

A CRISIS  
*of*  
BELIEFS

INVESTOR PSYCHOLOGY  
*and* FINANCIAL  
FRAGILITY



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NBER

July 2018

# Main Points:

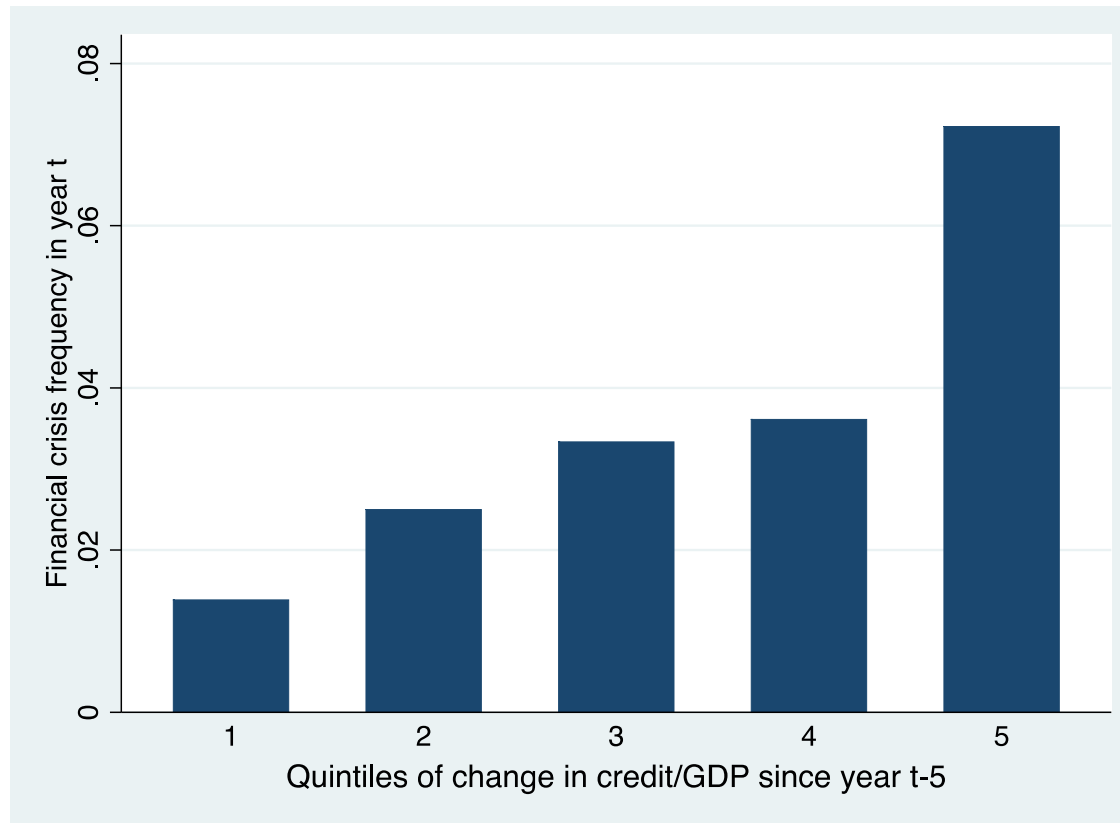
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- Revival of research on credit cycles shows that financial crises follow credit expansions, are long time coming, and in part predictable
- US housing bubble and the crisis of 2008 look very much like a standard credit boom followed by a crisis and a recession
- It is also similar in patterns of expectations, with enthusiasm about housing and MBS supporting the credit boom, but also – for both markets and policy makers – failure to anticipate the crash

# Credit Cycle Facts

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Rapid credit growth is associated with higher risk of a financial crisis.



Source: Schularick and Taylor (2012).

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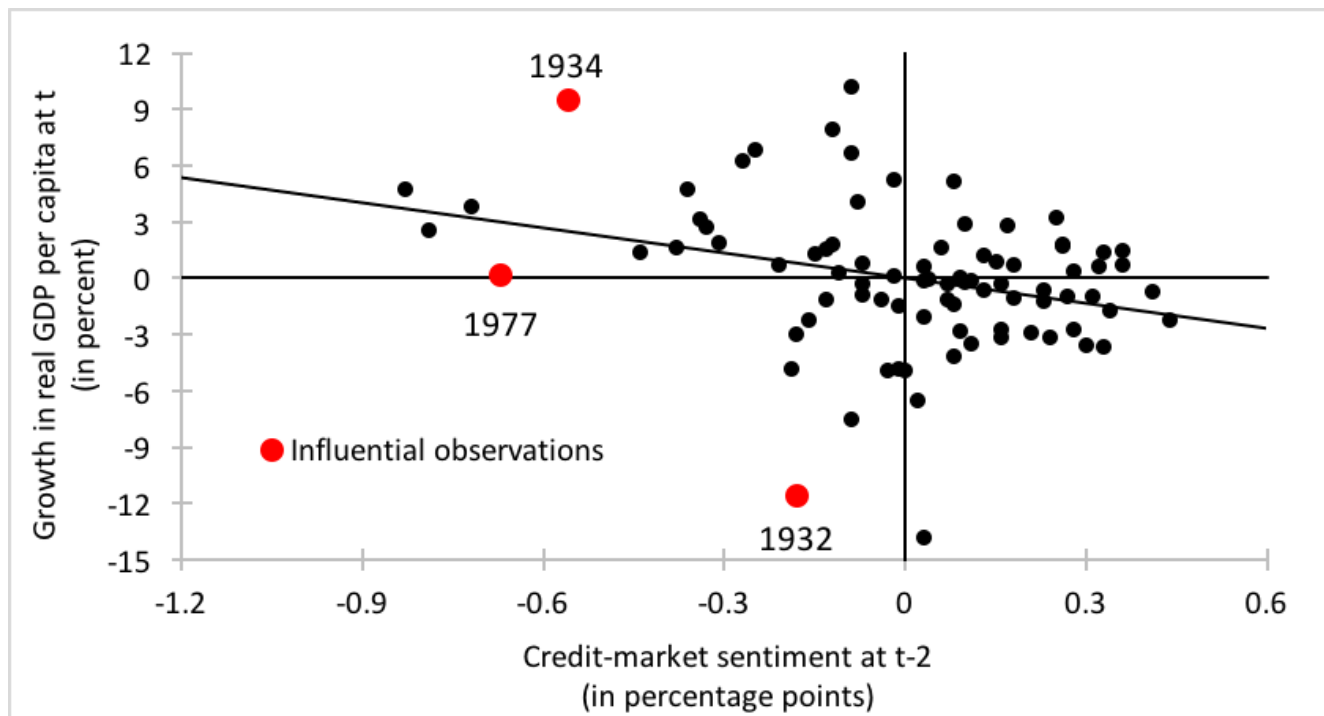


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# Credit Cycle Facts

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Exuberant credit market sentiment is followed by slower economic growth.



Source: López-Salido, Stein, and Zakrajšek (2017).

# Traditional View

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1. Bad Shock  
(sunspot, bad fundamental news, spike in spreads)
2. Amplification Mechanism  
(short term debt, illiquidity, agency problems, adverse selection)
3. Recession  
(impaired intermediation)

Expectations are rational, crises amplify bad news.

See Bernanke (1983), Diamond and Dybvig (1983).

# Instability from Beliefs

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1. Excess optimism, excess lending and investment
2. Correction of expectations  
(due to bad news or waning of optimism)
3. Recession  
(impaired intermediation or excess pessimism)

