Banks as Liquidity Provider of Second to Last Resort

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Q-Group, October 2008

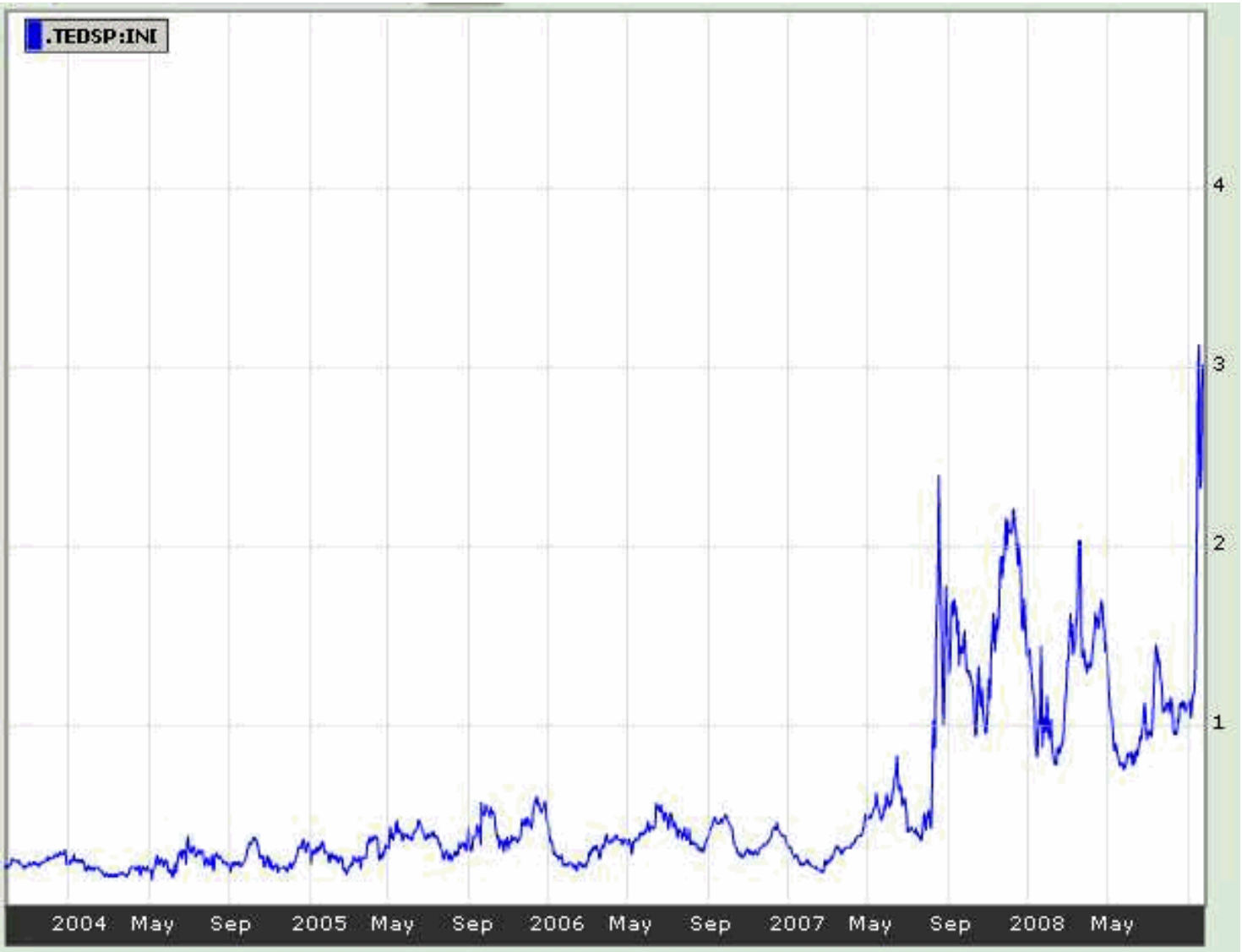
* Any views expressed represent those of the author only and not necessarily those of the Federal Reserve Bank of New York or the Federal Reserve System.

- Talk based on joint work with Evan Gatev and Phil Strahan (Boston College, Finance)

- First: how it's supposed to work

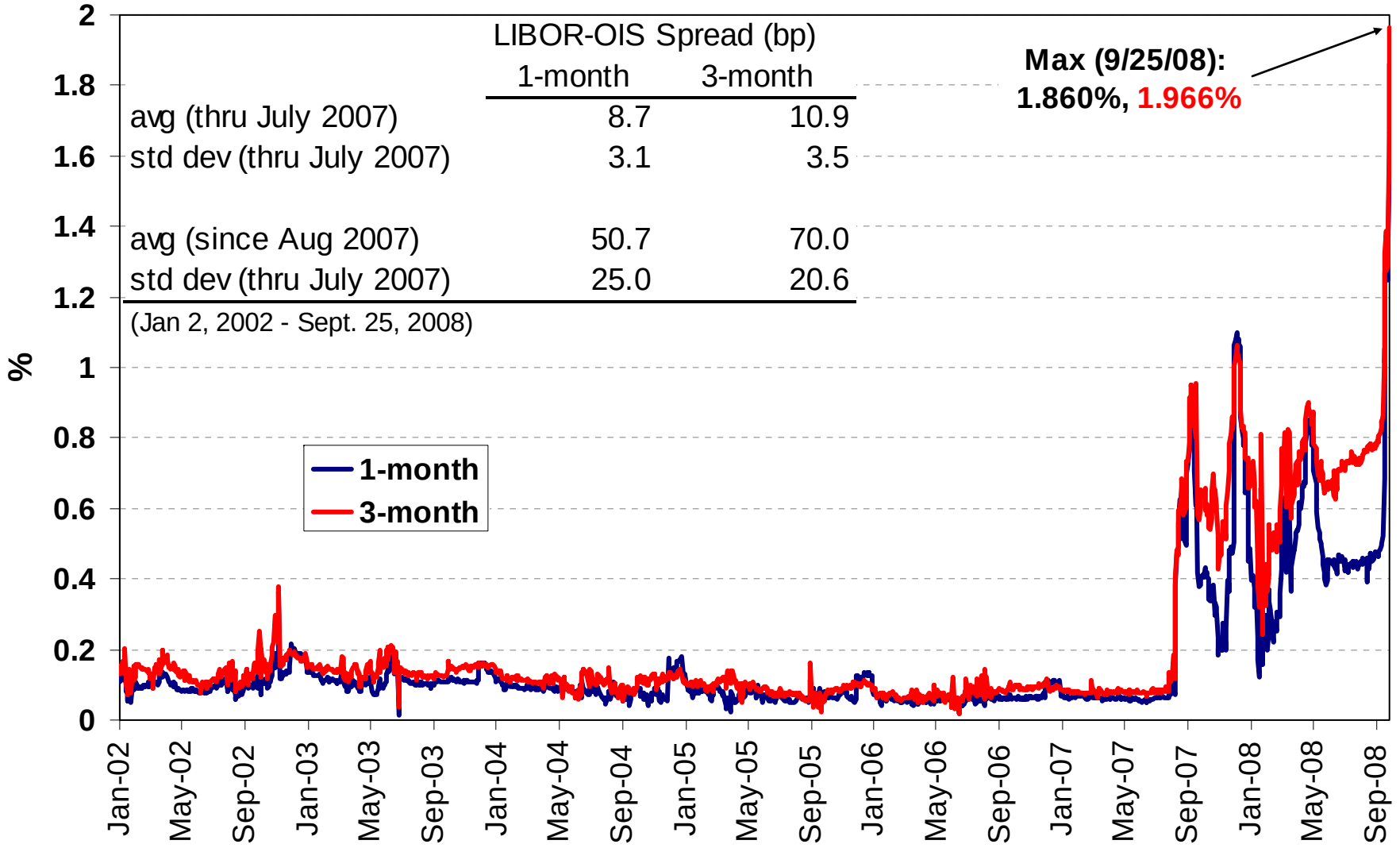
- Then: how it seems not to be working now….

3M TED Spread



LIBOR - OIS Spread

2 Jan 2002 - 25 Sep 2008



Some data

- What's a few trillion between friends…..

