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AMERICA'S
ECONOMY™

The International Economy: Challenge and Opportunity

The Origins of the Financial Crisis

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Disclaimer: The views expressed are those of the author and do not necessarily reflect those of the Federal Reserve Bank of St. Louis or the Federal Reserve System. Really.

I thank Brett Fawley for excellent assistance in putting this presentation together.

Today's Talk

- Common themes in financial crises
- The housing bubble
- The actors in the financial crisis
- The virtuous/vicious circle
- The bubble pops.
- Capital and leverage
- Systemic risk and bank lending
- Federal Reserve policy responses
- How do we avoid future financial crises?

Common themes in financial crises

- New financial instruments and new opportunities
 - Stocks, bonds, derivatives, CDOs, etc.
 - The opening of new markets and technology booms.
- A certain euphoria. Asset prices rise to unprecedented levels.
 - “This time is different.”
- Some trigger stops the euphoria.
- Asset prices collapse.
 - Balance sheet effects on banks and financial institutions.
 - Bankruptcy of some banks and financial institutions.
 - People’s perceived wealth and consumption declines.
- Economic activity recovers slowly.

Common themes in financial crises

- “Extraordinary Popular Delusions and the Madness of Crowds,” Charles Mackay, 1841
- “Manias, Panics, and Crashes: A History of Financial Crises,” Charles Kindleberger, 1978
- “This Time Is Different,” Carmen Reinhart and Ken Rogoff, 2009.

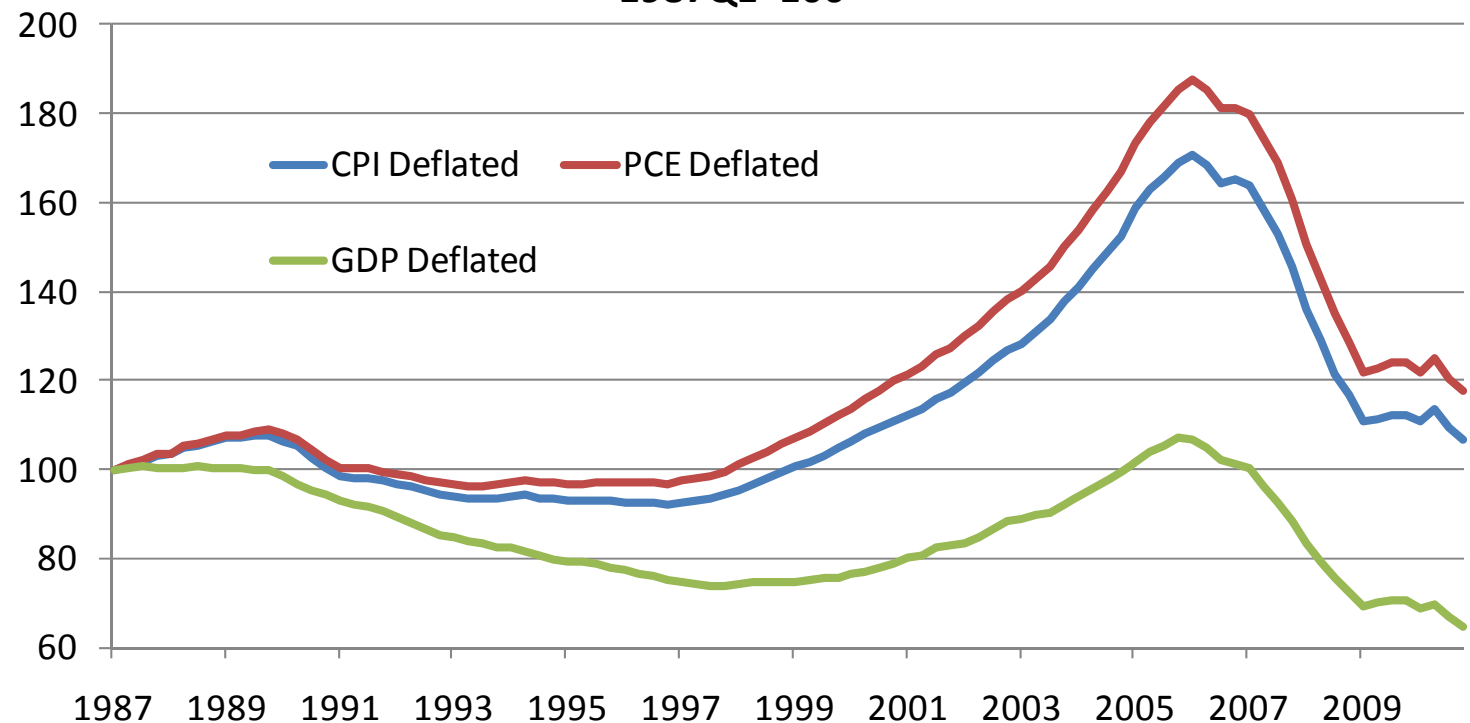
What was the story this time?