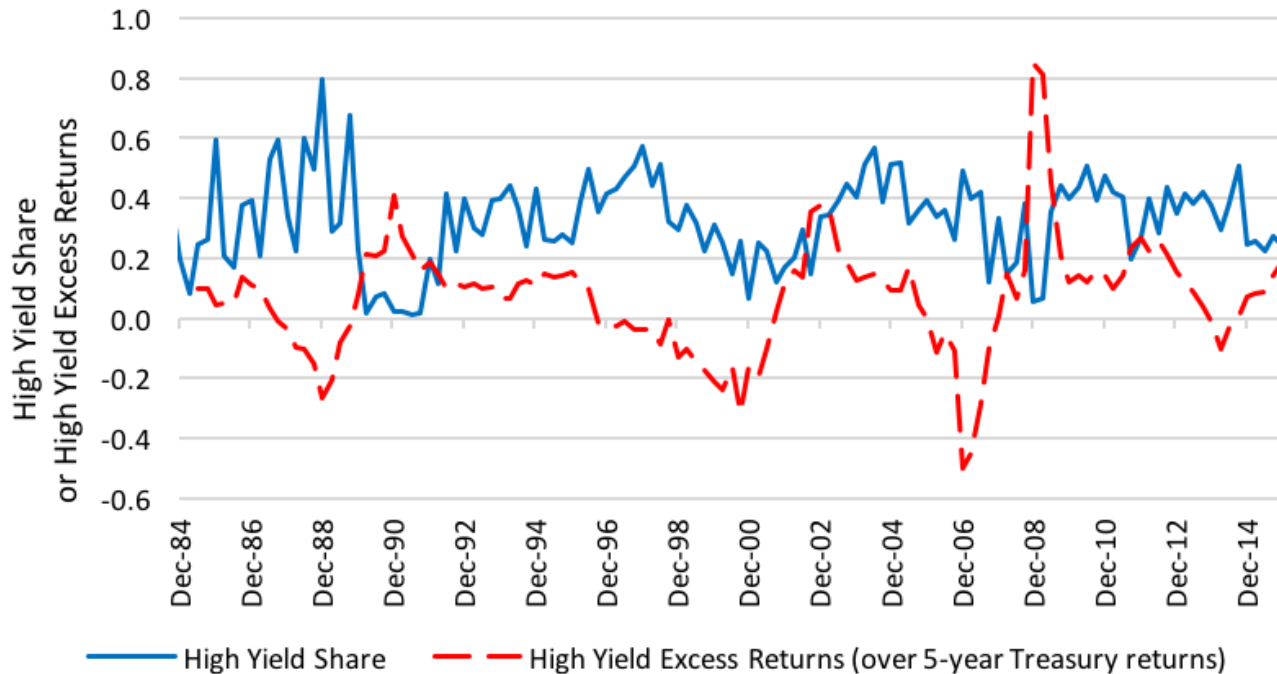
Crises are due to non-rational beliefs, which may be amplified by traditional mechanisms.

See Minsky (1977), Kindleberger (1978).

# Some Intriguing Evidence-1

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When the share of risky corporate debt in total is high, corporate bonds have low excess returns moving forward.



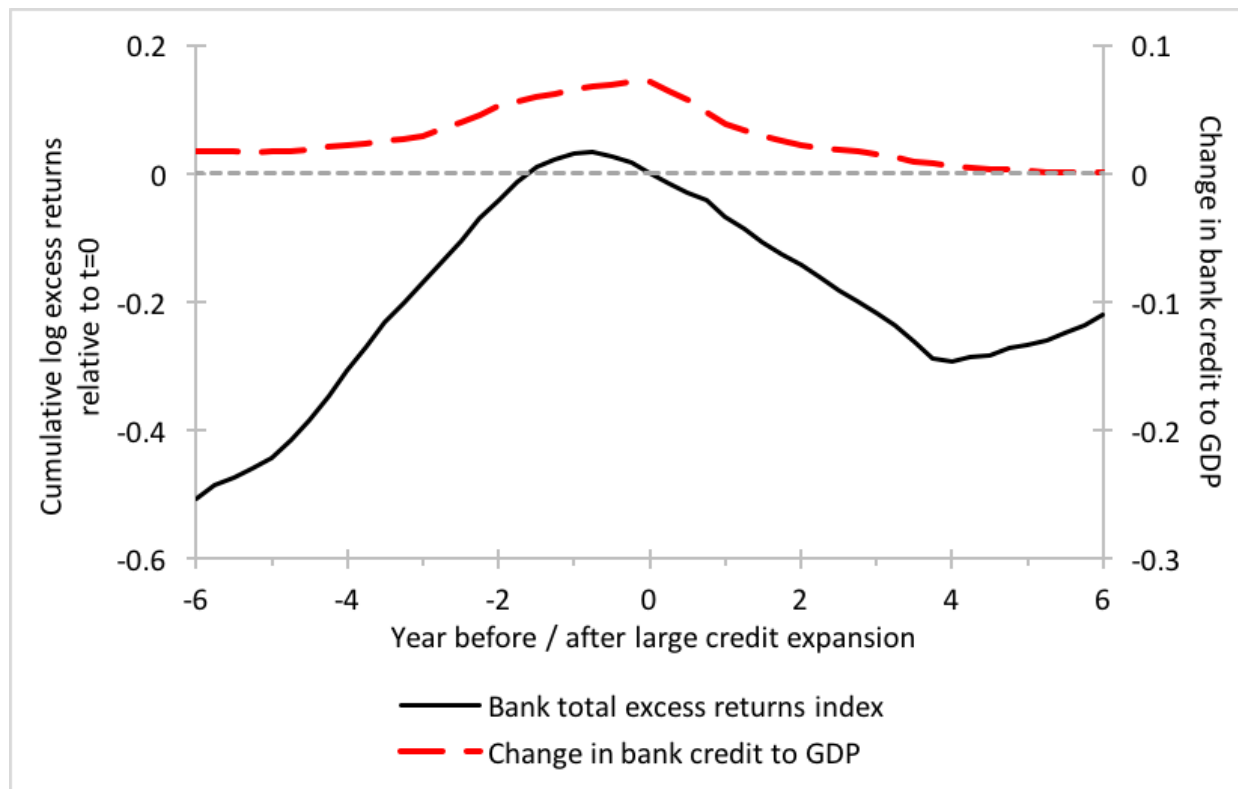
Source: Greenwood and Hanson (2013).



# Some Intriguing Evidence-2

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Bank equity prices rally leading up to the peak of a credit boom and decline afterward.

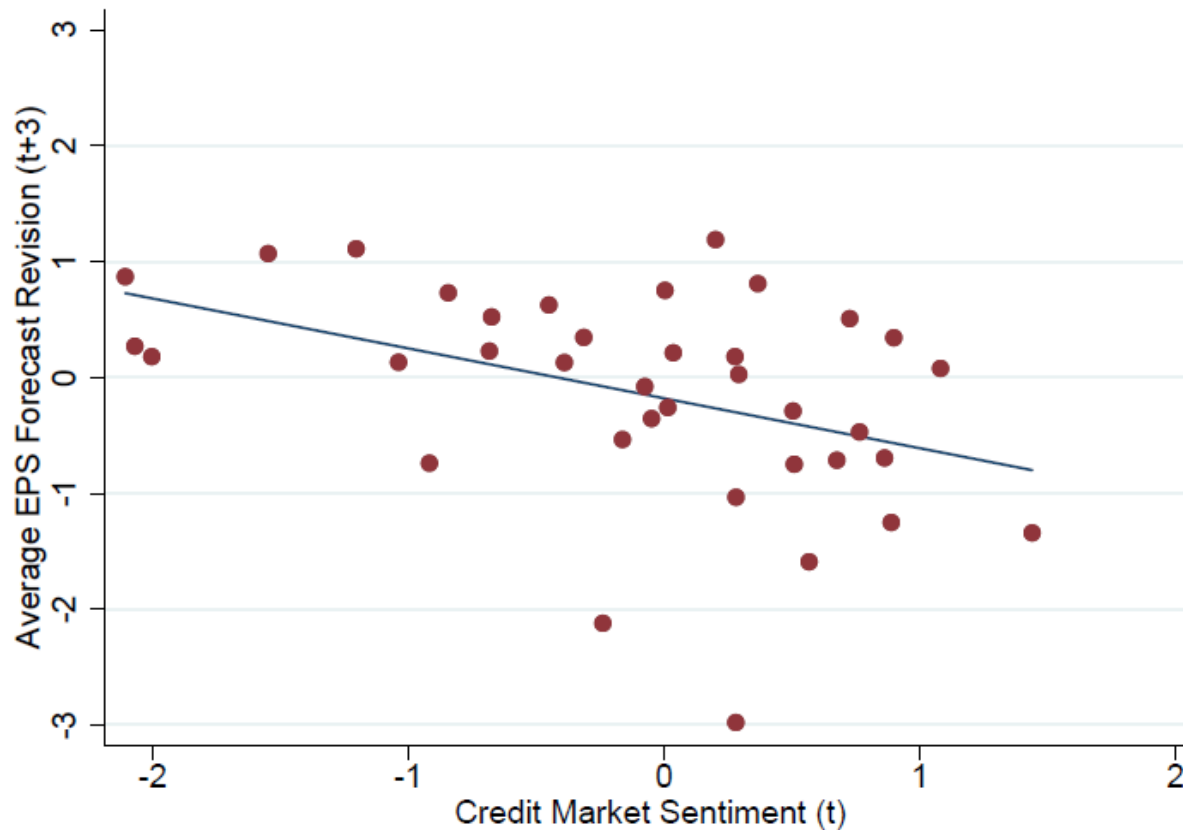


Source: Baron and Xiong (2017).

# Some Intriguing Evidence-3

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Credit market booms are followed by a downward revision of EPS forecasts



Source: Gulen, Ion and Rossi (2018).

