

Financial Crisis Recovery & Solutions

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The views expressed herein are those of the author and do not necessarily reflect the position of the Federal Reserve Bank of Kansas City or the Federal Reserve System.

Outline

Like Tolstoy's family, economic good times are all alike, but every crisis is bad in its own way – Gary Gorton, Professor of Finance at Yale, Jackson Hole Symposium 2008

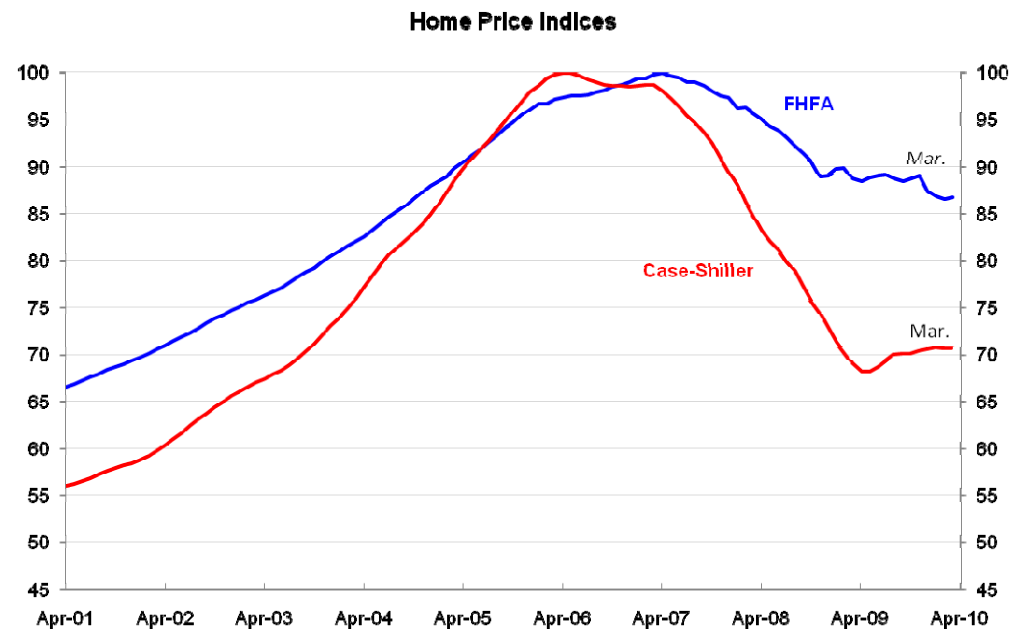
- What are the causes of the financial crisis of 2007-09?
- Is there a financial recovery? And if so, is it even?
- What are some of the actions taken and remedies being proposed and debated to address causes and effects of the crisis?
- Ideas for further reading and potential teaching material are listed at end of slides

Causes of the financial crisis of 2007-09

- What triggered subprime mortgage delinquencies?
- How did the subprime crisis morph into a global financial system crisis?
 - Subprime (and Alt-A) mortgage backed securities (MBS) were only a quarter of the \$6 trillion securitized mortgage market. Compare this to total US financial institution assets of about \$30 trillion (of which commercial banks account for over \$11 trillion)

Housing Bubble and Bust

- Subprime borrowers riskier than average -> short-term loans
- Subprime borrowers relied on house price appreciation to refinance
- Nationwide, not region specific

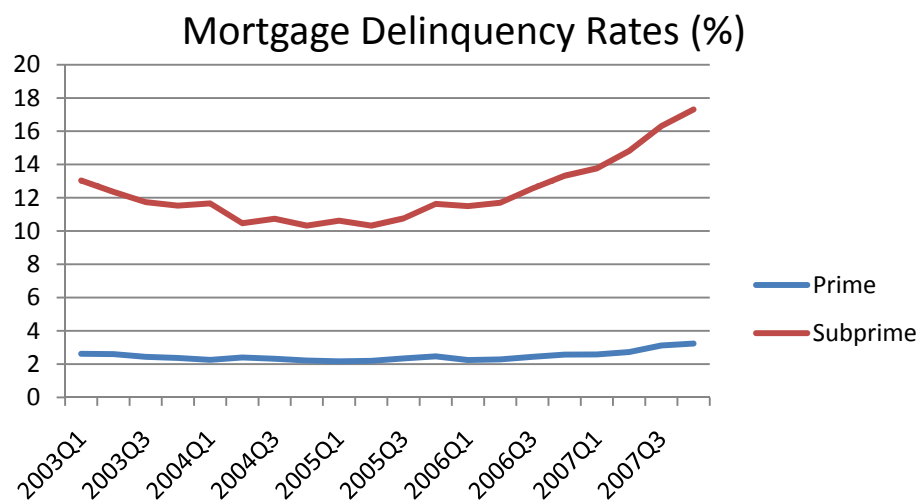


Source: Federal Housing Finance Agency/Standard & Poor's

Note: FHFA based on conforming loans and so excludes subprime and jumbo loans

As house values fell, delinquencies rose

- Borrowers found that did not have enough of a capital gain in house to refinance, and couldn't afford step-up rate in loans
- Lenders faced with option of refinancing or foreclosing and exposure to falling house values
- Foreclosure process began



Source: Mortgage Bankers Association

For an easy to study map of delinquencies and other credit conditions, see:

<http://data.newyorkfed.org/creditconditionsmap/>

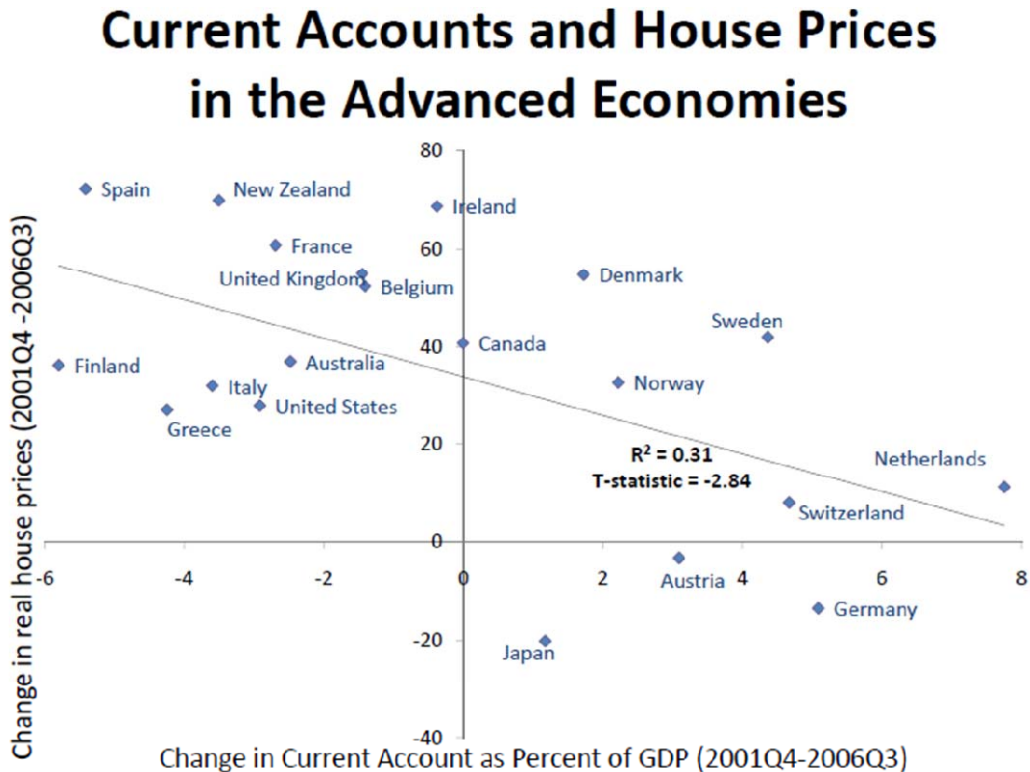
This shows that prime delinquency is at 8% March 2010, and 35% for subprime (defined as over 30 days past due)

Taking a step back: what are ingredients for a house price boom? (ongoing debate)

- Higher productivity
- Irrational exuberance; beliefs that house values could only go up
 - E.g. stress assumptions by bank models were flat or -5%
- Hubris; models based on short history of new products
 - E.g. Subprime loss assumptions based on one previous data point: recession of 2001-03 when house prices were rising
- Global Savings Glut, led to capital inflows into US in search of safe financial assets
- Federal Reserve may have kept interest rates too low for too long
- Government subsidies to housing leverage

Evidence of a possible link between capital inflows and house prices

- Countries that experienced higher foreign capital inflows (flip side of current account deficits), were also characterized by more house price appreciation

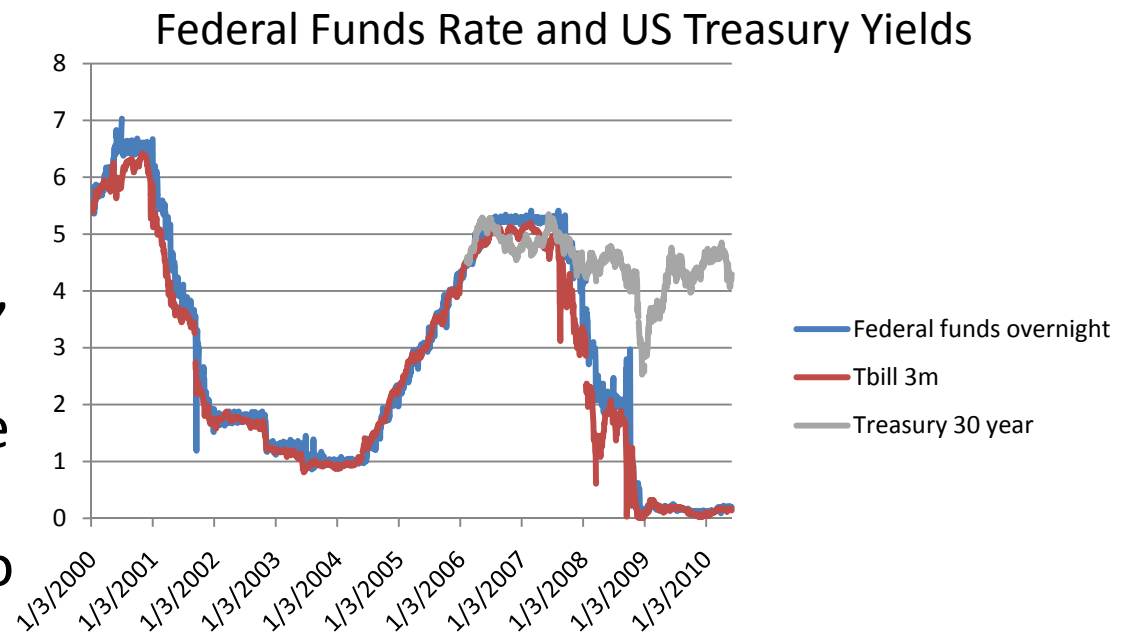


Source: International Monetary Fund, Haver Analytics, and Federal Reserve staff calculations.