Housing price bubble

- The Underlying Event: House prices started rising in 1997 but collapsed in 2006-2008.

Composite Index (CSXR)

1987Q1=100



Why did house prices rise?

- Regulatory Factors: CRA, HUD decisions.
- Taxpayer Relief Act of 1997
- Chinese savings => Lower long-term real interest rates
- Easy monetary policy (?) => Lower short-interest rates
- Financial innovation: MBSs, CDOs
- U.S. house prices rarely (never?) fell, year over year, since the 1930s. People thought that they had to rise.
- Short-selling houses is hard.
- Housing bubble was an int'l phenomenon to some extent.
- Home-ownership rates rose to unprecedented levels.

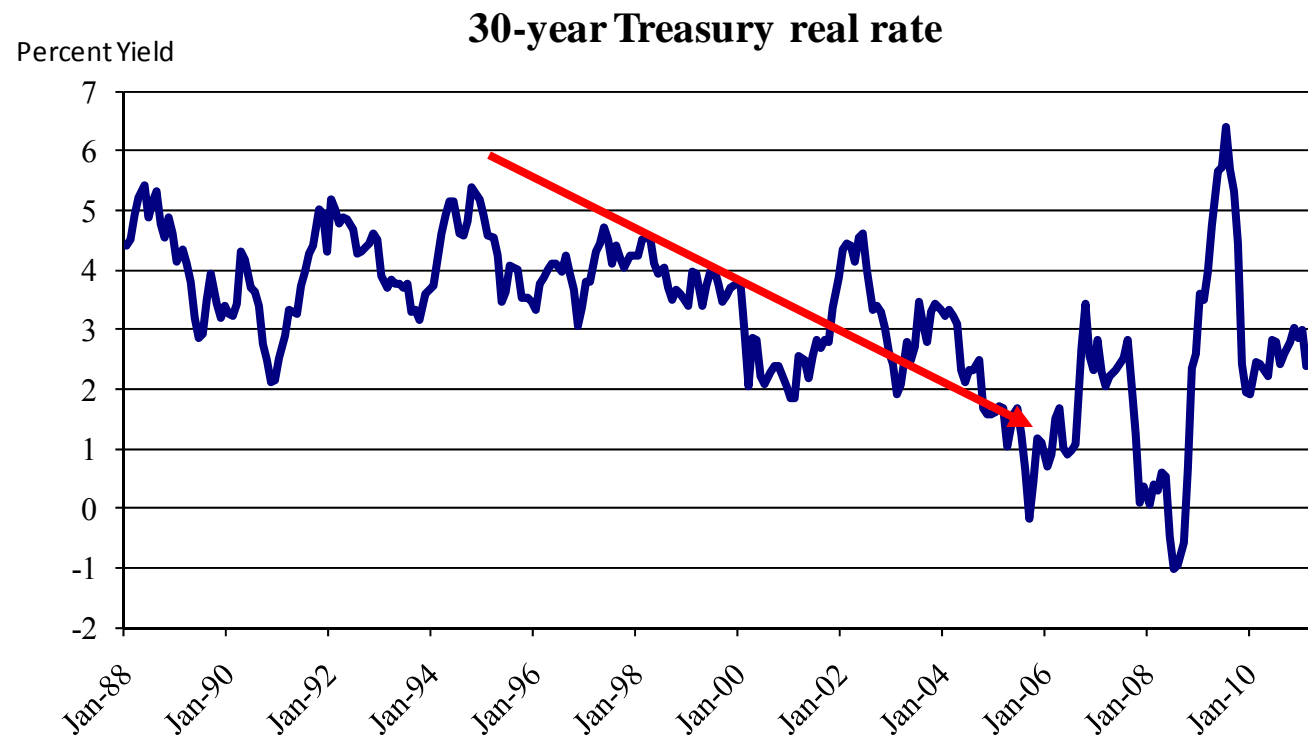
Why did house prices rise?