# The Crisis of 2008:

## How does it compare?

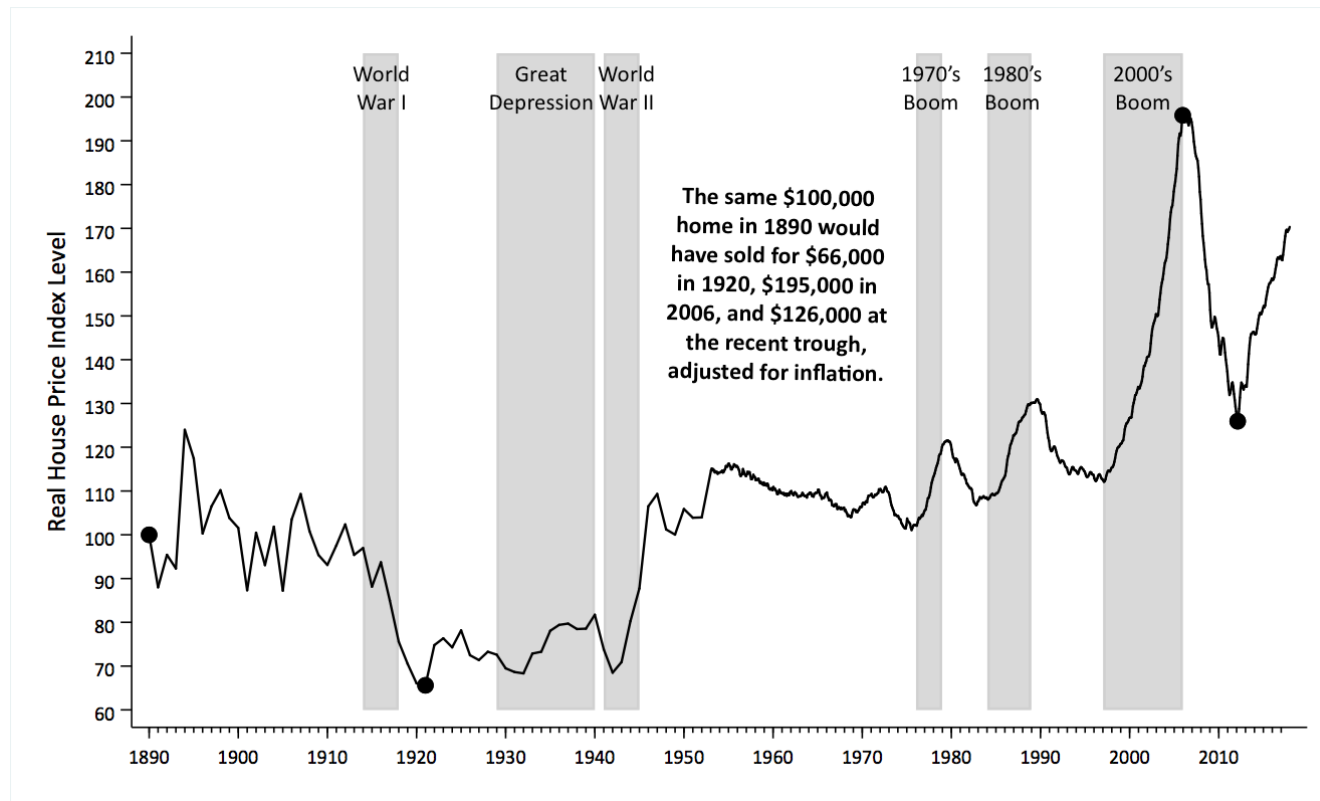
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- What happened in the financial crisis?
- What is the role of beliefs of investors and policymakers?
- What are the lessons for economics?

# U.S. Home Values over Time

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Robert Shiller's inflation-adjusted index of sale prices of standard existing homes in the United States. The index is set to 100 in 1890.

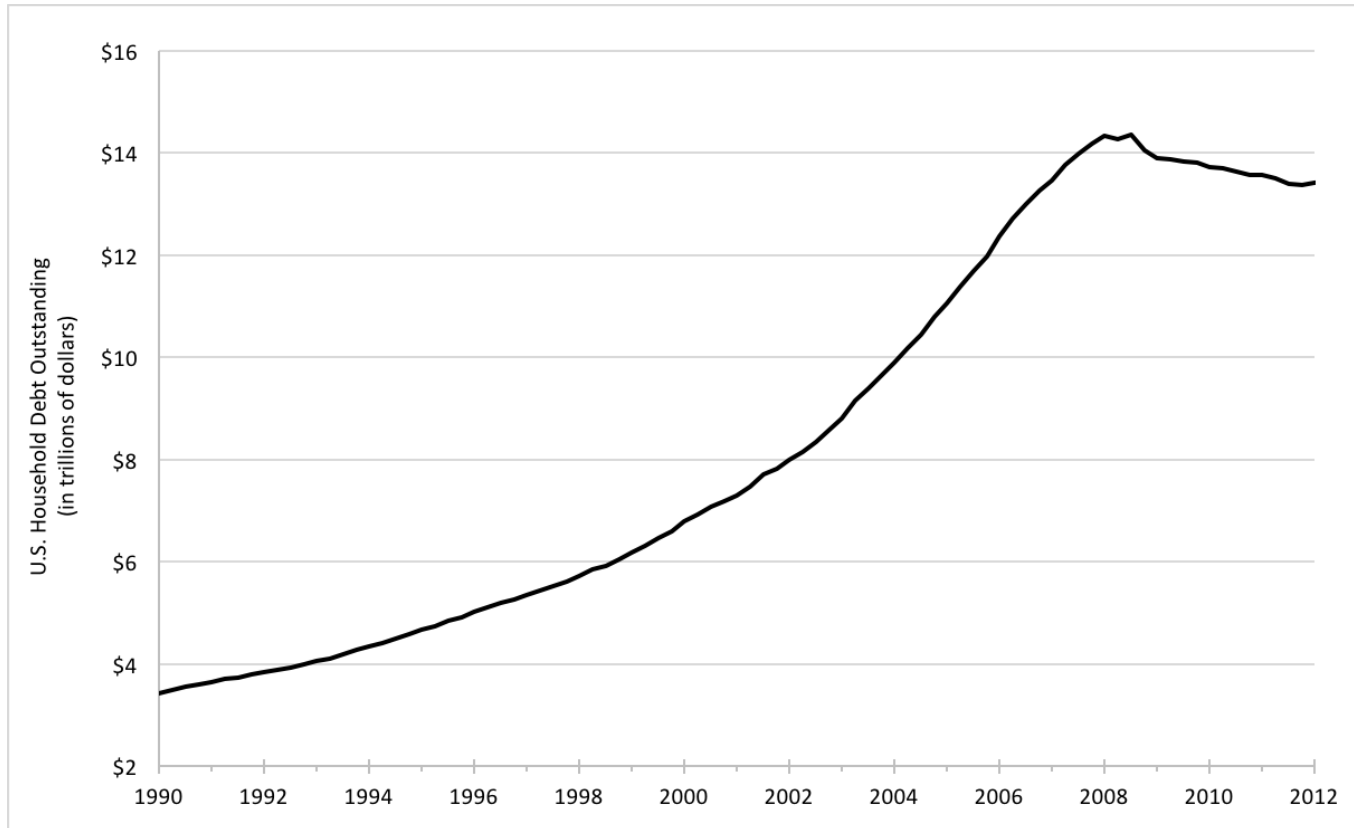


Source: Shiller (2016).

# U.S. Household Debt

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Total debt outstanding for U.S. households in trillions of dollars.