Taken from Ben Bernanke, American Economic Association Speech January 3, 2010, Atlanta, Georgia

Did the Federal Reserve keep interest rates too low for too long after the 2001 recession?

- Could be a direct link (especially for income-constrained borrowers)
- Or even if not direct, but low rates can fuel greater leverage (borrowing), and encourage flows into riskier assets as financial institutions search for yield



Source: Federal Reserve H15 Data Release

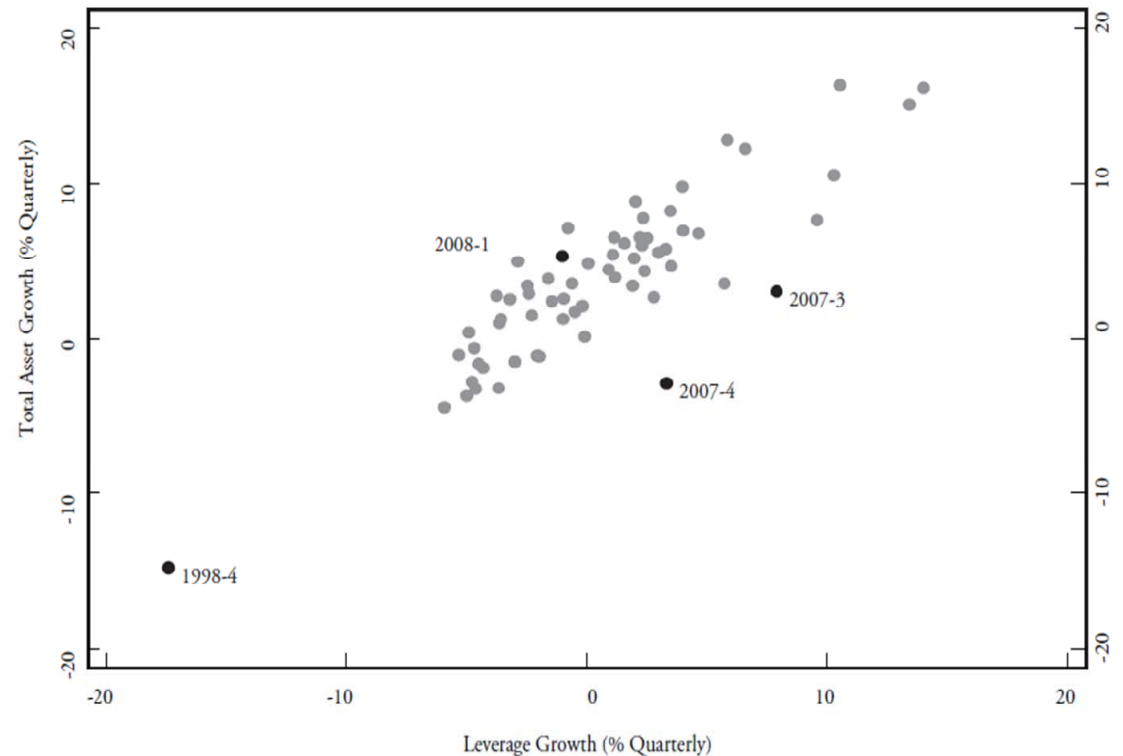
How did the subprime crisis seep into the financial system?

In the next 3 slides, will see that:

- While subprime as a share of assets was relatively small, financial institutions were highly leveraged
 - For example, a leverage ratio (Assets/Equity) of 20 meant that financial firm can borrow 19 dollars for every 1 dollar of its own equity
- Financial institutions also had concentrated exposures to mortgage debt securities
- But there was an information & complexity problem: These exposures were opaque and it was difficult to know where the risks were distributed in the system

Evidence of Procyclical Leverage

- A positive correlation exists between financial institutions asset growth and leverage build-up (especially investment banks shown in chart)



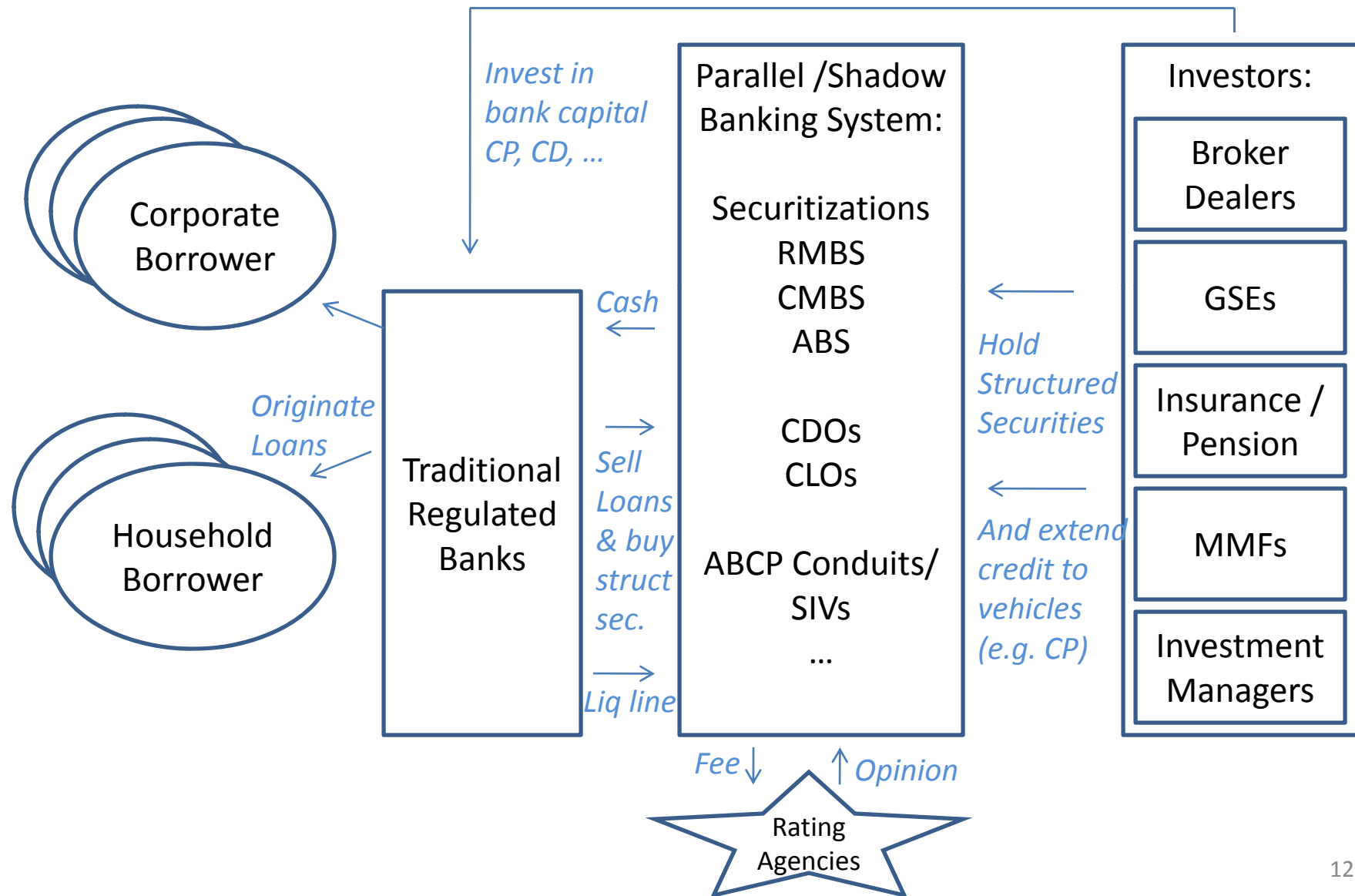
Source: Adrian and Shin, "Financial intermediaries, financial stability, and monetary policy," Jackson Hole Symposium, 2008

Financial Institutions' Exposure to Mortgage Debt 2008, 10,680 US \$ billion

	Non- securitized mortgages & home equity line of credit	GSE- sponsored Mortgage Backed Securities (MBS)	Privately- issued AAA tranches	Privately-issued subordinate tranches
Banks & Thrifts	2889	852	383	90
GSEs	444	741	308	
Broker Dealers		49	100	154
Insurance & Financial guarantors	62	856	125	189
Overseas		689	413	69
Other (includes hedge funds, money market funds)	646	1175	307	95

Source: Acharya and Richardson, 2009, "Causes of the Financial Crisis", Critical Review (original data from Lehman Brothers, April 2008)

Inter-Connections in the Financial System: and the loss of information in the chains

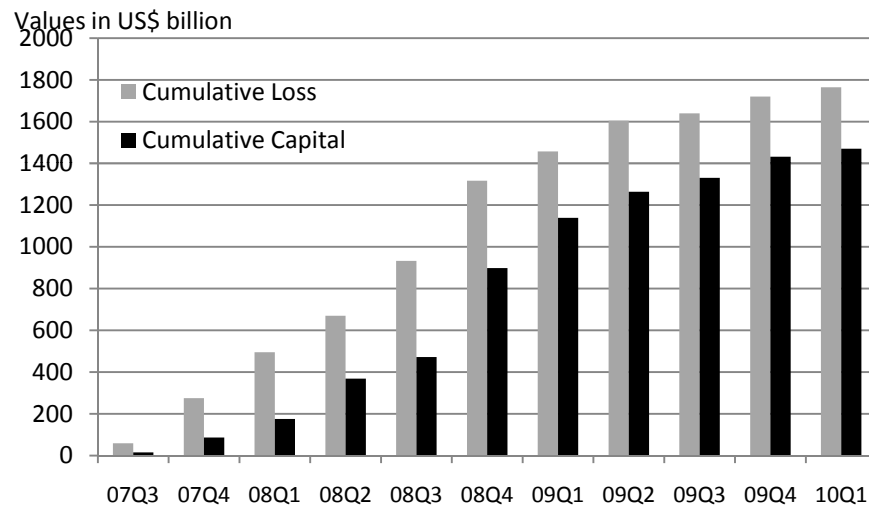


Why did banks retain exposure to mortgage debt securities and other structured financial assets?

