to a shock at t

Risk-Taking Declines After A Contractionary Monetary Policy Shock



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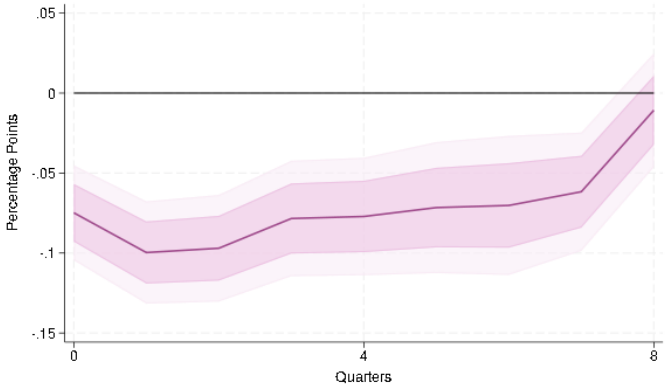

- Confirm model prediction and consistent with findings in the literature
- Innovation relative to empirical literature on the risk-taking channel in the US:

(i) Loan-level PDs (ii) Borrower fixed effects (iii) Dynamic effects

Prediction 2: The Role of the Deposit Franchise

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- **Prediction:** Banks with stronger deposit franchises reduce risk more when rates rise
- **Empirical requirement:** Need a measure of each bank's exposure via deposit franchise
- **Model guidance:** This exposure is captured by the **deposit beta**
- We can compute this!

Computing the Bank-Level Deposit Beta

- We follow the approach in Drechsler et al. (2021) to calculate the deposit beta
- Formally, we estimate the following regression over a pre-period (1984-2014):

$$\Delta \text{DepIntExp}_{it} = \alpha_i + \sum_{\tau=0}^{3} \beta_{i,\tau}^{D} \Delta \text{FedFunds}_{t-\tau} + \varepsilon_{it}$$

  - $\Delta \text{DepIntExp}_{it}$: change in bank i's deposit interest expense rate from t to $t+1$
  - $\Delta \text{FedFunds}_{t}$: change in the Fed funds rate from t to $t+1$
  - α_i : bank fixed effects

- We define the pre-period bank-level deposit beta as the sum of the beta coefficients:

$$\text{DepositBeta}_i = \sum_{\tau=0}^{3} \beta_{i,\tau}^{D}$$

- Pre-period betas important for identification but we also find they predict in-sample betas

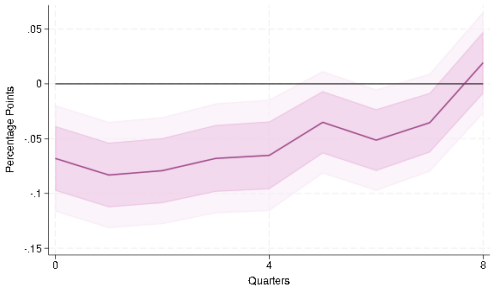
Balance Across High and Low-Deposit Beta Banks

Variable	High beta	Low beta	N (High / Low)	$\lvert\Delta_{IW}\rvert$
Bank-level variables				
Tier 1 capital ratio	0.133	0.130	492 / 492	0.104
Total assets ($M)	566,238	502,107	492 / 492	0.063
Net income/assets	0.006	0.007	492 / 492	0.090
Deposits/assets	0.781	0.805	492 / 492	0.320
Loan-level variables				
Probability of Default	2.41	2.14	2.15M / 2.71M	0.022
Probability of Default ($< 25\%$)	1.38	1.44	2.11M / 2.69M	0.016
Probability of Default ($< 5\%$)	0.80	0.83	1.98M / 2.53M	0.016
Loan Size ($M)	8.84	8.42	2.15M / 2.71M	0.009
Interest rate	4.06	4.15	1.30M / 2.05M	0.021
Collateralized loan	0.73	0.83	2.15M / 2.71M	0.168
Loan maturity ($<$ 20 years)	5.25	5.58	1.84M / 2.35M	0.075

