Interest Rate Risk and Bank Equity Valuations

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Extra Slides

DISCLAIMER

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INTRODUCTION

- What are the effects of changes in interest rates on bank profitability?
- **Conventional Wisdom**: Banks benefit from a steep yield curve because they engage in maturity transformation.
- However ...
  - Rising longer-term interest rates can cause immediate capital losses on longer-term assets.
  - Banks may hedge interest rate risk.
  - Noninterest income or expense may change in response to changes in interest rates.
- Evidence regarding the effects of interest rate changes on bank profitability is decidedly mixed.

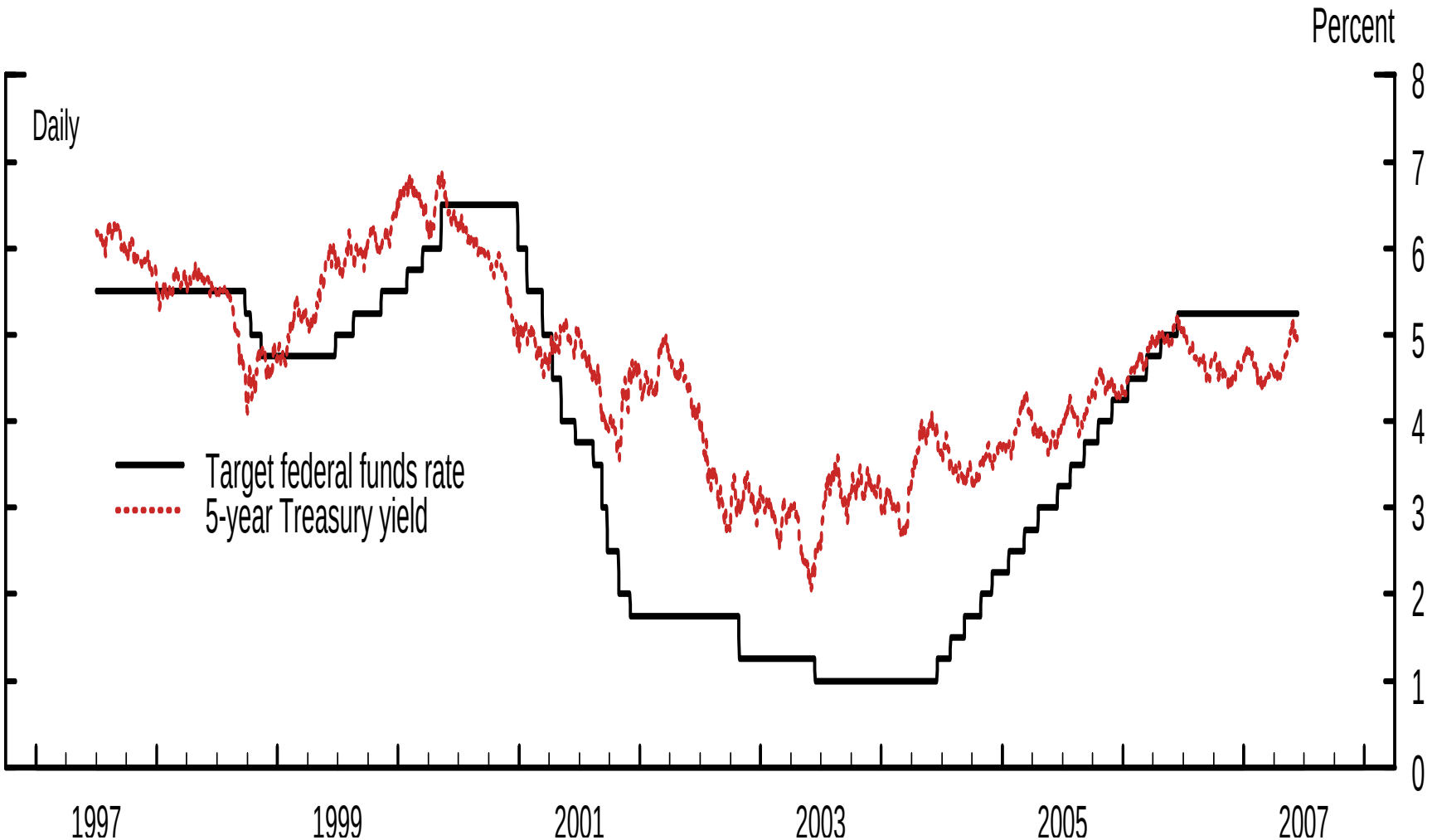
Existing Evidence

- Analysis based on equity valuations:
  - Generally finds that bank stock returns—controlling for the market return—react negatively to increases in interest rates. (Flannery & James [1984]; Aharony et al. [1986]; Saunders & Yourougou [1990]; Yourougou [1990]; Kwan [1991]; Akella & Greenbaum [1992]; Lumpkin & O'Brien [1997]; Choi & Elyasiani [1997]; Schuermann & Stiroh [2006])
  - A greater asset-liability mismatch tends to be associated with a greater sensitivity of stock returns to interest rate changes.
- Analysis based on accounting measures of profitability:
  - Mixed evidence that bank net interest margins respond to changes in short-term rates or in the slope of the yield curve. (Flannery [1981,1983]; Hancock [1985]; English [2002]; Hanweck & Ryu [2005]; Den Haan et al. [2007]; Memmel [2011])

KEY RESULTS

- Bank equity values decline in response to unanticipated increases in the level of interest rates:
  - Greater reliance on core deposits $\Rightarrow$ greater decline.
  - Larger the bank $\Rightarrow$ greater decline.
- Bank equity values decline in response to an unanticipated steepening of the yield curve.
  - Larger repricing/maturity gap $\Rightarrow$ smaller decline.
  - Greater usage of interest rate derivatives $\Rightarrow$ smaller decline.
- Adjustments in quantities and interest margins are important for understanding the reaction of bank equity values to interest rate changes.

Sample Period



- 84 FOMC announcements between 7/2/97 and 6/28/07:
  - Four intermeeting moves (10/15/98, 1/3/01, 4/18/01, 9/17/01).

TARGET SURPRISE

- For each FOMC announcement, decompose the change in the target federal funds rate:

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

  - Δff_t^e measured using federal funds futures quotes over the 30-minute window around the FOMC announcement (Kuttner [2001])
  - **Target Surprise**: $\Delta ff_t^u = \Delta ff_t - \Delta ff_t^e$
    - Unexpected change in the federal funds target rate associated with a specific FOMC announcement.

TARGET SURPRISE (CONT.)

- Fed funds future contracts have a payout based on the average effective federal funds rate prevailing over the month specified in the contract.

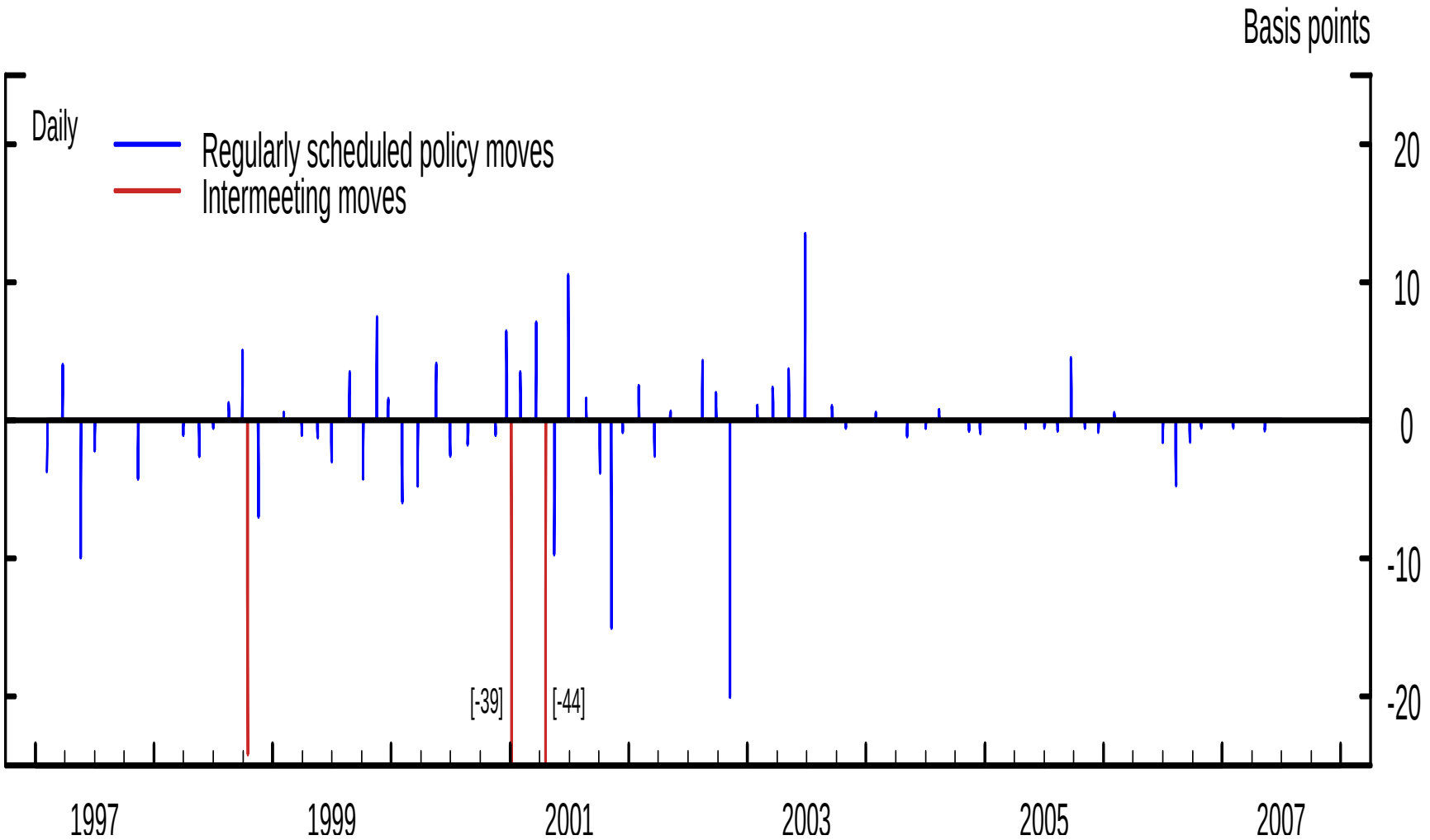
$$ff_{\tau-00:10:00} = \frac{d}{D} r_0 + \frac{D-d}{D} E_{\tau-00:10:00}[r_1] + \delta_{\tau-00:10:00}$$