- Securitizations, and generally, the ‘originate-to-distribute’ model of financial intermediation was meant to diversify risk among many investors
- But a lot of these exposures were found on bank balance sheets both directly and indirectly
 - Negative View
 - Excessive optimism (and under-estimated correlations)
 - Internal risk management failures (tail risk, free-rider problem)
 - Regulatory avoidance (lower capital requirements)
 - Benign View
 - These securities were needed as collateral for repos (e.g. when institutional investor deposits cash at bank, and gets AAA mortgage backed securities as collateral)

Cumulative Writeoffs and Capital Raised by Global Financial Firms

- Exposures were reflected in subsequent write-offs on positions
- Losses amplified by fire-sales because all institutions were exposed and were deleveraging
- Capital raising was weak initially (costs of capital such as adverse signal)

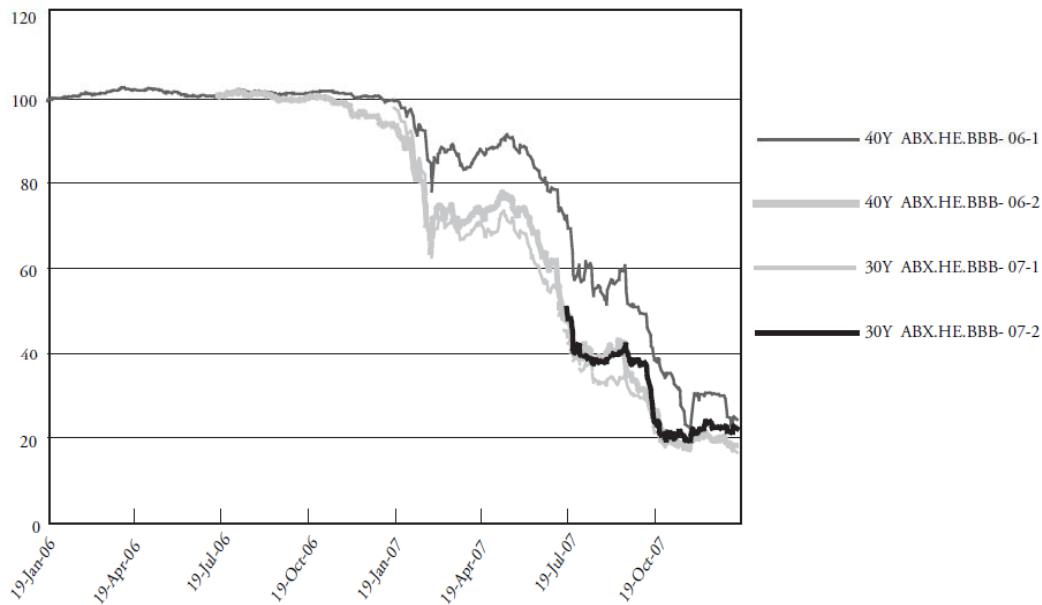


Source: Bloomberg, WDCI <GO>, accessed June 3, 2010
(update of Kashyap, Rajan and Stein, 2008)

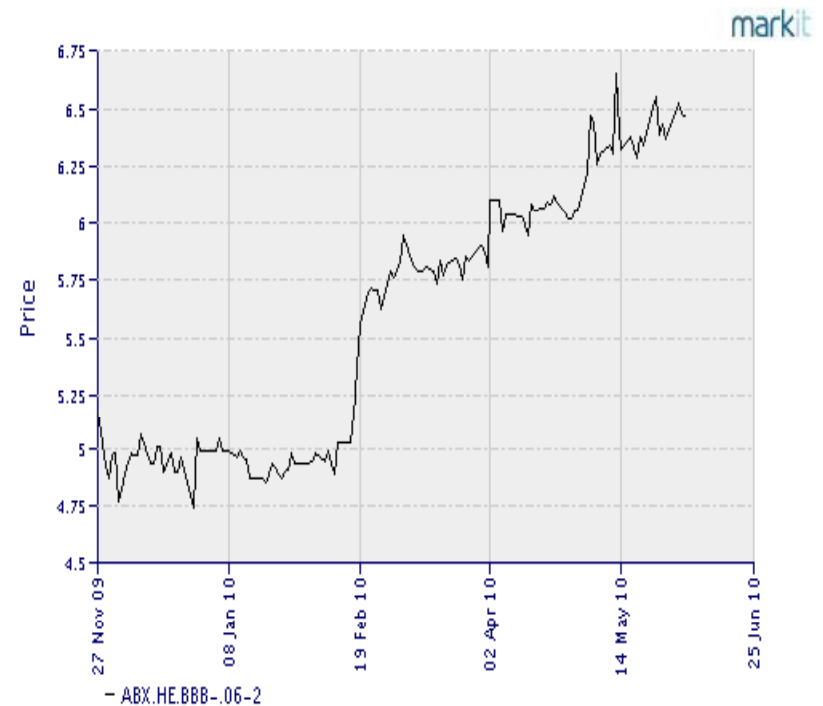
The introduction of the ABX index: Information is revealed

- Introduced in January 2006, the ABX was a liquid and transparent way of aggregating information about subprime risk. The consensus revealed a dive in value in early 2007

Chart 12
ABX BBB- Prices



Source: Gorton, Jackson Hole Symposium, 2008, "The Panic of 2007"



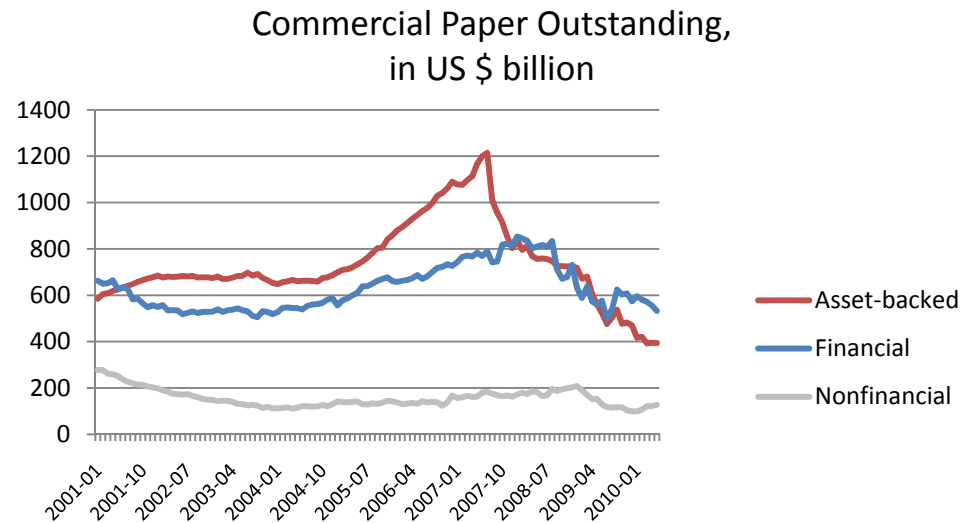
Source: Markit, Accessed June 3, 2010

The panic starts in mid-2007

- As consensus view about mortgage debt securities emerged, loss of confidence spread to all structured financial assets
- All assets suddenly became information-sensitive
- Those institutions with greatest dependence on short-term debt funding, such as ABCP and repo borrowing took the biggest hit

The Commercial Paper Market is Impaired

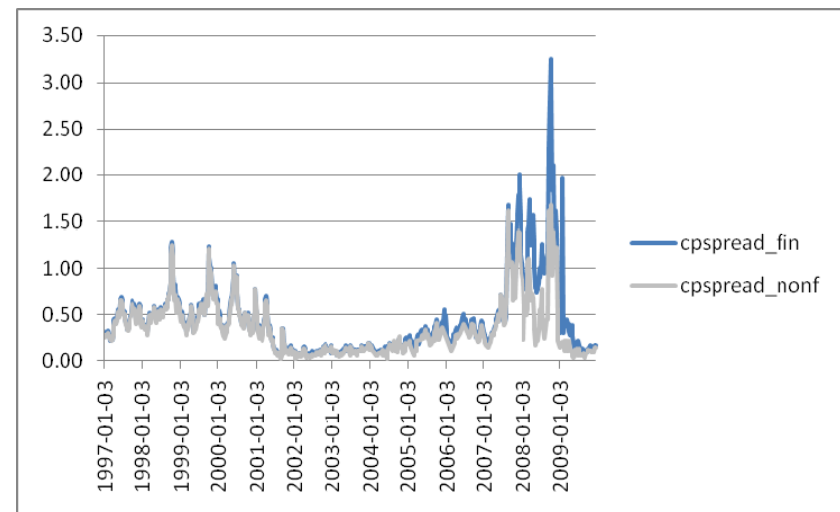
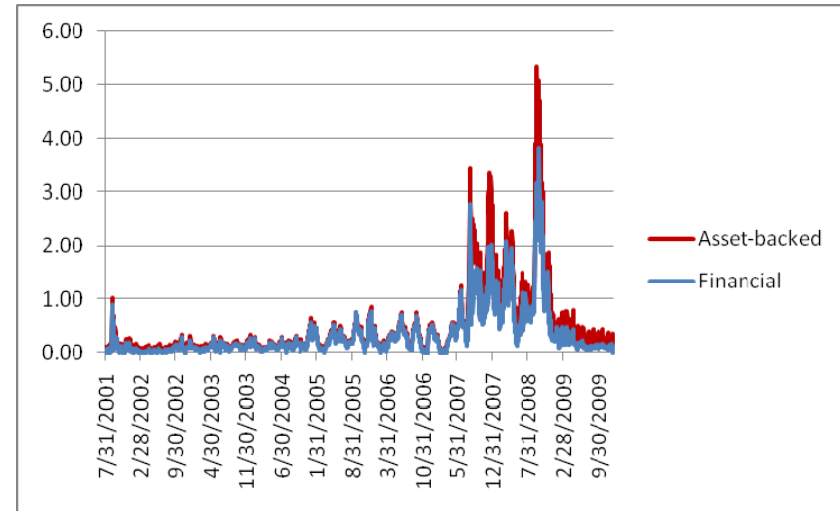
- As issuers of commercial paper found they could not roll over this short-term funding
- Banks had to take on balance sheet ABCP conduits that were “off” balance sheet



Source: <http://www.federalreserve.gov/releases/cp/>

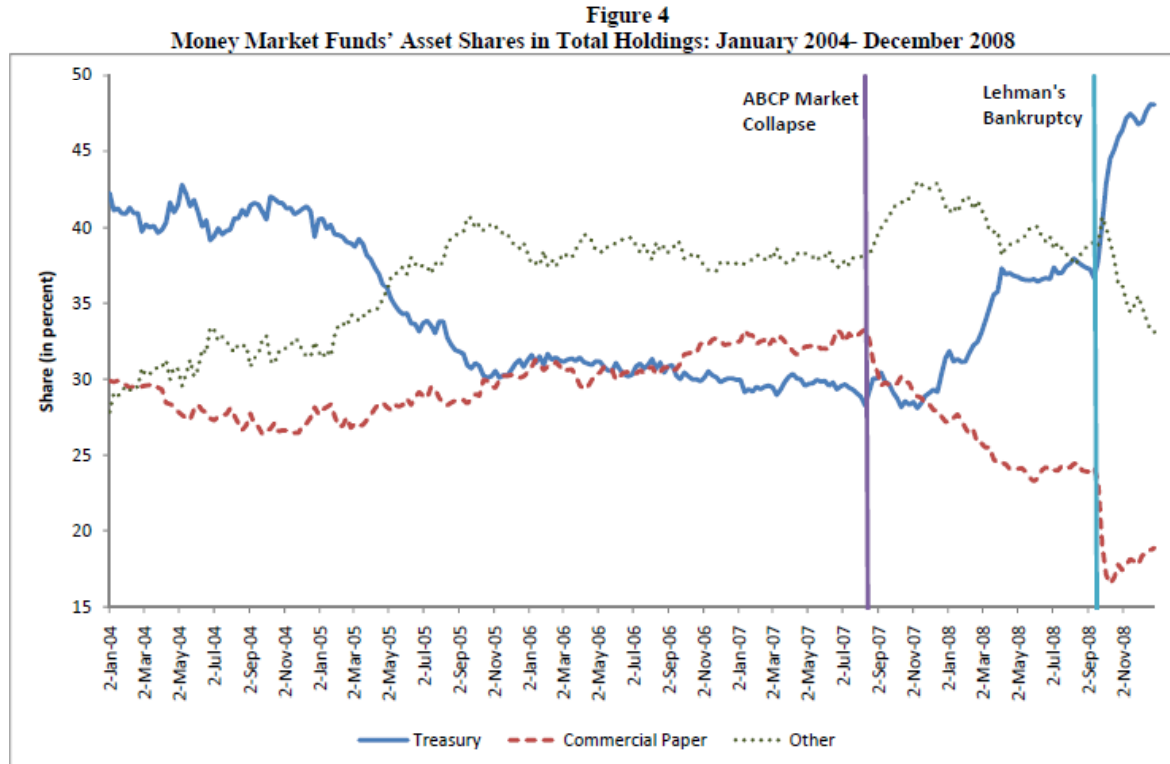
Commercial Paper Spreads

- Asset-backed CP was under most stress, followed by financial commercial paper
- This is unlike previous crises such as in 1998 after Russian default and LTCM failure when nonfinancial CP was most affected



