

Financial Market Stability, Liquidity, and Systemic Risk

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* 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.

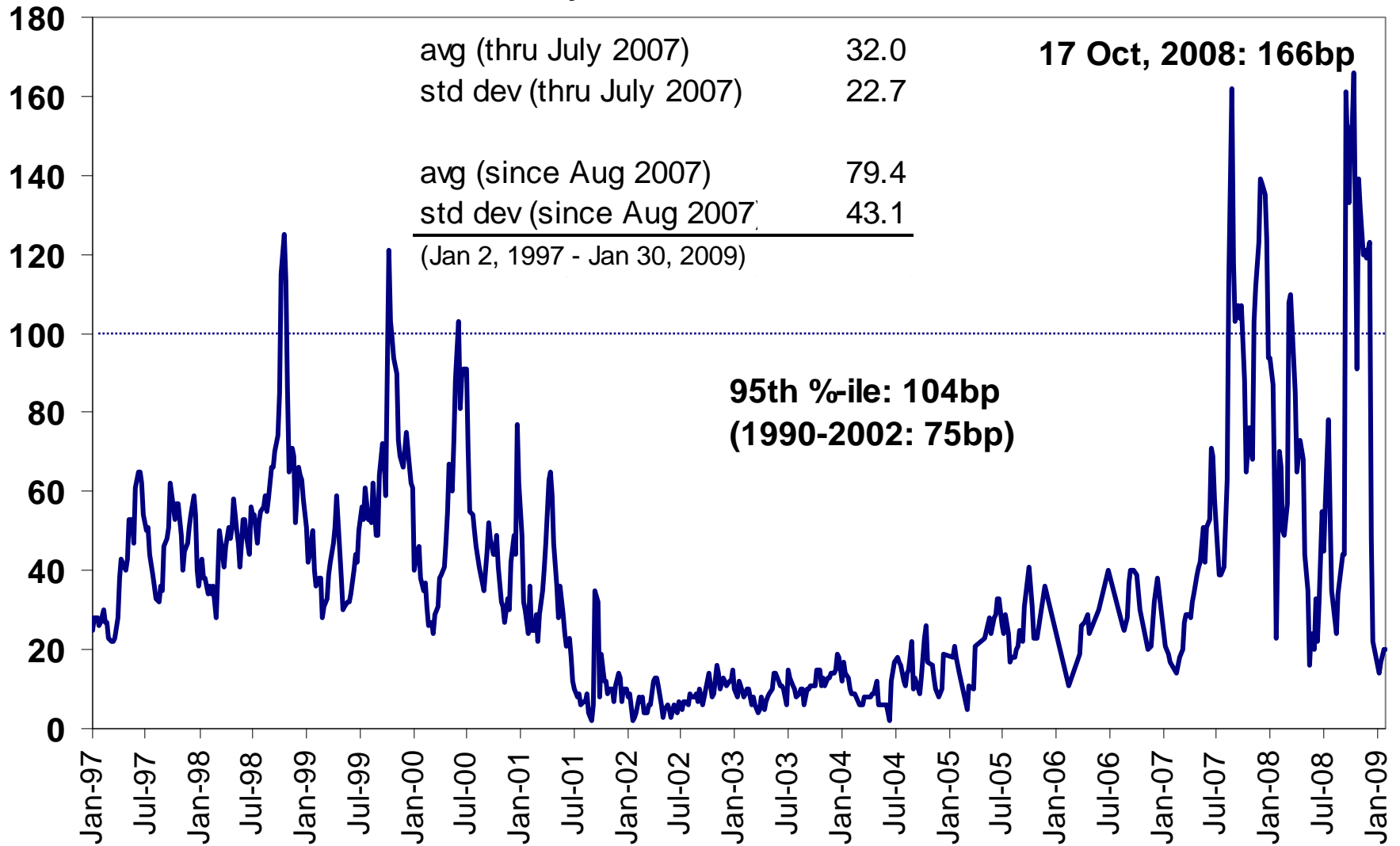
Words I thought I'd never hear

- Oh sh*\$, Lehman won't file for bankruptcy before Asia opens
- The interbank market is completely shut down
- An insurance company is systemically important
- \$2 trillion rescue plan and the market drops 5%
- WSJ uses the N word Nationalization

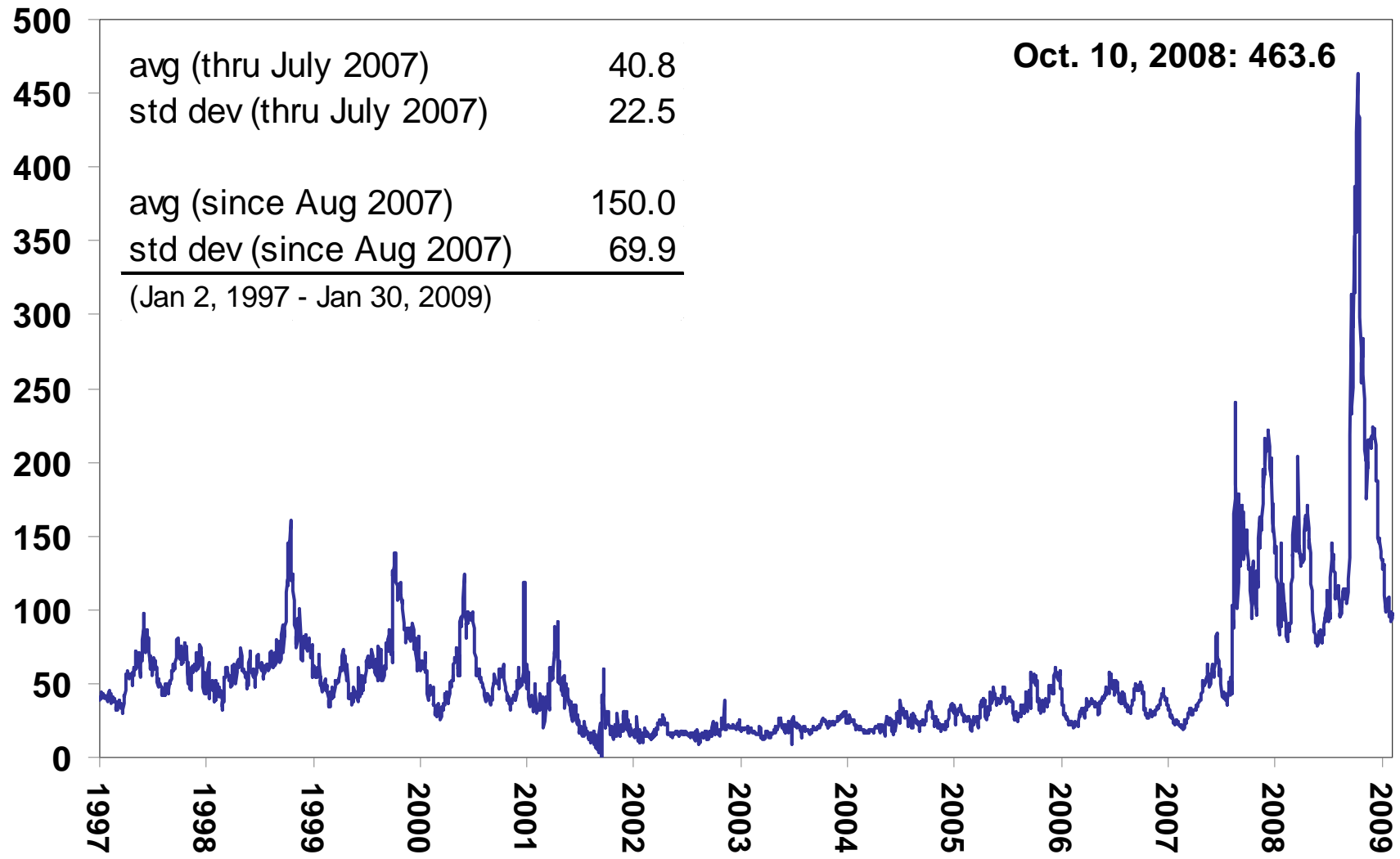
“Europe simulates financial meltdown”

(Headline in FT, April 10, 2006, p.2)