- Regulatory Factors
 - CRA: 1977, 1995
 - Enforcement mattered too.
 - HUD “special affordable” targets for Fannie and Freddie
 - 1996:12%
 - 2000:20%
 - 2005:22%
 - Lots of debate about the importance of regulatory factors.
- Taxpayer Relief Act of 1997
 - Expanded capital gains tax exclusion

Why did house prices rise?

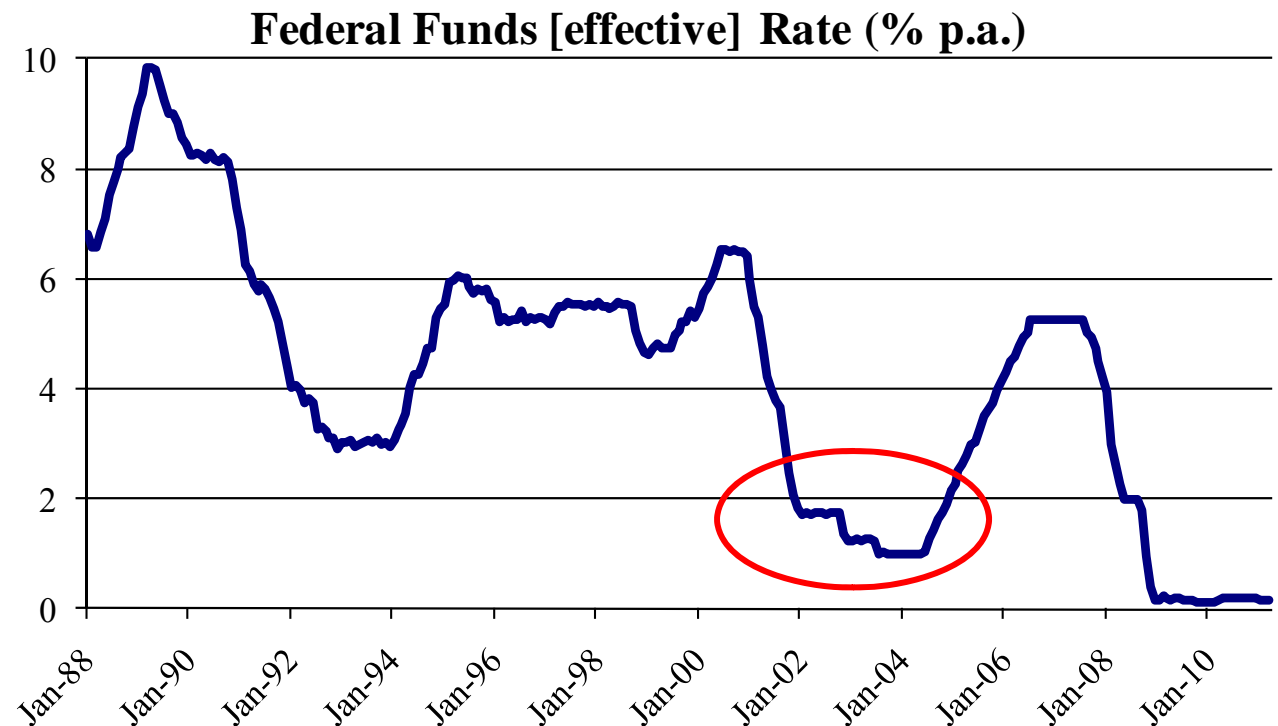
Long-term interest rates fell

- Real mortgage (inflation-adjusted) interest rates started declining in 1997.
- Effect of global capital flows? Chinese savings?



Why did house prices rise?

- The “jobless recovery” from the 2001 recession might have influenced monetary policy.
- Was monetary policy too easy in 2002-2004? Hard to say.