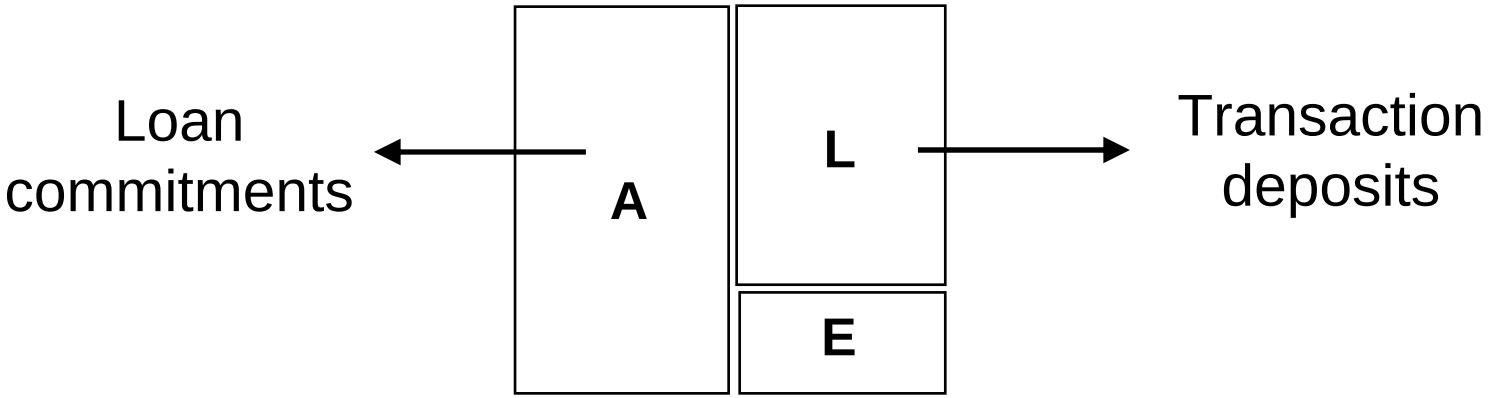
- Early 2007:
  - ABCP + SIV + ARS + TOB + VRDN ≈ $2.2 trn
  - O/N tri-party repo: $2.5 trn
  - Hedge funds AUM: $1.8 trn
  - Assets of 5 i-banks: $4 trn

  - Assets of 5 U.S. BHCs: $6 trn
  - Assets of all U.S. banks: $10 trn

- Meanwhile, sum of write-offs to date (> $500bn) exceeds cost of S&L crisis (~ $250bn in current $)

Bank liquidity management

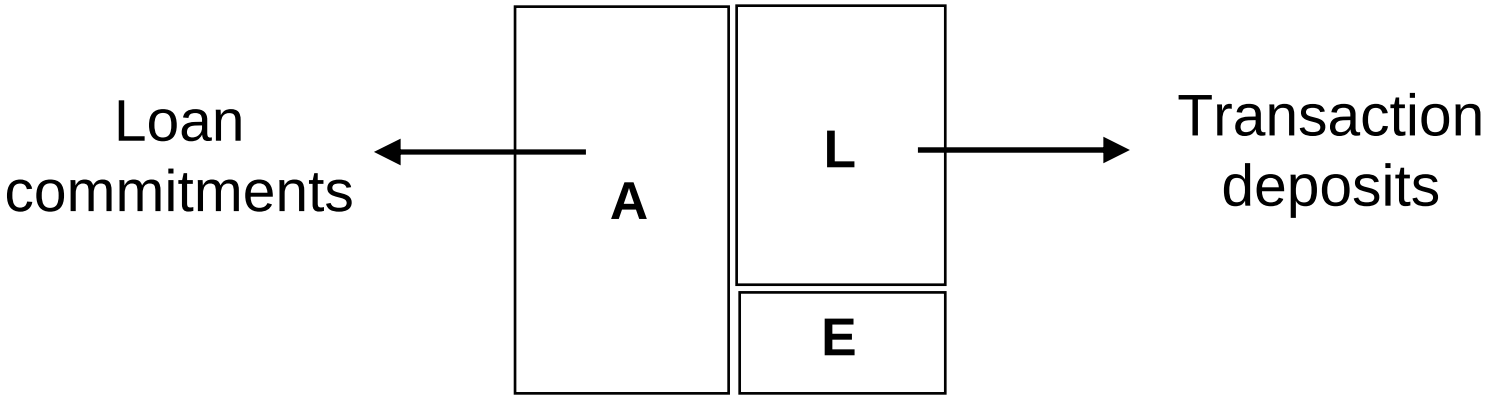
- A bank offers two short-term liquidity contracts



- Seems very unstable
  - What if demand spikes for both at the same time?
  - And what if that happens systematically (affecting *all* banks)
  - Worry about bank runs

Bank liquidity management

- A bank offers two short-term liquidity contracts



- Other sources of bank liquidity
  - Hold cash and liquid assets
  - Access to the inter-bank market
  - Borrow from the central bank

But maybe combining the 2 contracts reduces risk . . .

- Diversification synergy
  - Combining transactions deposits and loan commitments reduces *idiosyncratic* risk (Kashyap, Rajan & Stein, JF 2002)
  - Transaction deposits *hedge* the systematic liquidity risk exposure of loan commitments

- Flight to quality
  - Banks can bear *systematic* shocks to liquidity demand due to funding inflows (Gatev and Strahan, JF 2006)
  - Deposit-lending synergy is *stronger* in a liquidity crisis (e.g. Fall 1998)

- Seems related to government safety net
  - Funding flows not related to bank solvency or size
  - Effects absent prior to FDIC (Pennacchi JME 2006)

Research questions

- How does bank risk (stock volatility) vary with liquidity exposure?
  - Exposure from deposits
  - Exposure from loan commitments

- Is there evidence of a natural hedge to mitigate liquidity risk?
  - Does the hedge become more evident when liquidity becomes scarce?
  - Case study: Fall 1998 (Gatev, Schuermann & Strahan, NBER 2005)

Sample: Time-Series / Cross-Section Data

- Largest (based on market cap) 100 US banks each year, 1990-2002
- Drop bank-years when M&As occur
  - In 1990 leaves 85 banks
  - Number of banks ranges between 98 (2002) and 68 (1996)
- Market data (weekly stock returns) and call report data
- Almost 50,000 bank-week observations
  - Cluster data (errors) by bank to avoid assuming independence over time for each bank: 170 unique banks

Loan-Deposit synergy: early evidence

Unused Commitments / (Commitments + Loans) (LC)	*Transactions Deposits / Total Deposits (TD):*		
bottom third	**bottom third**	**middle third**	**top third**
Stock-return Volatility	**28%**	29%	32%
Assets (Billions of $s)	10.58	10.20	7.14
Equity / Assets	8%	8%	11%
middle third			
Stock-return Volatility	29%	29%	30%
Assets (Billions of $s)	17.85	21.64	16.53
Equity / Assets	8%	8%	7%
top third			
Stock-return Volatility	36%	32%	**31%**
Assets (Billions of $s)	34.63	89.10	83.36
Equity / Assets	8%	8%	8%
Mean Commitments Ratio	0.30	0.31	0.37

Research design to address questions

- Dependent variable = stock-return volatility (weekly)
  - Conditional return volatility: GARCH(1,1)
  - Realized volatility (total or residual)

- Modeling Bank Risk

$$Volatility = \alpha + \beta_1 LoanCommitments_{t\text{-}1,i} + \beta_2 DepositBase_{t\text{-}1,i} + \beta_3 (LoanCommitments_{t\text{-}1,i} * DepositBase_{t\text{-}1,i}) + OtherControls + \varepsilon_{i,t}$$