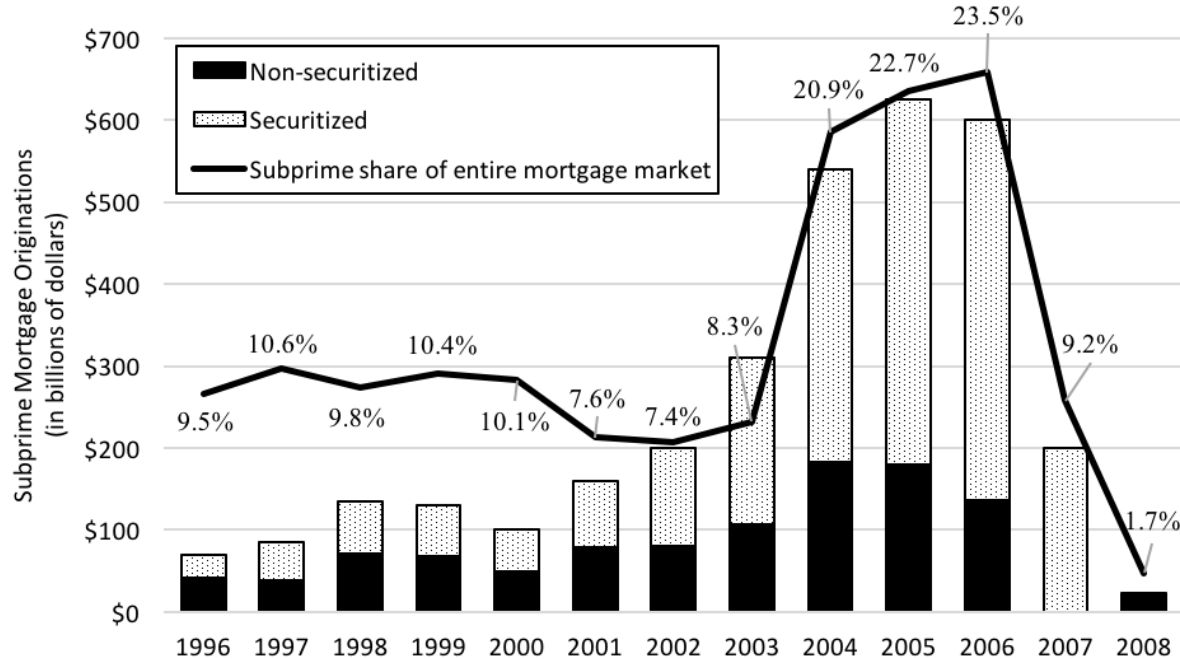


Source: Board of Governors of the Federal Reserve System (2017).

# U.S. Subprime Mortgage Originations

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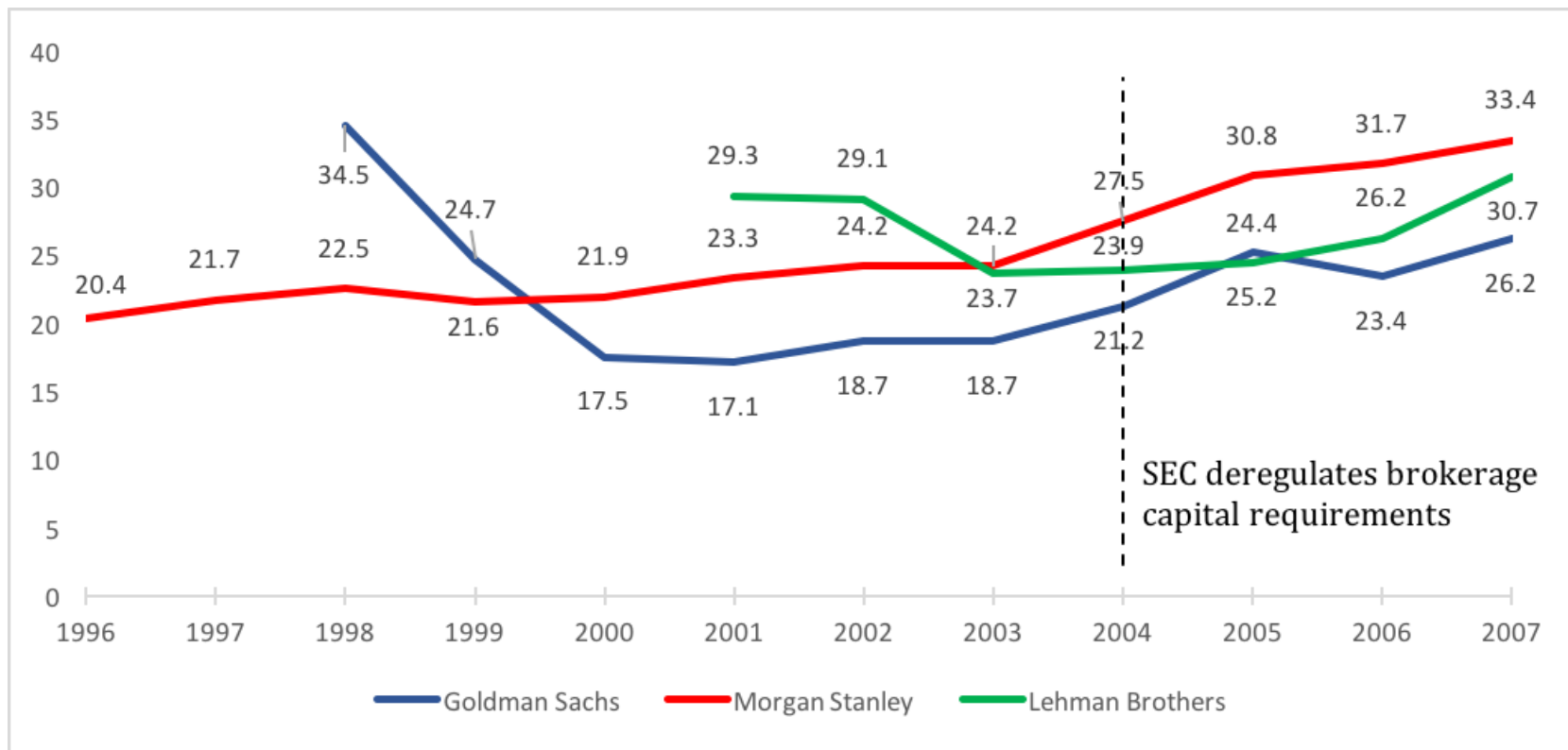
Total U.S. subprime mortgage originations are broken down into those securitized and those non-securitized. U.S. subprime mortgage originations are also given as a percentage of total U.S. mortgage originations.



Source: Financial Crisis Inquiry Commission (2011).

# Evolution of leverage ratios at major investment banks

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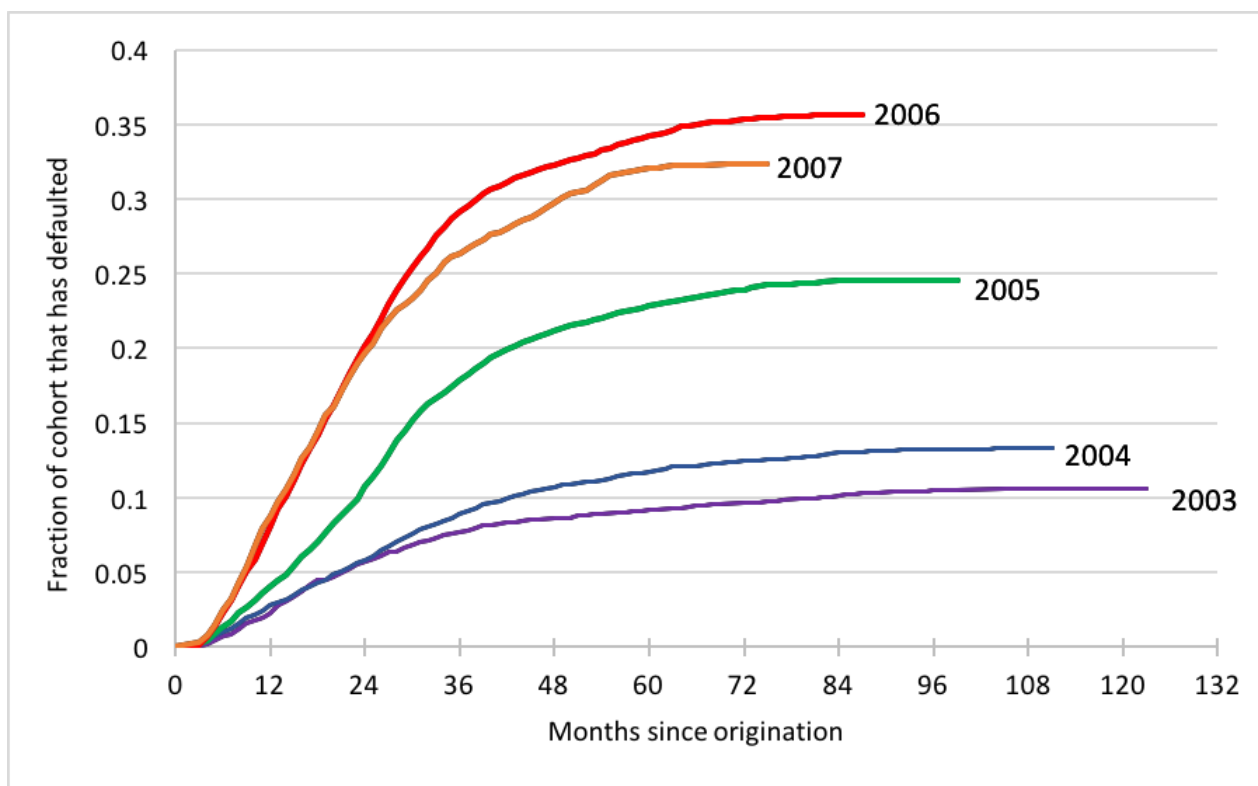
Note: Leverage ratio = Total Assets / Shareholders' Equity.

