Interest Rate Risk and Bank Profitability

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**INTRODUCTION**

What is the effect of interest rate changes on bank profitability?

**Conventional wisdom**: banks benefit from a steep yield curve because they engage in *maturity transformation*.

- But banks may hedge interest rate risk
- Noninterest income/expense may change in response to movements in interest rates

Empirical literature offers mixed evidence regarding the effects of changes in interest rates on profitability of banking institutions.

Our Paper

- Estimate the response of bank stock returns to *interest rate surprises* associated with monetary policy actions:
  - Interest rate surprises are uncorrelated with other economic news
- Examine how the reaction of bank stock returns to interest rate surprises varies with:
  - Degree of maturity mismatch between assets and liabilities
  - Usage of interest rate derivatives
  - Bank size and other characteristics
- Examine the mechanism(s) by looking at accounting measures of profitability and balance sheet dynamics.
Measuring Interest Rate Surprises

- **Sample period:** 84 policy actions between 7/2/97 and 6/28/07.
- Change in the target federal funds rate:

  \[ \Delta ff_t \equiv \Delta ff^e_t + \Delta ff^u_t \]

  expected \hspace{1cm} surprise

  - \( \Delta ff^e_t \) measured using federal funds future quotes
    \[(\text{Kuttner [2001]})\]

- Interest rate surprises:
  - **Level Surprise:** \( \Delta ff^u_t \)
  - **Slope Surprise:** \( (\Delta y^m_t - \Delta ff^u_t) \)
    - \( \Delta y^m_t = \) change in the \( m \)-year Treasury yield
    - \( \Delta = \) change over a 30 minute window
NOTE: Excludes the 9/17/2001 intermeeting policy action.
STOCK RETURNS AND INTEREST RATE SURPRISES

- **Intraday** stock price quotes for 346 BHCs (Obs. = 10,308).
- \( R_{it} \) = (simple) return for bank \( i \) over the 2-hour window bracketing the FOMC announcement on day \( t \).
- Regression specification:

\[
R_{it} = \alpha + \beta_e \Delta f f_t^e + \beta_u \Delta f f_t^u + \beta_s (\Delta y_t^m - \Delta f f_t^u) + \epsilon_{it}
\]

- \( m = 2, 5, 10 \) (years)
- Estimated by OLS
- Driscoll & Kraay [1998] robust standard errors
### Reaction of Bank Stock Returns

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>$m = 2$-year</th>
<th>$m = 5$-year</th>
<th>$m = 10$-year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expected change: $\Delta ff^e$</td>
<td>0.601</td>
<td>0.543</td>
<td>0.508</td>
</tr>
<tr>
<td></td>
<td>(0.422)</td>
<td>(0.417)</td>
<td>(0.422)</td>
</tr>
<tr>
<td>Level surprise: $\Delta ff^u$</td>
<td>-8.053***</td>
<td>-8.520***</td>
<td>-10.07***</td>
</tr>
<tr>
<td></td>
<td>(1.463)</td>
<td>(1.583)</td>
<td>(1.971)</td>
</tr>
<tr>
<td>Slope surprise: $(\Delta y^m - \Delta ff^u)$</td>
<td>-5.017***</td>
<td>-4.914***</td>
<td>-5.862***</td>
</tr>
<tr>
<td></td>
<td>(1.727)</td>
<td>(1.449)</td>
<td>(1.864)</td>
</tr>
<tr>
<td>Adj. $R^2$</td>
<td>0.099</td>
<td>0.098</td>
<td>0.093</td>
</tr>
</tbody>
</table>

**Note:** Robust standard errors in parentheses; *, **, *** denotes statistical significance at the 10-, 5-, and 1-percent level, respectively.
Measuring the Maturity Mismatch

- Call Reports contain information on the repricing time and/or maturity of selected assets and liabilities:

\[ GAP_{it}^{RP} = \left[ \text{average repricing/maturity of assets} \right] - \left[ \text{average repricing/maturity of liabilities} \right] \]

- Based on 26 asset and 11 liability categories

- Large \( GAP^{RP} \) implies greater exposure to changes in the slope of the yield curve.