$$\beta_1, \beta_2 > 0 \text{ (Exposure)}; \ \beta_3 < 0$$

Control variables

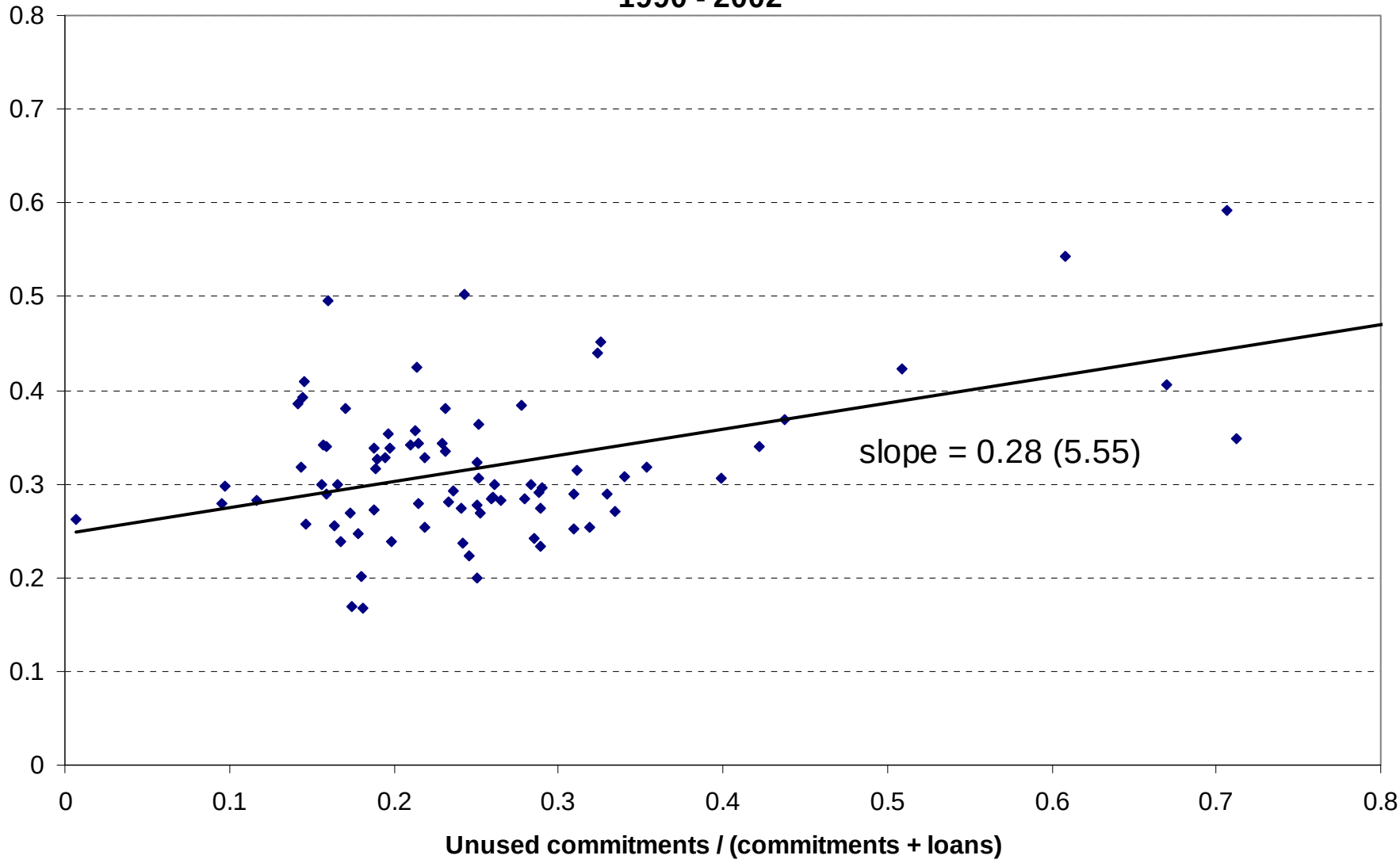
- Market conditions
  - Volatility of S&P500
  - Paper-bill spread (3M non-financial)
  - Yield on 3M T-bill

- Bank characteristics
  - Size: Log of assets
  - Capital ratio: Capital/assets
  - Inter-bank access: Fed funds purchased/assets
  - Liquid assets: (cash + securities)/assets

- Other risks (market, credit risk)
  - Trading assets/assets
  - C&I loans/assets
  - CRE loans/assets
  - NPL/assets
  - Loan-loss provision/assets
  - Net charge-offs/assets
  - Credit rating

Low TD banks: risk ↑ as LC ↑

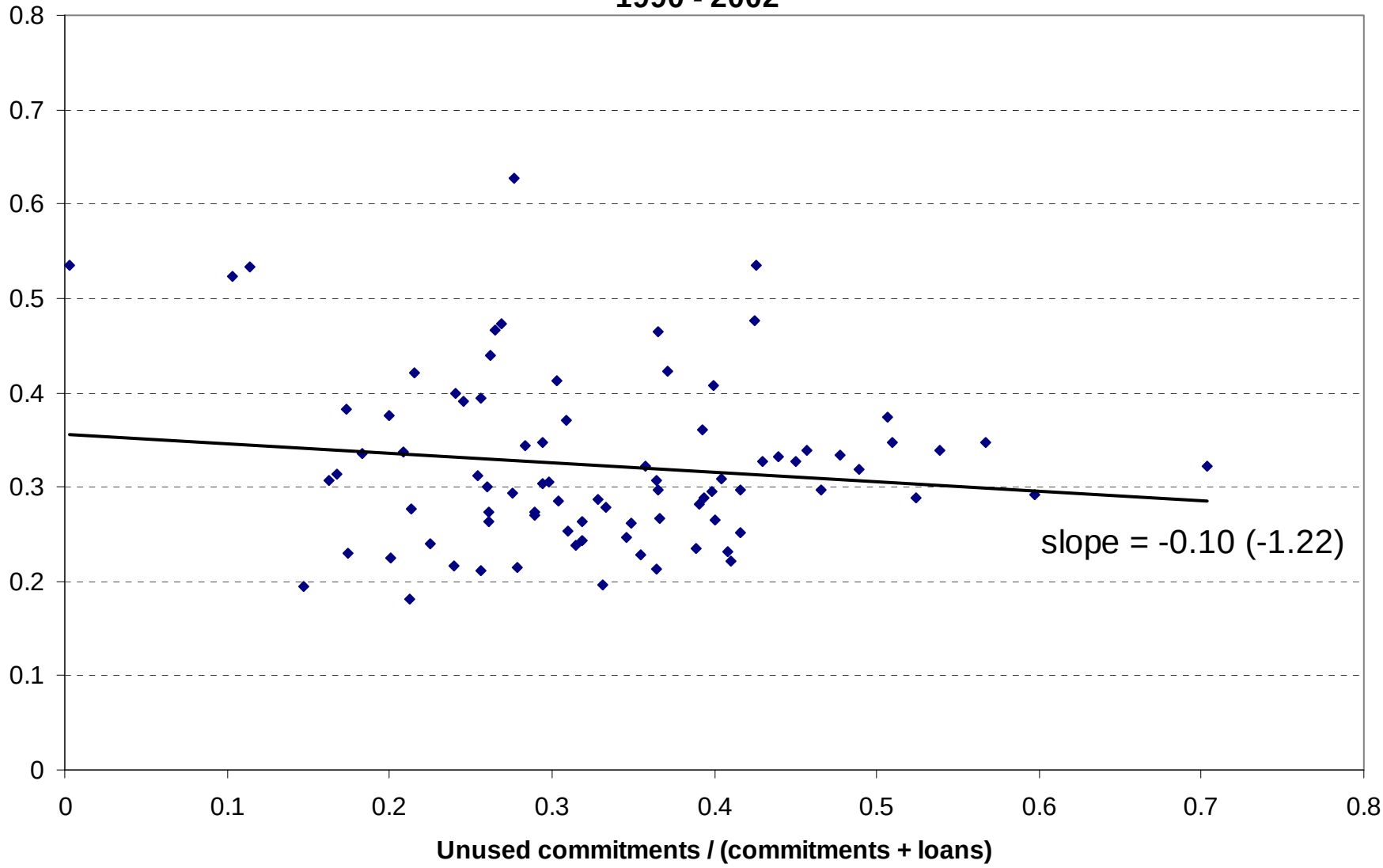
Figure 1a: Stock Return Volatility for Low Transactions Deposit Banks
1990 - 2002



Time average of annualized bank stock return volatility and commitment ratio for bank with below-median levels of transaction deposits for 170 largest U.S. banks (plot is for 85 banks). Source: Volatility based on authors' calculations using data from CRSP. Commitment ratio is from Call Reports.

High TD banks: risk unchanged as LC ↑

Figure 1b: Stock Return Volatility for High Transactions Deposit Banks
1990 - 2002



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Results of multivariate regressions

- Direct exposure coefficients (β_1 & β_2) positive
  - By themselves, more exposure to LC & TD increases risk
- Hedge coefficient (β_3) negative
- Results insensitive to volatility measure: GARCH or realized (total or residual)
- Results robust when controlling for market and credit risk

Reverse causality?