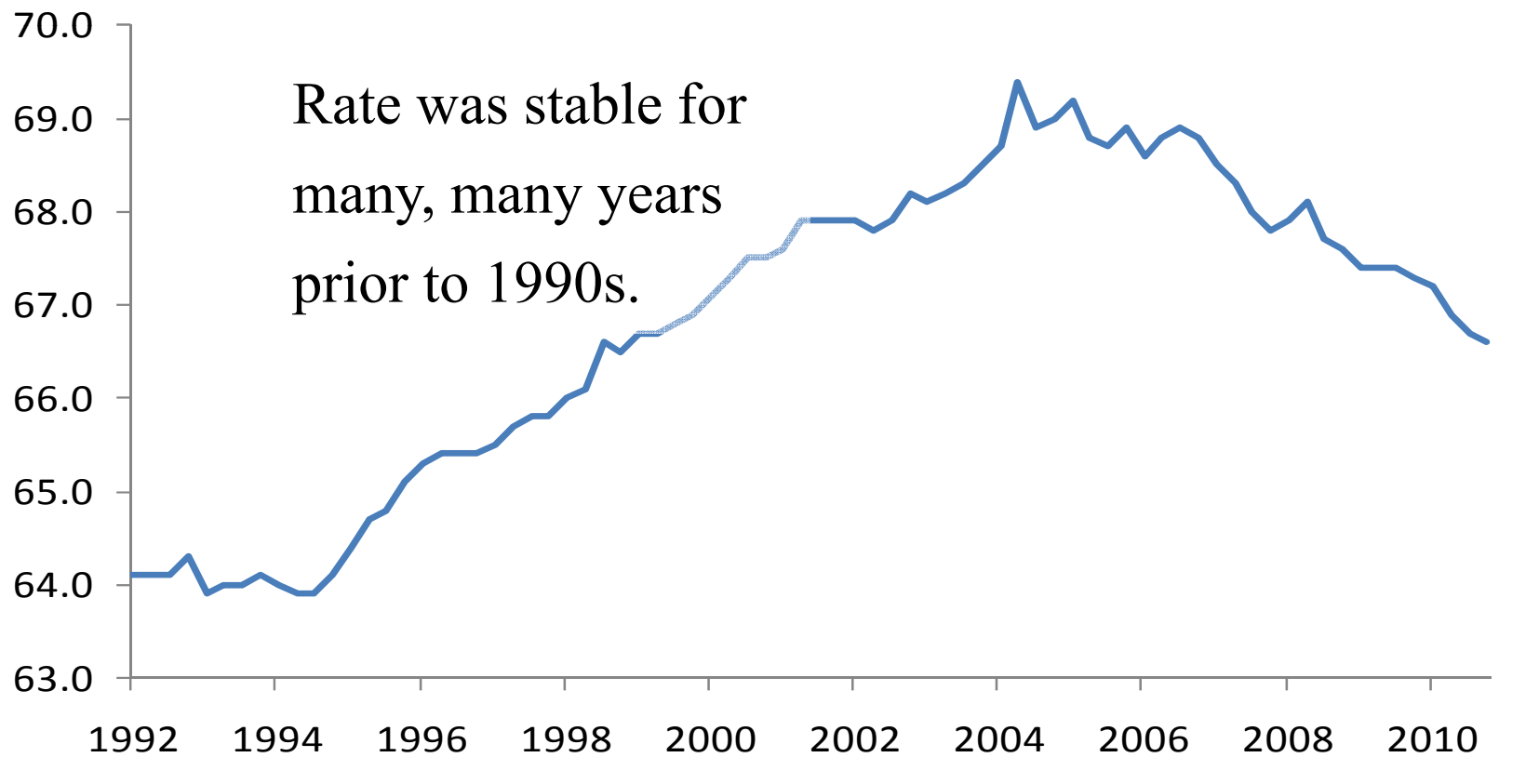
Why did house prices rise?

- Short selling helps keep asset prices from rising too high.
 - Short-selling houses is hard.
- Rise in housing prices was an international phenomenon to some extent.
 - E.g., the UK, Denmark, Spain, Ireland.

Home-ownership rates

64% in 1994 to 69% in 2004-2005. A big increase.

Homeownership Rate for the United States



Who were the actors? What did they do?

Banks, mortgage brokers, made loans but mostly sold the payments.

Fannie and Freddie guaranteed bonds backed by loans.

- CDOs and MBSs
- Fannie and Freddie also held their own securities

Investment banks packaged the loans into bonds of various risk.

- Mortgage payments were separated into tranches

The good, the not-so-good and the ugly.

Credit default insurance made the Good AAA

Investment banks often kept the riskiest bonds off their balance sheets in SPVs

Who were the actors?

What did they do?

Rating agencies rated the bonds

- Bad incentives for ratings agencies
- Bad methodology that ignored underwriting standards and the housing bubble.

Pension funds, bond funds, towns, central banks, bought the mortgage backed securities (MBSs)

- MBSs are bonds. They bought mortgage payments.