3M non-fin CP spread (basis points) weekly, Jan 1997 - Jan 2009

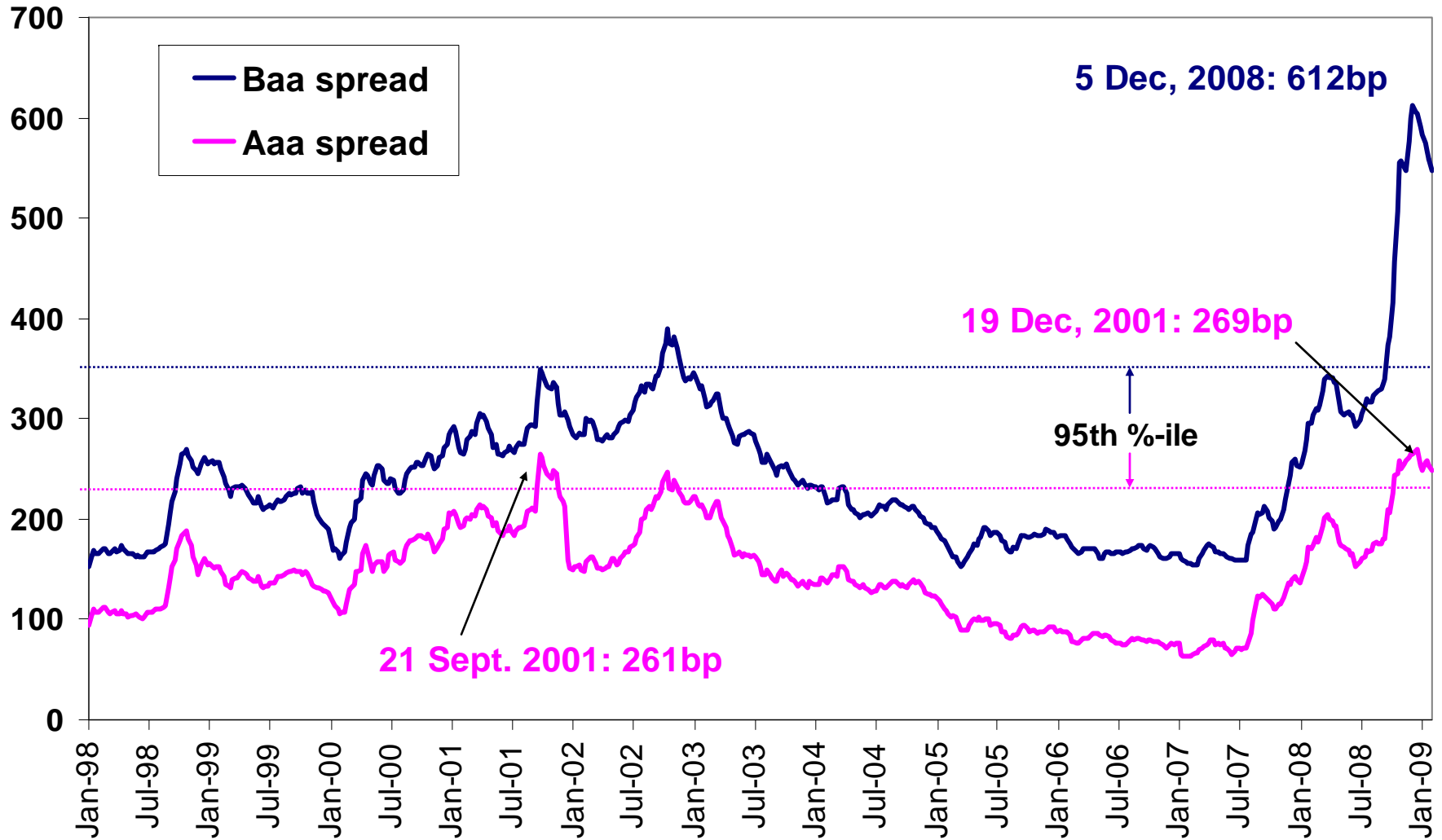


3M TED Spread Jan 2, 1997 - Feb 6, 2009

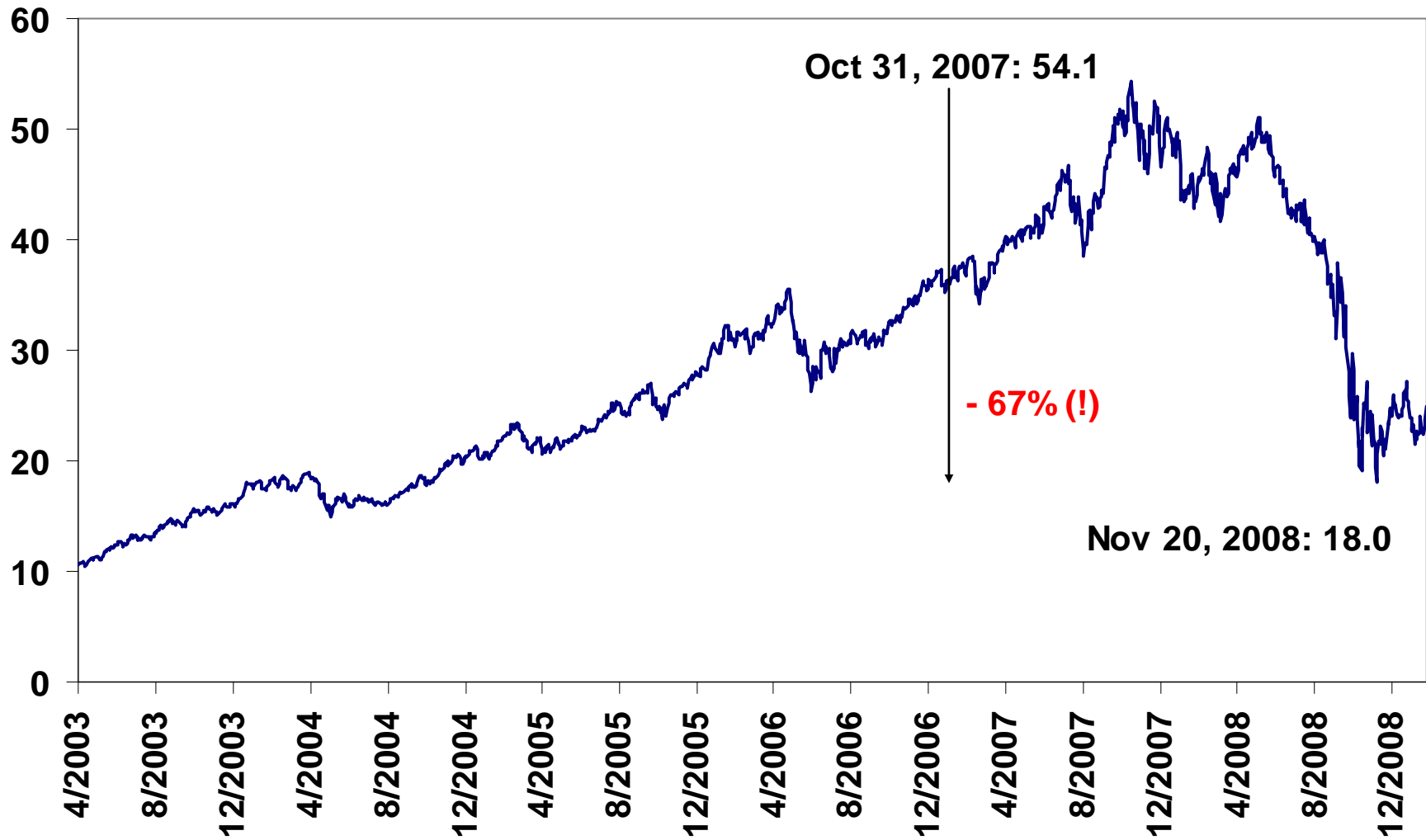


Baa and Aaa Spread (to Treasury)

