Bank Market Power and Monetary Policy Transmission

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How does monetary policy affect bank lending?

- **Bank reserve channel**
  - (Bernanke and Blinder 1988; Kashyap and Stein 1995)

- **Bank capital channel**
  - (Van den Heuvel 2002; Bolton and Freixas 2000)

- **Market power channel**
  - deposit market (Drechsler, Savov, and Schnabl 2017)
  - loan market (Scharfstein and Sunderam 2016)
Two questions

- What is the quantitative importance of the market power channel relative to the conventional channels?

- What are the interactions between different transmission channels?
This paper

- Construct a unified framework of banking monetary transmission
  - Imperfect competition
  - Financial frictions
  - Regulatory constraints

- Quantify different transmission channels
  - Estimate the model using bank-level data

- Combine two estimation strategies
  - Structural IO: Demand functions for deposits and loans (BLP)
  - Structural CF: Financial frictions (SMM)
What Do We Find?

- Bank market power plays a quantitatively important role in monetary transmission

- Bank market power channel interacts with bank capital channel, reversing the effect of monetary policy in a low interest environment
  - In a low interest rate environment, a rate cut becomes contractionary for bank lending
Model
Static Model: Frictionless Benchmark

Banks’ objective function

$$\Pi = \max_{\{r^l, r^d\}} r^l B - r^d D - f (B - D)$$  \hspace{1cm} (1)

The optimal lending rates:

$$r^l = f + \left( \frac{-B'}{B} \right)^{-1}$$

The optimal deposit rates:

$$r^d = f - \left( \frac{D'}{D} \right)^{-1}$$

Perfect competition: demand elasticities, \(-\frac{B'}{B}\) and \(\frac{D'}{D}\), become infinite and the markups converge to zero:

$$r^d \to f, \quad r^l \to f$$  \hspace{1cm} (2)
Frictionless Benchmark: Perfect Pass-through
Monetary Policy and Bank Market Power
Monetary Policy and Bank Market Power

\[ r \]

\[ f \]

\[ r^l \]

\[ r^d \]

\[ p^l \]

\[ p^d \]

\[ 0 \]
Monetary Policy and Bank Market Power
Static Model: Imperfect Competition

An increase in the Federal Funds rate increases the opportunity cost of holding cash, which allows banks to charge larger markups on deposits (e.g., Drechsler, Savov, and Schnabl 2017), so:

\[
\frac{\partial \left( \frac{D'}{D} \right)^{-1}}{\partial f} > 0
\]  \( (3) \)

An increase in the Federal Funds rate makes bank loans less attractive to firms relative to the outside option of not borrowing (e.g., Scharfstein and Sunderam 2016)

\[
\frac{\partial \left( -\frac{B'}{B} \right)^{-1}}{\partial f} < 0
\]  \( (4) \)
Deposit Spreads $= \text{FFR} - \text{Deposit Rates}$

kernel = epanechnikov, degree = 0, bandwidth = .66, pwidth = 1
Loan Spreads = Loan Rates - Treasury Bond Yield

kernel = epanechnikov, degree = 0, bandwidth = .61, pwidth = .92
Static Model: Balance Sheet Frictions

External financing friction:

$$\Pi = \max_{\{r^l, r^d\}} r^l B - r^d D - f (B - D) - \Phi(B - D)$$

Reserve requirement:

$$\Pi = \max_{\{r^l, r^d\}} r^l B - r^d D - f (B + R - D)$$

s.t. $R \geq \theta D$

$$r^d = f - \left( \frac{D'}{D} \right)^{-1} - \theta f \quad (5)$$

Capital regulation

$$\Pi = \max_{\{r^l, r^d\}} r^l B - r^d D - f (B - D)$$

s.t. $E_0 + (1 - \tau_c)\Pi \geq \kappa B$
Imperfect competition in the deposit market

- \( \hat{J} \) oligopolistic banks compete in the deposit market
- Depositors: choose cash, bonds, or bank deposit.
- Depositor utility

\[
 u_{i,j} = \alpha^d_i \times r^d_j + q^d_j + \epsilon^d_{i,j}
\]

yield sensitivity \( > 0 \) \rightarrow \text{“quality”} \rightarrow \text{deposit rate} \rightarrow \text{Match specific pref}

- Logit demand

\[
 D_j = W \times \sum_{i=1}^{I} \mu^d_i \frac{\exp (\alpha^d_i r^d_j + q^d_j)}{\sum_{m \in A^d} \exp (\alpha^d_i r^d_m + q^d_m)}
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  \]

  - Yield sensitivity $> 0$
  - "Quality"
  - Deposit rate
  - Match specific pref

- Logit demand:
  \[
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\[
\begin{align*}
\text{yield sensitivity} & > 0 \\
\text{"quality"} & \\
\text{depositor utility} & = \alpha_i^d \times r_j^d + q_j^d + \epsilon_{i,j}^d
\end{align*}
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- Logit demand

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\]

yield sensitivity $> 0$ \hspace{1cm} \text{“quality”} \hspace{1cm} \text{deposit rate} \hspace{1cm} \text{Match specific pref}
The loan market modeled symmetrically