- Why are there some banks on the “off-diagonal”?
  - E.g. Low LC exposure but high TD (upper right corner)
  - Smallest banks, bank-dependent clientele but little liquidity insurance provided

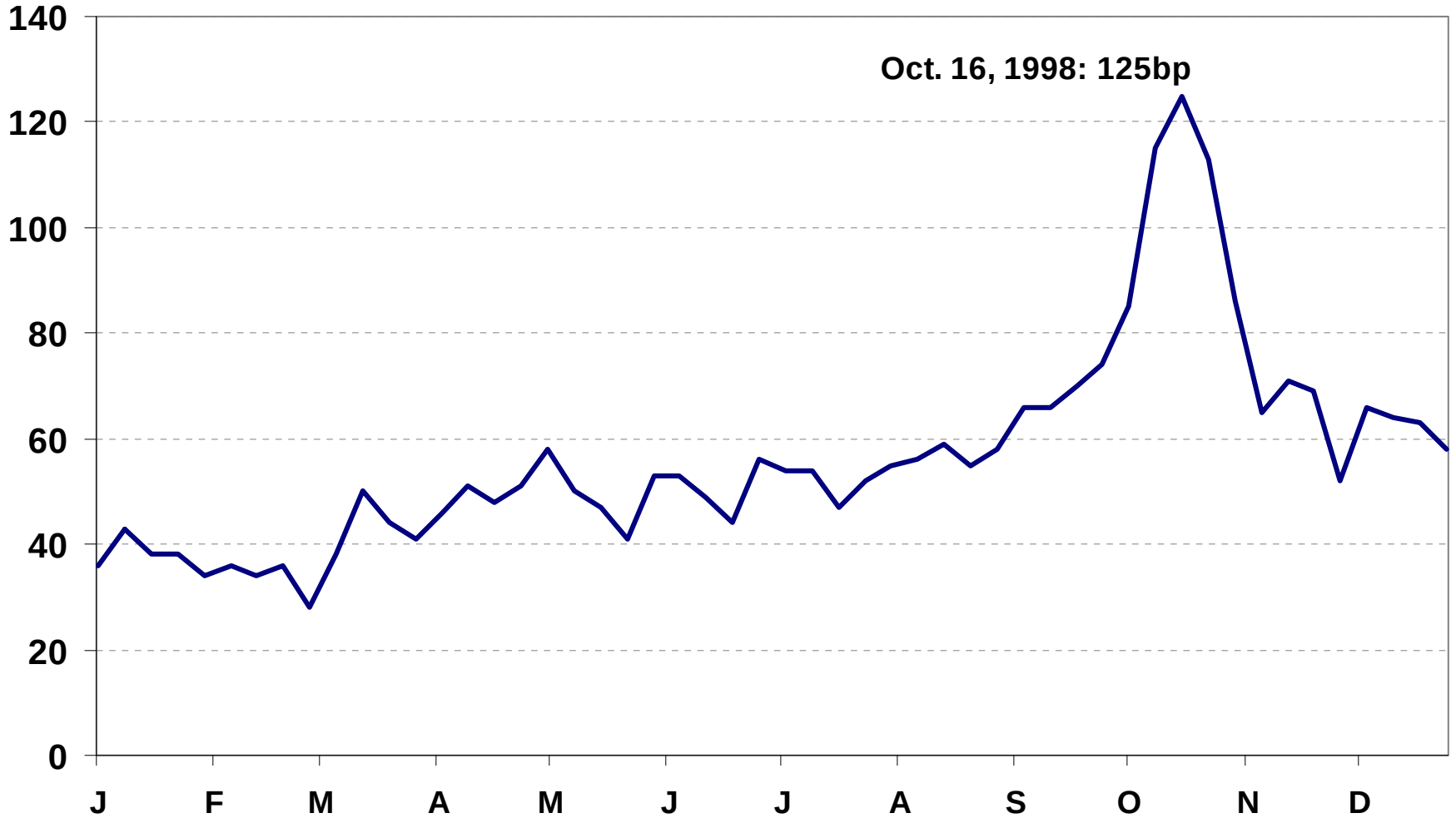
- Still, reverse causality is possible
  - Risk mgmt motive drives bank choice of TD and LC rather than other way around
  - Maybe (otherwise) safe banks choose to expose themselves to greater liquidity risk (high LC, high TD)

Idiosyncratic vs. systematic liquidity demands

- During ‘normal’ times, diversification synergy comes from reducing effect of idiosyncratic liquidity demands
- What if there is a systematic shock to liquidity?
  - All borrowers show up demanding liquidity
  - But: supply of TD increases too
- Hedging effect should be even stronger . . . And it is!
- Look at the times of low liquidity (top 5% of paper-bill spread distribution: >75bp; avg. = 40bp)
  - Hedging term (β_3) nearly triples in size
- Also consider Fall 1998 liquidity (flight to quality) crisis

3M non-fin CP spread (basis points)

weekly, Jan - Dec 1998



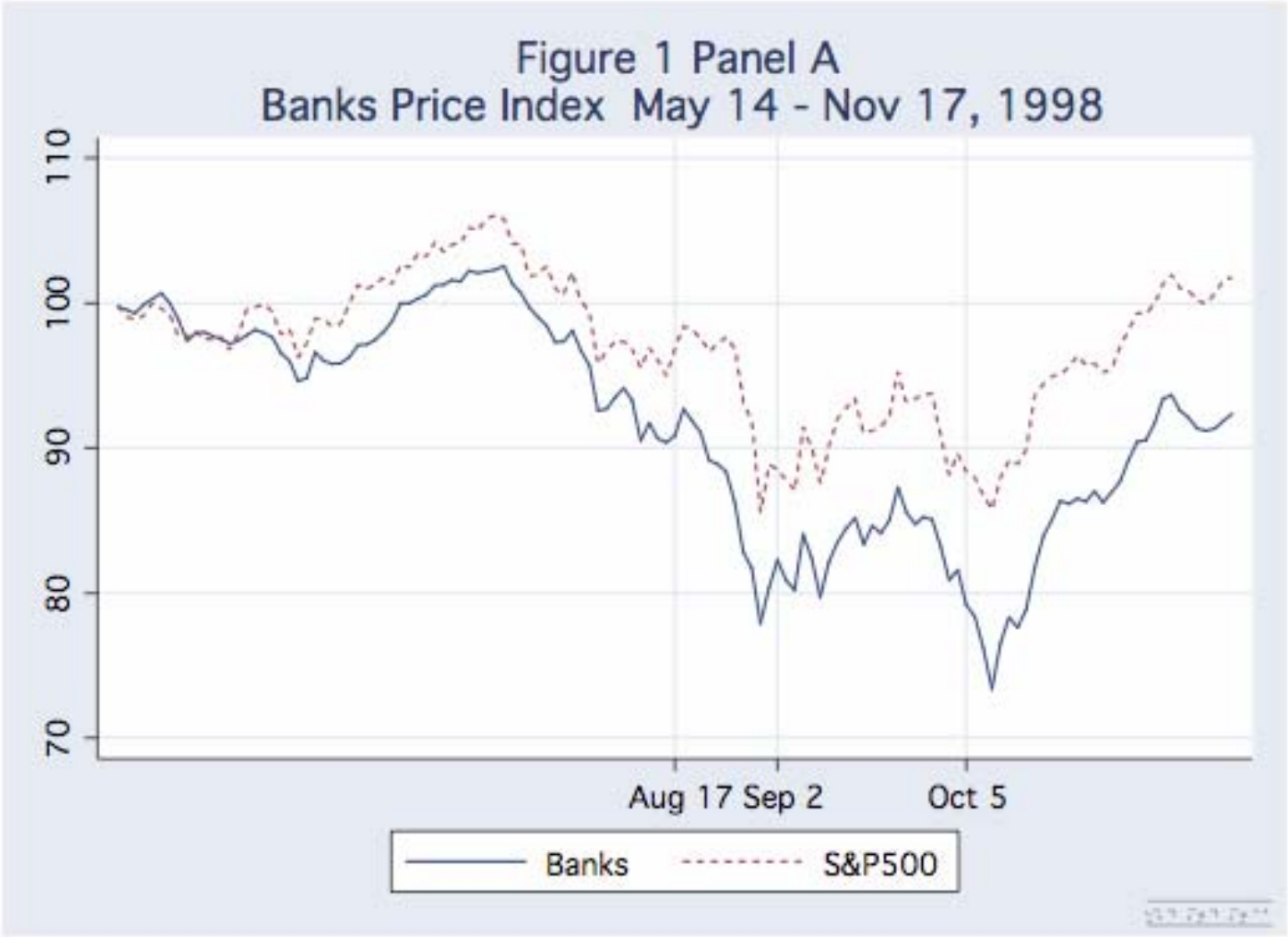


Figure 1 Panel A
Banks Price Index May 14 - Nov 17, 1998
110
100
90
80
70
Aug 17
Sep 2
Oct 5
Banks
S&P500