  - $ff_{\tau-00:10:00}$ = fed funds future rate 10 minutes before time τ (*hh:mm:ss*) of the FOMC announcement on day d
  - r_0 = fed funds rate that has prevailed up to day d of month D
  - r_1 = fed funds rate that is expected to prevail over the reminder of month D
  - $\delta_{\tau-00:10:00}$ = risk premium

- Assuming a constant risk premium:

$$\Delta ff_t^u \equiv r_1 - E_{\tau-00:10:00}[r_1] = \frac{D}{D-d}[ff_{\tau+00:20:00} - ff_{\tau-00:10:00}]$$

TARGET SURPRISES

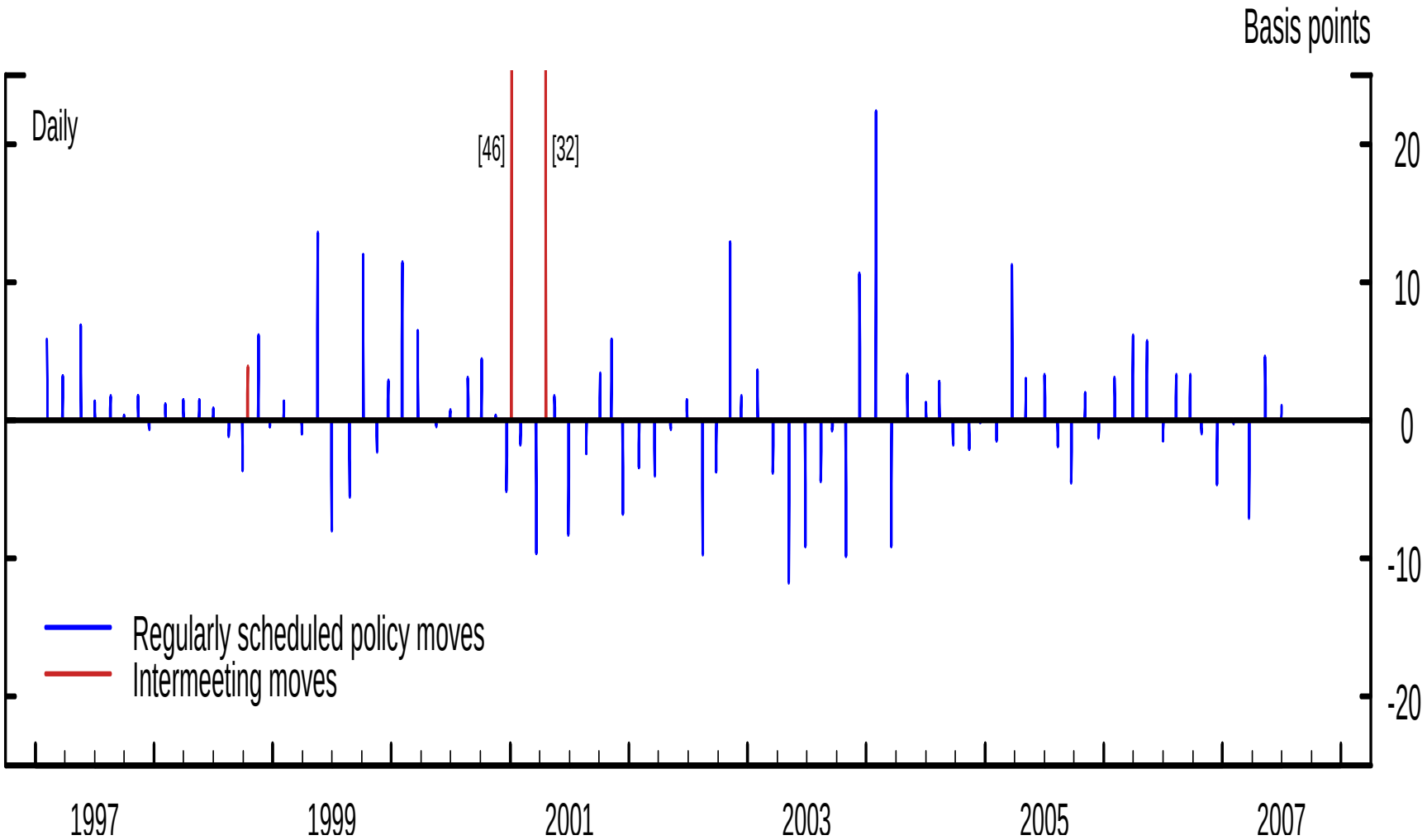


NOTE: Excludes the 9/17/2001 intermeeting policy action.

SLOPE SURPRISE

- Unexpected steepening or flattening of the yield curve.
- **Slope Surprise**: $(\Delta y_t^m - \Delta ff_t^u)$
  - $\Delta y_t^m =$ change in the m-year Treasury yield over a 30-minute window around the FOMC announcement
  - $m = 2$, 5, and 10 years
- Slope surprises can occur when FOMC communication alters the expected path of future short-term interest rates.

5-Year Slope Surprises



NOTE: Excludes the 9/17/2001 intermeeting policy action.

Stock Returns and Interest Rate Surprises

- Intraday stock price quotes for 355 BHCs (Obs. = 11,026).
- $R_{it} =$ (simple) return for bank i over the 2-hour window around the FOMC announcement on day t.
- Baseline specification:

$$R_{it} = \beta_0 + \beta_1 \Delta ff_t^u + \beta_2 (\Delta y_t^m - \Delta ff_t^u) + \beta_3 \Delta ff_t^e + \epsilon_{it}$$

  - Estimated by OLS.
  - Driscoll & Kraay [1998] robust standard errors.
  - Coefficient interpretation:

$$\beta_1 = \frac{\partial R}{\partial \Delta ff^u}\Big|_{(\Delta y^m = \Delta ff^u)} \quad \text{(level surprise)}$$

$$\beta_2 = \frac{\partial R}{\partial (\Delta y^m - \Delta ff^u)}\Big|_{(\Delta ff^u = 0)} \quad \text{(slope surprise)}$$

Reaction of Bank Stock Returns

All FOMC Announcements

Explanatory Variable	$m =$ 2-year	$m =$ 5-year	$m =$ 10-year
Level surprise: Δff^u	-8.166***	-8.627***	-10.20***
	(1.458)	(1.584)	(1.962)
Slope surprise: $(\Delta y^m - \Delta ff^u)$	-4.913***	-4.819***	-5.807***
	(1.694)	(1.446)	(1.854)
Expected change: Δff^e	0.617	0.560	0.525
	(0.478)	(0.422)	(0.426)
Constant	0.065	0.085	0.078
	(0.080)	(0.082)	(0.083)
Adj. R^2	0.103	0.102	0.099

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

Measuring Maturity Transformation

- Previous work has used crude measures of the maturity mismatch between bank assets and liabilities; e.g., “short” assets less “short” liabilities.
- Starting in 1997:Q2, Call Reports contain considerably more detailed information on the repricing time or maturity of bank assets and liabilities.
- Use this detailed information to construct a more refined measure of bank-specific maturity transformation.