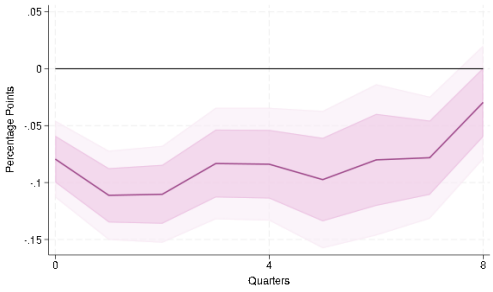
- Imbens-Wooldridge normalised difference $\lvert\Delta_{IW}\rvert < 0.25$ shows sufficient comparability

Comparing High- and Low-Beta Banks Risk-Taking Responses

- We re-estimate (1) for the high- and low-beta banks



Panel A: High Deposit Beta



Panel B: Low Deposit Beta

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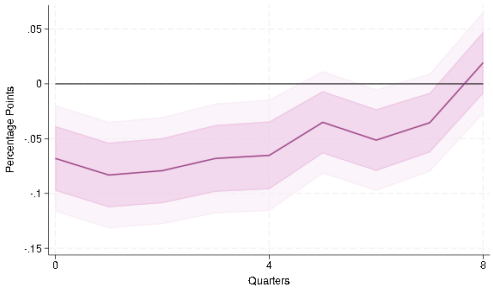

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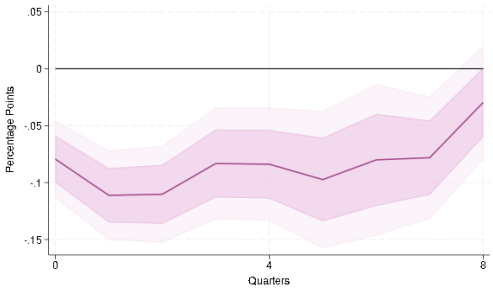

Panel B: Low Deposit Beta

- Consistent with model prediction, strongest de-risking response to rate hikes comes from banks with the most valuable deposit franchises (low betas) in Panel B

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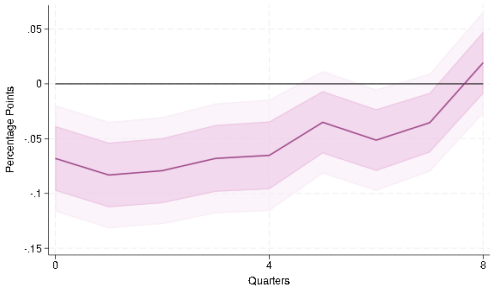

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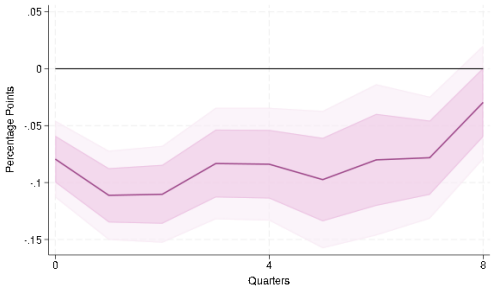

Panel B: Low Deposit Beta

- Consistent with model prediction, strongest de-risking response to rate hikes comes from banks with the most valuable deposit franchises (low betas) in Panel B
- But differences in credit demand across bank groups could confound this comparison

Formally Testing the Role of the Deposit Franchise

- For $h = 0, \ldots 8$, we estimate a series of Jordà local projections from 2015 to 2024:

$$z_{k,i,t+h} = \alpha_i + \delta_{b,t} + \sum_{l=0}^{4} \lambda_{h,l} \cdot (\text{Shock}_{t-l} \times \text{DepositBeta}_i) + \varepsilon_{k,i,t+h} \tag{2}$$

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- Identification:
  - **Shocks**: monetary policy *surprises* purged of information effects
  - **Exposures:** *pre-determined* (1984-2014) variation across banks in deposit beta
  - **Credit demand:** control for *borrower-time fixed effects*

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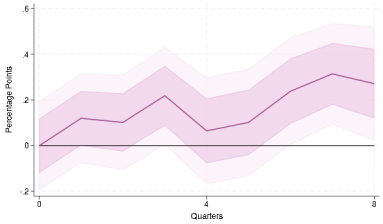
  - **Exposures:** *pre-determined* (1984-2014) variation across banks in deposit beta
  - **Credit demand:** control for *borrower-time fixed effects*