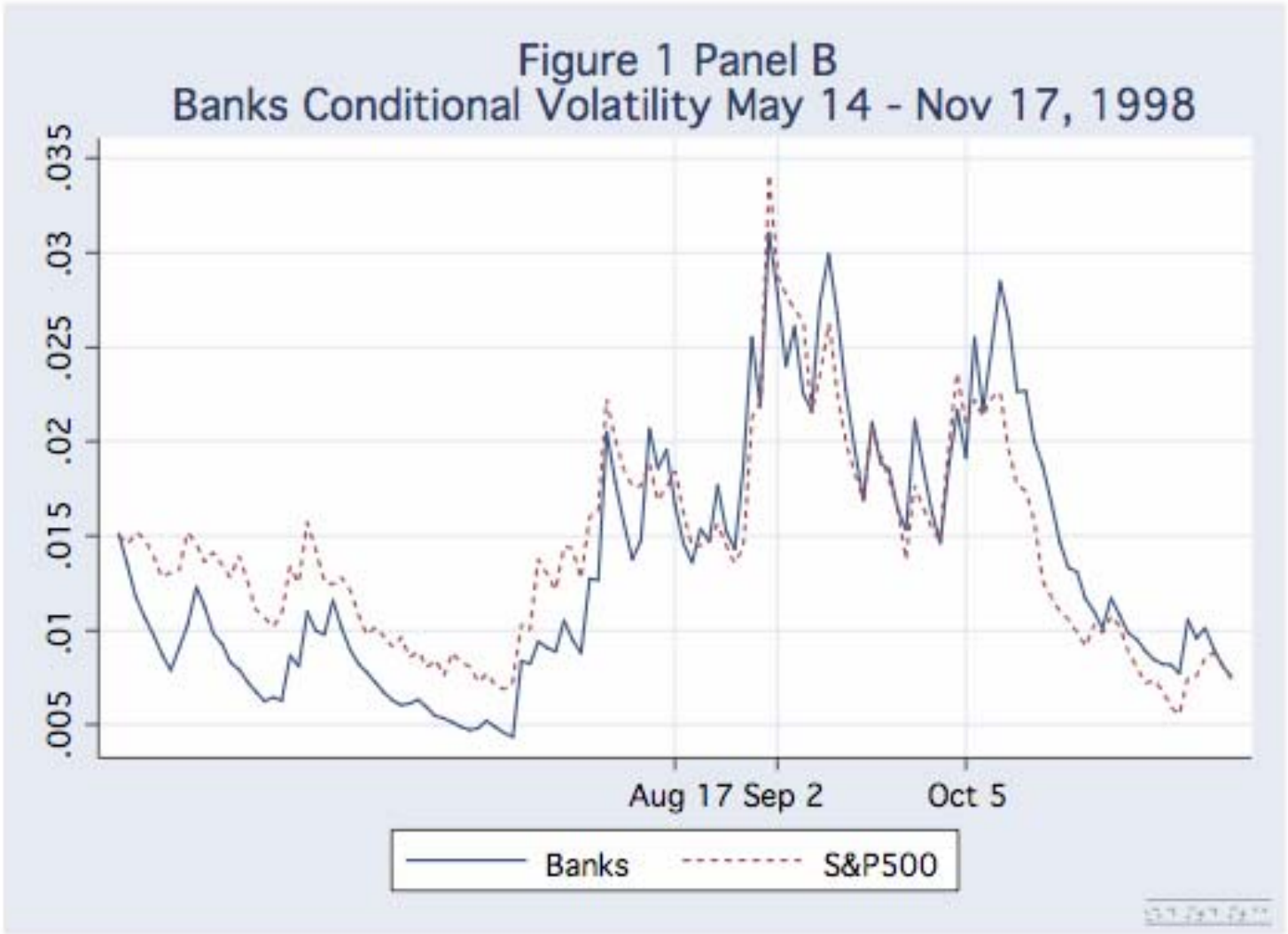
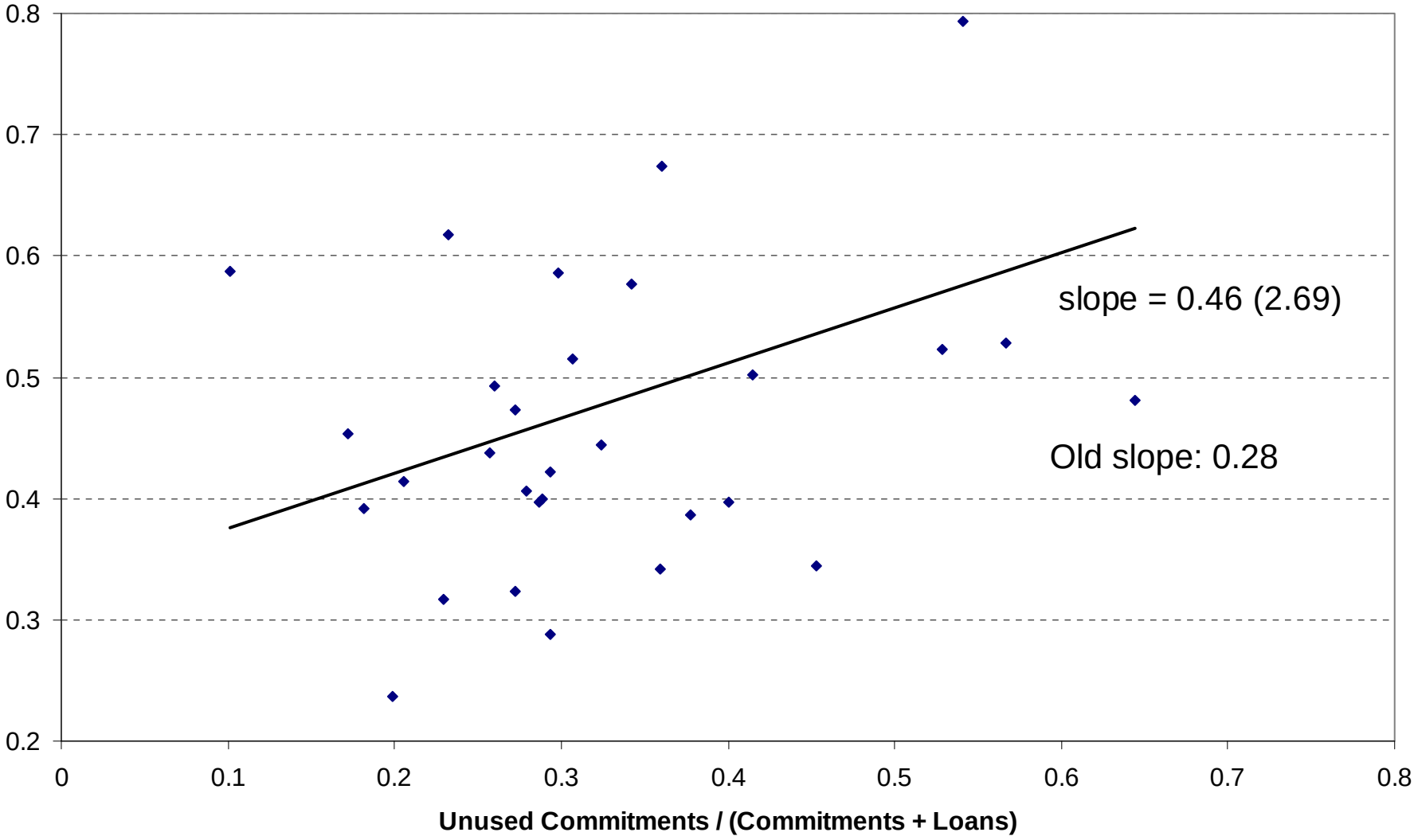


Figure 1 Panel B
Banks Conditional Volatility May 14 - Nov 17, 1998
.005
.01
.015
.02
.025
.03
.035
Aug 17
Sep 2
Oct 5
Banks
S&P500