Repricing/Maturity Gap

- Our measure of the repricing/maturity gap:

$$GAP^*_{it} = \begin{bmatrix} \text{average} \\ \text{repricing/maturity} \\ \text{of assets} \end{bmatrix} - \begin{bmatrix} \text{average} \\ \text{repricing/maturity} \\ \text{of liabilities} \end{bmatrix}$$

- Large GAP^*_{it} implies more maturity transformation and, according to conventional wisdom, a greater benefit from a steep yield curve.

Repricing/Maturity of Assets

- Average repricing time or maturity of assets:

$$\Xi_{it}^{A} = \frac{\left(\sum_j m_A^j A_{it}^j\right) + m_A^{OTH} A_{it}^{OTH}}{A_{it}^{IE}}$$

  - A_{it}^{j} = amount of assets that reprice or mature (whichever comes first) in m_A^j years.
  - A_{it}^{OTH} = amount of assets with unknown repricing time or maturity m_A^{OTH}:

$$A_{it}^{OTH} = A_{it}^{IE} - \sum_j A_{it}^j$$

  - A_{it}^{OTH} account, on average, for 9% of assets in our sample.

Repricing/Maturity of Liabilities

- Average repricing time or maturity of liabilities:

$$\Xi_{it}^{L} = \frac{\left(\sum_j m_L^j L_{it}^j\right) + m_L^{OTH} L_{it}^{OTH}}{L_{it}},$$

  - L_{it}^j = amount of liabilities that reprice or mature (whichever comes first) in m_L^j years.
  - Demand, transactions, and savings deposits are included at their contractual maturity (i.e., zero years).
  - L_{it}^{OTH} = amount of liabilities with unknown repricing time or maturity m_L^{OTH}:

$$L_{it}^{OTH} = L_{it} - \sum_j L_{it}^j$$

  - L_{it}^{OTH} account, on average, for 17% of liabilities in our sample.

Repricing/Maturity Gap

- Repricing/maturity gap:

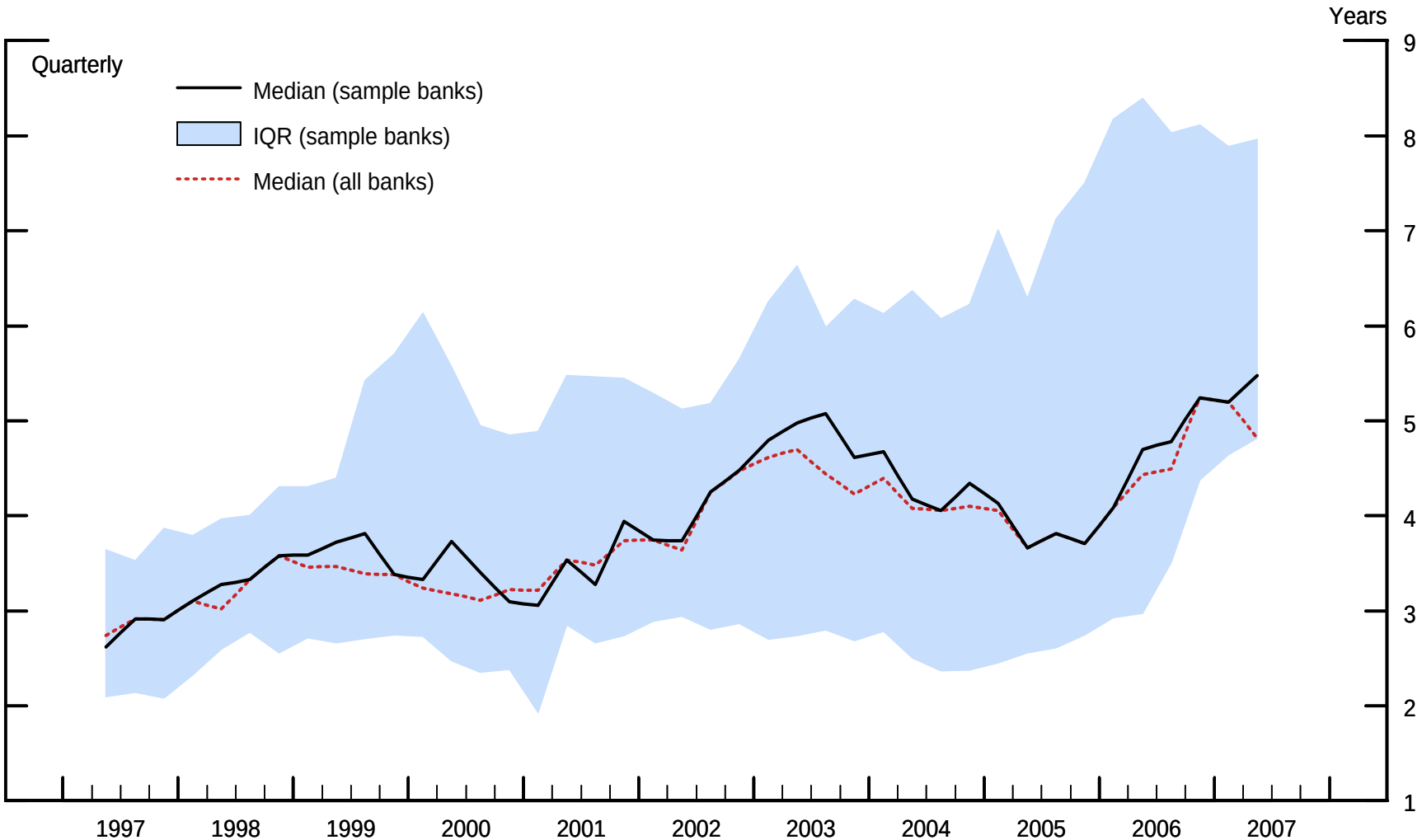
$$GAP_{it}^{*} = \Xi_{it}^{A} - \Xi_{it}^{L} = GAP_{it}^{R/M} + m_{A}^{OTH} \frac{A_{it}^{OTH}}{A_{it}^{IE}} + m_{L}^{OTH} \frac{L_{it}^{OTH}}{L_{it}}$$

- $GAP_{it}^{R/M}$ is the observed portion of the repricing/maturity gap:

$$GAP_{it}^{R/M} \equiv \sum_{j} m_{A}^{j} \frac{A_{it}^{j}}{A_{it}^{IE}} - \sum_{j} m_{L}^{j} \frac{L_{it}^{j}}{L_{it}}$$

Repricing/Maturity Gap

(1997:Q2–2007:Q2)



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

Median Bank Balance Sheet Characteristics

By Repricing/Maturity Gap Quintile

Variable	Q1	Q2	Q3	Q4	Q5
Total loans (shr. of assets)	0.71	0.69	0.69	0.67	0.61
C&I loans (shr. of total loans)	0.20	0.19	0.18	0.14	0.13
CRE loans (shr. of total loans)	0.42	0.36	0.34	0.31	0.30
RRE loans (shr. of total loans)	0.17	0.25	0.26	0.32	0.37
Consumer loans (shr. of total loans)	0.05	0.07	0.10	0.10	0.09
Interest-bearing liabilities (shr. of liabilities)	0.83	0.83	0.85	0.86	0.86
Savings deposits (shr. of liabilities)	0.29	0.31	0.33	0.31	0.33
Demand & trans. deposits (shr. of liabilities)	0.17	0.15	0.16	0.13	0.13
Total assets ($ billions)	1.43	1.54	2.26	2.45	1.98

Core Deposits

- Core (demand, transactions, and savings) deposits are "special:"
  - Evidence of sticky rates and quantities.
    (Hannan & Berger [1991]; Neumark & Sharpe [1992])
  - Interest rates on core deposits are typically below short-term market rates.
- Core deposits are a source of "rents:"
  - Banks can benefit from an increase in short-term market rates.
    (Samuelson [1945])
  - But if withdrawals are even moderately interest-sensitive, rents can also decline, implying negative duration.
- We control separately for demand & transaction deposits (DTD) and savings deposits (SD).