- Prediction: $\lambda_{h,0} > 0$
  - Banks with weaker deposit franchises (higher betas) reduce risk less in response to hikes

Risk-Taking Falls Less for Banks with Higher Deposit Beta

New Loans | PDs



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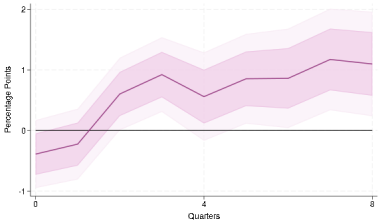
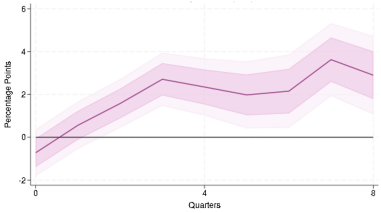


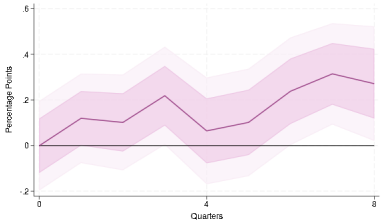
Panel B: PD Trimmed (99%)



Panel C: PD Untrimmed

Risk-Taking Falls Less for Banks with Higher Deposit Beta

New Loans PDs



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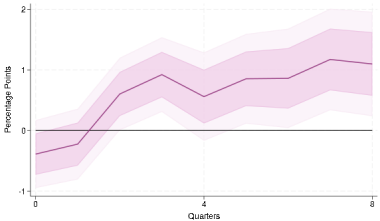

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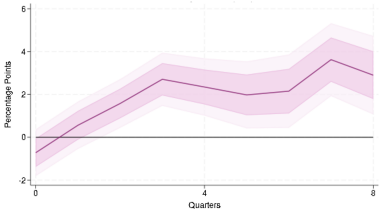
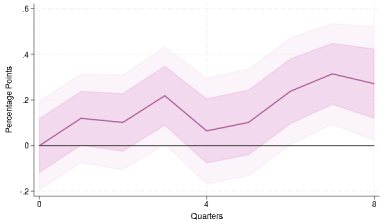


Panel C: PD Untrimmed

- Consistent with model prediction, after a contractionary monetary policy shock, loan default risk declines less at banks with weaker deposit franchises (higher betas)
- Result is robust across trimmed and untrimmed samples and new loans only

Risk-Taking Falls Less for Banks with Higher Deposit Beta

New Loans PDs



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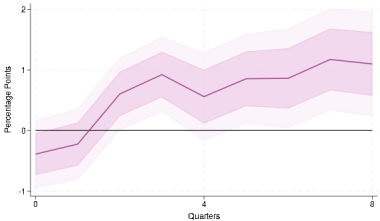

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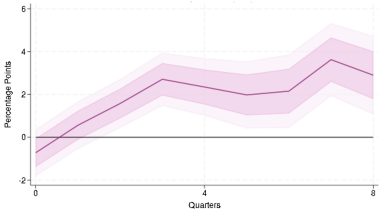
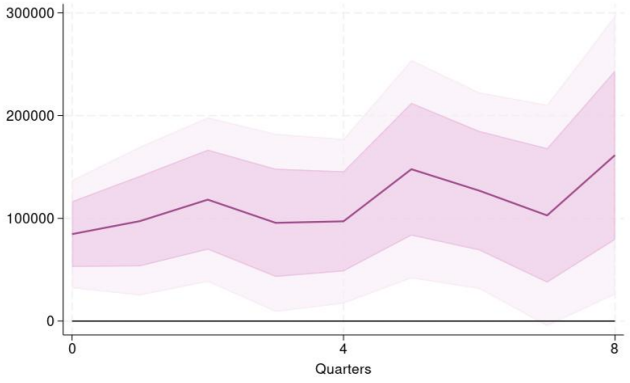


Panel C: PD Untrimmed

- Consistent with model prediction, after a contractionary monetary policy shock, loan default risk declines less at banks with weaker deposit franchises (higher betas)
- Result is robust across trimmed and untrimmed samples and new loans only
- How much can we trust PDs?

