Dynamic Deposits:
The Role of Inflows on Future Outflows

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An Example from the 2023 Fragility in the U.S. Banking System

Deposits, change from a quarter earlier

-20% -15 -10 -5 0 5 10 15 20

Bank of America
BNY Mellon
Capital One
Charles Schwab
Citigroup
Citizens Financial
Comerica
Cullen/Frost
Fifth Third
First Horizon
First Republic
Goldman Sachs
Huntington
JPMorgan Chase
KeyCorp
M&T Bank
MCB
Morgan Stanley
Northern Trust
PNC
PacWest
Popular
Regions Financial
State Street
Synovus
Truist
U.S. Bancorp
Wells Fargo
Western Alliance
Zions

1Q 2023
Motivation

- Deposits are an important source of capital in the economy and the main form of bank financing.

- Depositors can choose the timing and the amount of money they deposit in the bank.

- Banks’ funding structure is affected by deposit inflows stemming from depositor decisions that are unrelated to the bank, rather than banks actively seeking them.
  - Bolton et al. (2023); Drechsler et al. (2021); Jermann and Xiang (2023).

- We term these deposits **supply-driven** – account for 43% of all deposit flows.
This Paper

▶ How does marginal supply-driven deposit inflow affect banks?

▶ Analyzing the U.S. banking system from 2001-2022, we find that banks that experience supply-driven deposit inflows:
  ▶ Reach for yield & increase risk.
  ▶ When the fed funds rate rises, they face higher losses and deposit outflows.

▶ Mechanism:
  ▶ Supply-driven deposit inflows lead banks to compensate shareholders for more frequent costly equity issuance concerns.
    ▶ Equity issuance is accompanied by adverse selection costs, negatively affecting the value of the firm (Myers and Majluf, 1984).
    ▶ An ingredient in banking models (Bolton et al., 2023; Brunnermeier and Sannikov, 2014; Hugonnier and Morellec, 2017).

▶ We find a stronger effect for:
  ▶ Less-capitalized banks – close to the regulatory capital requirement.
  ▶ Uninsured deposit inflows – represent the major source of deposit volatility.
This mechanism also plays a key role in understanding the 2022-2023 U.S. bank fragility episode:

- Risk exposures of banks were amplified following deposit inflows in 2020-2021 ⇒ Larger losses and deposit outflows following the rise in the fed funds rate in 2022-2023.
- This underlying mechanism helps explain the observed results documented in recent papers, and the media coverage of the current fragility episode.

- Equity issuance concerns lead banks to increase risk despite the monitoring conducted by uninsured depositors.

- High supply-driven deposit inflows can serve as an early indicator for understanding changes in bank risk, its deposit franchise and future deposit outflows.
  - Could become a component of bank stress tests.
The main challenge studying the effect of deposit inflows on bank risk:
Disentangling the effect of deposit inflows from the ex-ante decision of the
bank to increase risk and collect deposits to achieve this goal.

Main measure: Supply-driven deposits.

- Follow identification strategy used by Cohen et al. (2007).
- The idea: For deposits to increase without a concurrent rise in the interest
  rate paid on the deposits, an outward shift in the supply of capital from
  depositors must have occurred.
- Estimation:
  - Exclude deposit inflows when bank increases deposit rates in quarter \( t \) or \( t - 1 \).
  - Supply-driven deposits inflows measure: Quarterly growth rate of non-excluded
    bank-quarter deposits.
Reaching for Yield

### Table

<table>
<thead>
<tr>
<th></th>
<th>Reaching for Yield</th>
<th>Interest Rate Risk</th>
<th>Credit Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Δ Gross Income</td>
<td>Δ ROA</td>
<td>Δ Maturity Gap</td>
</tr>
<tr>
<td>to Assets (1)</td>
<td></td>
<td></td>
<td>(3)</td>
</tr>
<tr>
<td>Supply-Driven Deposit Flow</td>
<td>0.0123*** (0.000410)</td>
<td>0.00824*** (0.000412)</td>
<td>0.0513*** (0.00852)</td>
</tr>
<tr>
<td>Controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Bank FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year-Quarter FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>431,657</td>
<td>431,657</td>
<td>431,657</td>
</tr>
<tr>
<td>R^2</td>
<td>0.120</td>
<td>0.351</td>
<td>0.069</td>
</tr>
</tbody>
</table>

- Although the marginal supply-driven deposit inflow does not necessarily lead banks to take more risk, we show:
  - **Higher supply-driven deposit inflows ⇒ Larger increase in reaching for yield & bank risk.**

- A one standard deviation higher supply-driven deposit inflow leads to:
  - Gross income and ROA ↑ comparable to their sample means.
  - Maturity gap ↑ 15% of its sample mean.
  - Risk-weighted assets/total assets ↑ 2x its sample mean.
Alternative Explanations

- Non-price factors that affect deposit flows (e.g., market power) ⇒ Alternative measure of supply-driven deposits using county-level deposit and rates data.