Stock Returns and Interest Rate Surprises

By Bank Characteristics

- Regression specification:

$$R_{it} = \beta_1 \Delta ff_t^u + \beta_2 (\Delta y_t^m - \Delta ff_t^u) + \gamma_1 \left[GAP_{it}^{R/M} \times \Delta ff_t^u \right] + \gamma_2 \left[GAP_{it}^{R/M} \times (\Delta y_t^m - \Delta ff_t^u) \right] + \theta_1' \left[\mathbf{X}_{it} \times \Delta ff_t^u \right] + \theta_2' \left[\mathbf{X}_{it} \times (\Delta y_t^m - \Delta ff_t^u) \right] + \eta_i + \epsilon_{it}$$

- $\mathbf{X}_{it}$ = 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)
  - DTD_{it} = demand + transaction deposits (as a share of liabilities)
  - SD_{it} = saving deposits (as a share of liabilities)
  - LNS_{it} = loans & leases (as a share of total assets)
  - $\log A_{it}$ = log of (real) total assets

Reaction of Bank Stock Returns

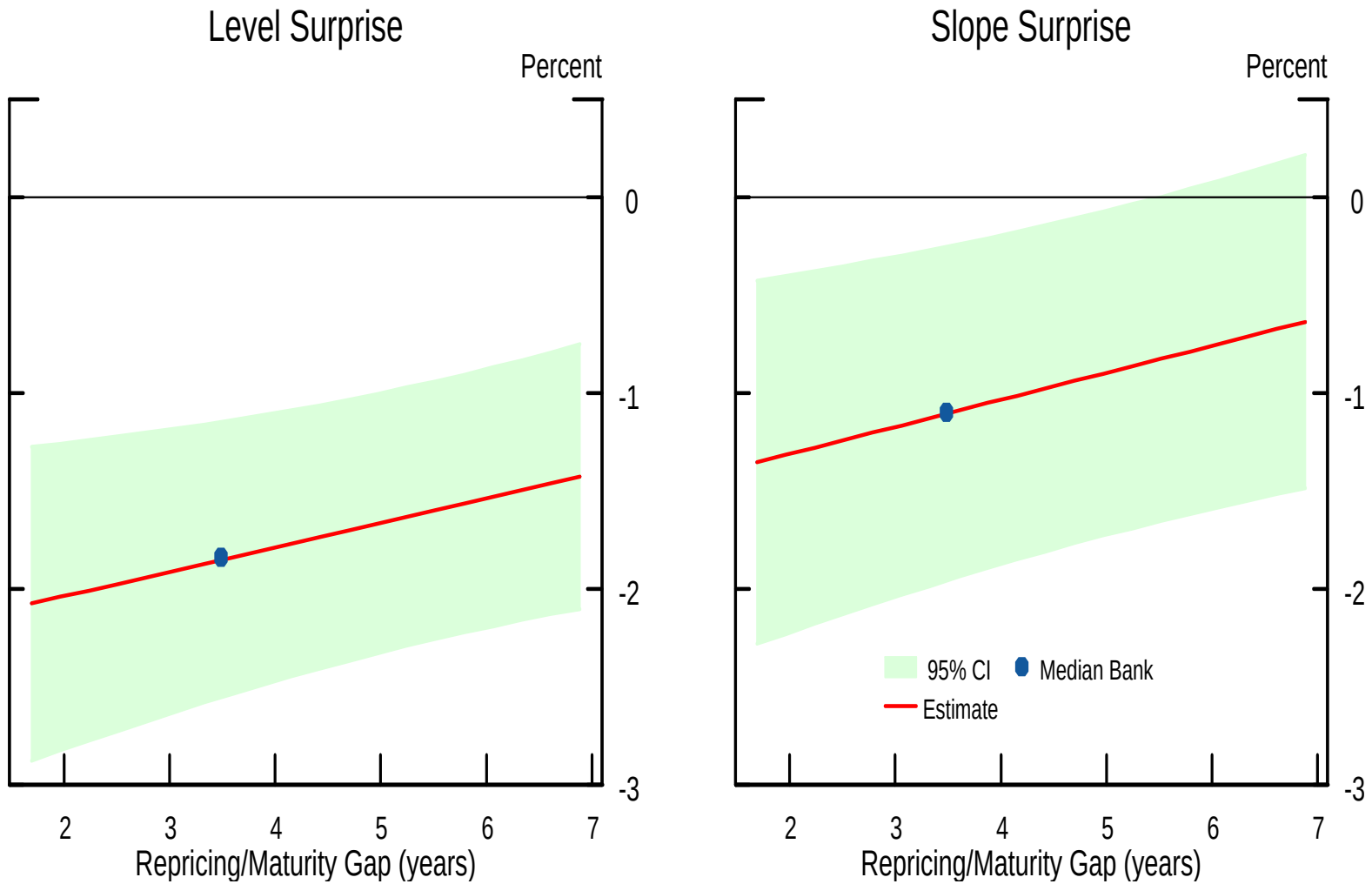
By Repricing/Maturity Gap

Variable × Interest Rate Surprise	$m =$ 2-year	$m =$ 5-year	$m =$ 10-year
$GAP^{R/M} \times \Delta ff^{u}$	0.500**	0.453*	0.598**
	(0.238)	(0.237)	(0.256)
$GAP^{R/M} \times (\Delta y^{m} - \Delta ff^{u})$	0.553**	0.426**	0.521**
	(0.244)	(0.217)	(0.246)

NOTE: Robust standard errors in parentheses; *, **, *** denotes significance at the 10%, 5%, and 1% 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

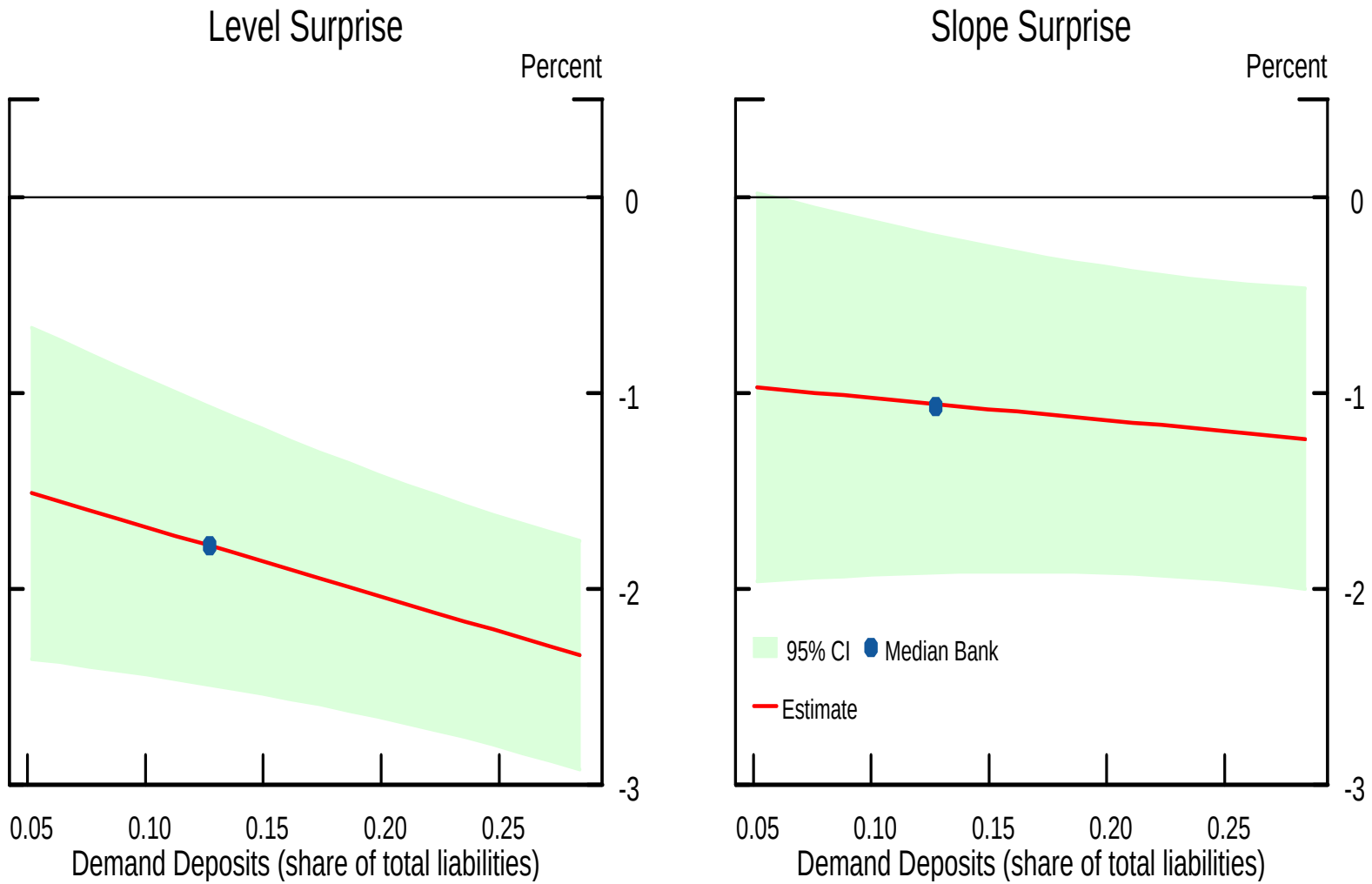
By Reliance on Demand/Transactions Deposits

Variable $\times$ Interest Rate Surprise	$m =$ 2-year	$m =$ 5-year	$m =$ 10-year
$DTD \times \Delta ff^u$	-14.27**	-17.80***	-18.58***
	(5.644)	(5.522)	(6.928)
$DTD \times (\Delta y^m - \Delta ff^u)$	-4.516	-8.046	-8.002
	(6.349)	(5.882)	(6.863)