Flight to Quality Spreads Across Markets

- Even money market funds experienced runs, and shifted their holdings to Treasury assets

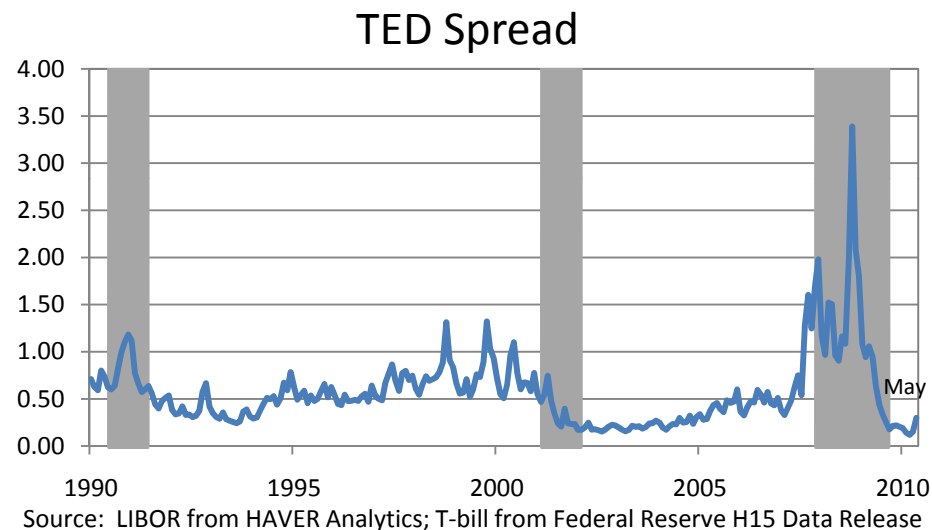


Note: Authors' own analysis using iMoneyNet data on money market funds' holdings.

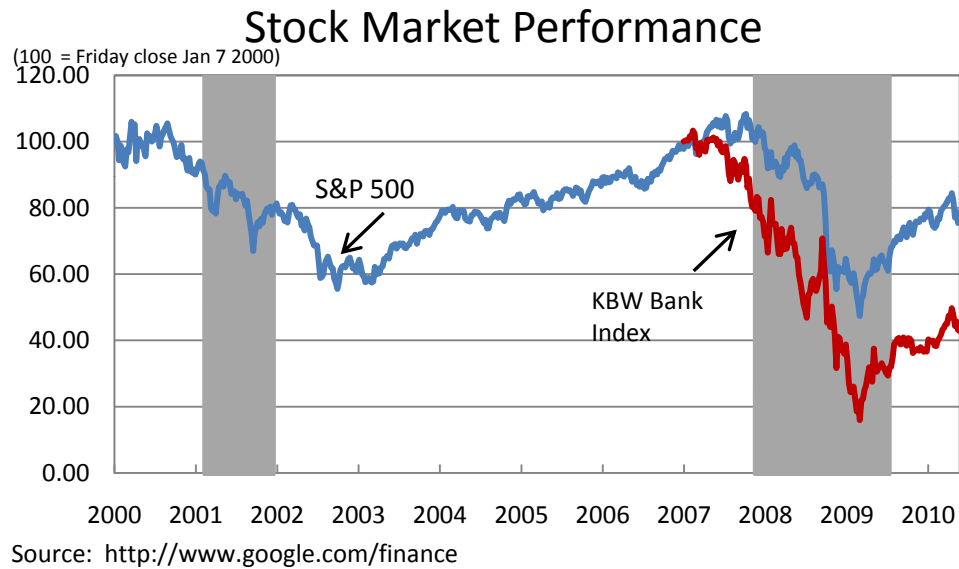
Source: Kacperczyk and Schnabl, Journal of Economic Perspectives, 2010, "When Safe Proved Risky: Commercial Paper during the Financial Crisis of 2007-2009"

The Interbank market is stressed

- TED spread is the difference between risky interbank rate (LIBOR) and risk-free US T-bill rate
- Even between banks, those with excess funds started to charge higher interest for unsecured loans to banks in need of funds
 - Counterparty risk
 - Liquidity hoarding



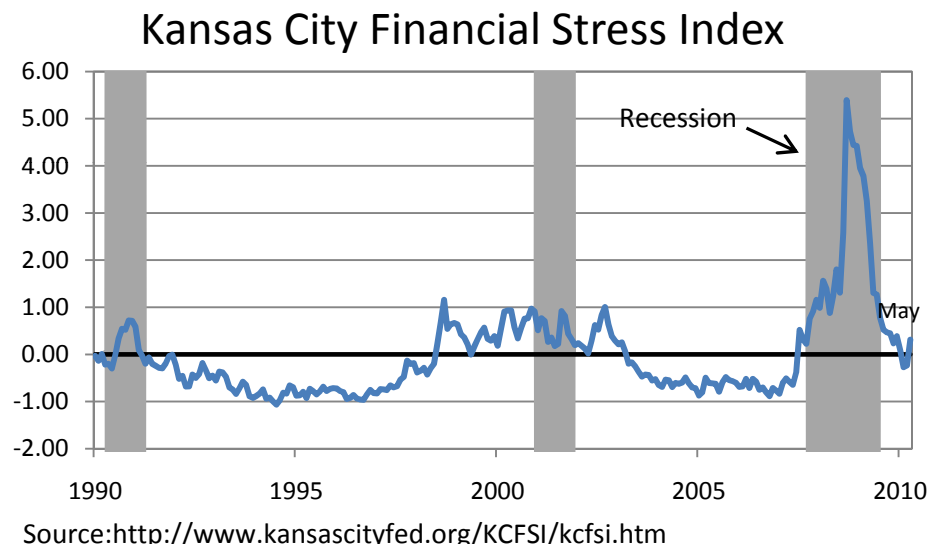
The crisis spreads to the wider stock market



The Kansas City Financial Stress Index:

A summary measure of gauging the severity of stress

- This index is updated monthly and is based on 11 financial market variables meant to capture stress in the US financial system; a positive value indicates that stress is above the long-run average

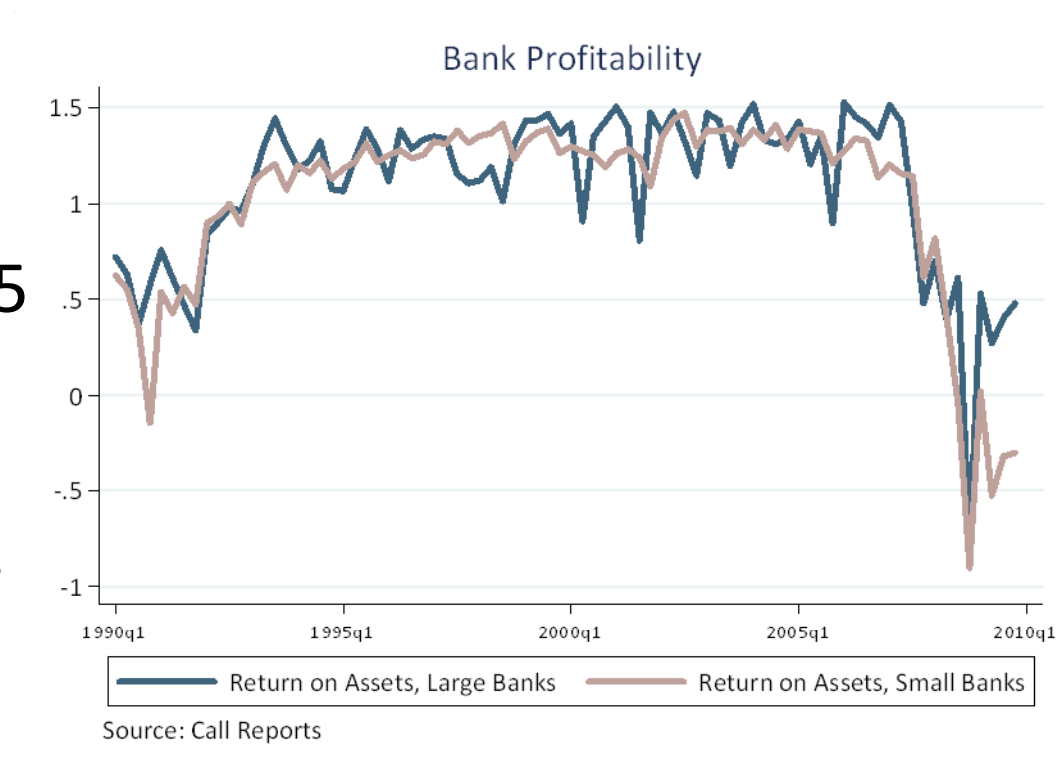


Is a financial recovery taking hold?

