

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.

(Flannery [1981,1983]; Flannery & James [1984]; Akella & Greenbaum [1992]; English [2002]; Schuermann & Stiroh [2006]; Den Haan, Sumner & Yamashiro [2007])

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:

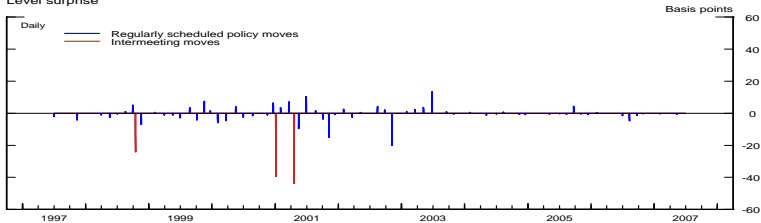
$$\Delta ff_t \equiv \underbrace{\Delta ff_t^e}_{\text{expected}} + \underbrace{\Delta ff_t^u}_{\text{surprise}}$$

- ▶ Δff_t^e measured using federal funds future quotes (Kuttner [2001])
- Interest rate surprises:
 - ▶ **Level Surprise:** Δff_t^u
 - ▶ **Slope Surprise:** $(\Delta y_t^m - \Delta ff_t^u)$
 - Δy_t^m = change in the m -year Treasury yield
 - Δ = change over a 30 minute window

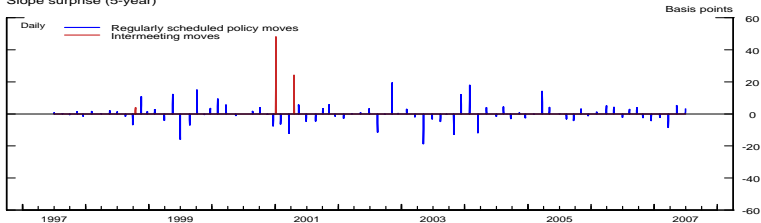
INTEREST RATE SURPRISES

(July 2, 1997 to June 28, 2007)

Level surprise



Slope surprise (5-year)



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:

$$R_{it} = \alpha + \beta_e \Delta ff_t^e + \beta_u \Delta ff_t^u + \beta_s (\Delta y_t^m - \Delta ff_t^u) + \epsilon_{it}$$

- ▶ $m = 2, 5, 10$ (years)
- ▶ Estimated by OLS
- ▶ Driscoll & Kraay [1998] robust standard errors

REACTION OF BANK STOCK RETURNS

Explanatory Variables	$m = 2\text{-year}$	$m = 5\text{-year}$	$m = 10\text{-year}$
Expected change: Δff^e	0.601 (0.422)	0.543 (0.417)	0.508 (0.422)
Level surprise: Δff^u	-8.053*** (1.463)	-8.520*** (1.583)	-10.07*** (1.971)
Slope surprise: $(\Delta y^m - \Delta ff^u)$	-5.017*** (1.727)	-4.914*** (1.449)	-5.862*** (1.864)
Adj. R^2	0.099	0.098	0.093

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

MEASURING THE MATURITY MISMATCH

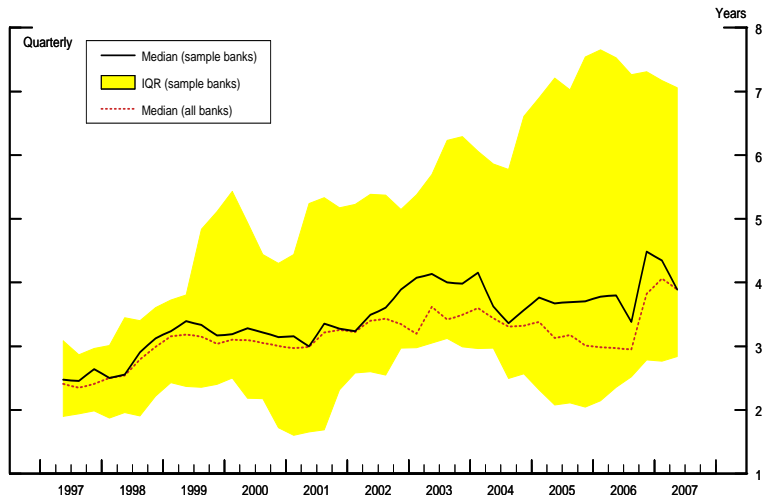
- Call Reports contain information on the repricing time and/or maturity of selected assets and liabilities:

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

- ▶ 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.

REPRICING/MATURITY GAP

(1997:Q2–2007:Q2)



NOTE: All percentiles are weighted by interest-earning assets.

STOCK RETURNS AND INTEREST RATE SURPRISES

By Bank Characteristics

- Regression specification:

$$\begin{aligned}
 R_{it} = & \alpha_i + \beta_u \Delta ff_t^u + \beta_s (\Delta y_t^m - \Delta ff_t^u) \\
 & + \gamma_u [GAP_{it}^{RP} \times \Delta ff_t^u] + \gamma_s [GAP_{it}^{RP} \times (\Delta y_t^m - \Delta ff_t^u)] \\
 & + \theta'_u [\mathbf{X}_{it} \times \Delta ff_t^u] + \theta'_s [\mathbf{X}_{it} \times (\Delta y_t^m - \Delta ff_t^u)] + \epsilon_{it}
 \end{aligned}$$