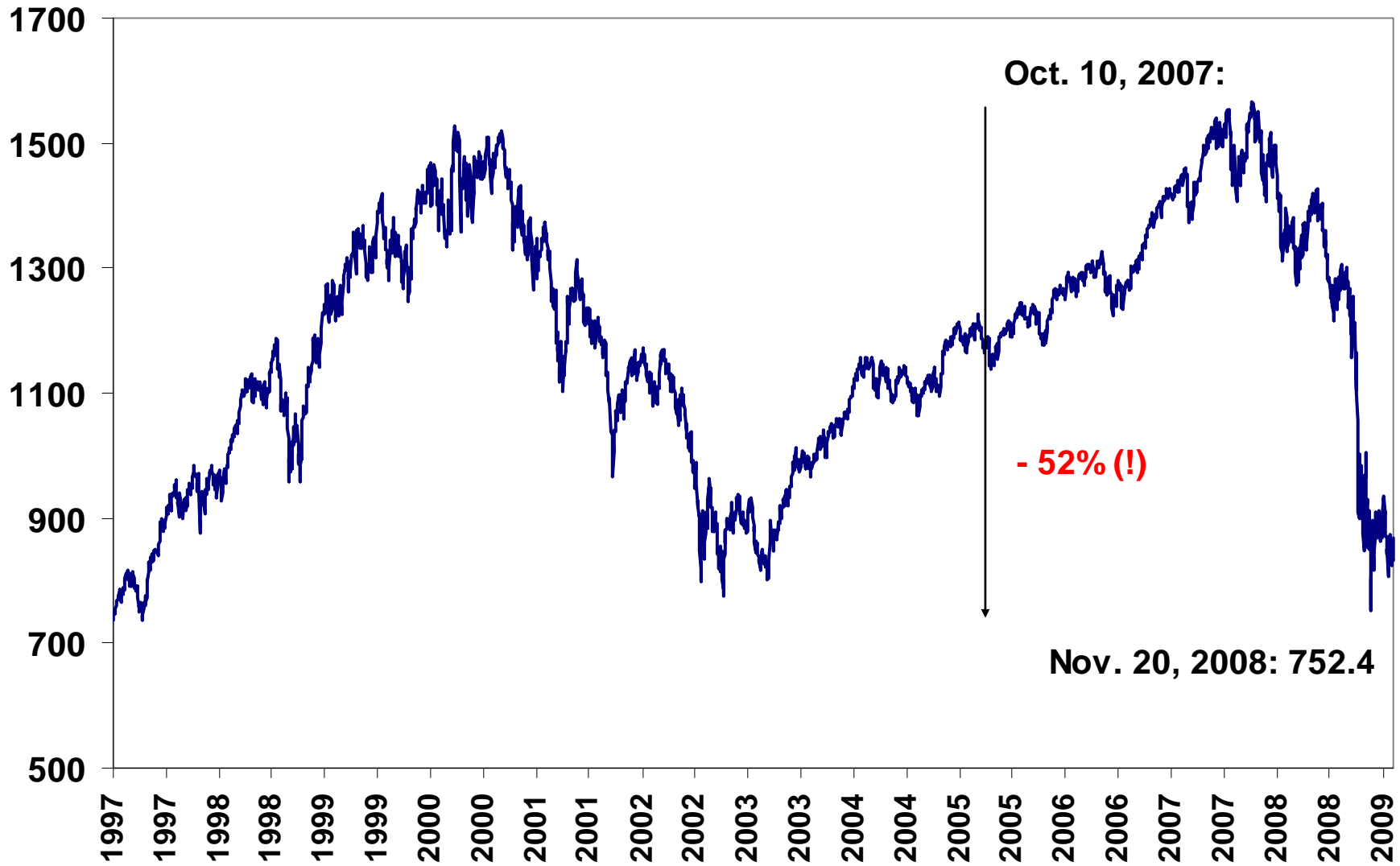
weekly, Jan. 2, 1998 - Jan 30, 2009



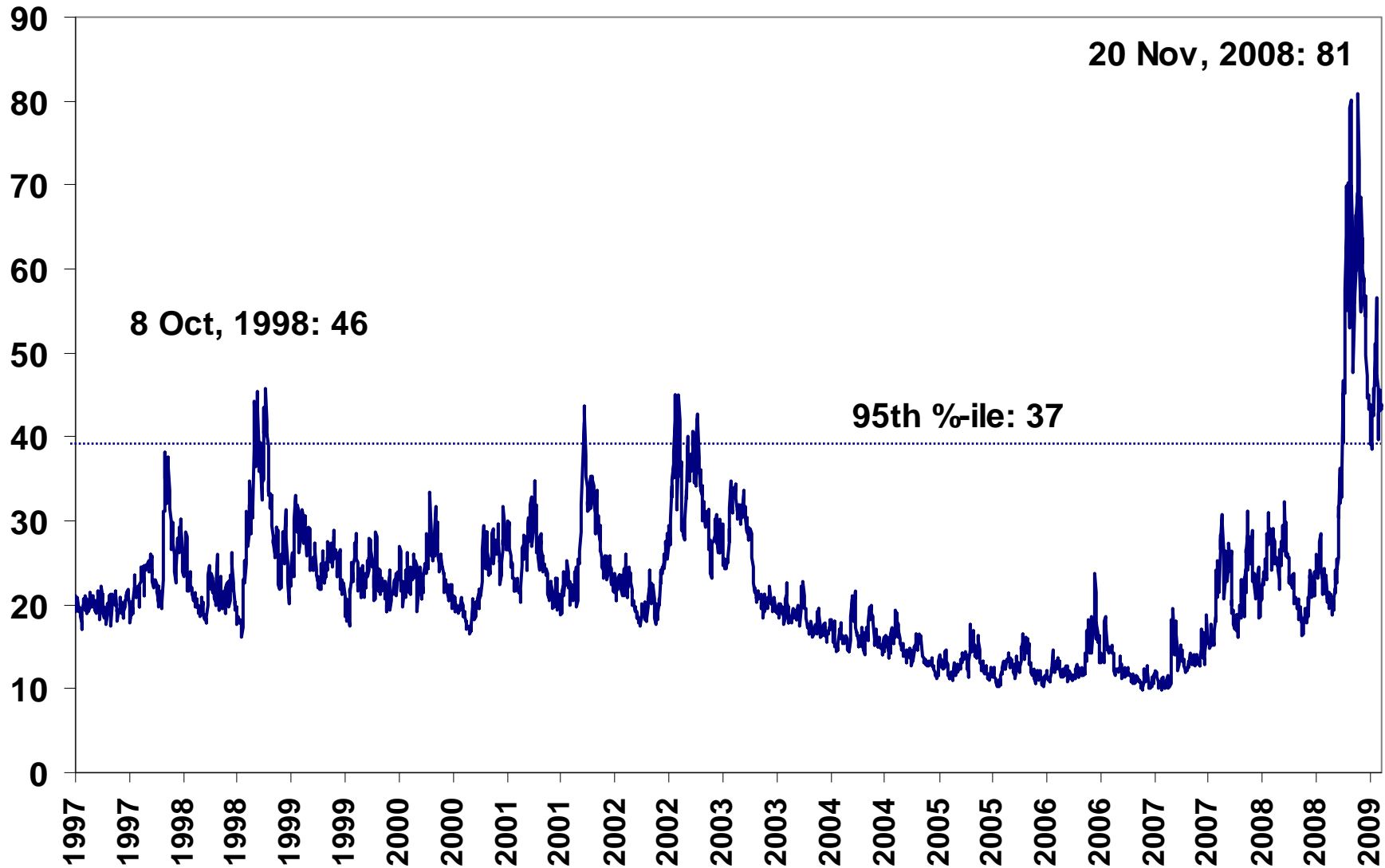
MSCI Emerging Markets (daily) 4/15/2003 - 2/6/2009