The GSEs: Fannie and Freddie¹

Fannie created in 1938.

Not part of the government.

Liabilities implicitly insured by the government.

Lower cost of borrowing.

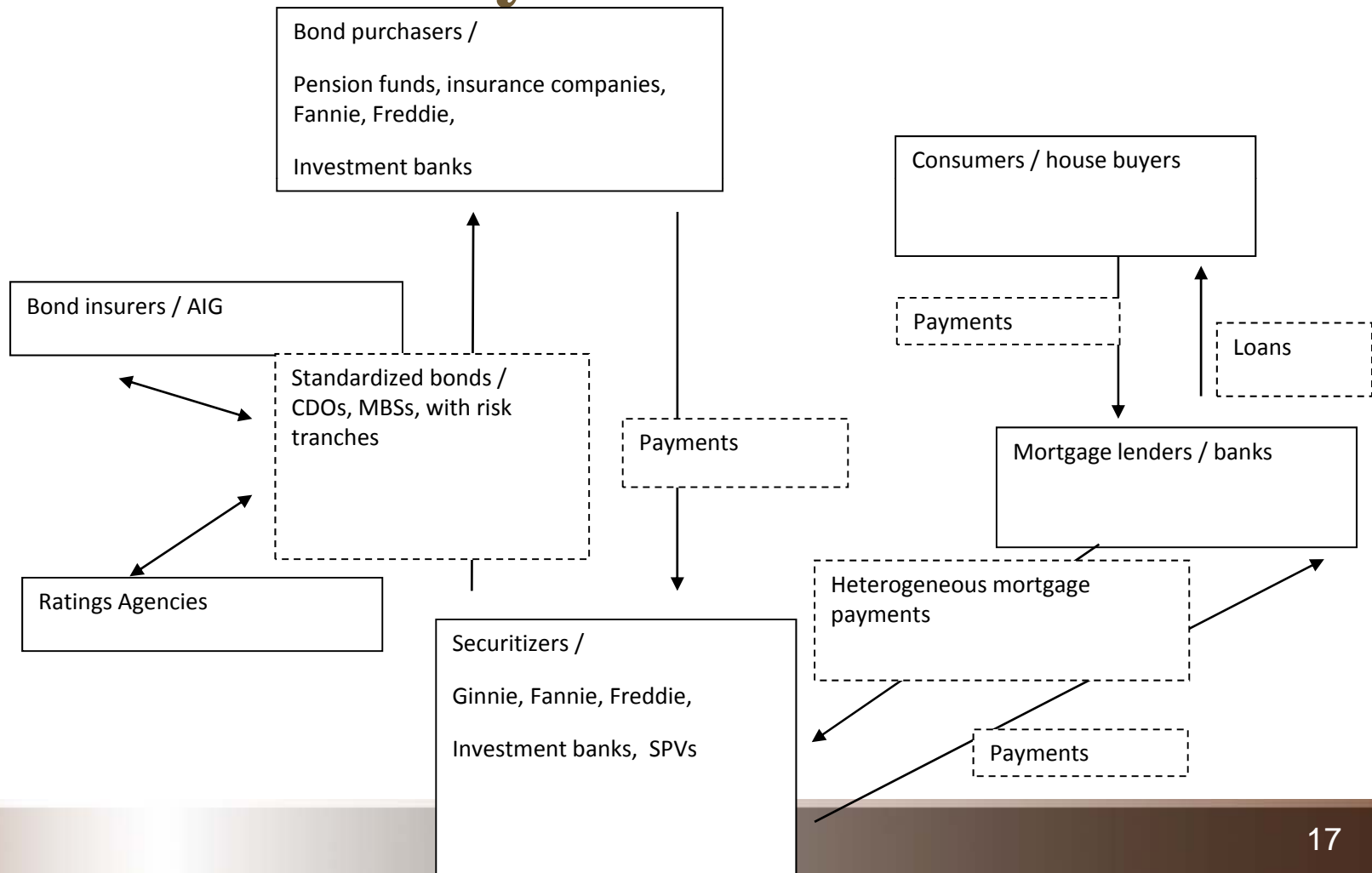
Cost advantage accrued to management.

Lots of people saw problems coming.

¹The Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation, (Freddie Mac) have operated as government sponsored enterprises (GSEs) since 1968 and 1970, respectively.

Who were the actors?

What did they do?



A virtuous/vicious circle

House prices rose.

Lending standards fell as prices rose.

