

Deposit Funding Shocks and Credit Supply: Bank-Level IV Estimates and Heterogeneous Responses

Chenning Xu

1) Motivation

Since the March 2022 liftoff, U.S. banks have faced higher funding costs as depositors shifted into higher-yield accounts and many institutions turned to more expensive borrowings, developments that pressured net interest margins (FDIC, 2024). A rapidly growing literature explains **cross-sectional variation in deposit rate pass-through** and outflows (e.g., bank size, depositor sophistication, digital intensity, AOCI/HTM mix). Far fewer studies follow the shock through the **deposit channel to credit supply** and its **cross-sectional heterogeneity**.

Classic branch-level designs (policy shocks \times county HHI in Drechsler, Savov, & Schnabl, 2017) have been questioned. **Begenau and Stafford (2023)** document **uniform deposit pricing** at large banks, weakening county-level price dispersion and raising **aggregability** concerns. A recent **sophistication-index** paper shows depositor composition strongly predicts pass-through and outflows, shifting attention from local market structure (HHI) to **who the depositors are** (Narayanan & Ratnadiwakara, 2024).

Central question: Does a policy-driven rise in effective deposit funding costs reduce lending for banks whose costs are shifted by our exposure \times policy instrument (bank-level LATE)? Having established that complier-average effect, I will *optionally* assess **size heterogeneity** to test whether small or community banks contract lending more for the same shock.

2) Research Questions

RQ1 (First-stage exposure validity and scope).

To what extent do pre-2021 bank exposures that are plausibly predetermined with respect to the 2022–2024 cycle—specifically, **depositor sophistication** and **relationship intensity** (with **footprint HHI** for robustness)—predict the **policy-induced** change in a bank’s **effective deposit rate** when interacted with high-frequency monetary policy variation ΔFFR_t ? This is a relevance question for the instrument set $Z_{it} = \text{Exposure}_i \times \Delta \text{FFR}_t$, estimated with bank fixed effects and **deposit-weighted region** \times **quarter** fixed effects that purge common and local demand shocks (Begenau & Stafford, 2023).

RQ2 (Average lending response to a funding-cost shock).

What is the **local average treatment effect (LATE)** of a 100 bp **instrumented** increase in the **effective deposit rate** on bank-level lending growth $\Delta \ln L_{i,t+h}^k$ over horizons $h \in \{0, 1, 2\}$ for major portfolios (Total, C&I, CRE, 1–4 family)? The identifying variation is **policy-driven funding-cost movement** among **complier banks** whose deposit rates load on the instrument; deposit-weighted region \times quarter fixed effects absorb regional demand. A negative coefficient on the instrumented funding-cost change is evidence that the **deposit channel reduces lending** on average.

RQ3 (Extension: size-heterogeneous lending response).

Conditional on RQ2, does the LATE differ by bank size? Test whether the elasticity varies across pre-set size bins ($<\$10\text{B}$, $\$10\text{--}50\text{B}$, $>\$50\text{B}$) or via an interaction between the instrumented funding-cost change and a small-bank indicator. This answers whether the **same funding-cost shock** produces a **disproportionate lending contraction** among small/community banks, without changing the interpretation of RQ2.

Notes: RQ1 is an instrument-relevance problem; RQ2 identifies a bank-level **credit-supply** effect under a standard exclusion restriction; RQ3 is heterogeneity conditional on RQ2.

3) Positioning

Many recent papers explain **who** has higher deposit betas; **few** establish the **second stage**: whether a **funding-cost shock** reduces **lending** and how that effect **varies across banks**. The design here is **bank-level** (not branch-level price dispersion), uses **pre-2021 exposures** \times **policy shocks** to instrument **effective deposit-cost changes**, and includes **deposit-weighted region** \times **quarter fixed effects** to purge local demand—directly responding to the uniform-pricing and aggregability concerns in **Begenau and Stafford (2023)** and incorporating the depositor-mix critique of **Drechsler et al. (2017)** via **Narayanan and Ratnadiwakara (2024)**.

4) Data & Key Variables

- **Call Reports (FFIEC 031/041/051)**, 2019Q1–2024Q4; domestically chartered banks.
- **FDIC Summary of Deposits (SOD)**; snapshot **2021-06-30** to build time-invariant bank footprints and deposit weights by region/county.
- **Optional exposures**: county ACS/HMDA features (income, %BA+, age 65+, refi intensity) aggregated to bank footprints using SOD-2021 deposit weights.