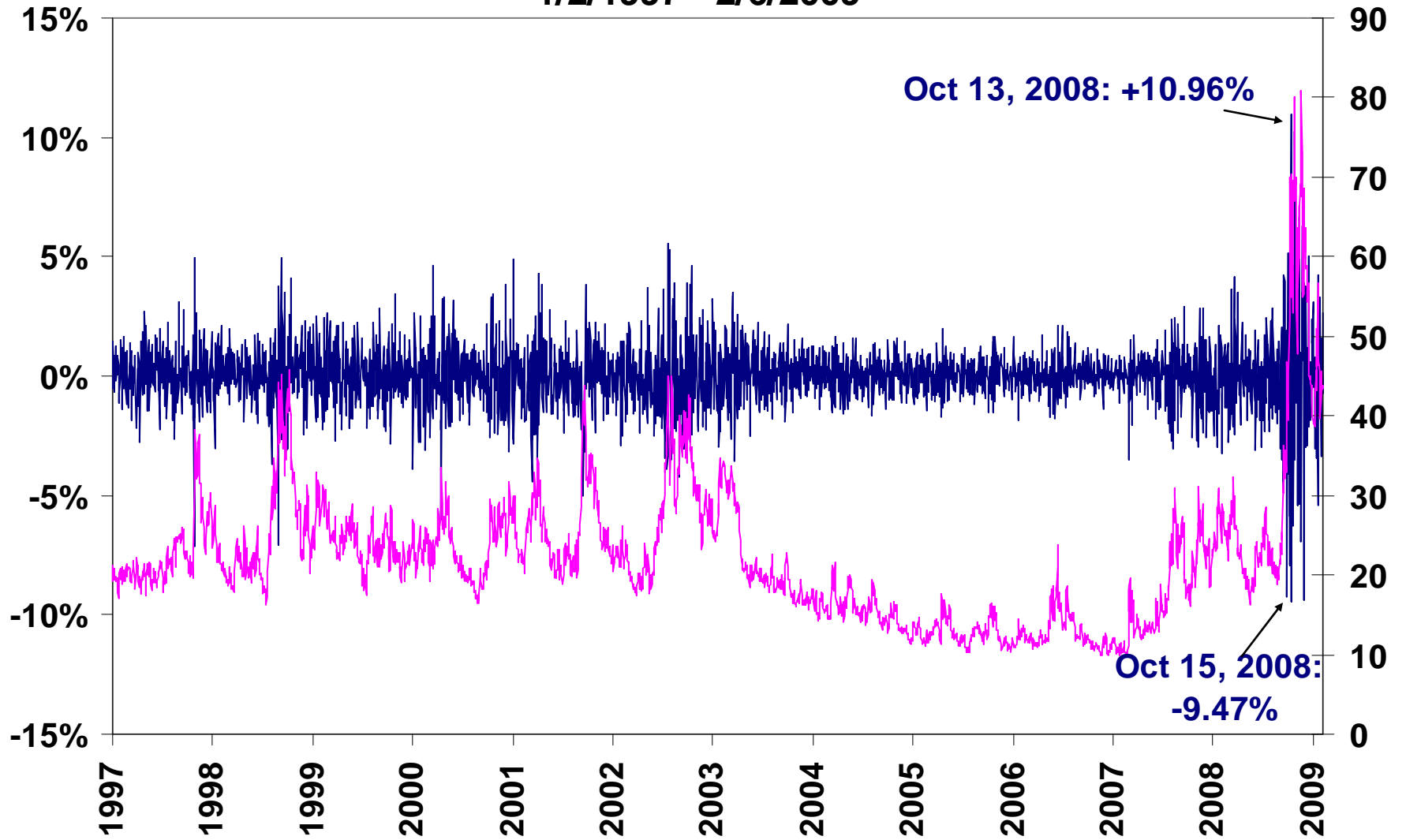
S&P500: Daily, 1/2/1997 - 2/6/2009



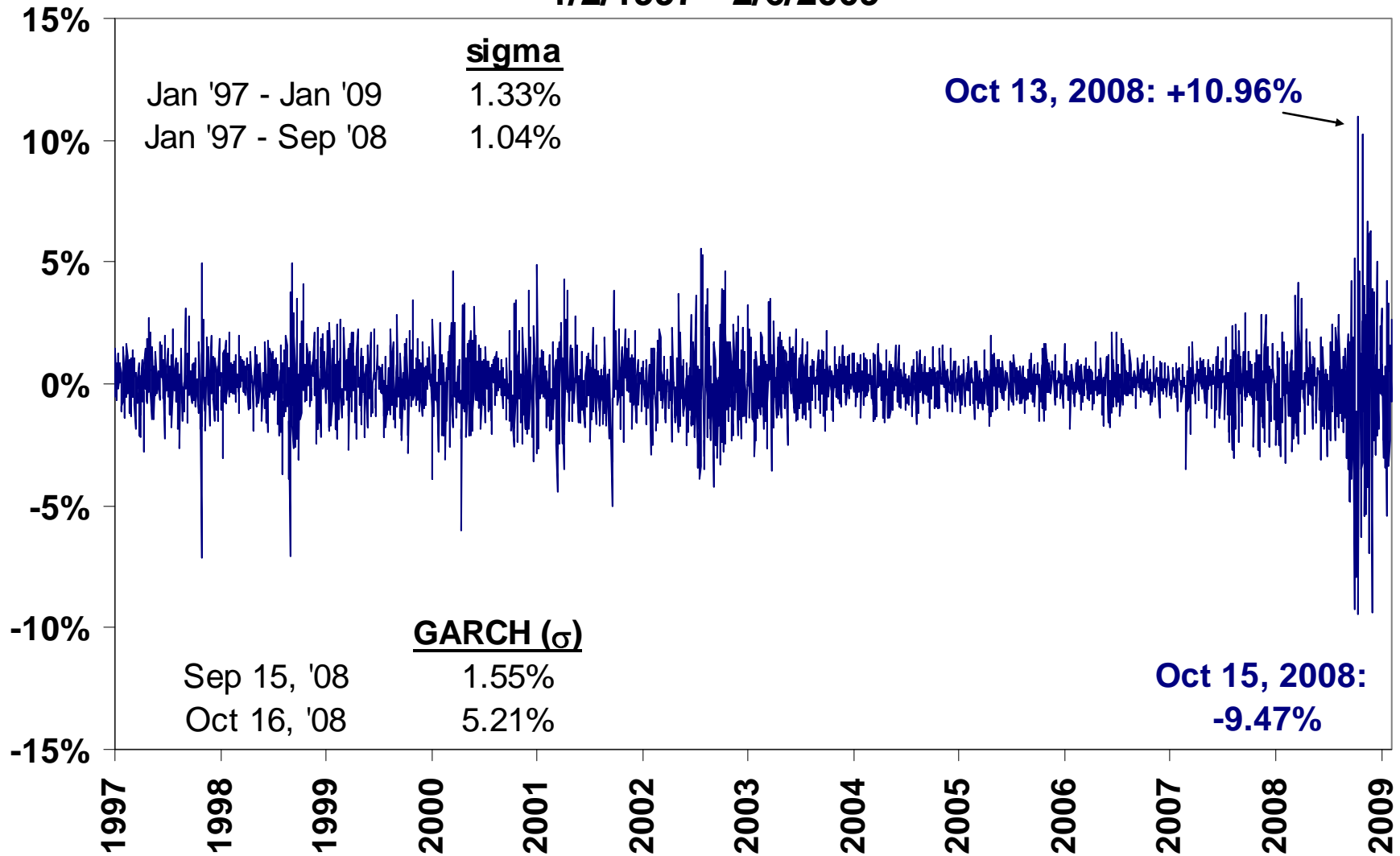
VIX: Daily, 1/2/1997 - 2/6/2009



S&P500 Daily Returns; VIX 1/2/1997 - 2/6/2009

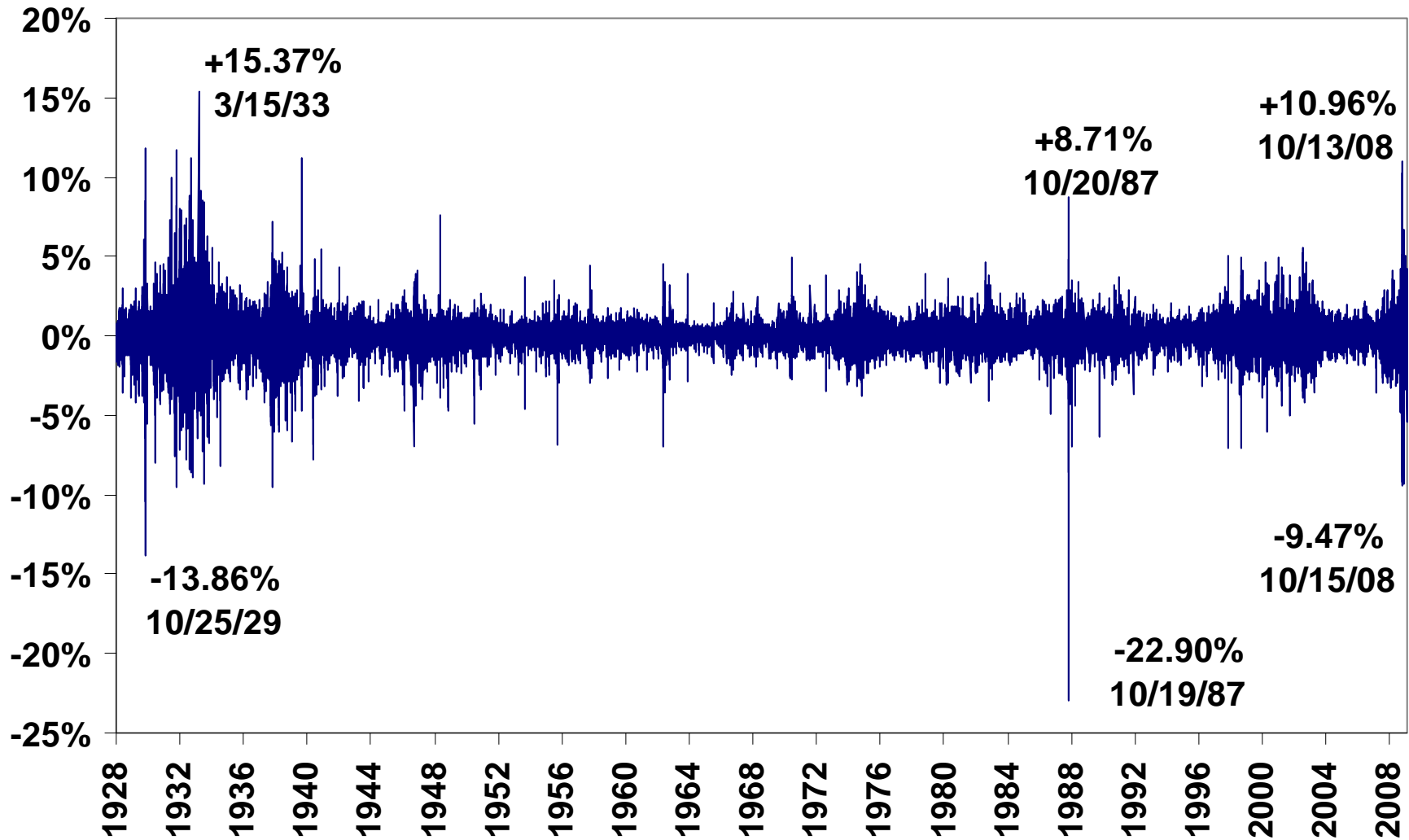


S&P500 Daily Returns 1/2/1997 - 2/6/2009



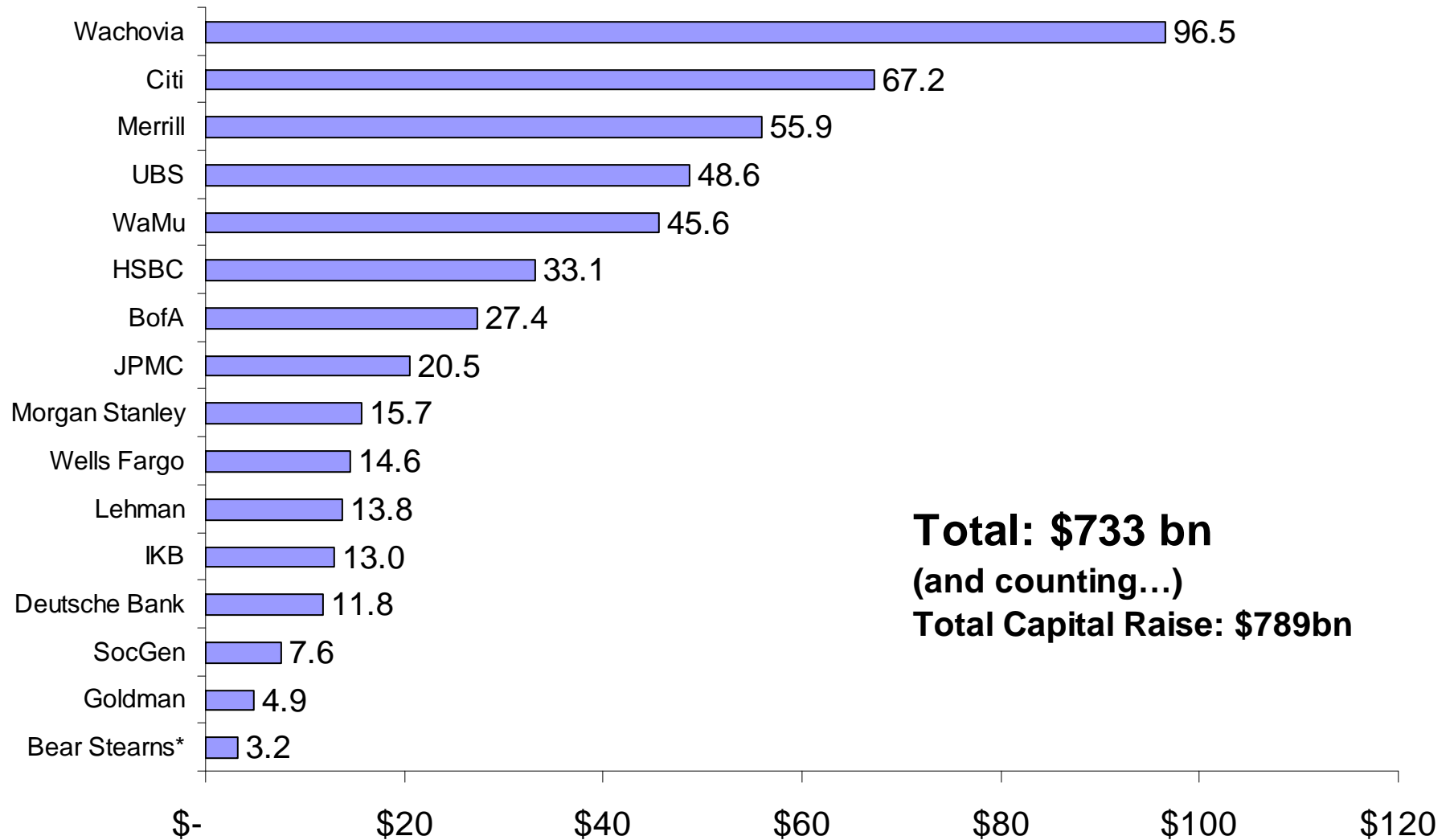
S&P500 Daily Returns

Jan. 3, 1928 - Feb. 6, 2009



Bank Write Downs

billions; through December 15, 2008



The shadow and “actual” banking system

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

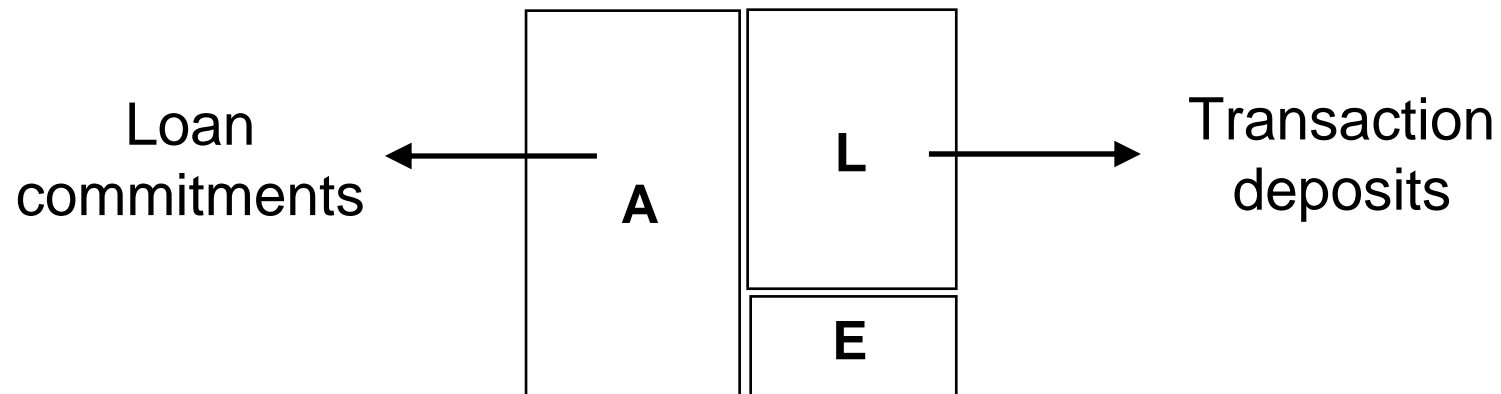
 - Assets of 5 U.S. BHCs: \$6 trn
 - Assets of all U.S. banks: \$10 trn
- Typically about 40% of consumer debt is securitized
 - No more; now it has to go back on to banks' BSs
- Meanwhile, sum of write-offs to date ($>$ \$700bn) exceeds cost of S&L crisis (\sim \$250bn in current \$)

Banks as liquidity providers and maturity transformers

- ALM is a dominant, hard to measure (manage?) risk
 - It is central to what banks do
- Banks (commercial and investment) are naturally longer assets than liabilities
 - In intermediating they conduct maturity transformation for the economy
 - They bear risk – and are compensated
 - And subsidized (through the existence of safety net)
- And banks are liquidity providers of second to last resort