Source: Company 10K reports.

# Cumulative Default Probability by Origination Cohort

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The figure tracks the default behavior of mortgages originated in five different years (cohorts). A loan is considered to default when it is indicated to be in foreclosure of real estate owned and as long as it is not later repaid in full.



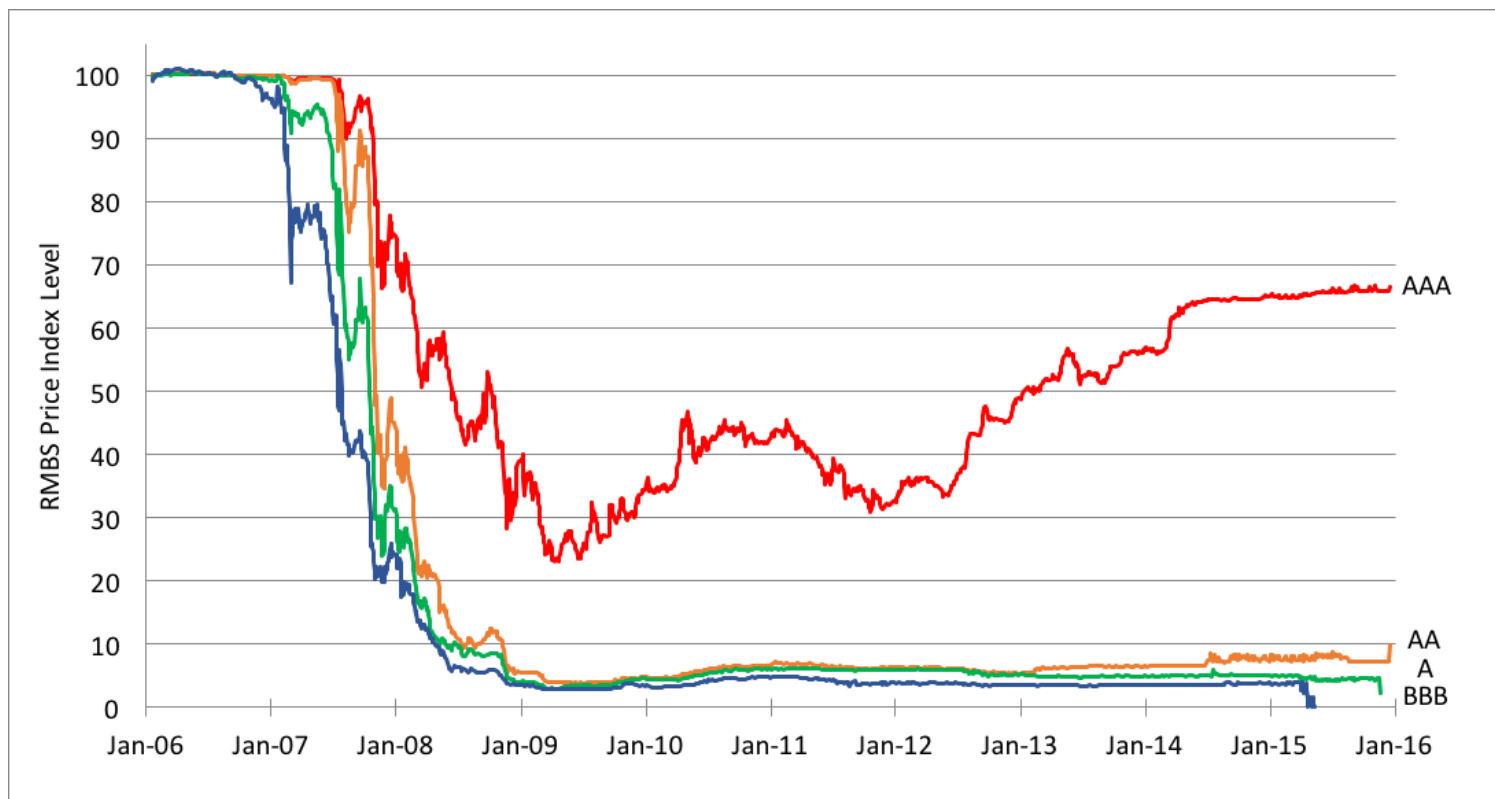
Source: Palmer (2015).



# Prices of Residential Mortgage-Backed Securities

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The figure shows the Markit ABX Home Equity Index (ABX.HE), which tracks the performance of residential mortgage-backed securities (RMBS) of different issuer ratings.

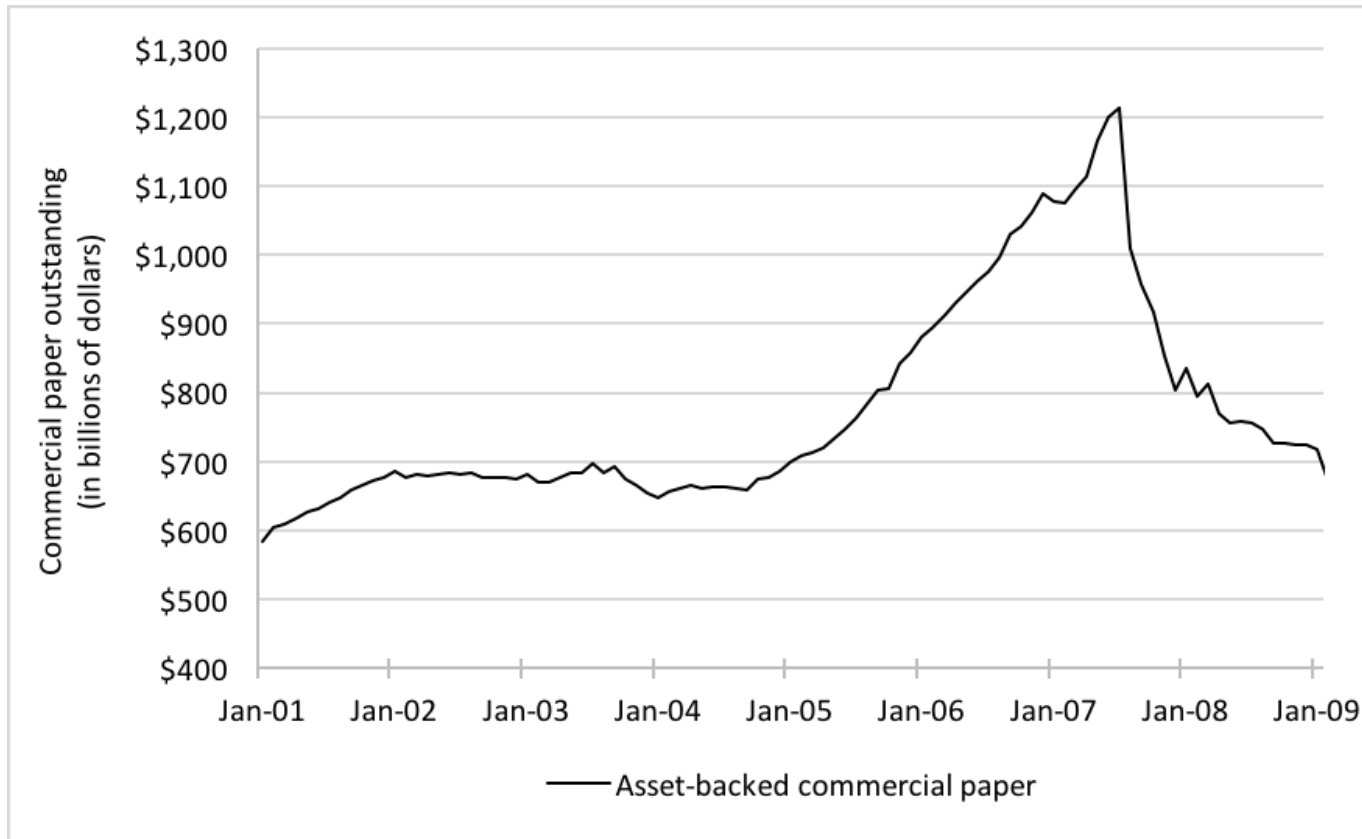


Source: Markit.

# Collapse of the Asset-Backed Commercial Paper Market

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The figure shows outstanding asset-backed commercial paper.