Low TD banks: risk ↑ 2x faster as LC ↑

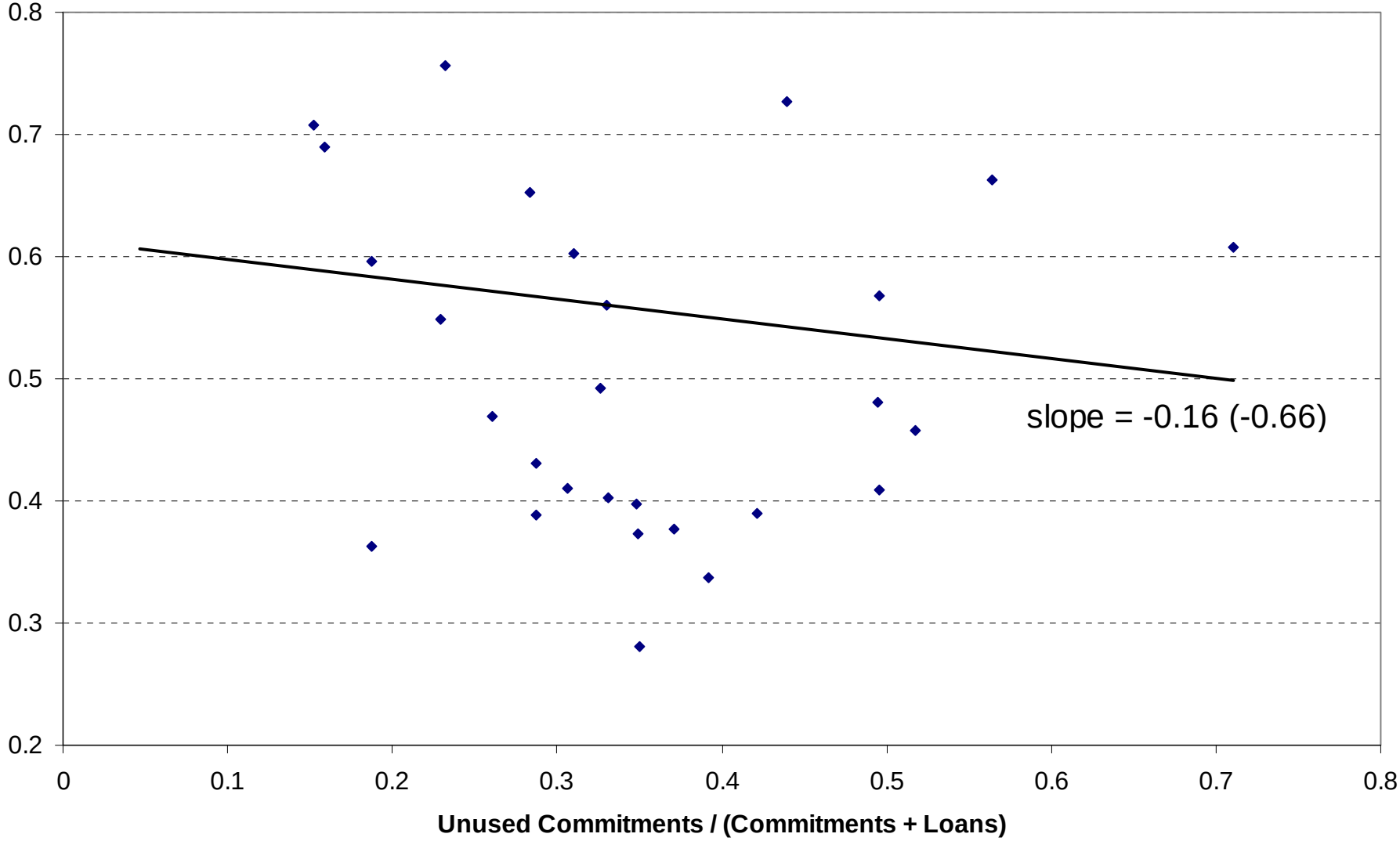
Figure 3a: Stock-Return Volatility for Low-Transactions Deposit Banks
Fall 1998



Time average of annualized bank stock return volatility and commitment ratio for bank with below-median levels of transaction deposits for 64 largest U.S. banks (plot is for 32 banks). Source: Volatility based on authors' calculations using data from CRSP. Commitment ratio is from Call Reports.

High TD banks: risk unchanged as LC ↑

Figure 3b: Stock-Return Volatility for High-Transactions Deposit Banks
Fall 1998



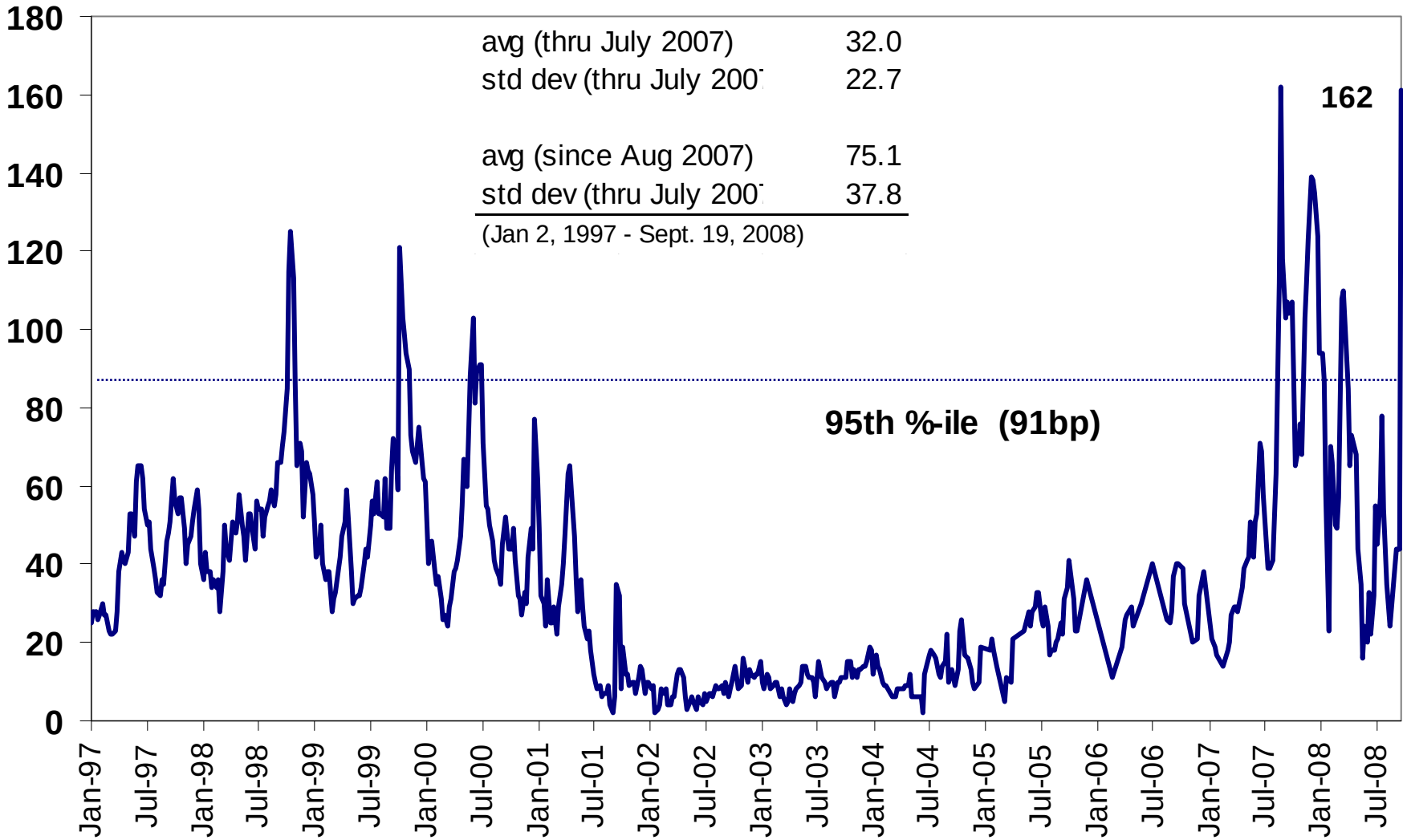
Time average of annualized bank stock return volatility and commitment ratio for bank with below-median levels of transaction deposits for 64 largest U.S. banks (plot is for 32 banks). Source: Volatility based on authors' calculations using data from CRSP. Commitment ratio is from Call Reports.

Conclusions (so far)

- Deposit-loan combination *reduces* bank risk
  - Idiosyncratic liquidity demands
- Risk-reducing synergy more powerful when paper-bill spreads are wide
  - Systematic liquidity demands
  - Helps with causality
- Results not due to other risks (market, credit)

3M non-fin CP spread (basis points)

weekly, Jan 1997 - Sept 2008



It’s good to be a (commercial) bank

- When short term funding, e.g. CP, in the capital markets dries up, go to your bank
- If you no longer wish to place your short term funds in ABCP, go to your bank
- How long can this go on?
  - Until balance sheet can grow no more
- Where does this leave investment banks?

What's going on now?

- Banks have been hoarding liquidity
  - Especially European banks
- Deposit flows
  - Foreign/domestic ..
- New Fed facilities
- And credit spreads?