Bank liquidity management

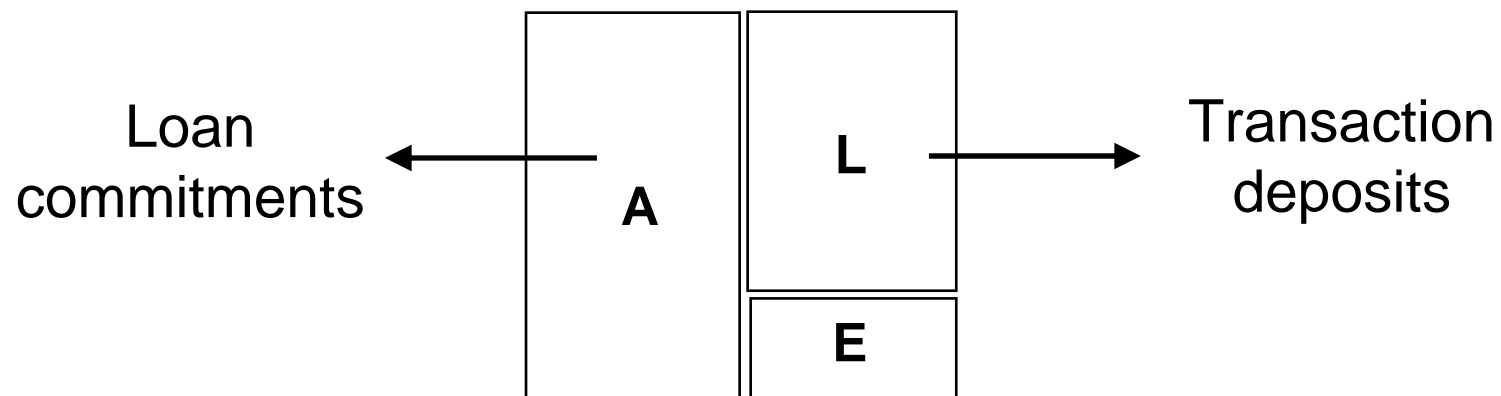
- A bank offers two short-term liquidity contracts



- 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) Gatev, Schuermann & Strahan, NBER 2005, RFS 2009
- Seems related to government safety net
 - Funding flows not related to bank solvency or size
 - Effects absent prior to FDIC (Pennacchi JME 2006)

What's going on now?

- Banks have been hoarding liquidity
- Deposit flows
 - Foreign/domestic
- Bank balance sheets are growing
 - “Voluntarily”?
 - Banks are clearly re-intermediating as the “shadow banking system” is shrinking
 - But are they extending enough new credit?
- New Fed facilities
 - To help with liquidity (TAF, TSLF, PDCF)
 - To also help with credit provision (CPFF, TALF)

Problems addressed by new lending facilities

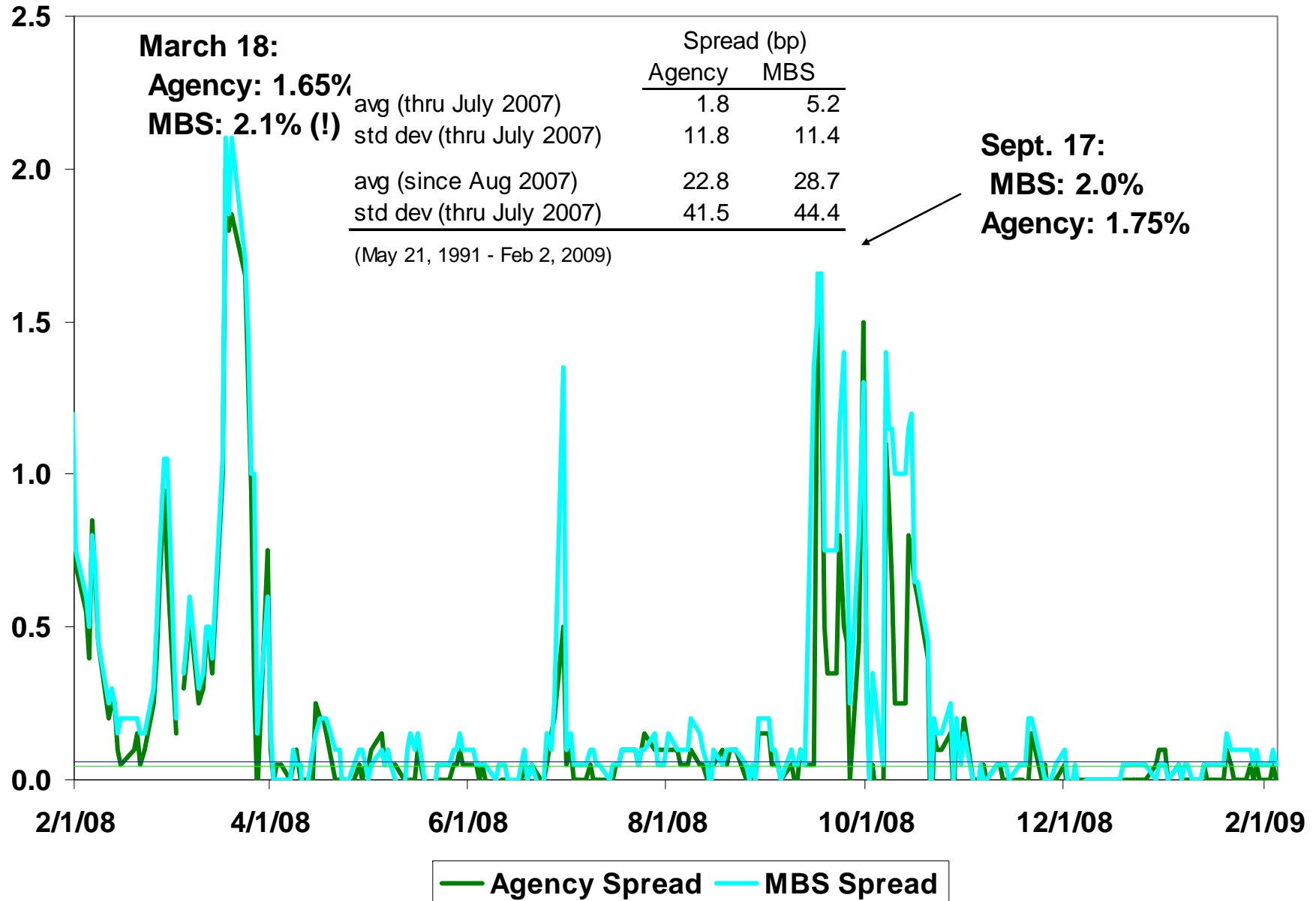
	<u>Depository Institutions</u>	<u>Primary Dealers</u>
Backstop Standing Facilities	Discount Window	Primary Dealer Credit Facility (PDCF)
Auction Facilities	Term Auction Facility (TAF)	Term Securities Lending Facility (TSLF)

- 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.

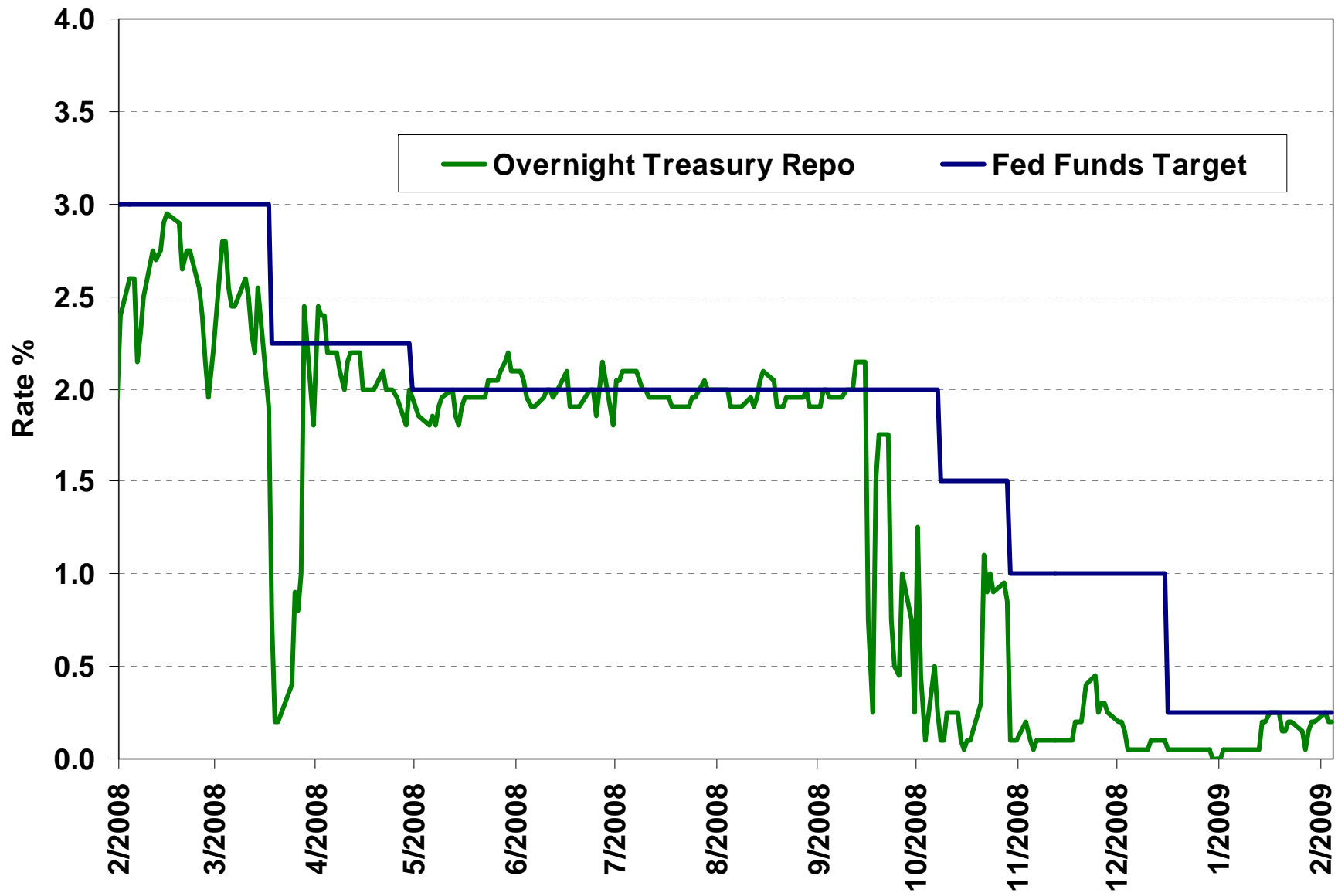
What can you pledge at the TSLF & PDCF?