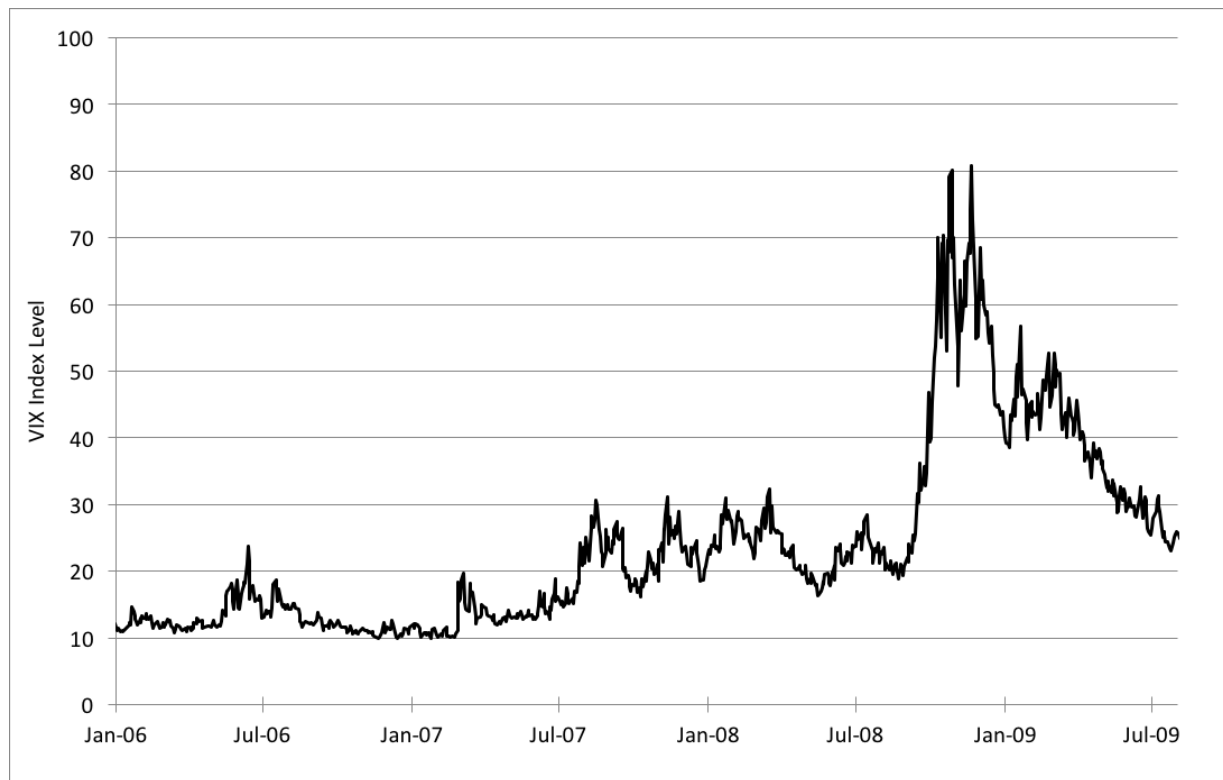


Source: Federal Reserve Bank of St. Louis (2017c, 2017d).

# VIX

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The Chicago Board Options Exchange Volatility Index (VIX) captures the stock market's expectation of volatility. It is computed using S&P 500 index options.

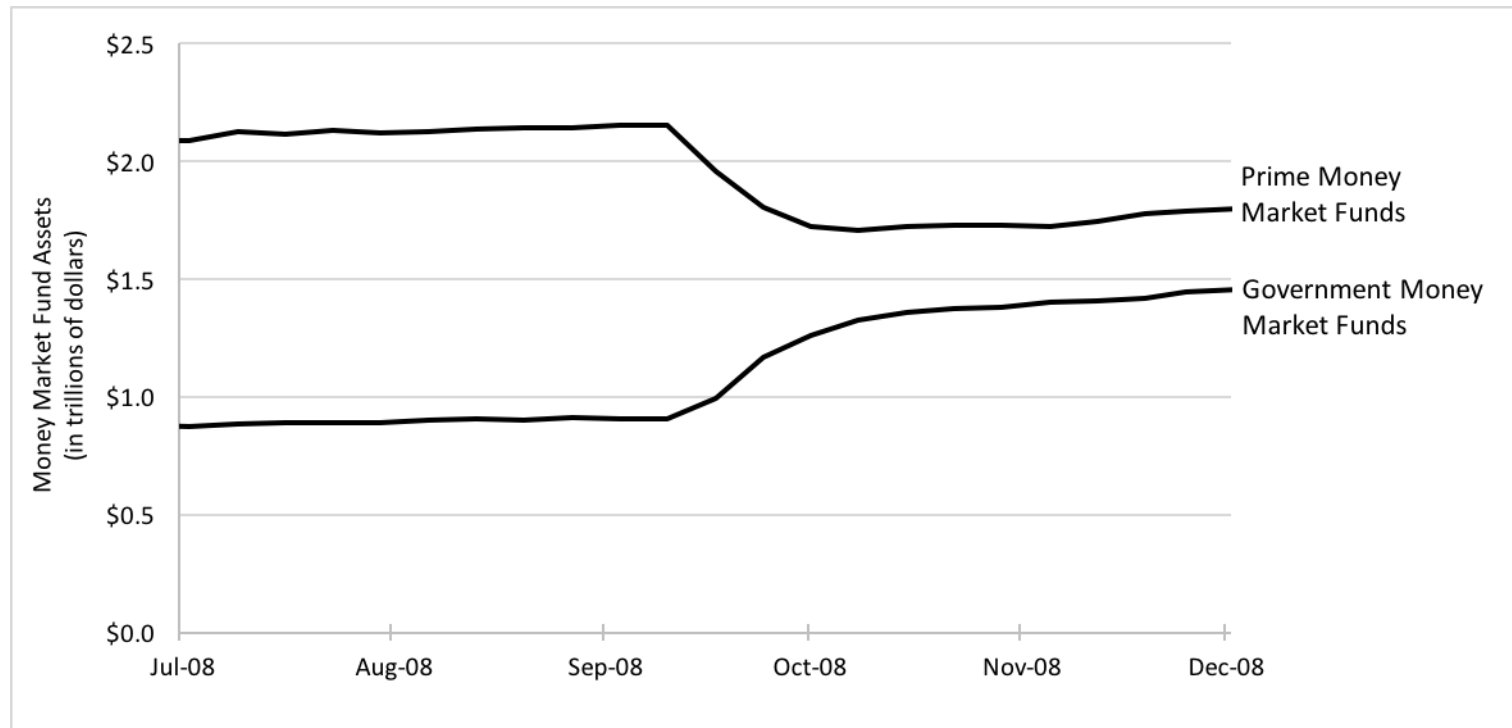


Source: Federal Reserve Bank of St. Louis (2017e).

# Money Market Fund Assets After Lehman

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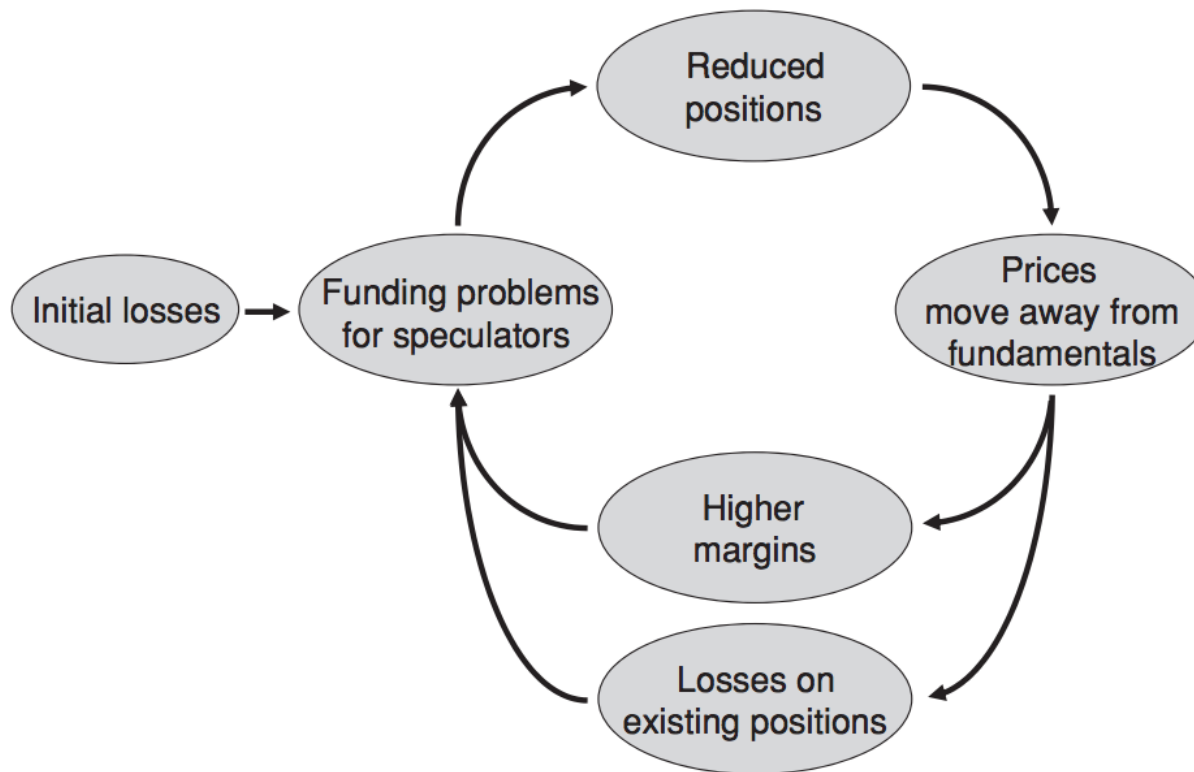
The figure shows how investors ran from prime money market funds that lent to holders of MBS toward government money market funds.