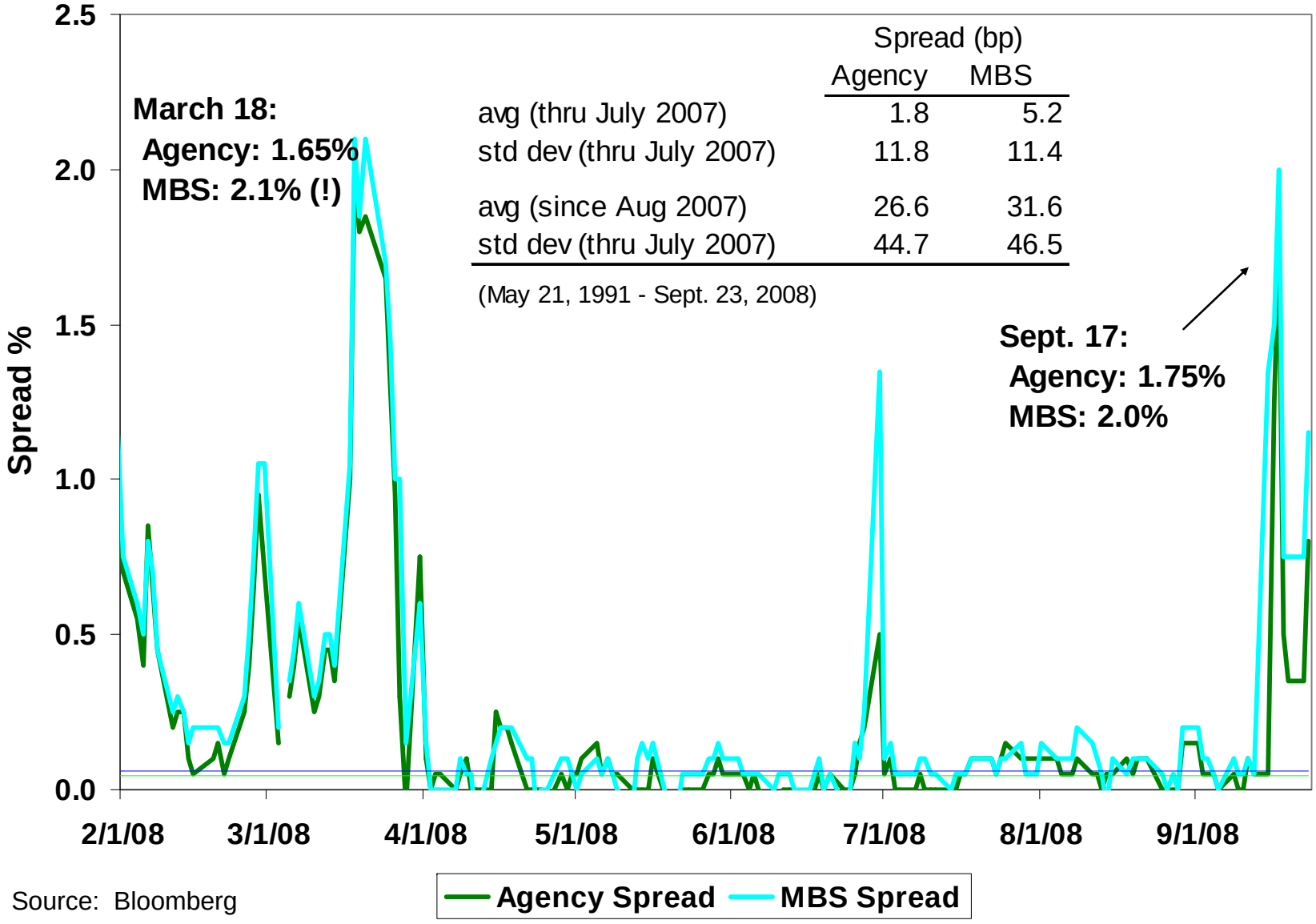
So what's happening to bank deposits?

Deposit Growth Rates

Quarter-over-quarter, all commercial banks

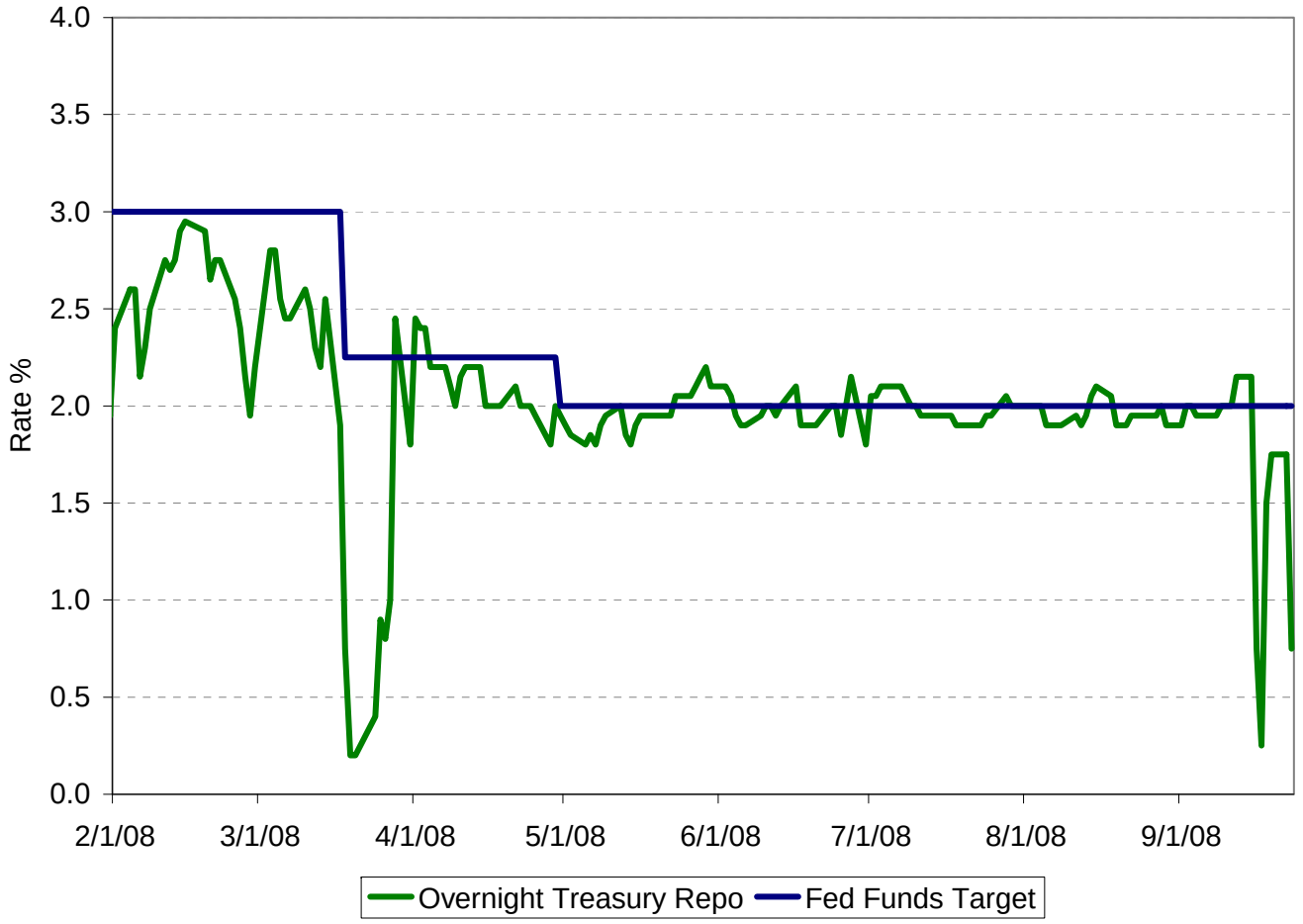
	Domestic	Foreign	Total
2001-2005	1.96	1.32	1.86
2006q1-2007q2	1.16	6.30	2.05
2007q3	0.82	6.97	2.07
2007q4	4.20	4.23	4.21
2008q1	2.23	-0.38	1.70
2008q2	-1.01	3.08	-0.16
Entire period	*1.75*	*2.60*	*1.91*