- The same \( \hat{J} \) banks
- Firms can issue corporate bonds, take a bank loan, or not borrow
- Firm profit

\[
\pi_{i,j} = \alpha^l \times r^l_j + q^l_j + \epsilon^l_{i,j}
\]

- Logit demand

\[
B_j = \frac{\exp (\alpha^l r^l_j + q^l_j)}{\sum_{m \in A^l} \exp (\alpha^l r^l_m + q^l_m)} K
\]
**Banks Optimize Subject to Frictions**

- **Banks’ balance sheet**

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans $L + B$</td>
<td>Equity $E$</td>
</tr>
<tr>
<td>Reserves $R$</td>
<td>Deposits $D$</td>
</tr>
<tr>
<td>Government securities $G$</td>
<td>Non-reservable borrowings $N$</td>
</tr>
</tbody>
</table>
Banks Optimize Subject to Frictions

- Banks maximize the present value of dividends

\[
V(f_t, \delta_t, L_t, E_t | \Gamma_t) = \max_{B_t(r^l), D_t(r^d), G_t, N_t, C_t} C_t + \frac{1}{1 + \gamma} \mathbb{E} V(f_{t+1}, \delta_{t+1}, L_{t+1}, E_{t+1} | \Gamma_{t+1})
\]

subject to

- Financial friction: \( \Phi(N_t) = \frac{\phi}{2} N_t^2 / D_t \)

- Reserve requirement: \( R_t \geq \theta \times D_t \)

- Capital regulation: \( E_{t+1} \geq \kappa \times L_{t+1} \)

- \( L \) existing loans, \( B \) new loans, \( G \) securities, \( N \) nonreservable borrowing, \( f \) FFR, \( \delta \) default rate, \( E \) book equity
Estimation


**Estimation**

- Regulatory constraints
  - Parameters calibrated using corresponding regulation

- Demand function estimation
  - Random coefficient logit demand $D(r^d_j | f)$, $B(r^l_j | f)$ estimated by BLP
  - Use panel data on individual bank’s rate and market share
  - Estimate RC logit demand function using cost shifters as IVs

- Financial frictions
  - Simulated method of moment estimation (SMM)
  - Choose parameters that minimize the distance btw model and data
Identification of Demand Parameters

- The demand elasticity is identified off the cross section of banks.
- Avoid endogenous variations in monetary policy.
Identification of Demand Parameters

- The demand elasticity is identified off the cross section of banks
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Results
Model Solution: Bank Rate Passthrough

The pass-throughs of Federal Funds rate to deposit and lending rates are less than one-to-one.
Model Solution: Bank Lending and FFR

- Overall, lending decreases in FFR; contribution of each channel?
- Effect of monetary policy reverses at low FFR region
Result 1: Decomposition of Transmission Channels

- The reserve channel is not quantitatively important
- Capital rqmt amplifies monetary transmission: maturity mismatch
- Deposit market power amplifies monetary transmission
- Loan market power dampens monetary transmission
Deposit Spreads $=$ FFR - Deposit Rates

kernel = epanechnikov, degree = 0, bandwidth = .66, pwidth = 1
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Result 2: The Reversal Rate
Monetary Shocks and Bank Stock Returns: FFR≥2%

▶ In low FFR environment, FFR↑, bank equity value↑
Motivation Model Estimation Results Conclusion Appendix References

Monetary Shocks and Bank Stock Returns: FFR < 2%

Banking industry excess return vs. Policy shock on FOMC days

Wang, Whited, Wu, and Xiao
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## Monetary Shocks and Bank Stock Returns

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▸ Banks with greater deposit market power have more positive returns.
Result 3: Transmission for Small and Large Banks

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<th>Borrowing</th>
<th>Deposit</th>
<th>Loan</th>
<th>Noninterest</th>
<th>Sensitivity</th>
</tr>
</thead>
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<tr>
<td></td>
<td>$\phi^N$</td>
<td>$\phi^d$</td>
<td>$\phi^l$</td>
<td>$\psi$</td>
<td>$\frac{\Delta \ln l}{\Delta f}$</td>
</tr>
<tr>
<td>Large Banks</td>
<td>0.004</td>
<td>0.009</td>
<td>0.005</td>
<td>0.002</td>
<td>-1.360</td>
</tr>
<tr>
<td>Small Banks</td>
<td>0.010</td>
<td>0.008</td>
<td>0.005</td>
<td>0.029</td>
<td>-2.102</td>
</tr>
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▶ Small banks are more sensitive to monetary policy because they face substantially higher financial frictions
Result 4: Transmission for Early and Late Period

- The impact of a 1% Federal Funds rate cut to aggregate bank lending has declined from 2.17% to 1.44% from 1994-2006 to 2006-2017
  - Change in macroeconomic environment (58%)
  - Change in market power (18%)
  - Change in operating and financing cost (24%)
Sluggish Loan Growth Post Crisis
Conclusion

▶ Does bank market power influence the transmission of monetary policy?

▶ YES!

▶ The effect is quantitatively large

▶ Interesting interaction with capital constraint
Appendix
Begenau, Juliane and Erik Stafford. 2018. “Do Banks have an Edge?”.