Source: Investment Company Institute.

# Liquidity Spirals

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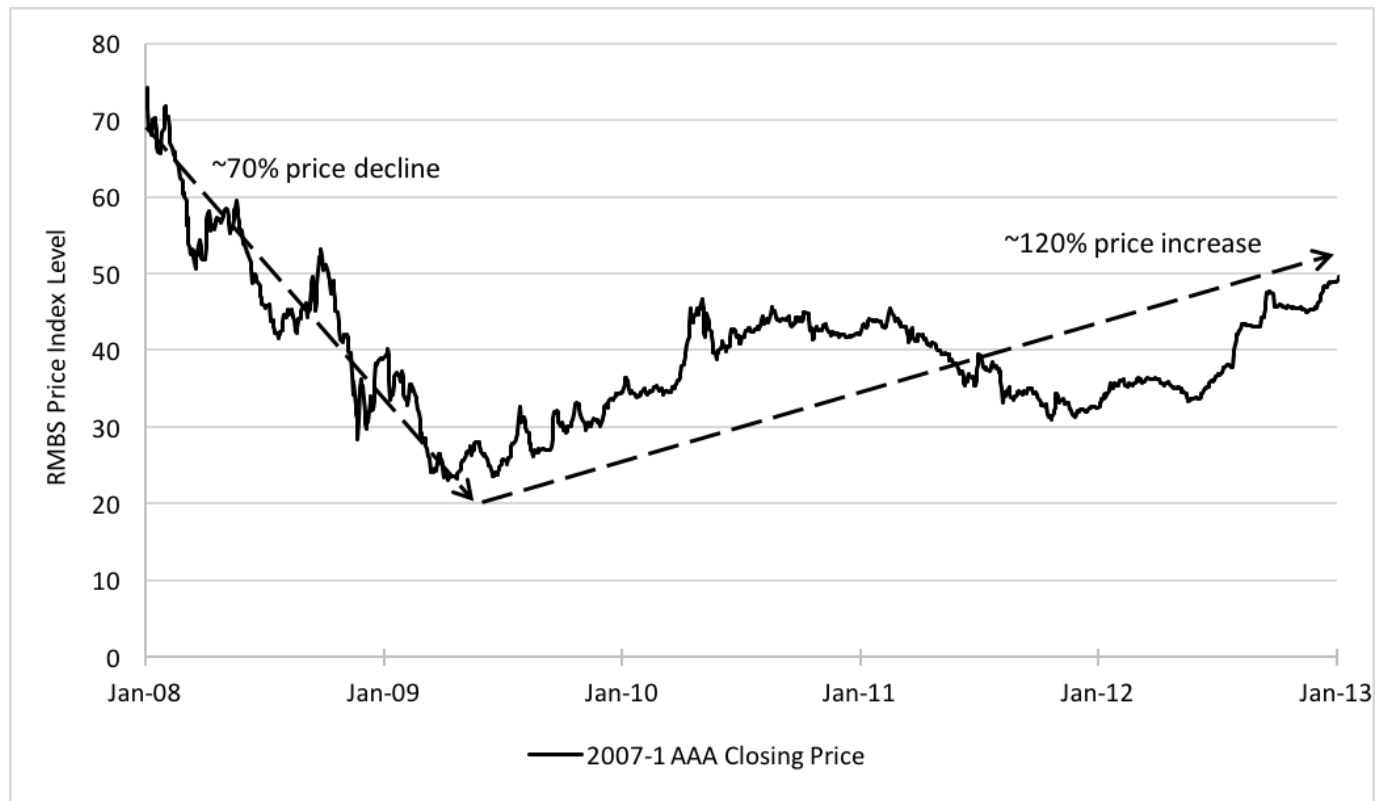


Source: Brunnermeier and Pedersen (2009).

# Residential Mortgage-Backed Securities (RMBS) Fire Sale

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AAA-rated RMBS prices (as captured by the ABX.HE RMBS index) exhibit a classic fire sale.



Source: Markit.

# Estimates of Financial System Losses by the International Monetary Fund

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October 2007:

- ~\$200 billion mark-to-market losses on all asset-backed securities (mostly MBS) and CDOs

March 2008:

- \$720 billion global losses on all securities (including corporate debt)
- ~\$200 billion U.S. bank losses

October 2008:

- \$980 billion global losses on all securities
- ~\$400 billion U.S. bank losses

April 2009:

- \$1.64 trillion global losses on all securities
- \$1.07 trillion global losses on all loans
- ~\$800 billion U.S. bank losses

October 2009:

- \$1 trillion U.S. bank losses

Source: International Monetary Fund, Global Financial Stability Reports.

# What were they thinking?

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- Beliefs in the housing bubble and securitization?
- Why the quiet period from initial tremors in Spring 2007 to the fall of Lehman Brothers?
- Why was Lehman so pivotal and why did it lead to a collapse?



# House Price Expectations

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- Case, Shiller, and Thompson (2012) conducted surveys in four U.S. counties—Alameda, California; Middlesex, Massachusetts; Milwaukee, Wisconsin; and Orange, California.
- To elicit expectations of long-term price growth, they asked:  
“On average, over the next ten years, how much do you expect the value of your property to change each year?”
- During five-year period before 2008, annual expected growth rates were:
  - 11.6% in Alameda County
  - 8.1% in Middlesex County
  - 9.5% in Milwaukee County
  - 13.2% in Orange County
- Forecasts were roughly in line with extremely rapid home price growth witnessed prior to the surveys but were way off from future realized growth.

# Conditional Forecasts of Mortgage Default and Losses

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Analysts at Lehman Brothers understood the consequences of home price declines. However, they severely underestimated the probability and the magnitude of these declines.

#	Name	Scenario	Cumulative loss	Probability
(1)	Aggressive	11% HPA over the life of the pool	1.4%	15%
(2)		8% HPA for life	3.2%	15%
(3)	Base	HPA slows to 5% by end-2005	5.6%	50%
(4)	Pessimistic	0% HPA for the next 3 years, 5% thereafter	11.1%	15%
(5)	Meltdown	-5% for the next 3 years, 5% thereafter	17.1%	5%

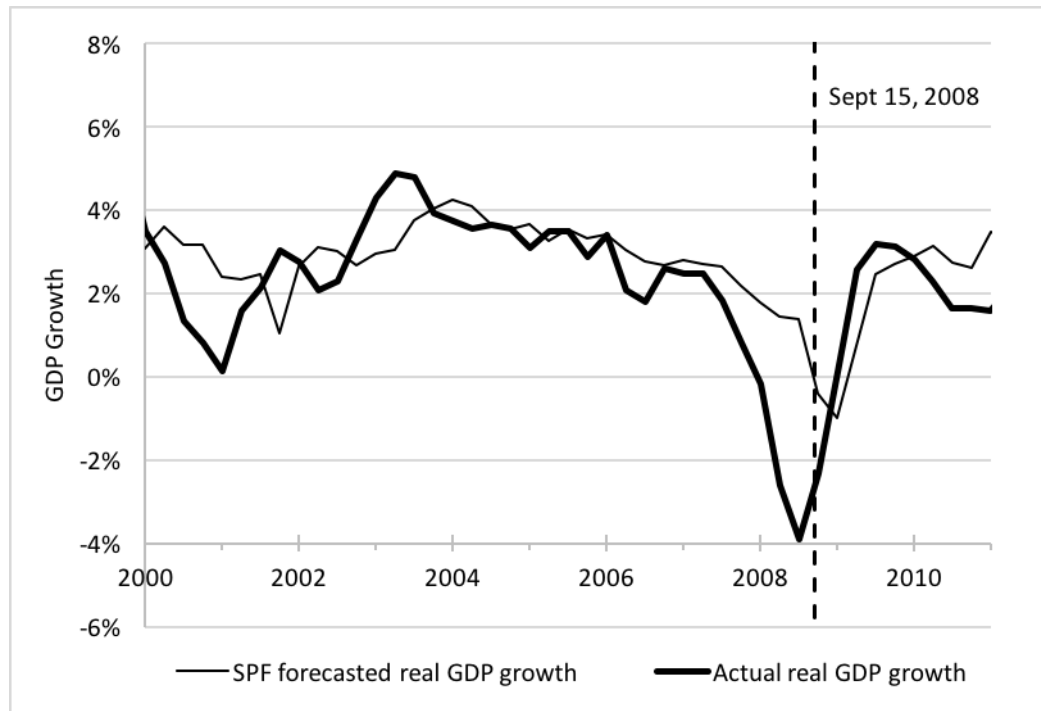
Also CDO pricing models were wrong (Coval, Jurek, and Stafford 2009a,b).