- 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
- TALF: re-ignite consumer debt securitization

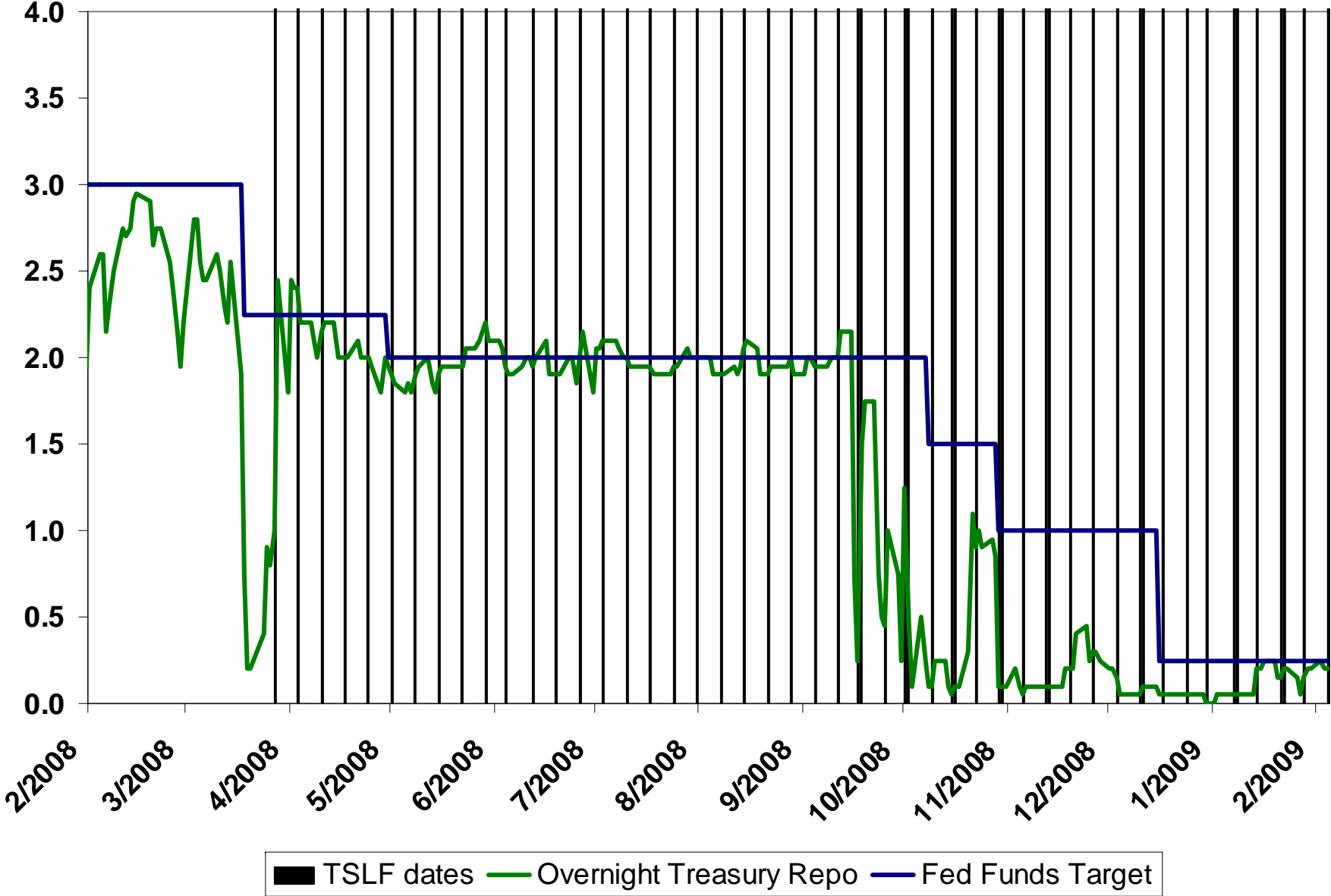
Spread to Agencies: flight to quality



Flight to quality



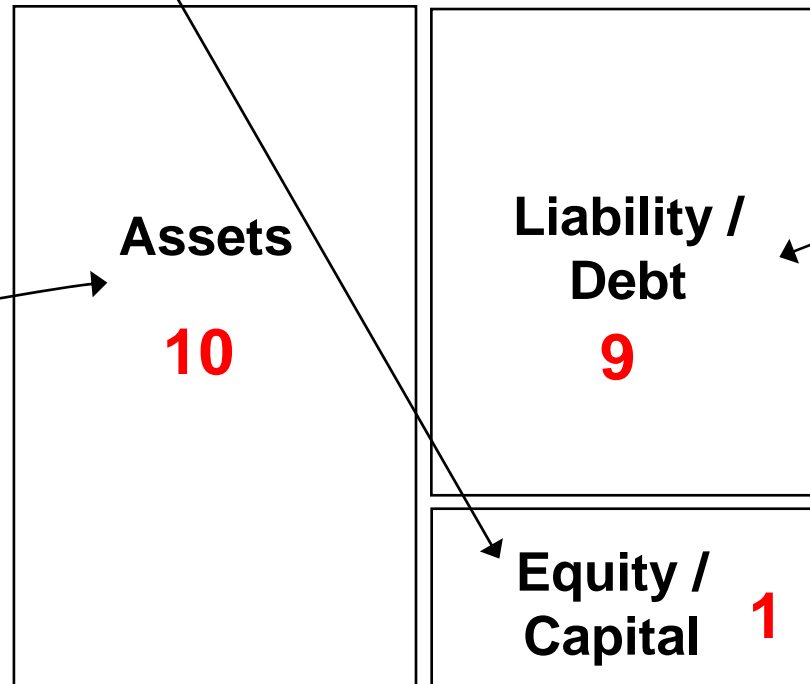
Impact of TSLF



A suite of policy tools

EESA: Emergency Economic Stabilization Act

- TARP: Troubled Asset Purchase Program
- CPP: Capital Purchase Program
- TLGP: Temporary Liquidity Guarantee Program



Leverage: 10:1
Ratio: 10%

Asset purchase: Price > Mark

- Treasury buys troubled assets:
 - Spends \$2 (cash) to buy assets “marked” \$1

Assets 11	Liability / Debt 9
	Equity / Capital 2

Leverage: 11:2
(5.5:1)
Ratio: 18.2%

Asset purchase: Price < Mark

- Treasury buys troubled assets:
 - Spends \$0.5 (cash) to buy assets “marked” \$1

Assets 9.5	Liability / Debt 9
	Equity / Capital 0.5

**Leverage: $9\frac{1}{2}:1\frac{1}{2}$
(19:1)
Ratio: 5.3%**

Capital injection

- Treasury buys preferred shares (capital injection:
 - Spends \$1 to buy \$1 of preferred shares
 - Proceeds used to buy safe(r) assets

Assets 11	Liability / Debt 9
	Equity / Capital 2

Leverage: 11:2
(5.5:1)
Ratio: 18.2%

Capital injection for debt retirement

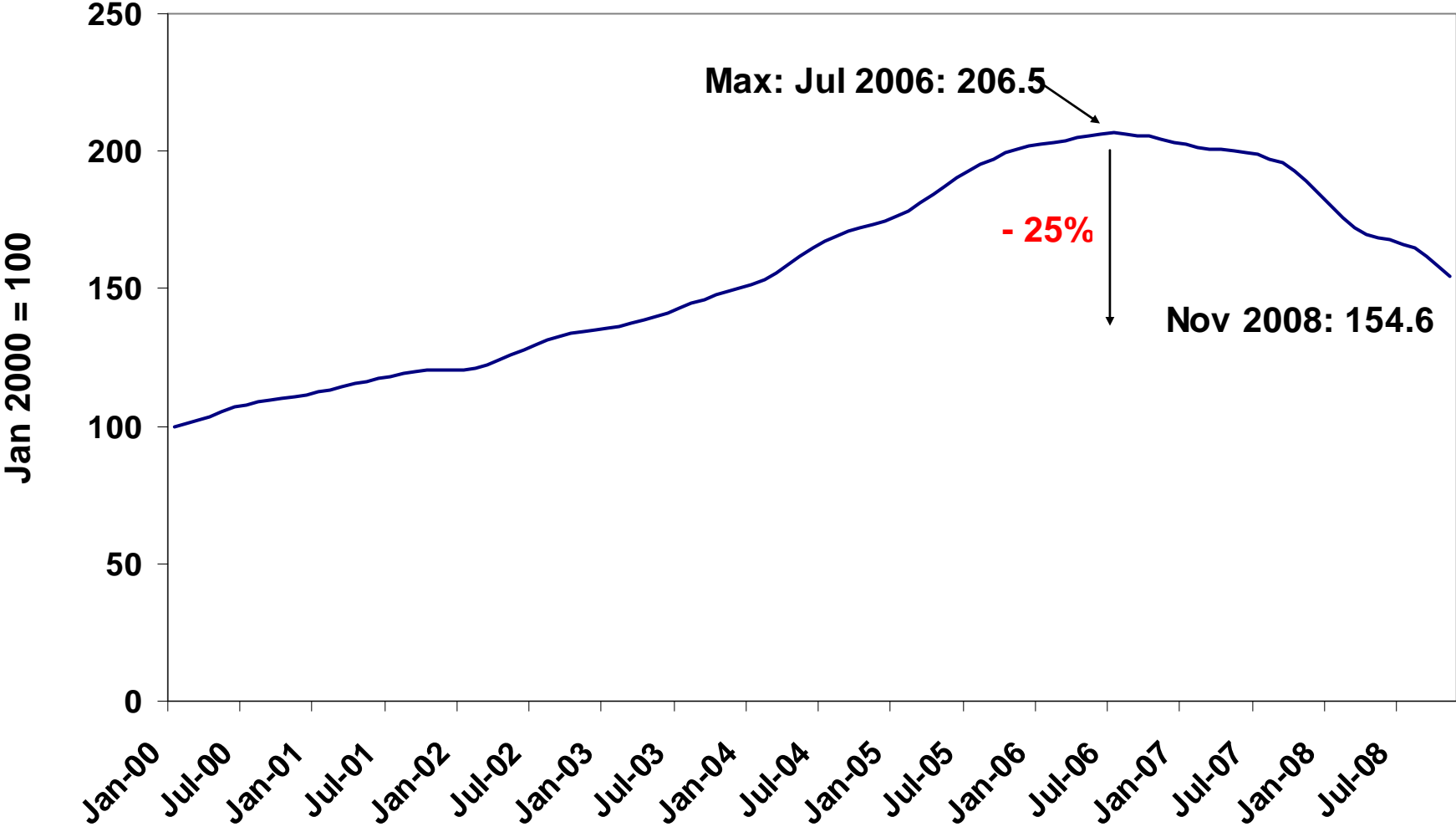
- Treasury buys preferred shares (capital injection:
 - Spends \$1 to buy \$1 of preferred shares
 - Firm retires \$1 of debt