- Depositors’ choice to increase deposits following changes in bank characteristics ⇒ Conduct nearest-neighbor matching.

- Unused credit line withdrawals or employed loan commitments mechanically increase deposits ⇒ Control for changes in these factors.

- Exclusion of:
  - QE periods ⇒ could affect the rise in bank reserves (Acharya et al., 2023; Acharya and Naqvi, 2012).
  - Low interest periods ⇒ might drive reaching for yield behavior.
  - COVID period with large deposit inflows.
  - Temporary Liquidity Guarantee Program (TLGP) following the global financial crisis.
Equity Issuance Concerns

- **Higher equity issuance concerns** ⇒ **Larger increase in reaching for yield and bank risk.**

  - Less-capitalized banks – closer to the regulatory capital ratio and more likely to issue equity.

<table>
<thead>
<tr>
<th></th>
<th>Low Equity</th>
<th>High Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply-Driven Deposit Flow</td>
<td>0.228***</td>
<td>0.179***</td>
</tr>
<tr>
<td></td>
<td>(0.0150)</td>
<td>(0.0186)</td>
</tr>
<tr>
<td>Controls</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Bank Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year-Quarter Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>143,558</td>
<td>143,447</td>
</tr>
<tr>
<td>(R^2)</td>
<td>0.120</td>
<td>0.085</td>
</tr>
</tbody>
</table>

- **Banks with ex-ante higher share of uninsured deposits** – 3x more volatile than insured deposit flows, exacerbating the concern that the bank will cross the boundary and need to issue equity.

- **Uninsured supply-driven deposit inflows.**
Monetary tightening typically leads to losses on security exposures & more non-performing loans ⇒ Analyze implications of bank’s actions after receiving supply-driven deposit inflows.

<table>
<thead>
<tr>
<th>Supply-Driven Deposit Flow × Δ FF Rate</th>
<th>Full Sample</th>
<th>Low Equity</th>
<th>High Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.0842***</td>
<td>-0.0938***</td>
<td>-0.0766***</td>
</tr>
<tr>
<td>(0.0121)</td>
<td>(0.0175)</td>
<td>(0.0219)</td>
<td></td>
</tr>
</tbody>
</table>

Controls: Yes, Yes, Yes
Bank Fixed Effects: Yes, Yes, Yes
Year-Quarter Fixed Effects: Yes, Yes, Yes
Observations: 467,190, 146,866, 146,771
$R^2$: 0.155, 0.216, 0.189

Higher supply-driven inflows ⇒ Higher outflows during monetary tightening.

Driven by higher risk & negative outcomes when fed fund rates rise.

Larger effect larger for banks with higher equity issuance concerns.
This episode followed significant deposit inflows during the COVID period. Banks exhibited substantial deposit inflows following a rise in risk-aversion of firms and households & government stimulus policies.

Conduct Difference-in-Differences analysis:
- Focus only on supply-driven deposit inflows in 2020Q1-2020Q2.
- Conduct nearest neighbor matching between banks at the end of 2019.
- This allows us to compare two similar banks, but only one of them experiences significant supply-driven deposit inflows in first part of 2020.
- Treated group: Banks that exhibited largest supply-driven inflow growth.
  - Included: Silicon Valley Bank & Signature Bank.
  - Treated banks had higher presence in California and other areas with relatively dominant high-tech industry.
- Control group: Banks with the lowest growth rate.
Parallel trends in supply-driven deposit inflows prior to COVID.

Treated banks:

- Engaged more in reaching for yield behavior, increased their interest rate risk & credit risk in 2020Q3-2021Q4.
- Experienced higher deposit outflows in 2022, especially banks with higher equity issuance concerns.
Banks that experienced supply-driven deposit *inflows* ⇒ Reach for yield and increase bank risk ⇒ When fed funds rate rises, they face higher losses and deposit *outflows*.

Mechanism: Supply-driven deposit inflows lead banks to compensate shareholders for more frequent costly equity issuance concerns.

Our results point to an underlying mechanism that helps explain the observed results documented in recent papers, and the media coverage of the current fragility episode.

High supply-driven deposit inflows can serve as a new early indicator for understanding changes in bank risk, its deposit franchise and future deposit outflows.

Equity issuance concerns lead banks to increase risk despite the monitoring conducted by uninsured depositors.