- The previous charts show that the financial system is along a path to recovery
 - House prices are flattening out
 - Stock market on a general upward path
 - Commercial paper and interbank spreads lower
 - General indicator of financial stress is lower
- But it is not even
 - Mortgage delinquencies still rising
 - Subprime securities prices close to nil
 - Commercial paper issuance depressed
 - Financial system cumulative losses still going up, albeit at a smaller pace
 - Downside risks exist as seen in recent weeks

Other signs of financial recovery in the US banking system

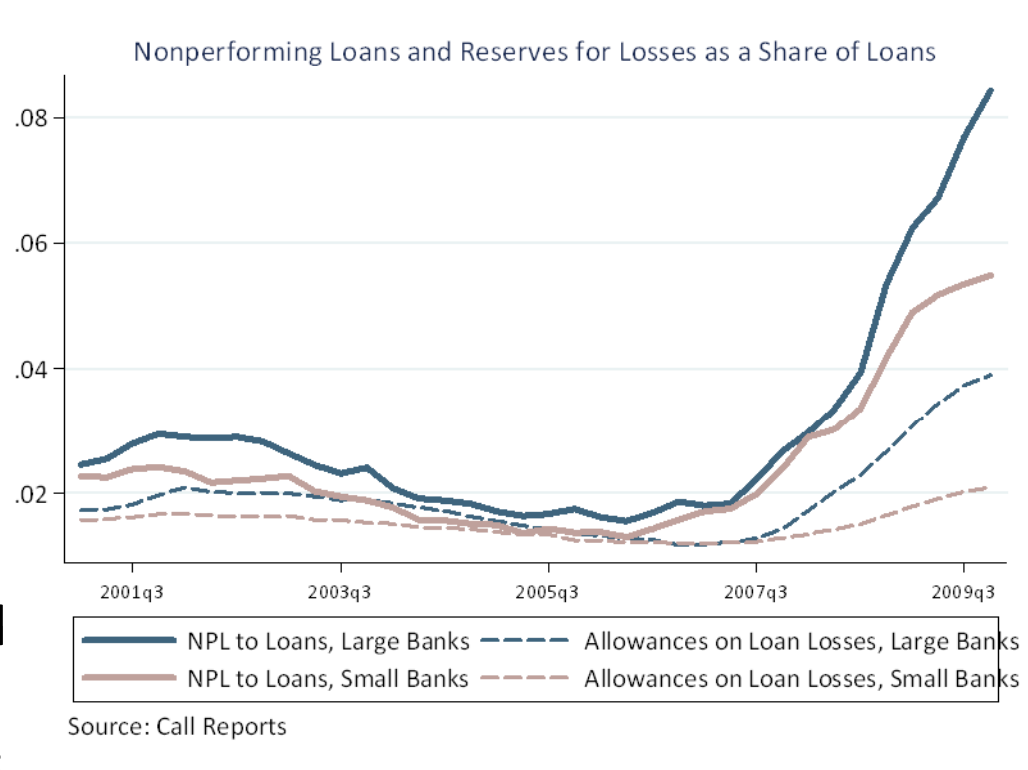
- Especially for the large banks; these are the top 25 domestic banking organizations



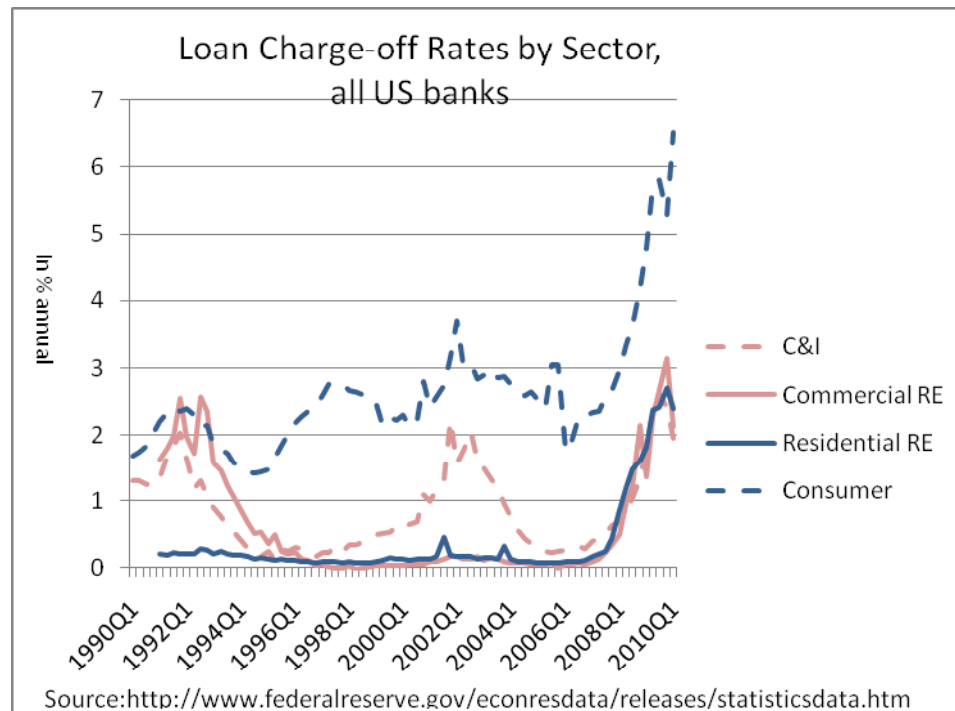
This is quarterly, annualized and in %

But delinquencies continue to affect bank loans

- Highest share of loans delinquent are in residential mortgage sector (to 11% 2010Q1); consumer loans also rising delinquencies
- But some decline for commercial real estate and C&I loans
- Reserves for losses haven't kept up

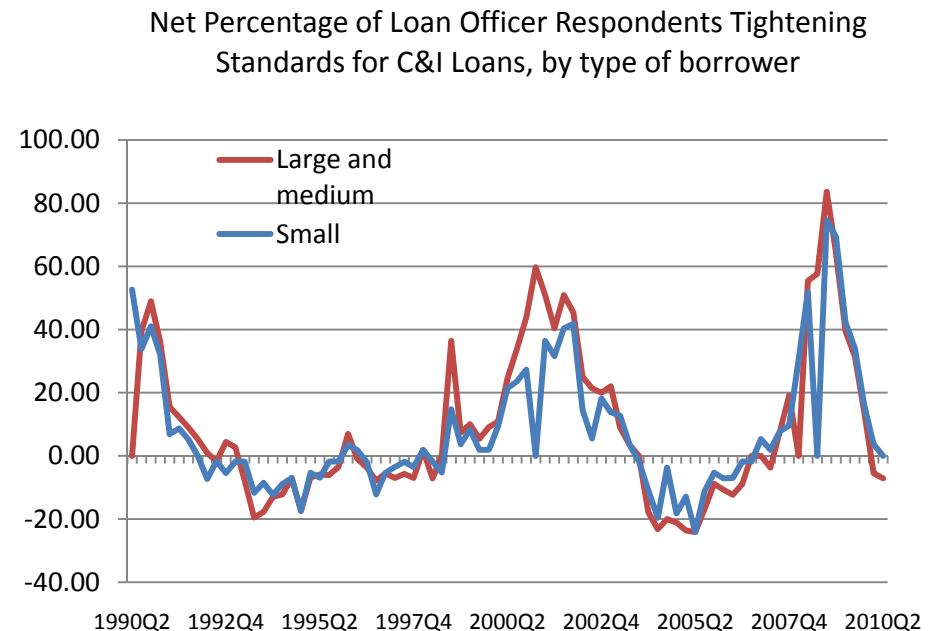


And delinquencies show up in loan charge-offs



Reluctance to lend is seen in survey of bank loan officers

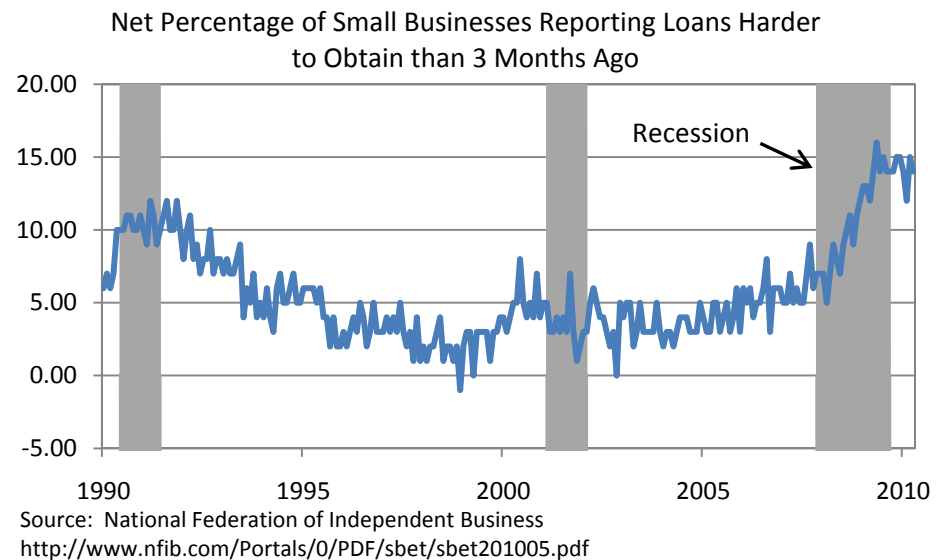
- Reluctance due to borrower credit risk, bank liquidity hoarding, better fire-sale opportunities in future
- Lending standards have relaxed for corporate borrowers in recent quarters
- Consumer credit conditions (non-real estate) have also improved: from a decline of 4.4% in 2009 to a rise of 0.4% (at an annual rate) in the first quarter of 2010 (as of May release)



Source: Senior Loan Officer Opinion Survey on Bank Lending Practices, as of May 3, 2010 release
<http://www.federalreserve.gov/boarddocs/SnLoanSurvey/201005/chartdata.htm>

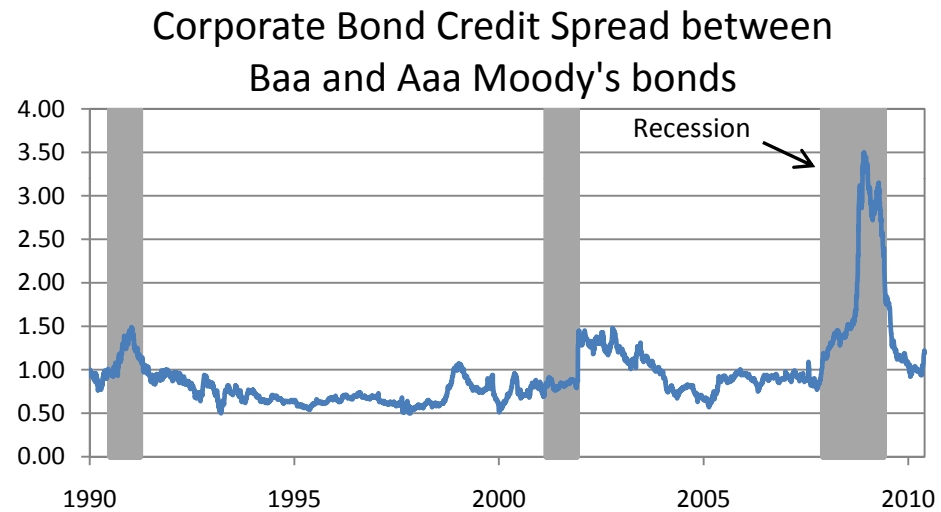
And evidence from directly surveying small businesses

- While elevated, the fraction of small businesses reporting that loans are getting harder to obtain has stopped going up
- Caveat: is the constraint supply or demand for credit? Some academic evidence that in first year of crisis it was credit supply crunch but later weak demand due to limited investment opportunities for businesses