Constructs

- **Effective deposit rate**:

$$r_{it}^d = \frac{\text{Deposit interest expense}_{it}}{\frac{1}{2}(\text{IB deposits}_{it} + \text{IB deposits}_{i,t-1})}, \quad \Delta r_{it}^d = r_{it}^d - r_{i,t-1}^d.$$

- **Loan growth**: $\Delta \ln L_{i,t+h}^k$ for $k \in \{\text{Total, C&I, CRE, 1-4}\}$ and $h \in \{0, 1, 2\}$. Include **Small-business loans** (RC-C Part II, June-to-June long difference) as a complementary outcome.
- **Pre-hike exposures (fixed at 2021)**: depositor sophistication S_i , relationship intensity R_i , footprint HHI HHI_i (robustness).
- **Policy shocks**: ΔFFR_t baseline; robustness: cumulative FFR or a Post-2022 indicator.

5) Identification & Methodology (Bank-Level 2SLS)

First stage (2022Q1–2023Q4): Bartik-style instruments $Z_{it} = \text{Exposure}_i \times \Delta FFR_t$ isolate the policy-driven component of Δr_{it}^d :

$$\Delta r_{it}^d = \alpha_i + \tau_t + \pi_S(S_i \Delta FFR_t) + \pi_R(R_i \Delta FFR_t) + \pi_H((-HHI_i) \Delta FFR_t) + X'_{i,t-1} \beta + \sum_r \delta_{rt} w_{ir} + \varepsilon_{it}.$$

Expect $\pi_S > 0$ and $\pi_R < 0$. Report Kleibergen–Paap F and partial R^2 overall and by size.

Second stage (credit-supply LATE):

$$\Delta \ln L_{i,t+h}^k = \alpha_i + \tau_{t+h} + \lambda \widehat{\Delta r_{it}^d} + X'_{i,t-1} \gamma + \sum_r \phi_{r,t+h} w_{ir} + u_{i,t+h}.$$

Optionally add a size interaction $\widehat{\Delta r_{it}^d} \times \text{Small}_i$ or re-estimate by size bins ($<\$10B$, $\$10-50B$, $>\$50B$).

6) Validity & Diagnostics (brief)

- **Local demand purge:** deposit-weighted **region** \times **quarter** **fixed effects** in both stages.
- **Placebos:** 2019–2021 pre-period (near-zero shocks).
- **IV strength & over-ID:** KP-F, partial R^2 ; Hansen J when over-identified.
- **Robustness:** deposit-weighted vs unweighted; exclude Top-25/Top-50 banks; winsorize tails and drop merger quarters.

7) Scope, Limits, and Policy Relevance

- **Scope:** Bank-level quantities (with RC-C Part II for small-business loans).
- **Limits:** Instrument relevance may weaken for mega-banks; addressed via size splits. Exclusion rests on exposures affecting lending **only via funding costs** during hikes; supported by fixed effects, placebos, and standard IV diagnostics.
- **Policy:** Identifies bank profiles that **amplify monetary transmission** to SME-relevant credit and clarifies when **liquidity backstops** temper the lending impact of rate hikes.

8) Expected Contribution to the Literature

- **Second-stage causal evidence.** Provides bank-level LATE estimates for the effect of a **policy-induced funding-cost shock** on lending, moving beyond pass-through/outflow determinants to the **credit-supply consequence** (cf. Drechsler et al., 2017; Narayanan & Ratnadiwakara, 2024; Reghezza et al., 2024).
- **Design aligned with critiques.** Offers an identification strategy that is robust to **uniform pricing** and **aggregability** critiques (Begenau & Stafford, 2023) by (i) working at the **bank level**, (ii) using **exposure** \times **policy** instruments, and (iii) employing **footprint-weighted region** \times **time** controls.
- **Heterogeneity as an extension.** Documents whether **small/community banks** exhibit **larger** lending elasticities to the same shock, informing distributional assessments of monetary transmission.
- **Portable template.** The framework generalizes to other funding channels and jurisdictions, complementing bank-firm matched approaches (e.g., Reghezza et al., 2024).

Selected references (core deposit-channel papers)

- Begenau, J., & Stafford, E. (2023). *Uniform pricing of U.S. bank deposits* (Working paper).
- Drechsler, I., Savov, A., & Schnabl, P. (2017). The deposits channel of monetary policy. *Quarterly Journal of Economics*, 132(4), 1819–1876.
- Narayanan, A., & Ratnadiwakara, D. (2024). *Depositor sophistication and bank funding in the 2022–23 hiking cycle* (Working paper).
- d’Avernas, A., Eisfeldt, A. L., & Weill, P.-O. (2025). *Large vs. small banks: Deposit rate elasticities, uniform pricing, and location* (Working paper).

- Egan, M., Hortaçsu, A., & Matvos, G. (2017). Deposit competition and financial fragility: Evidence from the U.S. banking sector. *Journal of Finance*, 72(6), 2511–2567.
- Egan, M., Lewellen, S., & Sunderam, A. (2021). The deposit franchise of banks. *Quarterly Journal of Economics*, 136(1), 1–46.
- Reghezza, C., et al. (2024). *As interest rates surge: Flighty deposits and lending* (ECB Working Paper No. 2923).