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

Reaction of Bank Stock Returns

By Reliance on Demand/Transactions Deposits



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

Reaction of Bank Stock Returns

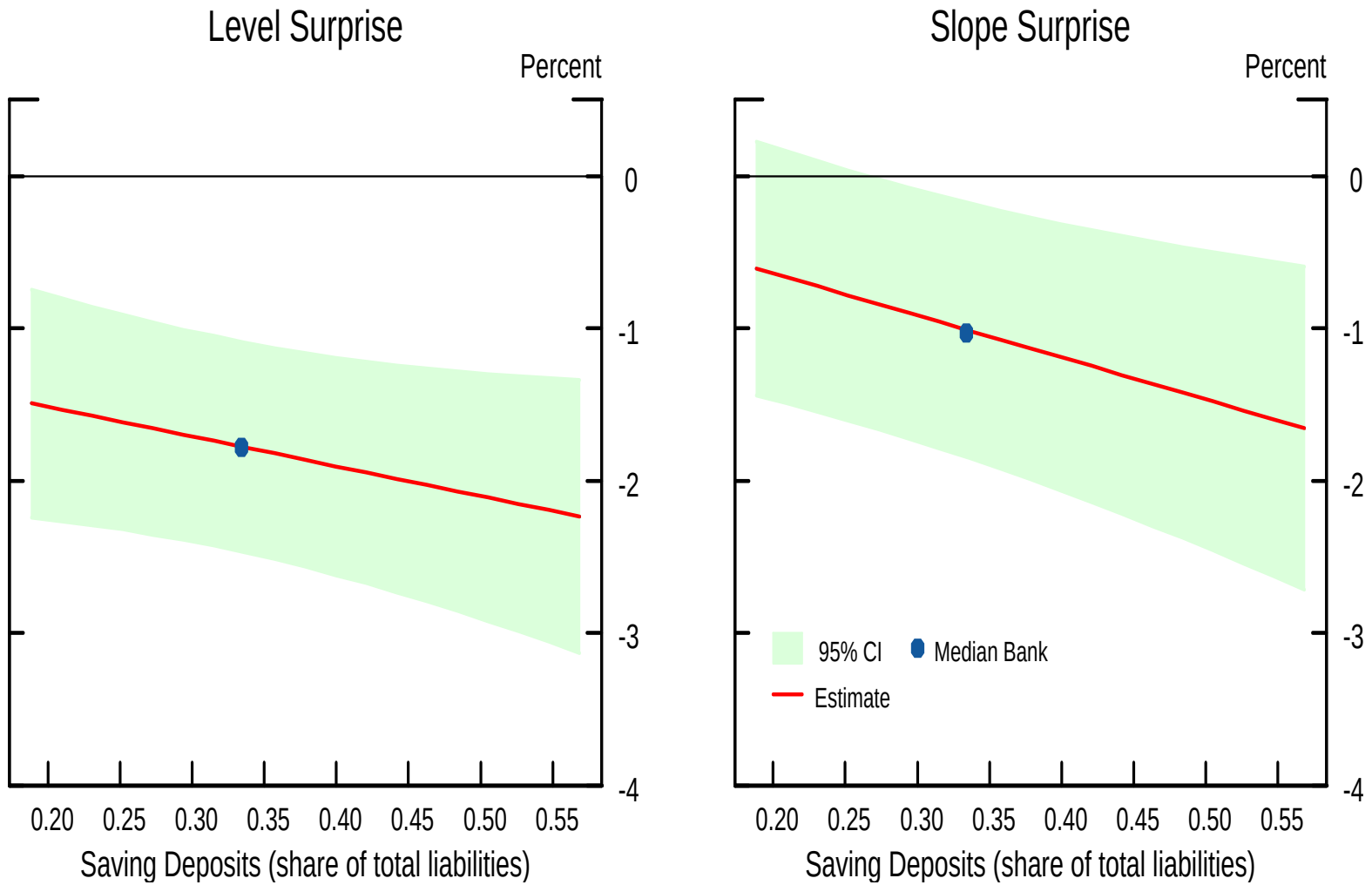
By Reliance on Savings Deposits

Variable $\times$ Interest Rate Surprise	$m =$ 2-year	$m =$ 5-year	$m =$ 10-year
$SD \times \Delta ff^u$	-7.793*	-8.750	-7.937
	(4.637)	(5.467)	(6.309)
$SD \times (\Delta y^m - \Delta ff^u)$	-11.02**	-11.32**	-9.004*
	(4.437)	(4.401)	(5.366)

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

Reaction of Bank Stock Returns

By Reliance on Savings Deposits



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

Reaction of Bank Stock Returns

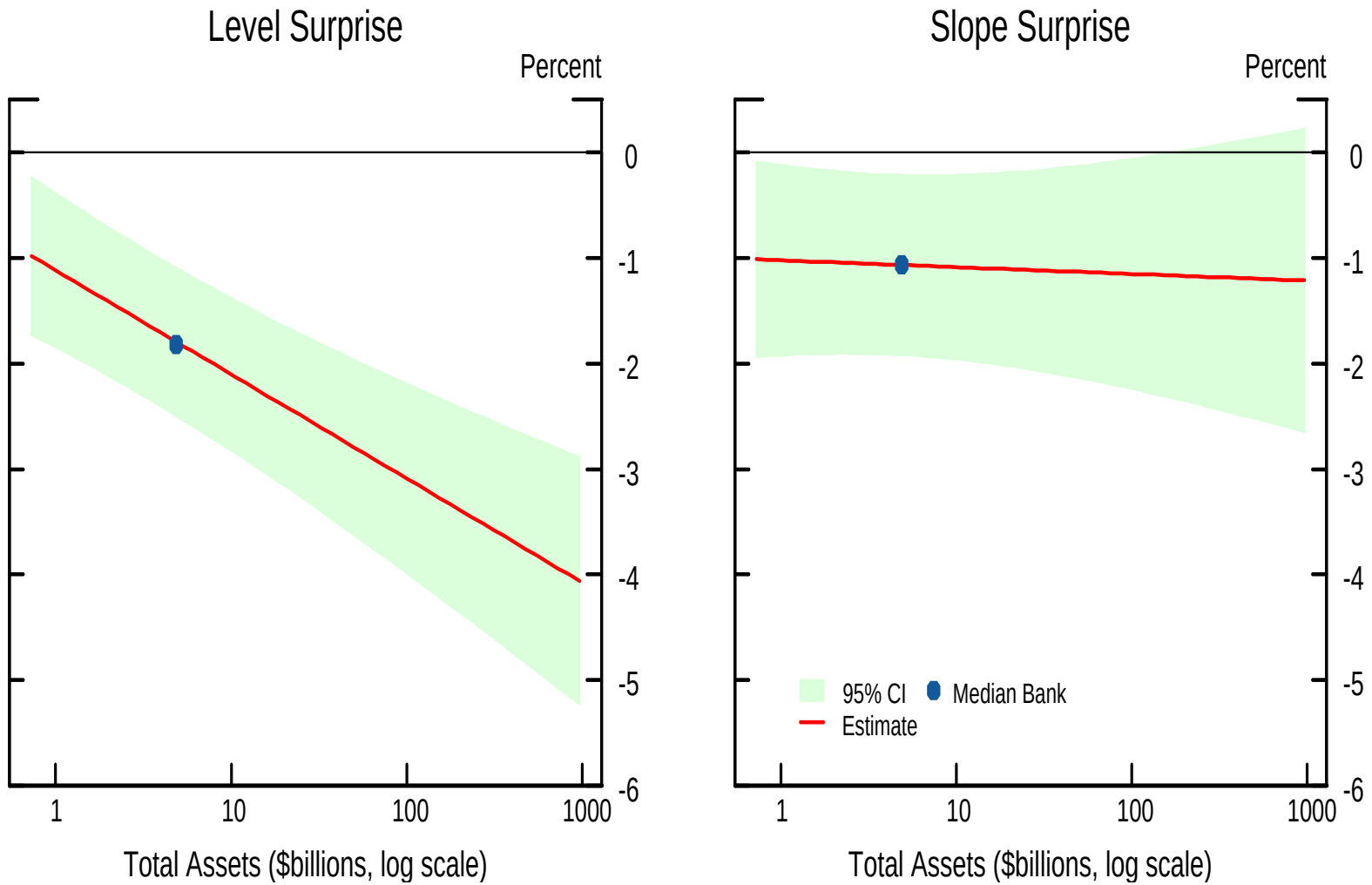
By Bank Size

Variable $\times$ Interest Rate Surprise	$m =$ 2-year	$m =$ 5-year	$m =$ 10-year
$\log A \times \Delta ff^u$	-1.714***	-1.766***	-2.035***
	(0.340)	(0.347)	(0.460)
$\log A \times (\Delta y^m - \Delta ff^u)$	-0.111	-0.123	-0.394
	(0.429)	(0.390)	(0.447)