Costs of issuing corporate debt have gone down

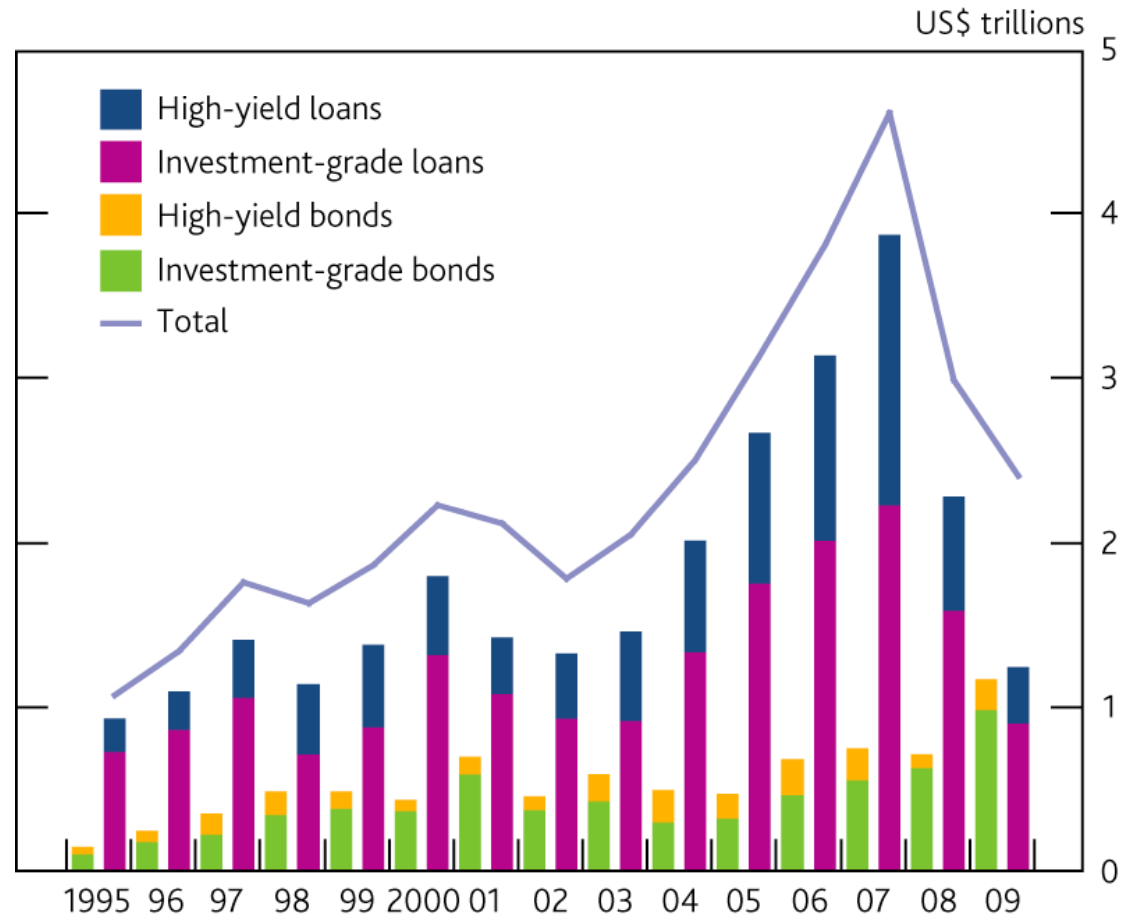
- Riskier companies with a Baa rating can now issue a bond at a spread of 100 basis points (1%) relative to Aaa companies
- Even subinvestment grade companies spreads have gone down (e.g. Merrill Lynch high yield bond index is 300 basis points above Baa, compared with a peak of 1400 basis points end of 2008)



Source: <http://www.federalreserve.gov/releases/h15/data.htm>

Global issuance of corporate bonds and loans

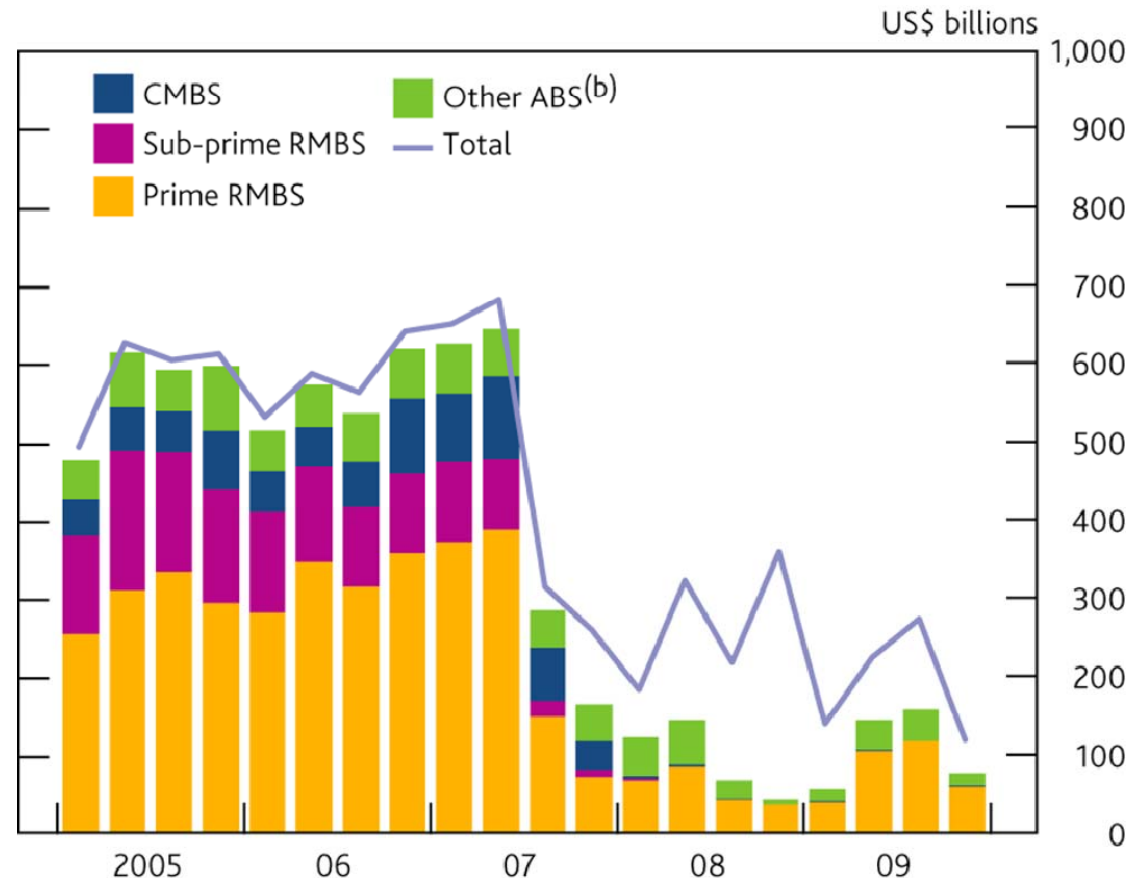
- Corporate bond market on a recovery
- Increasingly trickling down to riskier borrowers (e.g. of the \$66 billion in bond financing in the US in April 2010, \$30 billion was high-yield bonds)



Source: Bank of England, Financial Stability Report, Dec 2009 (from Dealogic)

Global issuance of structured financial assets

- Even some structured credit products are showing signs of life: prime RMBS and other ABS (such as auto)



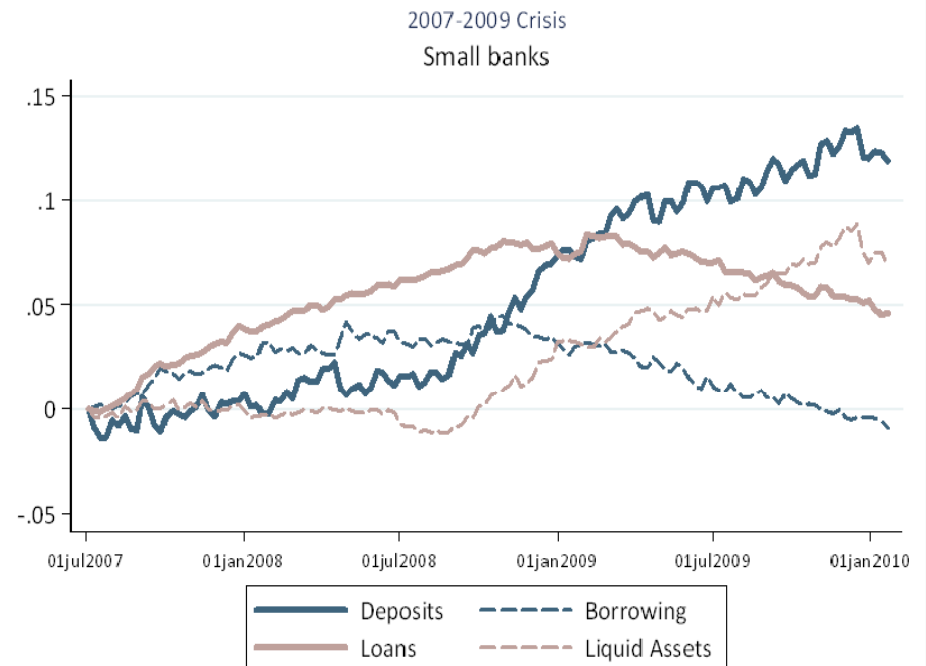
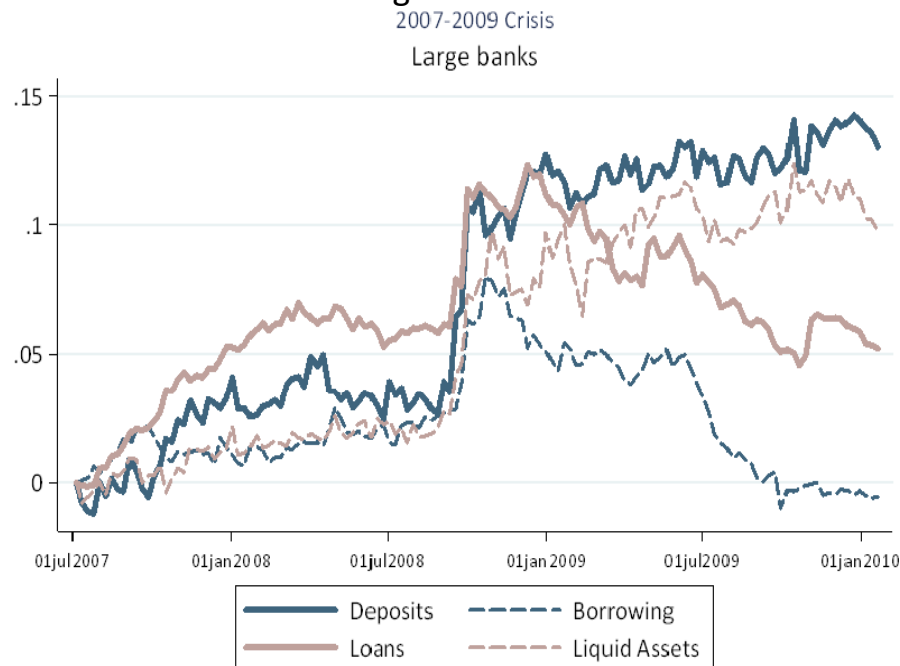
Source: Bank of England, Financial Stability Report, Dec 2009 (from Dealogic)

(a) Bars show non-retained issuance, proxied by issuance eligible for inclusion in underwriting league tables. Line includes retained issuance proxied by issuance not eligible for inclusion. Partial data for 2009 Q4.