High overnight agency and MBS spreads to Treasury



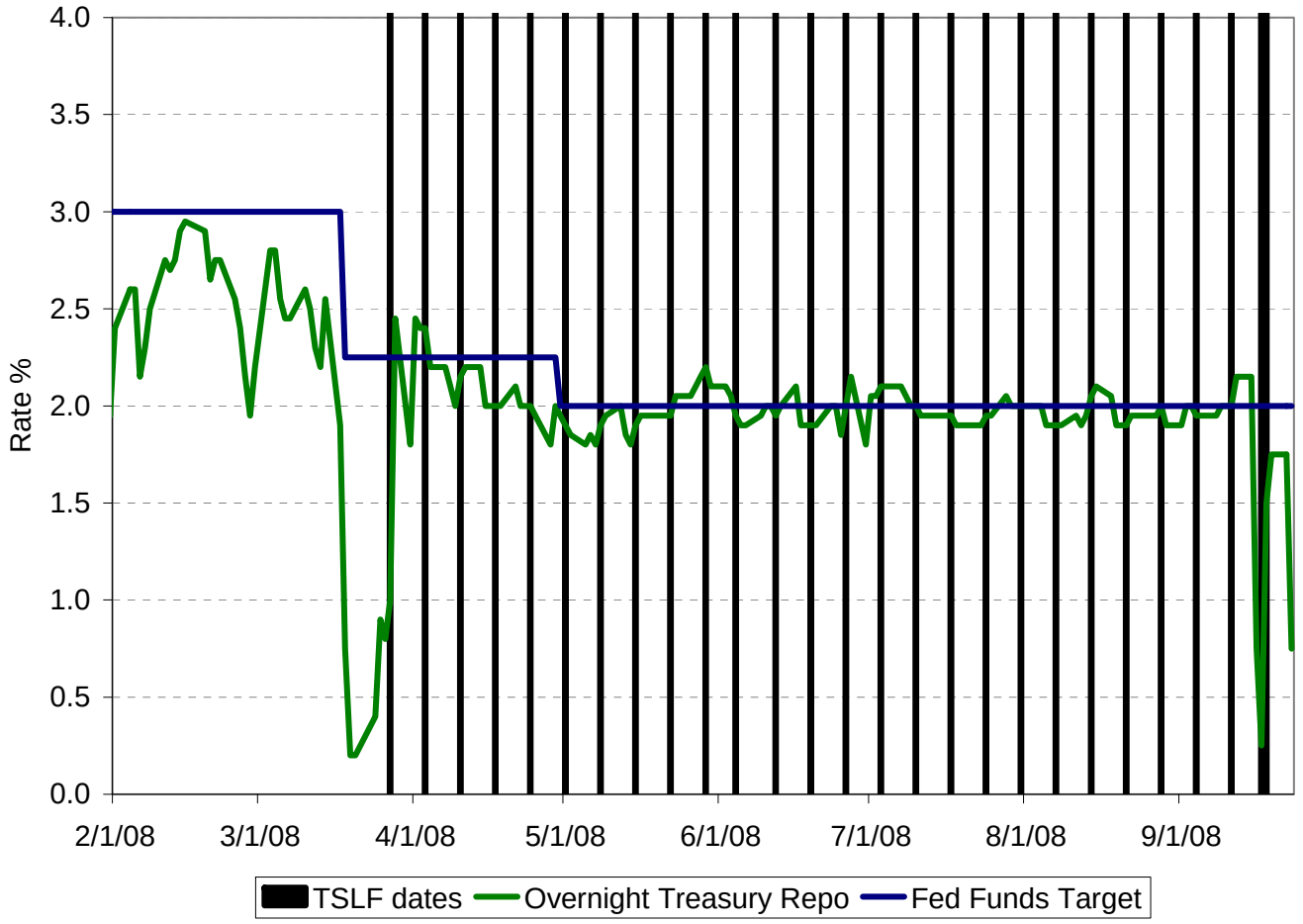
Source: Bloomberg

Abnormally low overnight Treasury repo rates



Source: Bloomberg, FRBNY

Abnormally low overnight Treasury repo rates



Source: Bloomberg, FRBNY

Problems addressed by new lending facilities

	Depository Institutions	Primary Dealers
Backstop Standing Facilities	Discount Window	Primary Dealer Credit Facility (PDCF)
Auction Facilities	Term Auction Facility (TAF)	Term Securities Lending Facility (TSLF)

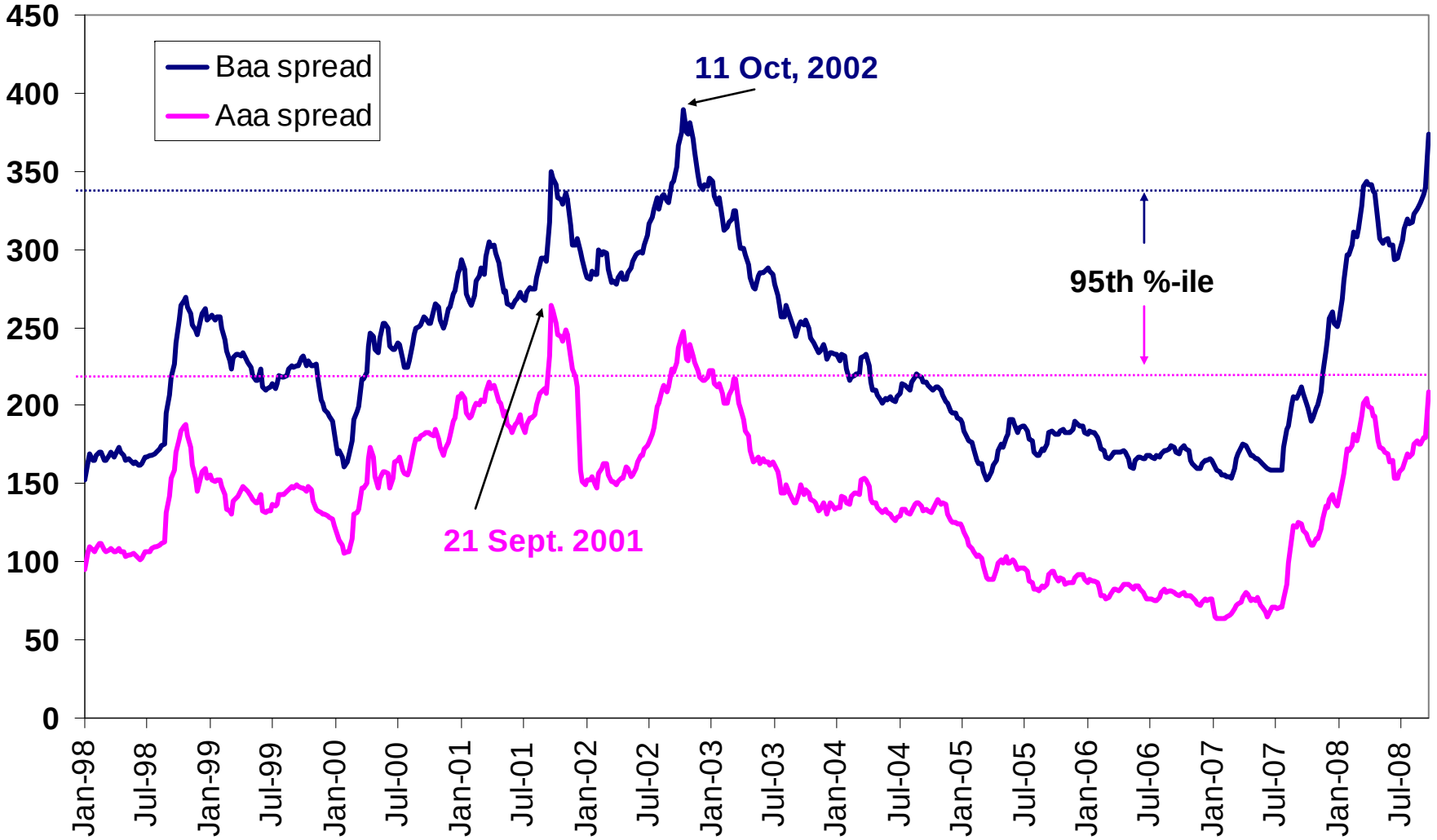
- TAF: illiquid term markets and the stigma that accompanies discount window borrowing.
- TSLF: illiquid functioning in repo funding markets—illustrated by abnormal rates and high haircuts.
- PDCF: the lack of market-based back-stop credit in repo markets.

What can you pledge at the TSLF & PDCF?

- TSLF: OMO collateral plus investment grade securities: private label RMBS, CMBS, Agency CMOs, ABS such as CDOs, CLOs,corporates, munis, MBS (R and C), ABS
  - So long as it can be priced by the clearing banks
- PDCF: above plus sub-investment grade securities plus equities
- Importantly, previously repo-able securitized instruments are no longer “stuck” on firms’ balance sheets
  - Facilities designed as liquidity vehicles

Baa and Aaa Spread (to Treasury)

weekly, Jan. 2, 1998 - Sept 19, 2008



Thank You!

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