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

Reaction of Bank Stock Returns

By Bank Size



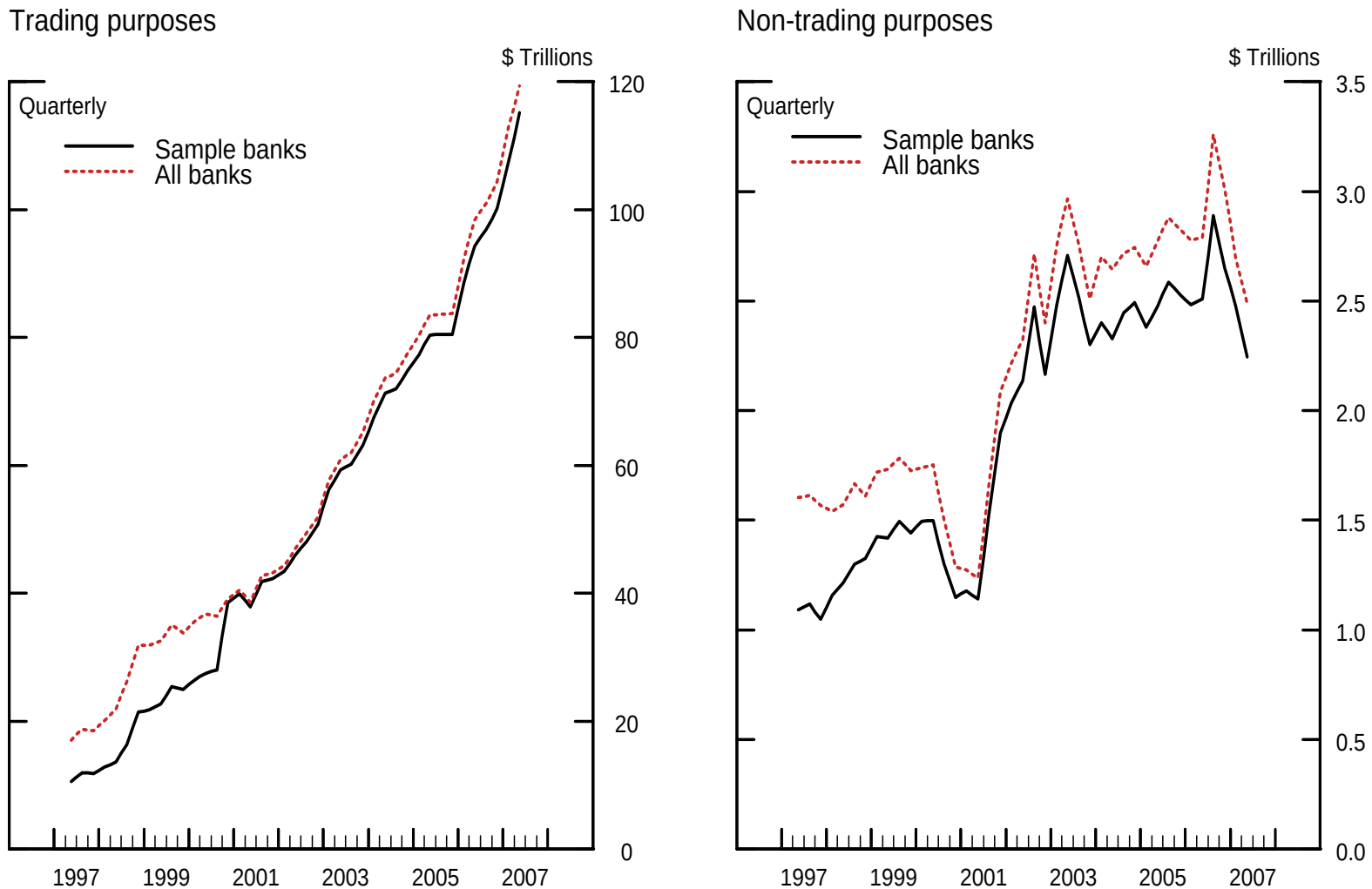
NOTE: Slope surprise is measured using a 2-year Treasury yield.

Interest Rate Derivatives

- Banks may hedge interest rate risk using derivatives.
- Call Report information on interest rate derivatives:
  - By type of purpose: trading vs. non-trading (i.e., hedging)
    - Notional outstanding amounts.
    - Positive and negative fair (i.e., market) values.
  - Notional amounts by contract type (i.e., swaps, futures, etc.)

Notional Amount of Interest Rate Derivatives

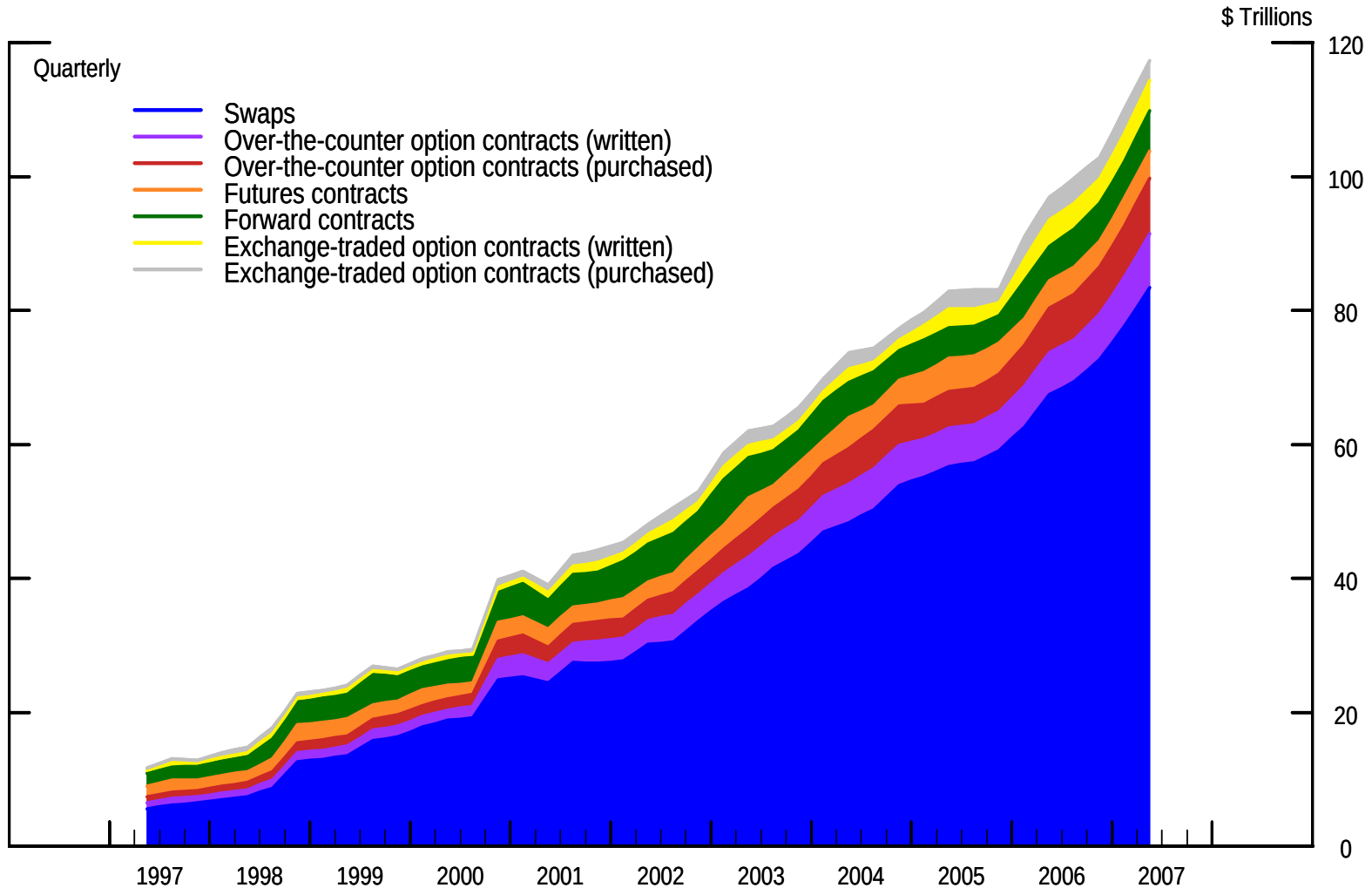
By Type of Purpose



NOTE: Deflated by the GDP price deflator (2005 = 100).