(b) Other asset-backed securities. Includes auto, credit card and student loan ABS.

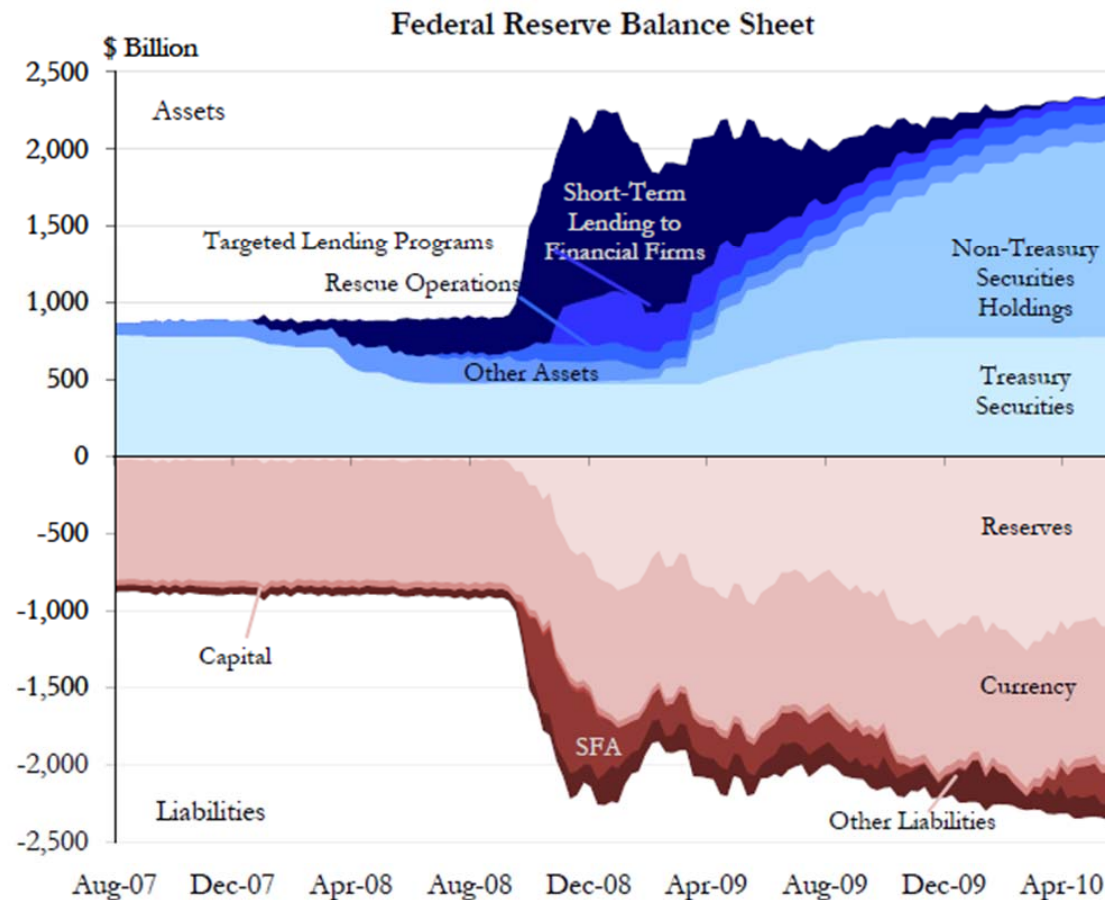
Cumulative growth in bank balance sheets over the crisis

- Banks have sharply reduced lending since end of 2008; a lot of the lending increase in the first year of the crisis was because of off-balance sheet exposures converting into on balance sheet loans
- How did banks fund this increase in lending?
 - Deposit inflows but these were anemic initially, especially at small banks
 - Using up liquid assets
 - Borrowing



Who did banks and other financial institutions turn to as a lender of last resort in the crisis?

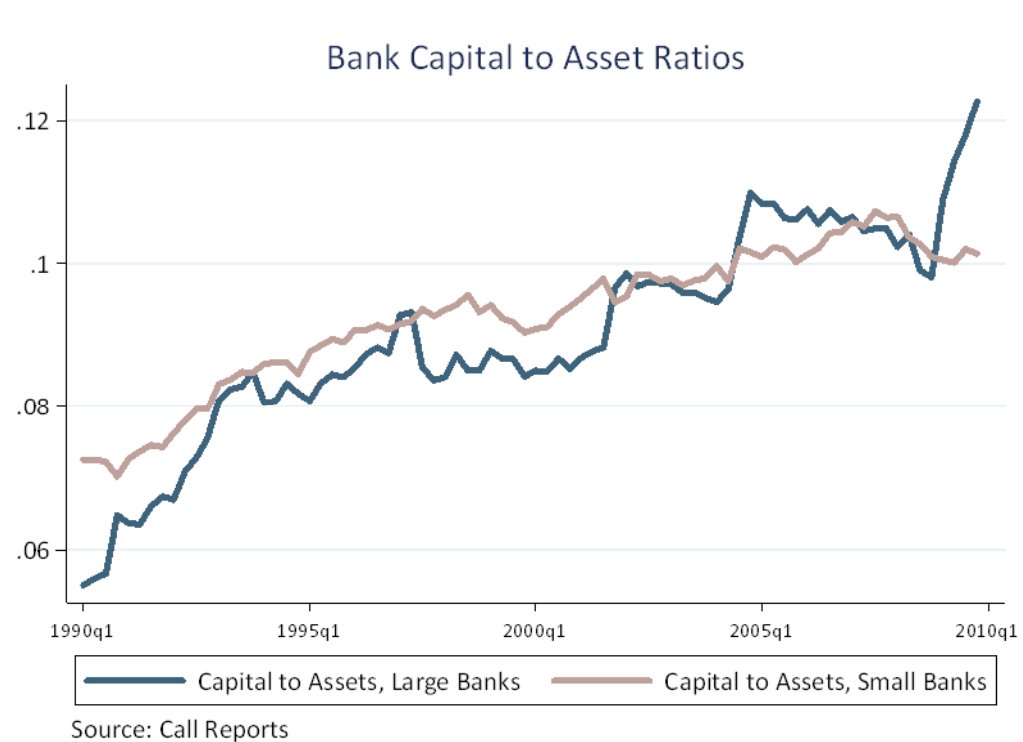
- The Federal Reserve served as a backstop of liquidity in impaired markets
- In addition to the Federal Reserve, banks and thrifts also turned to the Federal Home Loan Banks as a lender of next-to-last resort



Source: Macroeconomic Advisers, from Federal Reserve H.4.1 Release June 2, 2010.

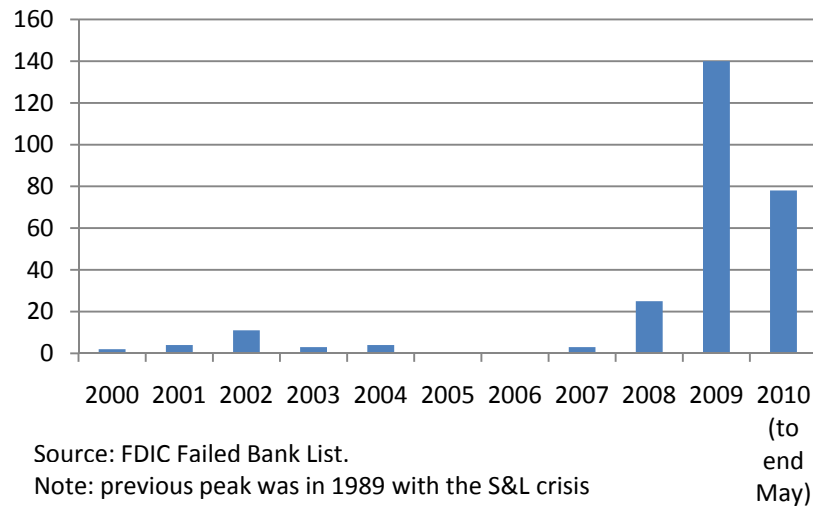
Large banks have raised capital

- Bank regulators carried out stress tests on the largest banks in the Spring of 2009; those found short were asked to raise capital
- Small banks have not been able to raise capital as easily; tend to rely on retained earnings



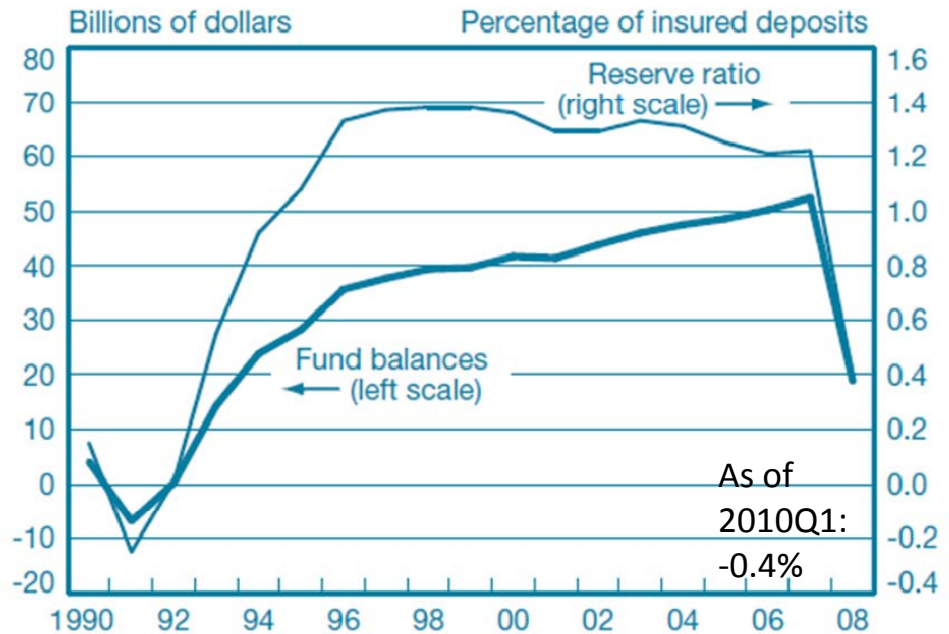
Bank failures continue, and the deposit insurance fund is depleted

Number of failed banks



Source: FDIC Failed Bank List.
 Note: previous peak was in 1989 with the S&L crisis (over 500 failures and 1500 problem institutions).
 As of 2010 Q1, there were 775 problem FDIC-insured institutions.