Assets 10	Liability / Debt 8
	Equity / Capital 2

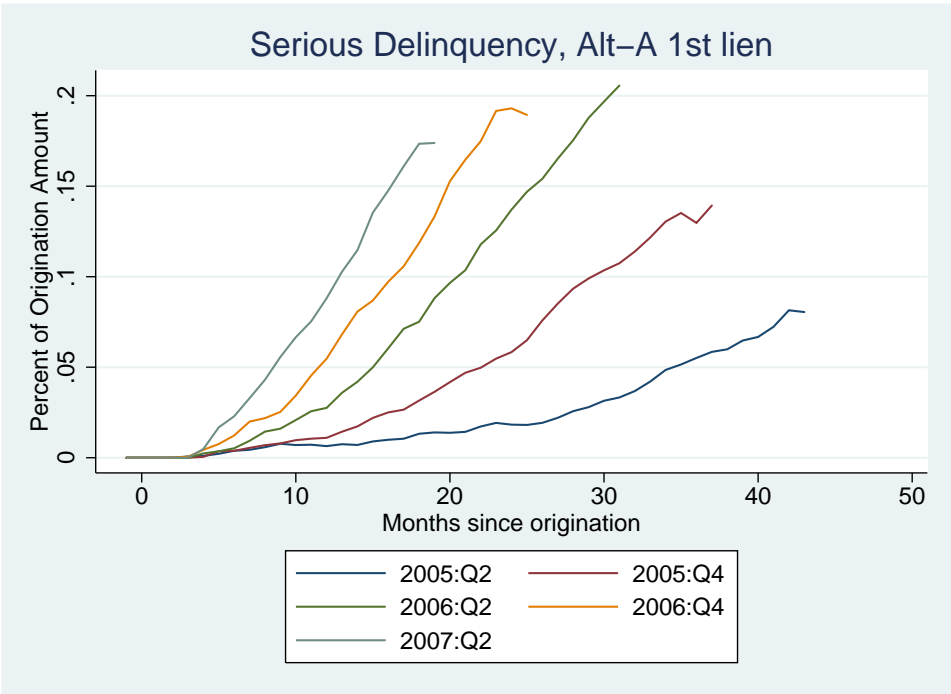
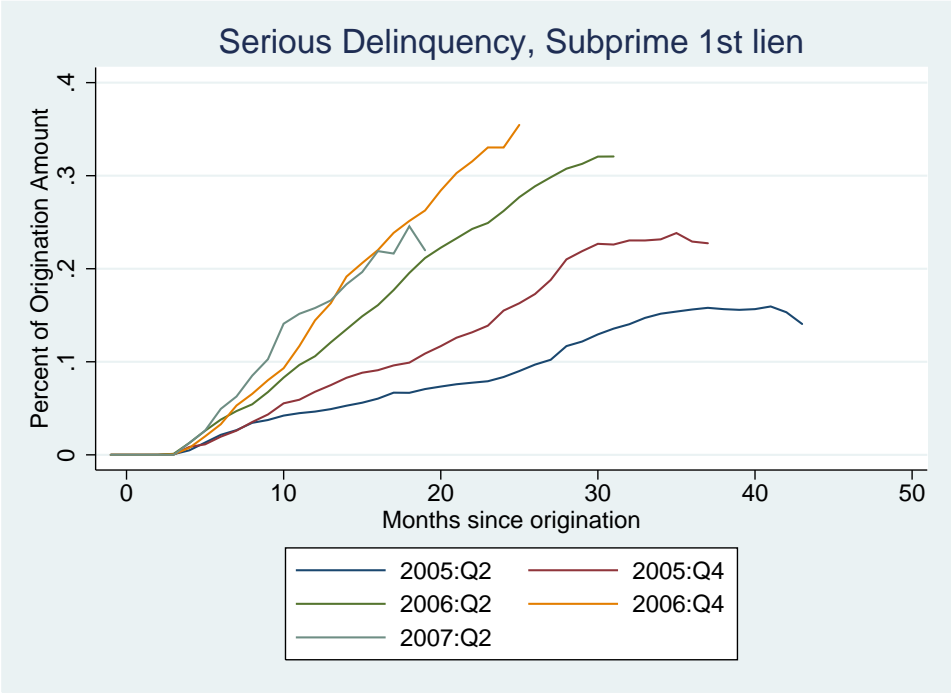
**Leverage: 10:2
(5:1)
Ratio: 20%**

What about housing?

Case Shiller 20-City Index
Jan 2000 - Nov 2008

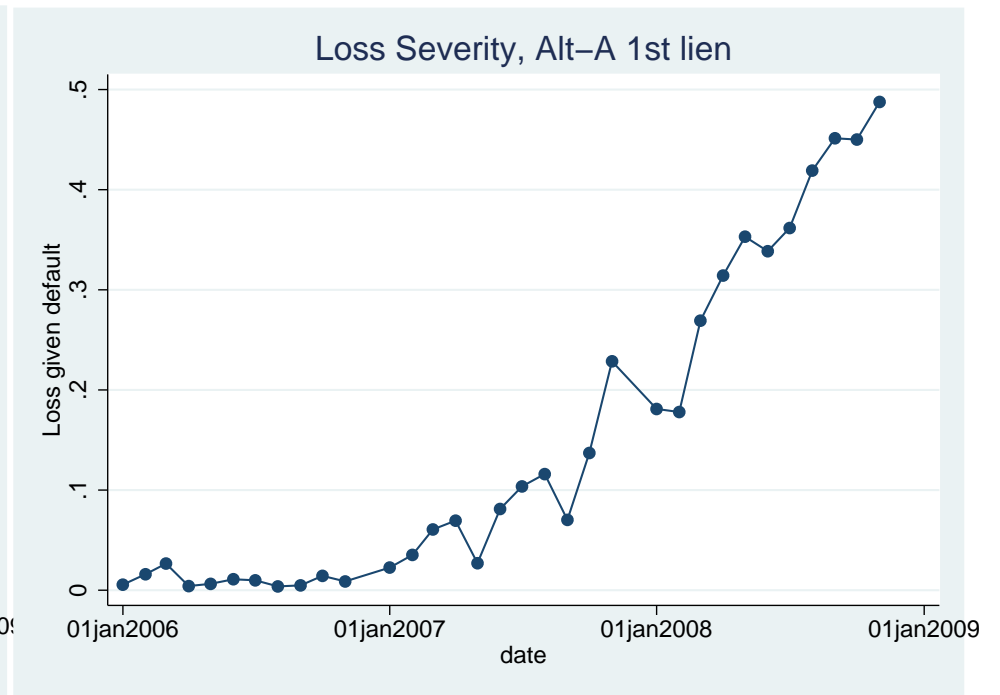
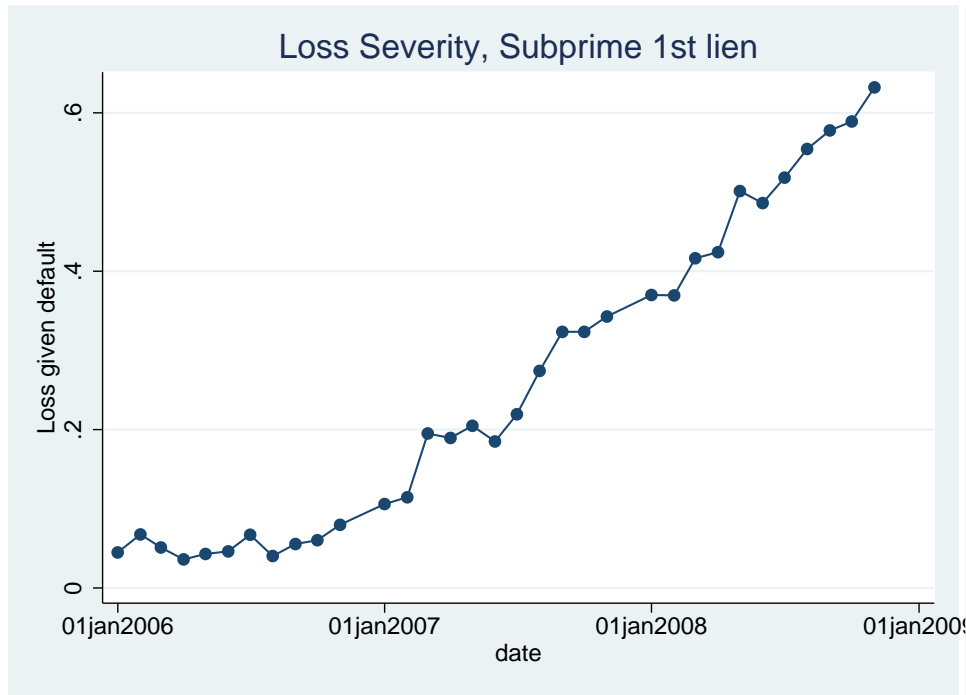