Notional Amount of Interest Rate Derivatives

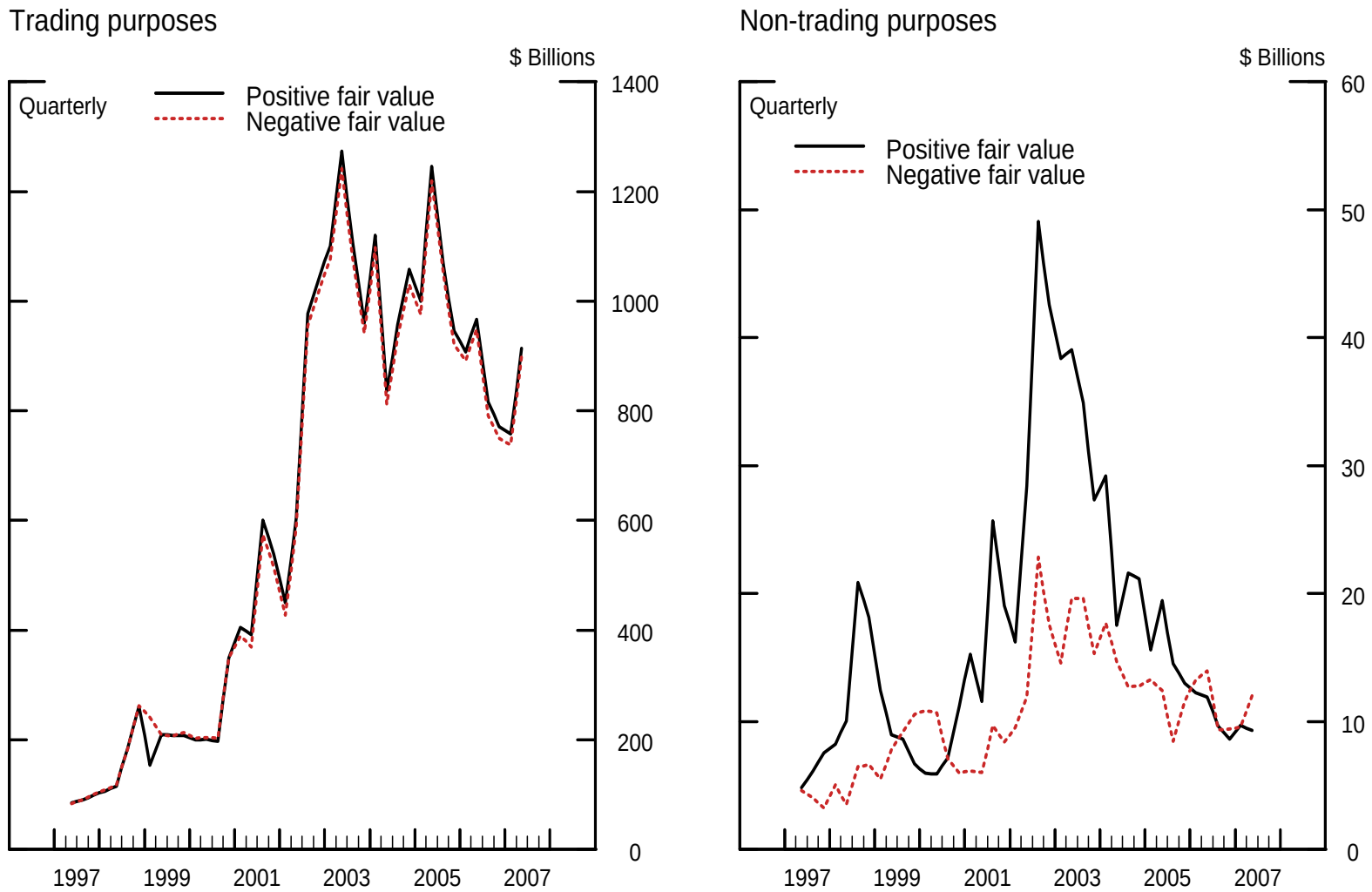
By Contract Type



NOTE: Deflated by the GDP price deflator (2005 = 100).

Fair Value of Interest Rate Derivatives

By Type of Purpose



NOTE: Deflated by the GDP price deflator (2005 = 100).

Interest Rate Derivatives

By Size Quintile

Trading Purposes (percent of assets)

Valuation	Q1	Q2	Q3	Q4	Q5
Notional Value					
Mean	0.09	0.01	0.06	0.32	133.1
Median	0.00	0.00	0.00	0.00	1.37
Max	72.2	14.8	10.5	29.6	4608
Net Fair Value					
Mean	-0.00	0.00	0.00	0.00	0.03
Min	-0.05	-0.03	-0.07	-0.05	-21.6
Median	0.00	0.00	0.00	0.00	0.00
Max	0.08	0.03	0.70	0.09	2.00

Interest Rate Derivatives

By Size Quintile

Non-Trading Purposes (percent of assets)

Valuation	Q1	Q2	Q3	Q4	Q5
Notional Value					
Mean	1.87	0.79	2.11	6.53	19.8
Median	0.00	0.00	0.00	0.21	8.54
Max	146.8	20.1	94.8	760.9	430.2
Net Fair Value					
Mean	0.00	0.00	0.00	0.00	0.07
Min	-0.66	-0.63	-1.14	-0.94	-1.22
Median	0.00	0.00	0.00	0.00	0.01
Max	2.46	0.53	0.99	1.23	2.69

Stock Returns and Interest Rate Surprises

Controlling for the Usage of Interest Rate Derivatives

- Regression specification:

$$
\begin{aligned}
R_{it} = {} & \beta_1 \Delta ff_t^u + \beta_2 (\Delta y_t^m - \Delta ff_t^u) + \\
& \gamma_1 \left[GAP_{it}^{R/M} \times \Delta ff_t^u \right] + \gamma_2 \left[GAP_{it}^{R/M} \times (\Delta y_t^m - \Delta ff_t^u) \right] + \\
& \theta_1' \left[\mathbf{X}_{it} \times \Delta ff_t^u \right] + \theta_2' \left[\mathbf{X}_{it} \times (\Delta y_t^m - \Delta ff_t^u) \right] + \\
& \lambda_1' \left[\mathbf{Z}_{it} \times \Delta ff_t^u \right] + \lambda_2' \left[\mathbf{Z}_{it} \times (\Delta y_t^m - \Delta ff_t^u) \right] + \eta_i + \epsilon_{it}
\end{aligned}
$$

  - $\mathbf{Z}_{it}$ = vector of interest rate derivative controls (all available contract types).
  - Use $\log\left(1 + \frac{\text{Notional Amount}}{\text{Total Assets}}\right)$ transformation.

Reaction of Bank Stock Returns

By Usage of Interest Rate Derivatives

	Interest Rate Surprise	
Median Bank	Level	Slope
With median interest rate derivatives position	-7.234***	-4.279**
	(1.407)	(1.717)
With large interest rate derivatives position	-6.278**	-2.480
	(3.169)	(3.518)

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

- Estimated effects of all other bank characteristics are the same.

Inspecting the Mechanism

Interest Rates and Accounting Measures of Profitability

- Use accounting measures of profitability to further understand the mechanisms behind the reaction of equity values to interest rate shocks.
- Analyze the response of interest and noninterest margins as well as bank balance sheets to changes in interest rates.
- Using merger-adjusted Call Report data, construct a panel of 4,776 of U.S. commercial banks over the 1997:Q2–2007:Q2 period.

Inspecting the Mechanism

Interest Rates and Accounting Measures of Profitability

- Dynamic fixed effects specification:

$$\pi_{it} = \sum_{k=1}^{4} \rho_k \pi_{i,t-k} + \beta_1 y_t^{3m} + \beta_2 (y_t^{10y} - y_t^{3m}) +$$
$$\gamma_0' \mathbf{X}_{i,t-1} + \gamma_1' \left[\mathbf{X}_{i,t-1} \times y_t^{3m}\right] + \gamma_2' \left[\mathbf{X}_{i,t-1} \times (y_t^{10y} - y_t^{3m})\right] +$$
$$\lambda' \mathbf{m}_t + \eta_i + \epsilon_{it}$$

  - π_{it} = accounting measure of profitability
  - $\mathbf{X}_{it}$ = vector of bank-specific characteristics
  - $\mathbf{m}_t$ = vector of macroeconomic controls
    (real GDP growth, unemployment gap, inflation,
    S&P 500 return, 10-year BBB credit spread, VIX)

- Estimated by OLS with Driscoll-Kraay robust standard errors.