Alternative Measure of Risk-Taking: Ex Post Charge-Offs



- Ex post charge-offs worse for high beta banks (similar to ex ante probability of default)
- Consistent with Beyhaghi et al. (JF, Forthcoming) who verify that bank PDs predict interest rates and ex-post loan performance

Deposit Franchise and Deposit Profitability

- Do the pre-period deposit betas actually influence deposit profitability?

$$\text{Deposit RoA} \equiv \frac{\text{Profits from Deposits}}{\text{Assets}} = \frac{rD - r^D D}{A}$$

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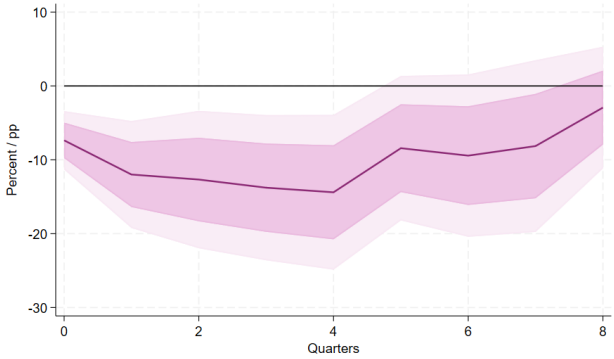

- Banks with weaker deposit franchise (high deposit beta) see worse deposit RoA

Alternative Measure of Deposit Franchise (Deposit-HHI) and Risk-Taking

- Are deposit betas the only way to capture the deposit franchise?

$$z_{k,i,t+h} = \alpha_i + \delta_{b,t} + \sum_{l=0}^{4} \lambda_{h,l} \cdot (\text{Shock}_{t-l} \times \text{HHI}_i) + \varepsilon_{k,i,t+h}$$

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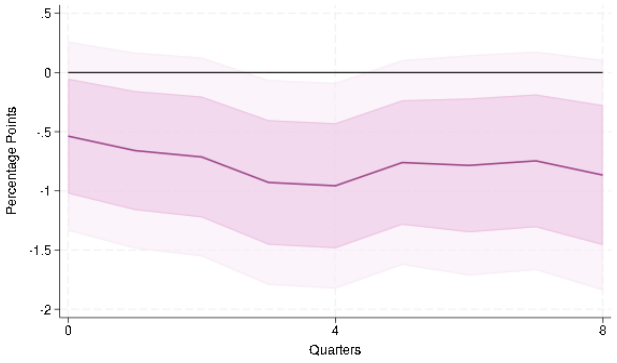


- Banks with stronger deposit franchise (high HHI) reduce risk-taking more

The Role of Bank Capital

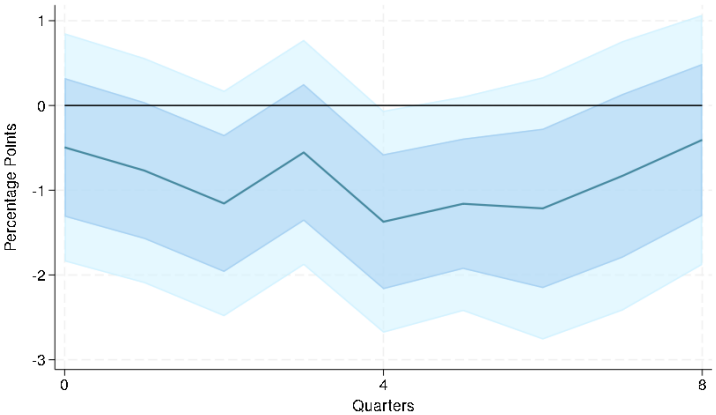
- Many existing mechanisms (e.g., search-for-yield, moral hazard) indicate that a bank's *capital ratio* is a key driver of risk-taking responses in the cross-section (Dell'Ariccia et al., 2017)