Subprime: Serious delinquencies by class and vintage



Subprime: Loss severity by class

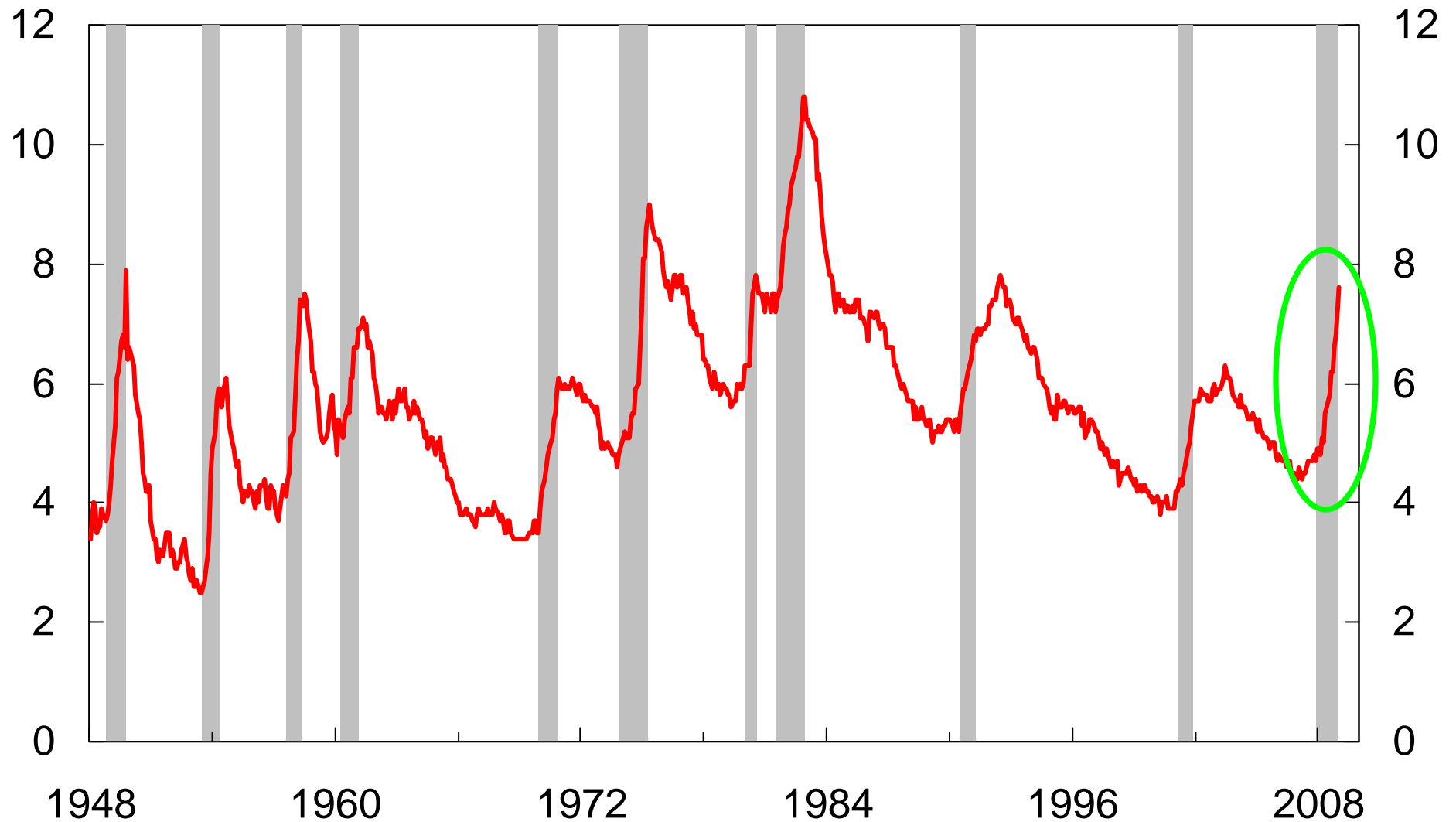
- Starting to see LGD > 60%!



Unemployment Rate

Percent

Percent

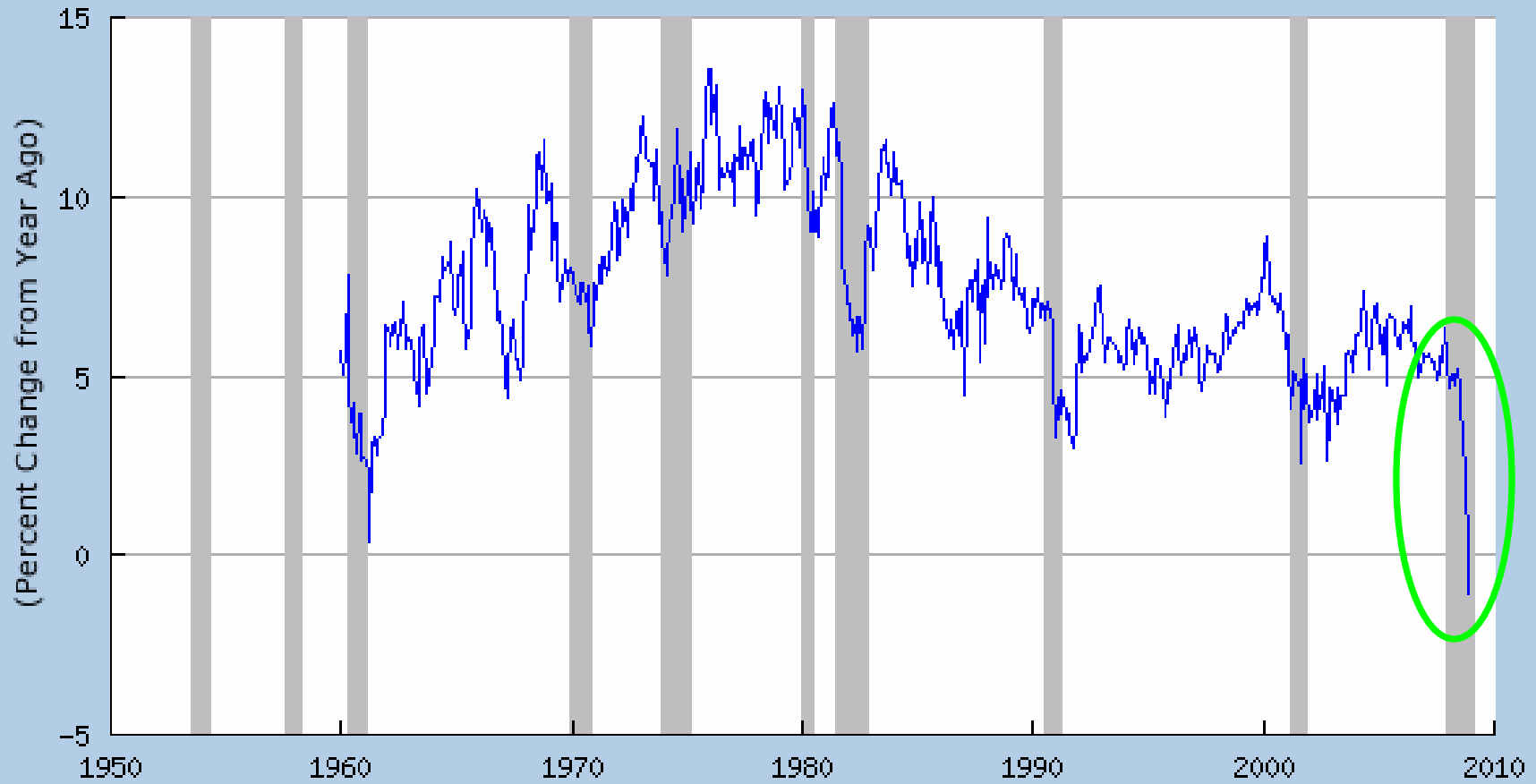


Source: Bureau of Labor Statistics

Note: Shading represents NBER recessions.

Personal Consumption Expenditures (PCE)

Source: U.S. Department of Commerce: Bureau of Economic Analysis



Shaded areas indicate US recessions as determined by the NBER.
2009 Federal Reserve Bank of St. Louis: research.stlouisfed.org

Really Unpredictable? Extreme Tail Estimation

(joint work with Ben Iverson, HBS)

- Use Extreme Value Theory (EVT) to model extreme events in financial markets
- Method: fit exceedances over chosen threshold to Generalized Pareto Distribution to model extreme quantiles
 - Returns, de-clustered with volatility from GARCH-family
- Perform this estimation for 47 global financial series including stock market indices, foreign exchange rates, commodities prices, and interest rates
 - Average of 25yrs of daily data; min = 5 yrs (Dubai EQ), max = 80 yrs (S&P500)

Extreme Tail Estimation: Results

- Three main results:
 - Magnitude of extreme quantiles (even 0.05% and 99.95%) homogeneous across geographic regions and asset classes
 - Tail shape estimated using data through the end of 2006 is very similar to shape estimated from data through 2008
 - Exception: Short-term interest rates have fatter and less stable tails than other series

Of 10 most extreme (negative/positive) daily returns, how many in 2008? Equities

	Raw Returns		Standardized Returns		# of Yrs
	<u>Negative</u>	<u>Positive</u>	<u>Negative</u>	<u>Positive</u>	
S&P 500	2	2	0	0	80.7
Mexico Bolsa	2	2	0	1	19.9
Brazil Bovespa	1	2	0	1	16.7
Chile IPSA	4	2	2	0	19.8
Toronto S&P/TSX Composite	5	7	0	1	32.0
FTSE 100	5	7	2	1	25.1
CAC 40	4	5	2	1	21.5
DAX	4	4	1	1	37.9
FTSE Eurotop 100	7	5	1	2	19.4
Russia RTS Index \$	3	2	2	0	13.2
Turkey ISE National 100	0	1	0	1	18.7
Tel Aviv 100	4	2	1	1	16.6
Dubai DFM General Index	7	5	4	2	5.4
Nikkei 225	6	4	0	0	37.2
Hang Seng	1	3	0	0	34.0
Shanghai Stock Exchange Composite	1	2	1	0	13.4
Sydney All ordinaries	3	4	0	0	29.1
SET Index (Stock Exch of Thai)	2	0	1	0	20.9
Bombay BSE SENSEX 30	2	1	1	0	26.4
Singapore All	0	0	0	0	26.8

Of 10 most extreme (negative/positive) daily returns, how many in 2008? Other...

	Raw Returns		Standardized Returns		# of Yrs
	<u>Negative</u>	<u>Positive</u>	<u>Negative</u>	<u>Positive</u>	
\$/Euro	6	8	2	1	10.4
yen/\$	1	1	0	0	39.3
\$/pound	2	1	0	0	39.3
Swiss Franc/\$	1	0	0	0	39.3
\$/Deutsche Mark	0	0	0	0	39.3
West Texas Crude	0	3	0	1	25.3
Gold 100 Oz. future	1	0	0	0	33.8
Silver \$/Oz.	4	3	0	0	25.5
Copper \$/metric ton	4	4	0	0	22.8
Wheat 3mo future contract	7	7	4	2	17.2
Goldman Sachs Commodities Index	8	9	3	1	8.6
US Gov't 3 mo.	10	10	3	0	26.1
Germany Gov't 3 mo.	4	1	3	0	15.7
JPY 3 mo. LIBOR	0	0	0	0	19.0
GBP 3 mo. LIBOR	2	0	1	0	22.0
US Gov't 10 yr.	8	7	1	0	47.2
Germany Gov't 10 yr.	7	2	0	0	20.3
Japan Gov't 10 yr.	0	0	1	0	21.2
UK Gov't 10 yr.	6	3	0	0	20.5
JPM EMBI+	8	9	3	1	5.5
Moody's Corp. Aaa Index	6	5	0	0	25.9
Moody's Corp. Baa Index	5	0	2	1	22.9

Final thoughts

- Biggest financial market disruption in my lifetime
- Policy makers – central banks, fiscal authorities – working to prevent the biggest real economic disruption in my lifetime
- “Unprecedented” “never in my career”
 - But un-forecastable?
- Everything is endogenous . . . for a central banker

Thank You!

<http://nyfedeconomists.org/schuermann/>