Interest Rates, Profitability, and Asset Growth

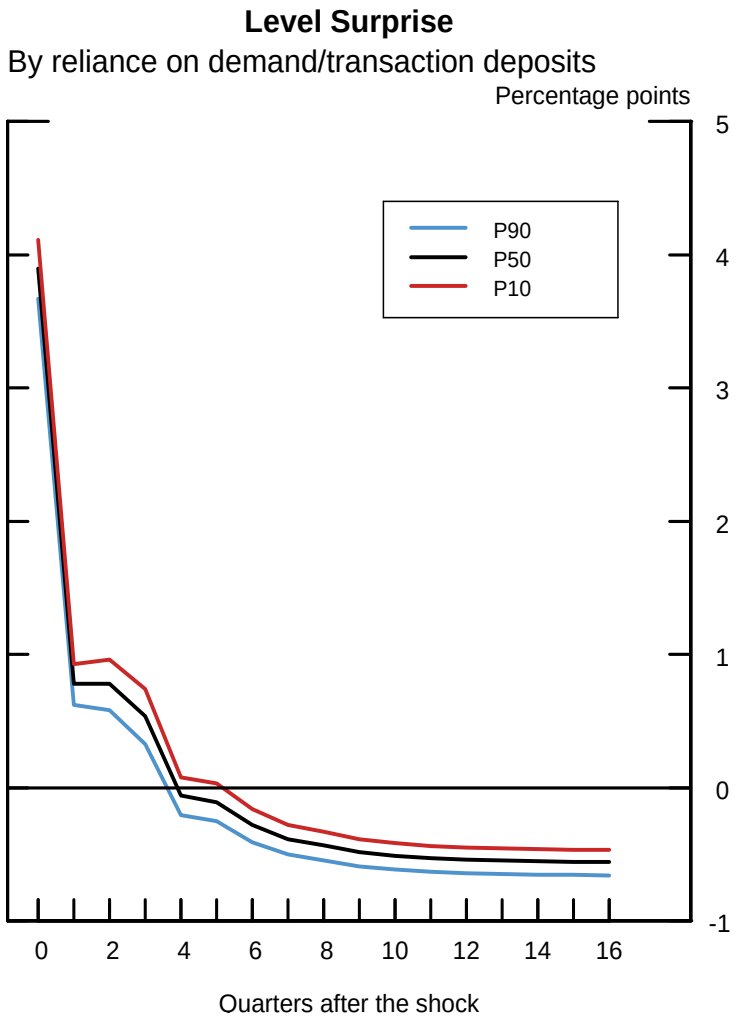
By Selected Bank Characteristics

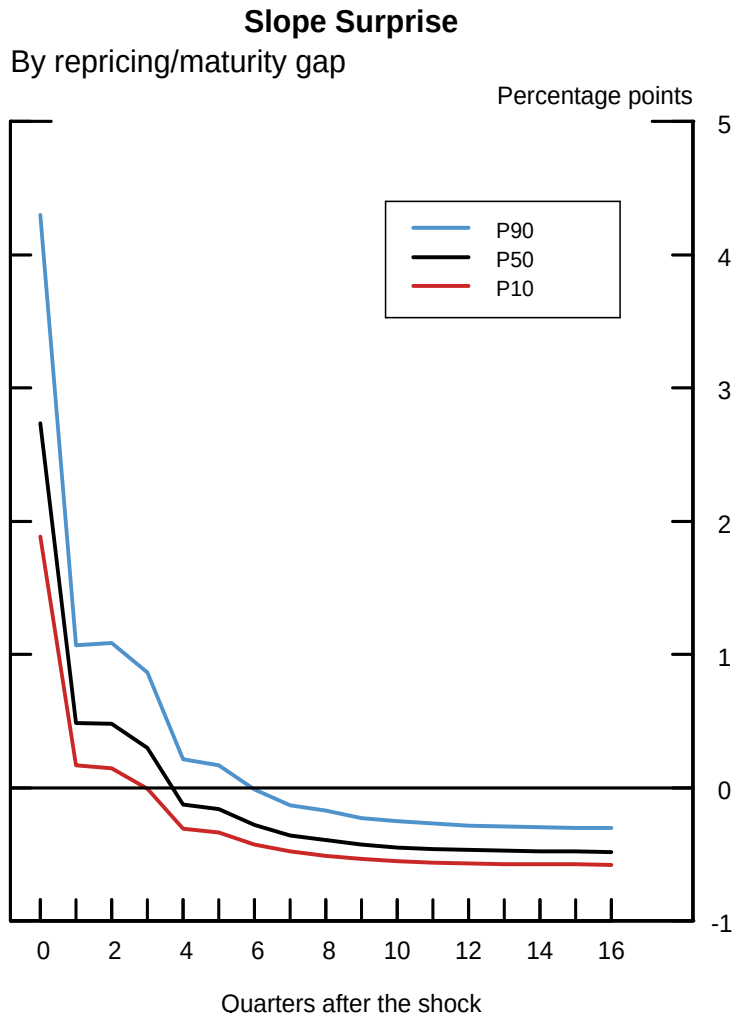
Variable × Interest Rate	*NII*	*NNI*	*ROA*	$\Delta \log A$
Level effect (median)	0.088***	-0.015	0.051***	-2.139**
	(0.014)	(0.011)	(0.010)	(0.879)
Slope effect (median)	0.071***	-0.005	0.037***	-1.830***
	(0.011)	(0.008)	(0.008)	(0.618)
$GAP^{R/M} \times y^{3m}$	-0.001	0.000	-0.000	0.105*
	(0.002)	(0.001)	(0.002)	(0.060)
$GAP^{R/M} \times (y^{10y} - y^{3m})$	0.007***	-0.001	0.007***	0.291***
	(0.002)	(0.002)	(0.002)	(0.059)
$DTD \times y^{3m}$	0.110***	-0.144***	0.015	-2.883***
	(0.035)	(0.024)	(0.022)	(0.920)
$DTD \times (y^{10y} - y^{3m})$	-0.020	-0.126***	-0.106***	-2.670**
	(0.045)	(0.032)	(0.030)	(1.365)
R^2 (within)	0.690	0.321	0.258	0.104

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

Net Income and Interest Rate Shocks

By Type of Shock and Selected Bank Characteristics





Interest Rates and Balance Sheet Composition

Growth Contribution	Level	Slope	R^2	Share
$(\Delta LNS)/A$	0.973*	-0.836**	0.116	0.637
	(0.514)	(0.384)	-	-
$(\Delta SEC)/A$	0.823	0.464	0.110	0.234
	(1.267)	(0.899)	-	-
$(\Delta FFSRRP)/A$	-3.646***	-3.540***	0.215	0.033
	(1.019)	(0.560)	-	-
$(\Delta BALDEP)/A$	-0.556***	-0.499***	0.118	0.012
	(0.149)	(0.099)	-	-
$(\Delta COREDEP)/A$	-2.152**	-0.729	0.116	0.432
	(1.045)	(0.748)	-	-
$(\Delta TIMEDEP)/A$	0.037	-0.721***	0.121	0.281
	(0.321)	(0.192)	-	-
$(\Delta MNGLIAB)/A$	0.465	0.447*	0.085	0.167
	(0.366)	(1.717)	-	-

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

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 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 income in response to interest rate changes.

An Asset Pricing Perspective

- Interest rate surprises induced by monetary policy actions have large effects on the aggregate stock market.
  (Bernanke & Kuttner [2005])
- Do our results represent a departure from standard empirical asset pricing models?

Our Approach: Step I

- Estimate a dynamic CAPM using daily data:

$$(R_{i\tau} - r^f_\tau) = \alpha_{i\tau} + \beta_{i\tau}(R^M_\tau - r^f_\tau) + \epsilon_{i\tau},$$

- Idiosyncratic return for FOMC announcement day t:

$$(R_{it} - r^f_t) - \left[0.31\hat{\alpha}_{i,t-1} + \hat{\beta}_{i,t-1}(R^M_t - r^f_t)\right]$$

- **Result**: Level and slope surprise have no effect of idiosyncratic returns.
- **Implication:** Reaction of bank stock returns to changes in interest rates induced by FOMC announcements is in line with their usual comovement with the market.

Our Approach: Step II

- Bank-specific characteristics determining the magnitude and direction of the reaction to policy-induced interest rate surprises should be correlated with the market beta.
- Estimate:

$$\hat{\beta}_{it} = \boldsymbol{\theta}' \mathbf{X}_{i,t-1} + \eta_i + \epsilon_{it},$$

  - $\hat{\beta}_{it}$ = estimate of market beta for bank i in quarter t
  - $\mathbf{X}_{i,t-1}$ = vector of "fundamental" bank characteristics

Bank Characteristics on the Market Beta

Explanatory Variable	*Coef.*	*S.E.*
Maturity gap: $GAP^{R/M}$	-0.067***	0.012
Other assets: A^{OTH}	-0.589***	0.208
Other liabilities: L^{OTH}	1.242***	0.310
Savings deposits: SD	2.090***	0.408
Demand deposits: DTD	1.930***	0.410
Loans/Assets: LNS/A	-0.014	0.177
Size: $\log A$	0.561***	0.052
Swaps	-0.752***	0.090
OTC options (written)	-0.295*	0.163
OTC options (purchased)	0.207	0.133
ET options (written)	0.217	0.178
ET options (purchased)	-0.123	0.147
Futures	0.027	0.099
Forwards	0.168**	0.073
Memo: R^2 (within) = 0.175		