- Local projection specification as before:

$$z_{k,i,t+h} = \alpha_i + \delta_{b,t} + \sum_{l=0}^{4} \gamma_{h,l} \cdot (\text{Shock}_{t-l} \times \text{CapitalRatio}_{i,t-l-1}) + \varepsilon_{k,i,t+h}$$

- Prediction: $\gamma_h < 0$
  - Less capitalized banks face stronger incentives to reach for yield and restore profitability

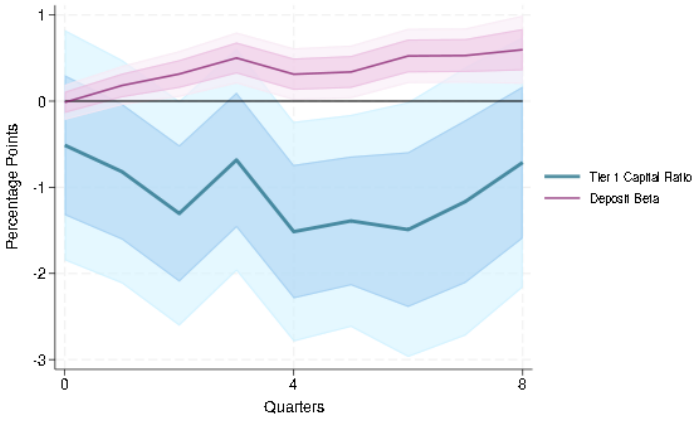
Bank Capital and Risk-Taking



- Consistent with Dell'Ariccia et al. (JF, 2017), after a rate hike, banks with higher capital ratios reduce loan risk more

Deposit Franchise and Bank Capital Mechanisms Co-Exist

$$z_{k,i,t+h} = \alpha_i + \delta_{b,t} + \sum_{l=0}^{4} \lambda_{h,l} \cdot (\text{Shock}_{t-l} \times \text{DepositBeta}_i) + \sum_{l=0}^{4} \gamma_{h,l} \cdot (\text{Shock}_{t-l} \times \text{CapitalRatio}_{i,t-l-1}) + \varepsilon_{k,i,t+h}$$



Portfolio-level Risk Adjustments

- Do banks adjust their overall balance sheet composition in response to monetary policy?

$$\text{Risky Asset Share} \equiv \frac{\text{Assets Assigned 1250\% Risk Weight}}{\text{Assets}}$$

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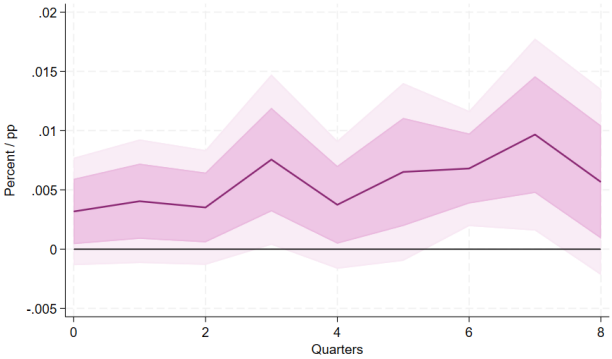

- Banks with weaker deposit franchise increase their holdings of the riskiest assets more

Conclusion and Future Work

Conclusion and Future Work

- **We study how deposit franchise shapes the risk-taking channel of monetary policy**
  - Banks with stronger deposit franchises respond to rate hikes by reducing risk more
  - This is due to an increase in deposit profitability, which raises the cost of taking risk
- **Empirical analysis with loan-level Y-14 data and internal PDs**
  - Robust heterogeneity in risk response across banks with different deposit betas
  - This mechanism co-exists with the capital mechanism highlighted in the existing literature
- **Implication:**
  - How monetary policy transmits to financial stability depends on banks' deposit franchise

Conclusion and Future Work

- **We study how deposit franchise shapes the risk-taking channel of monetary policy**
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- **Implication:**
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- **Future Work:**
  1. *Decomposing the risk adjustment:* closing riskier loans, changing existing loans, or new loans?
  2. *Borrower response (real effects):* how do borrowers react (e.g., less risky investments?)
  3. *Robustness checks:* many to do!