Source: U.S. ABS Weekly Outlook, Lehman Brothers Fixed-Income Research, August 15, 2005.

# Forecasted vs. Actual Real Economic Growth

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Forecasted and Actual Real Economic Growth over the Next 12 Months from the Survey of Professional Forecasters (SPF).

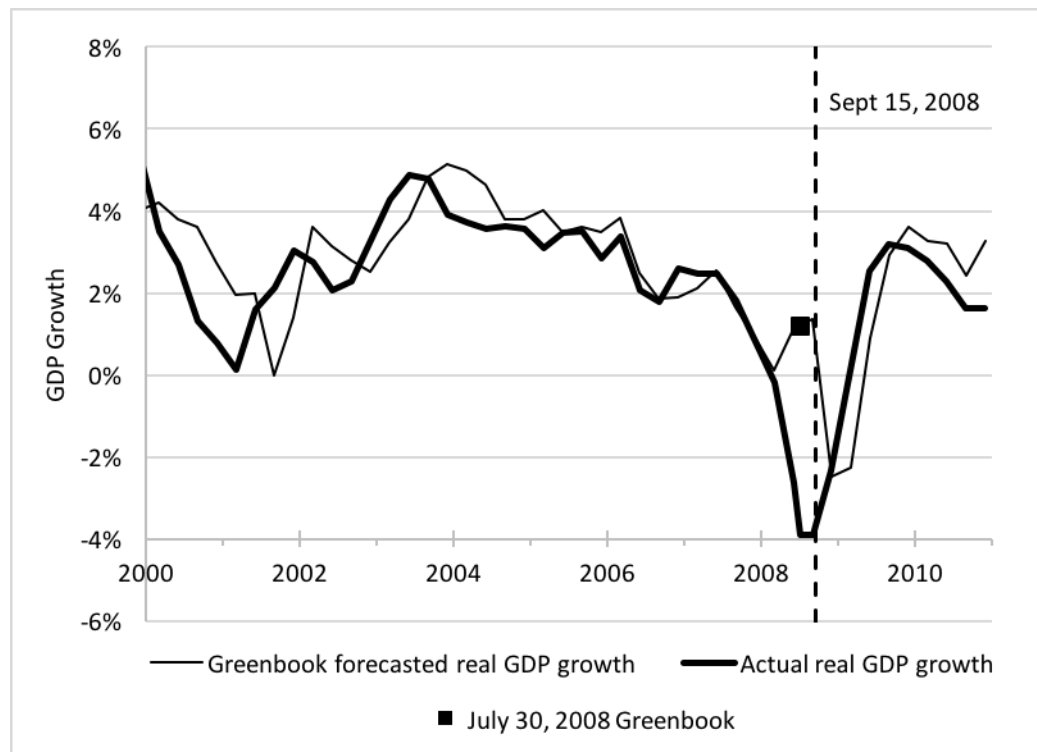


Source: Federal Reserve Bank of Philadelphia.

# Forecasted vs. Actual Real Economic Growth

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Forecasted and Actual Real Economic Growth over the Next 12 Months from the Federal Reserve Board Greenbook.



Source: Federal Reserve Bank of Philadelphia.

# Severe Financial Stress Scenario

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- In Greenbook for August 5, 2008 FOMC meeting, Fed staff prepared forecasts for the scenario of “severe financial stress.”
  - “in this scenario credit losses and solvency concerns intensify for many financial institutions, restricting their ability to supply credit and causing them to tighten lending standards more than in the baseline.”
- In this scenario, Fed forecasters expected  $-0.4$  percent real GDP growth in the second half of 2008, with real growth rising to 0.5 percent in 2009 and 2.6 percent in 2010. Fed forecasters expected unemployment rate to peak at 6.7 percent in 2009. It actually peaked at 10 percent.
- Six weeks before Lehman, the Fed forecasters had no idea what was coming.

# Why was Lehman so pivotal?

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- Tail risks neglected by both investors and policymakers.
- Liquidity interventions, but no aggressive attempts to get banks to raise capital.
- Markets learn the system was more interconnected – through derivative contracts and fire sales – than believed.
- Lehman was a huge dislocation because markets and regulators learned they were wrong.

# Alternative Theories

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## Alternative Theory I: Moral Hazard

- Banks are too big to fail and knowingly took risks of housing exposure.

## Alternative Theory II: Bank Runs

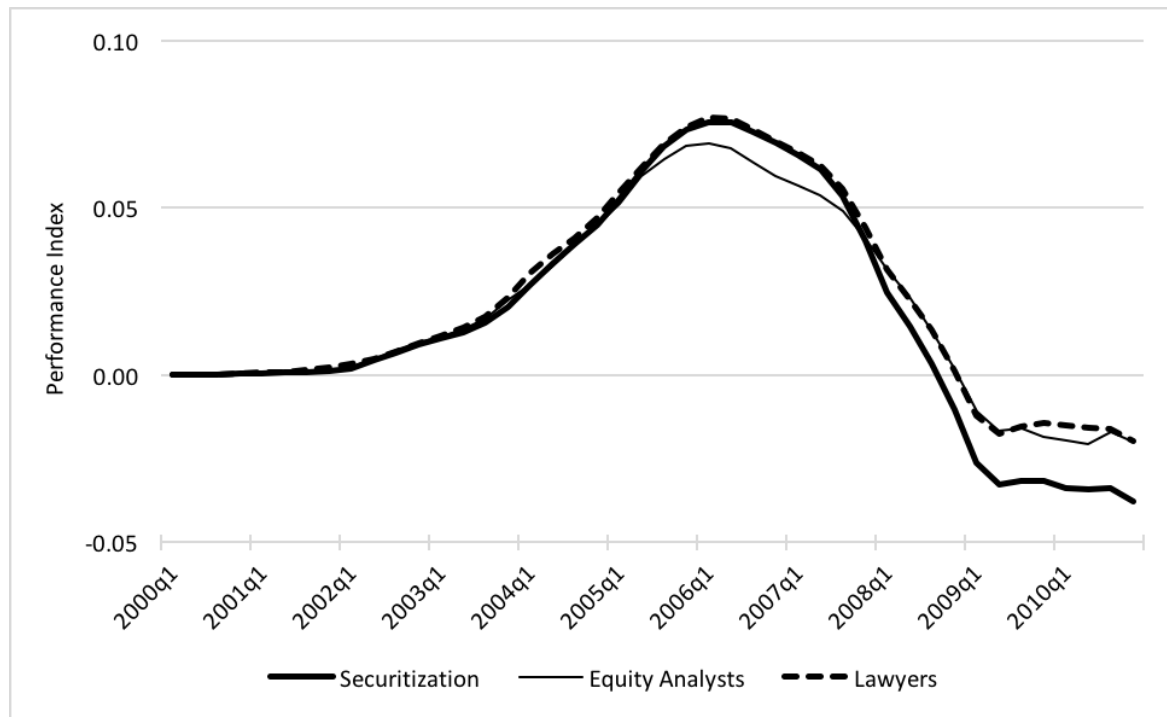
- Lehman crisis was the result of a Diamond-Dybvig bank run.

In a 2015 speech at the National Bureau of Economic Research, Bernanke stated that “the Diamond-Dybvig model describes what happened in the financial crisis extremely well.”

# Investment Performance of Homebuyers

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The figure below shows the performance of three groups of homebuyers. Securitization specialists do not appear to have a better understanding of the risk of home prices falling as they are no more successful at timing the housing bubble.



Source: Cheng, Raina, and Xiong (2014).



# Bank Runs?

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- Hard to see Lehman as a non-fundamental sunspot.
- Need more sophisticated theories like Goldstein-Pauzner.
- But then the question of policy passivity comes back.
  - The fragility of the financial sector cannot be surprising in the summer of 2008.
- Errors in expectations are critical.

# Summary of the Crisis

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- Extrapolative expectations central to the housing bubble.
- Continued neglect of downside risks central to understanding 2007-2008.
- Policy was fantastic after Lehman, behind the curve before Lehman.
- Hard to tell the story of the crisis without beliefs.