- \mathbf{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

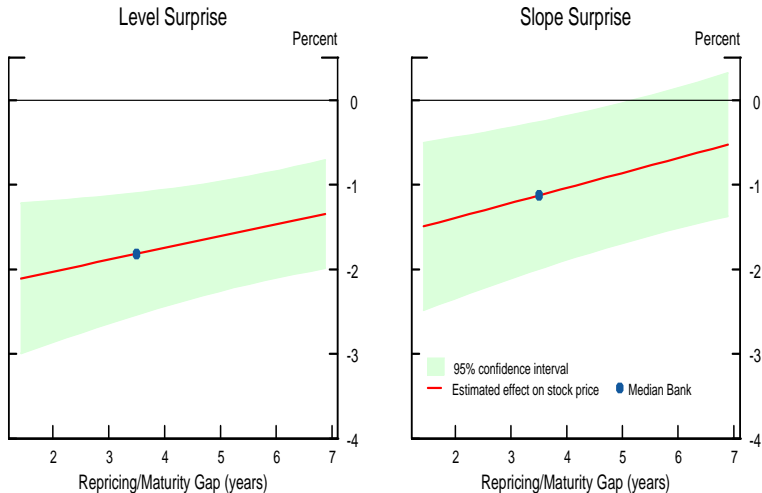
By Repricing/Maturity Gap

Variable × Interest Rate Surprise	$m = 2\text{-year}$	$m = 5\text{-year}$	$m = 10\text{-year}$
$GAP^{RP} \times \Delta ff^u$	0.558** (0.275)	0.489* (0.280)	0.643** (0.320)
$GAP^{RP} \times (\Delta y^m - \Delta ff^u)$	0.711** (0.277)	0.537** (0.251)	0.628** (0.293)

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

REACTION OF BANK STOCK RETURNS

By Repricing/Maturity Gap



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

REACTION OF BANK STOCK RETURNS

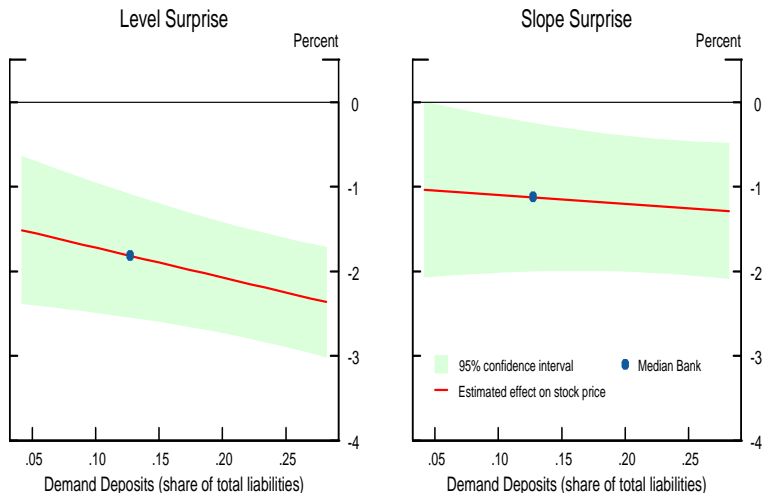
By Reliance on Demand/Transaction Deposits

Variable × Interest Rate Surprise	$m = 2\text{-year}$	$m = 5\text{-year}$	$m = 10\text{-year}$
$DD \times \Delta ff^u$	-14.17** (5.884)	-17.68*** (5.790)	-18.48** (7.529)
$DD \times (\Delta y^m - \Delta ff^u)$	-4.235 (6.892)	-7.732 (6.301)	-7.897 (7.489)

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

REACTION OF BANK STOCK RETURNS

By Reliance on Demand/Transaction Deposits



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

REACTION OF BANK STOCK RETURNS

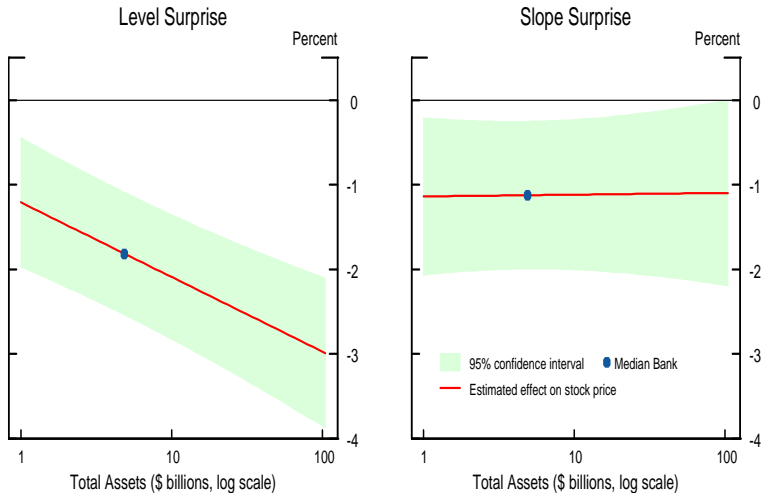
By Bank Size

Variable \times Interest Rate Surprise	$m = 2\text{-year}$	$m = 5\text{-year}$	$m = 10\text{-year}$
$\log A \times \Delta ff^u$	-1.531*** (0.327)	-1.585*** (0.328)	-1.806*** (0.437)
$\log A \times (\Delta y^m - \Delta ff^u)$	0.036 (0.431)	0.004 (0.387)	-0.229 (0.438)

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



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.