Thank you!

The Risk-Adjusted Present Value of Deposit Franchise

Back

- We can decompose a bank's profits into

$$p(\theta_i)\left[\theta_i + r - r_i^D\right] = \underbrace{p(\theta_i)\theta_i}_{\text{loan profits}} + \underbrace{p(\theta_i)(r - r_i^D)}_{\text{deposit profits}}$$

- Suppose that the bank's problem is repeated for an infinite number of periods. If the bank is risk-neutral and discounts profits at the risk-free rate r

$$\text{(Deposit Franchise Value)}_i = \frac{p(\theta_i)(r - r_i^D)}{r} = p(\theta_i)(1 - \beta_i^D)$$

- Low-beta banks have larger deposit franchise values

$$\frac{\partial \text{(Deposit Franchise Value)}_i}{\partial(-\beta_i^D)} = \underbrace{-p'(\theta_i)}_{>0}\underbrace{\frac{\partial \theta_i}{\partial \beta_i^D}}_{>0}(1 - \beta_i^D) + p(\theta_i) > 0$$

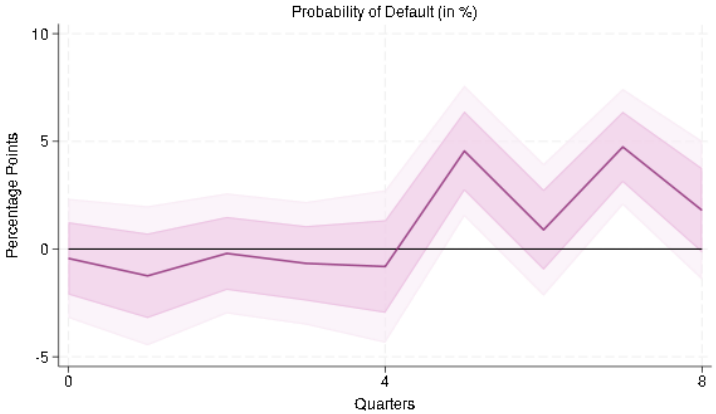
Summary Statistics

Back

	N	Mean	25th	75th	Std. Dev.
Loan-level variables					
Probability of Default	4.9M	2.26	0.17	1.38	8.83
Probability of Default ($< 25\%$)	4.8M	1.42	0.17	1.28	2.83
Probability of Default ($< 5\%$)	4.5M	0.82	0.15	1.07	0.94
Loan size ($M)	4.9M	8.60	0	5.52	30.64
Interest rate	3.4M	4.11	2.63	5.20	2.88
Collateralized loan	4.9M	0.78	1	1	0.41
Loan maturity (< 20 years)	4.2M	5.43	3.35	6.99	3.18
Bank-level variables					
Tier 1 capital ratio	984	0.13	0.11	0.14	0.03
Equity/assets	984	0.11	0.09	0.12	0.02
Total assets ($M)	984	534,173	151,148	466,138	714,751

Risk-Taking Response for New Loans

Back



- Results are qualitatively similar to using all loans but noisier due to reduced sample size

Determinants of Probability of Default

Back

Independent Variable: Probability of Default

	(1)	(2)	(3)	(4)
Interest Rate	0.066***	0.066***	0.109***	0.108***
	(0.010)	(0.011)	(0.015)	(0.016)
Loan Size ($M)	-0.002***	-0.002***	-0.002***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)
Collateralized Loan	0.354***	0.368***	0.362***	0.377***
	(0.062)	(0.059)	(0.057)	(0.049)
Loan Maturity (< 20 years)	-0.010*	-0.007	-0.004	-0.001
	(0.005)	(0.005)	(0.005)	(0.005)
Constant	0.437***	0.415***	0.220***	0.197***
	(0.071)	(0.066)	(0.072)	(0.064)
Bank FE	No	Yes	No	Yes
Time FE	No	No	Yes	Yes
Observations	2,563,231	2,563,231	2,563,231	2,563,231
R-squared	0.053	0.089	0.078	0.116