- \( GAP^{RP} \) is not a measure of duration.
NOTE: All percentiles are weighted by interest-earning assets.
Stock Returns and Interest Rate Surprises

By Bank Characteristics

Regression specification:

\[ R_{it} = \alpha_i + \beta_u \Delta ff_t^u + \beta_s (\Delta y_t^m - \Delta ff_t^u) \\
+ \gamma_u [GAP_{it}^{RP} \times \Delta ff_t^u] + \gamma_s [GAP_{it}^{RP} \times (\Delta y_t^m - \Delta ff_t^u)] \\
+ \theta'_u [X_{it} \times \Delta ff_t^u] + \theta'_s [X_{it} \times (\Delta y_t^m - \Delta ff_t^u)] + \epsilon_{it} \]

\( X_{it} = \) vector of bank-specific characteristics

- \( A_{it}^{OTH} = \) other assets (as a share of interest-earning assets)
- \( L_{it}^{OTH} = \) other liabilities (as a share of liabilities)
- \( SD_{it} = \) saving deposits (as a share of liabilities)
- \( DD_{it} = \) demand + transaction deposits (as a share of liabilities)
- \( \log A_{it} = \) log of (real) total assets
# Reaction of Bank Stock Returns

By Repricing/Maturity Gap

<table>
<thead>
<tr>
<th>Variable × Interest Rate Surprise</th>
<th>$m = 2$-year</th>
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<th>$m = 10$-year</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{GAP}^{RP} \times \Delta ff^u$</td>
<td>0.558**</td>
<td>0.489*</td>
<td>0.643**</td>
</tr>
<tr>
<td></td>
<td>(0.275)</td>
<td>(0.280)</td>
<td>(0.320)</td>
</tr>
<tr>
<td>$\text{GAP}^{RP} \times (\Delta y^m - \Delta ff^u)$</td>
<td>0.711**</td>
<td>0.537**</td>
<td>0.628**</td>
</tr>
<tr>
<td></td>
<td>(0.277)</td>
<td>(0.251)</td>
<td>(0.293)</td>
</tr>
</tbody>
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Reaction of Bank Stock Returns

By Repricing/Maturity Gap

Level Surprise

Slope Surprise

Note: Slope surprise is measured using a 2-year Treasury yield.
**REACTION OF BANK STOCK RETURNS**

*By Reliance on Demand/Transaction Deposits*

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<th>( m = 2\text{-year} )</th>
<th>( m = 5\text{-year} )</th>
<th>( m = 10\text{-year} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( DD \times \Delta ff^u )</td>
<td>-14.17***</td>
<td>-17.68***</td>
<td>-18.48**</td>
</tr>
<tr>
<td></td>
<td>(5.884)</td>
<td>(5.790)</td>
<td>(7.529)</td>
</tr>
<tr>
<td>( DD \times (\Delta y^m - \Delta ff^u) )</td>
<td>-4.235</td>
<td>-7.732</td>
<td>-7.897</td>
</tr>
<tr>
<td></td>
<td>(6.892)</td>
<td>(6.301)</td>
<td>(7.489)</td>
</tr>
</tbody>
</table>

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REACTION OF BANK STOCK RETURNS
By Reliance on Demand/Transaction Deposits

Level Surprise

Slope Surprise

NOTE: Slope surprise is measured using a 2-year Treasury yield.
### Reaction of Bank Stock Returns

By Bank Size

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</tr>
</thead>
<tbody>
<tr>
<td>$\log A \times \Delta ff^u$</td>
<td>-1.531***</td>
<td>-1.585***</td>
<td>-1.806***</td>
</tr>
<tr>
<td></td>
<td>(0.327)</td>
<td>(0.328)</td>
<td>(0.437)</td>
</tr>
<tr>
<td>$\log A \times (\Delta y^m - \Delta ff^u)$</td>
<td>0.036</td>
<td>0.004</td>
<td>-0.229</td>
</tr>
<tr>
<td></td>
<td>(0.431)</td>
<td>(0.387)</td>
<td>(0.438)</td>
</tr>
</tbody>
</table>

**Note:** Robust standard errors in parentheses; *, **, *** denotes statistical significance at the 10-, 5-, and 1-percent level, respectively.
REACTION OF BANK STOCK RETURNS

By Bank Size

Level Surprise

Slope Surprise

NOTE: Slope surprise is measured using a 2-year Treasury yield.
CONCLUSION

- Bank stock returns react **negatively** to
  - Unexpected increase in the **level** of interest rates
  - Unexpected steepening of the **slope** of the yield curve

- A large maturity mismatch between assets and liabilities mitigates the negative reaction of stock returns to slope surprises.

- Findings are completely robust to controlling for the usage of interest rate derivatives.

- The reaction of stock returns appears consistent with the adjustment of bank balance sheets and net interest margins in response to interest rate changes.