Balances of Deposit Insurance Fund and the Reserve Ratio

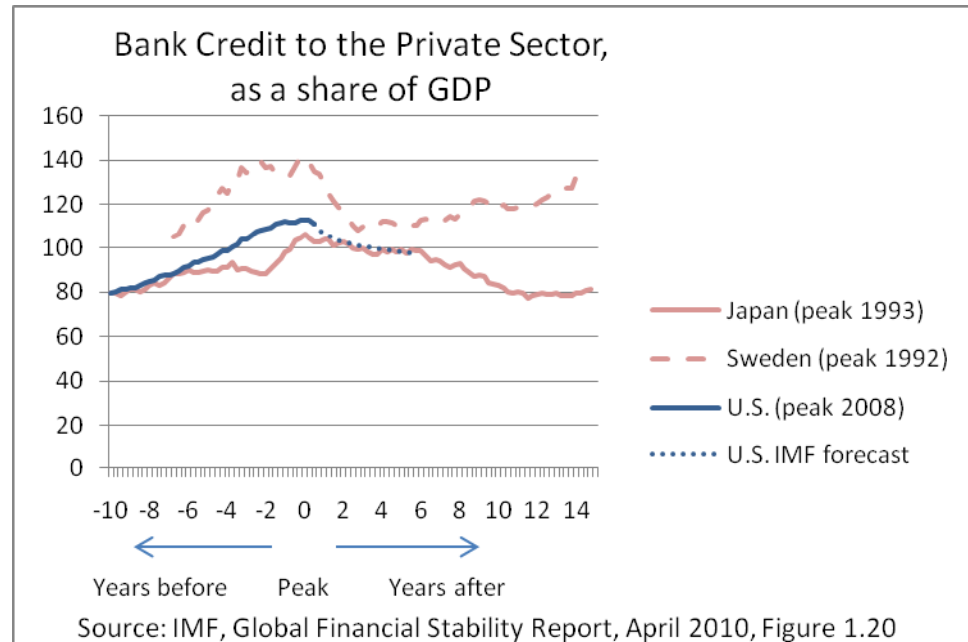


Source: Federal Deposit Insurance Corporation.

Taken from Acharya, Santos and Yorulmazer, New York Fed Economic Policy Review, Forthcoming, Systemic Risk and Deposit Insurance Premiums, and supplemented with information from FDIC as of 2010Q1

How long does a recovery take?

- Financial crises originating in credit markets can take years to work themselves out
 - E.g. Debt deflation in Japan
- Caveat: is a return to peak bank credit optimal?



Actions taken to resolve crisis

- Monetary policy easing (lowering federal funds target)
- Liquidity support provided by Federal Reserve through collateralized lending programs
- FDIC expanded guarantees
- Capital injections by government
- Stress tests on largest banks
- Programs to avoid home foreclosures and agency mortgage asset purchases by Federal Reserve to support mortgage market

Problems highlighted by the crisis

- Financial innovations can benefit households in terms of greater access to credit and cheaper credit, but also risks
 - E.g. securitized subprime mortgages excessively sensitive to house prices; lack of history; reduced incentives of lenders to assess risk and to monitor; overall exposures to risk were opaque and fuelled panic
 - Failures of internal risk management at financial firms
- Information and complexity problems point to limits to quality of financial infrastructure
 - Efforts to centralize more credit derivatives trades by establishing clearinghouses and to standardize trades with exchanges

Problems highlighted by the crisis, cont'd

- Regulatory deficiencies: capital requirements and avoidance (regulatory use of ratings); not comprehensively applied to all financial institutions; excessive leverage; insufficient liquidity management (even secured borrowing was shut off)
 - Also problems of capital once adverse shock hits, and banks cut on lending to credit-worthy borrowers. Can lead to excessive liquidations
- Regulatory deficiencies: each financial institution may seem safe but collectively they pose a risk to systemic stability because institutions have correlated exposures, or are inter-connected
 - New regulatory-supervisory approach is macroprudential (system-wide) and not focused on individual institutions

Problems highlighted by the crisis, cont'd

- Deposit insurance premiums not properly priced
- 'Too big to fail' problems
 - Some institutions received access to federal safety nets (or was implicit). This can distort risk-taking incentives even more in the future
 - This has led to efforts aimed at resolving distortion: more intense supervision and stringent regulatory requirements in proportion to the risk an institution contributes to the system; implementing a credible and mechanism to resolve TBTF institutions in a rules-based fashion that would impose losses on equityholders and some creditors; an extreme solution would be to cap size but still have inter-connected institutions



**'Have you got anything that's
been ring fenced?'**

Source: Financial Times,
June 8, 2010

Problems highlighted by the crisis, cont'd: not related to financial system structure

- Going beyond remedies of financial market structure, if the driver is foreign demand for safe US assets, a macroeconomic approach is needed
- Possible connection between monetary policy and financial stability
- Subsidies to housing leverage. Better to be explicit

Limits

- Even if eliminate regulatory ‘free lunch’ by passing a financial reform bill this summer,
- may continue to see periodic panics as banks (and shadow banks) are inherently vulnerable. They transform illiquid assets (that only pay off in the future) into liquid assets. And investors are subject to risk and uncertainty aversion driven runs

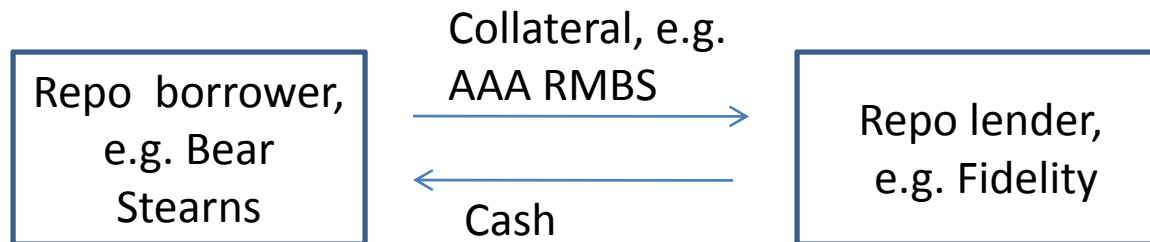
For further reading & references

- The New York Fed maintains a link to education resources for teachers at: <http://www.federalreserve.gov/econresdata/releases/surveysreports.htm>
- To find out more about monetary policy, how it is evolving and all the emergency liquidity facilities that were set up during the crisis, go to: <http://www.federalreserve.gov/monetarypolicy/bst.htm>
- For not very technical expositions of the crisis written by academic economists, see Acharya and Richardson, *Critical Review*, 2009 “Causes of the Financial Crisis”; Brunnermeier, *Journal of Economic Perspectives*, 2009 “Deciphering the Liquidity and Credit Crunch 2007-2008”; Gorton Testimony to Financial Crisis Inquiry Commission, Feb 2010, “Questions and Answers about the Financial Crisis” (other testimonies can also be found at <http://www.fcic.gov/hearings/>)
- For those interested in behavioral and irrationality, see book by Akerlof and Shiller, 2009, “Animal Spirits”.
- For more on the interest rate debate and whether it fuelled asset prices, see Bernanke, Jan 3, 2010 “Monetary Policy and the Housing Bubble”; Greenspan, 2010, *Brookings Papers on Economic Activity “The Crisis”*; Hoenig interview in the *Wall Street Journal*, May 15, 2010; Taylor, “Housing and Monetary Policy”; Adrian and Shin, 2008, *Jackson Hole Symposium “Financial Intermediaries, Financial Stability and Monetary Policy”*

For further data sources

- Weekly financial highlights report compiled by the Atlanta Fed:
<http://www.frbatlanta.org/research/highlights/finhighlights/>
- Current Credit conditions compiled by the New York Fed:
<http://data.newyorkfed.org/creditconditions/>
- Quarterly report on bank conditions compiled by the FDIC (e.g. March 2010 available at
<http://www2.fdic.gov/qbp/2010mar/grbookbw/QBPGRBW.pdf>
- Other sources of financial data and credit surveys are maintained by the Federal Reserve Board of Governors available at
<http://www.federalreserve.gov/econresdata/releases/statisticsdata.htm>
<http://www.federalreserve.gov/econresdata/releases/surveysreports.htm>

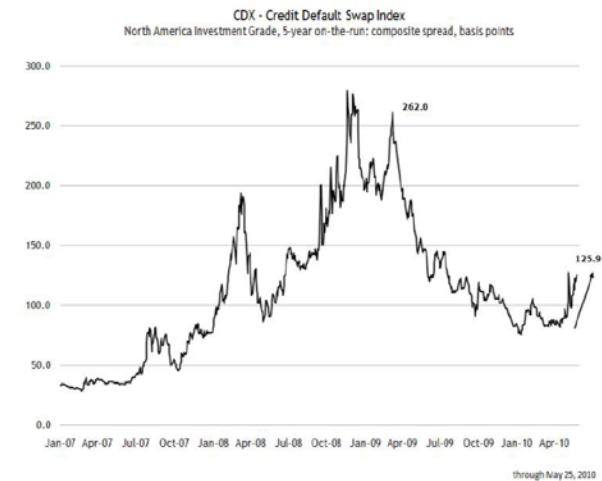
What is a Repo?



- A repo (repurchase) agreement is a short-term loan that is secured by financial securities; before the crisis was perceived as safe. The difference between the security's price and its value as collateral is the 'haircut'. Higher haircuts lead to deleveraging as more collateral is needed for a given amount of borrowing. If repo lenders refuse to roll over loans, a 'repo run' occurs as happened with Bear Stearns
- The average repo haircut on structured debt shot up from close to 0 to 45% end 2008; dealer banks stopped accepting collateral for any structured asset because they anticipated that there would be no market in which to sell collateral if counterparty failed
- How big was the repo market? Only limited information on repo done by largest dealer banks; Gorton estimates that it is at least \$12 trillion, the size of total assets in the regulated banking sector

What is a CDS?

- First, a derivative is something whose value derives from something else, so you can be exposed to the risk of a corporate bond without owning it
- Credit derivatives market rapidly expanded from \$1 trn outstanding in 2000 to \$20 trn outstanding in 2006. Before credit derivatives, there were currency, interest rate and commodity derivatives. JP Morgan is alleged to have come up with the credit default swap (CDS) in 1994. Apparently, JPMorgan was concentrated in trading European government bonds that meant it was exposed to losses if any bonds suddenly went into default (such as Greece, Italy, Belgium; this was pre-euro times but now back full circle!). So JP Morgan designed a contract which said that if any of these government bonds went into default, the protection seller would pay JPMorgan compensation; and if no default, the seller simply earns the insurance fee (premium). See Gillian Tett, March 24, 2006, Financial Times “The dream machine: invention of credit derivatives”



Taken from Atlanta Fed Financial Highlights 5/26/10

Investors use the CDX to insure against losses on corporate debt or to speculate on creditworthiness. An increase in the CDX indicates higher credit risk. One basis point increase in spread (really, it's an insurance fee) equates to \$1,000 annually on a contract protecting \$10 million in debt.

What is the ABX index?

- The ABX index is another form of a credit derivative index that references 20 equally-weighted RMBS tranches. It was introduced in January 2006, and provided information about the aggregate view of subprime risk. Before introduction, dealer banks only knew about how various subprime-related structures they designed were placed
- As with other credit derivatives, an investor wanting to insure (or speculate) against the default of the underlying securities pays a periodic fee that was set to ensure an index price of 100 when first traded. Afterwards, the protection buyer has to pay an upfront fee of $(100 - \text{ABX price})$. This meant that as the price of the ABX fell, protection buyers had to pay a higher and higher upfront fee (and previous sellers suffered losses)