- Troubled borrowers can always refinance or sell, right?
- Lenders did not enforce standards.
- Borrowers misrepresented their ability to pay.

Securitization created a principal-agent problem.

- The person making the loan doesn't hold the mortgage.

House prices rose further.

The bubble pops

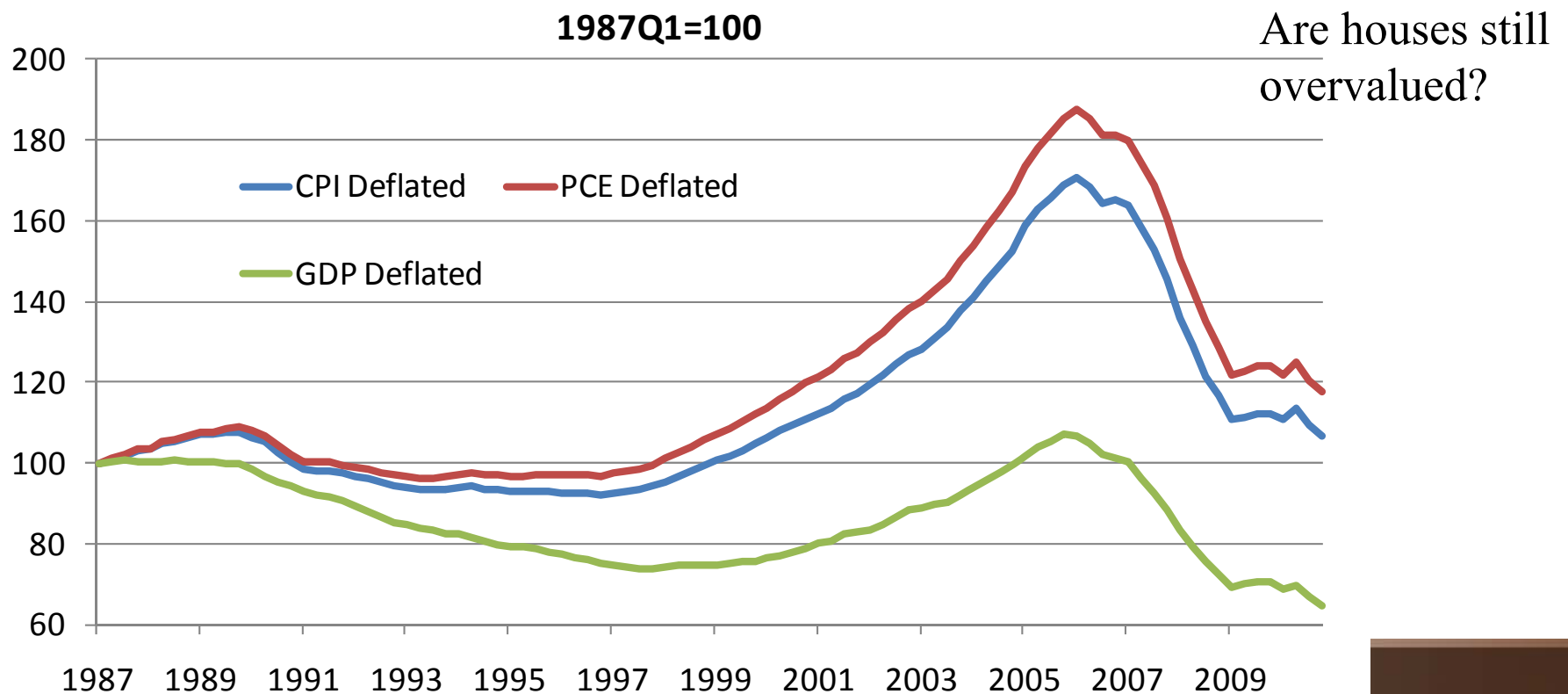
- Oil prices rose from 2002, hitting \$75 a barrel in 2006
- The fed funds rate started rising in late June 2004.
 - Fed funds rose from 1% in June 2004 to 5.25% in June 2006
 - 10-year Treasury rates rose from 4% in June 2005 to 5.1% in June 2006.
- The economy slowed.
- House prices stopped rising.
- Lending standards tightened.
- House prices eventually started declining.

The bubble pops

- Fundamental valuation is difficult to determine.

Composite Index (CSXR)

1987Q1=100



Upside-down homeowners

You lose your job and can't meet your mortgage.

- Your house is worth less than the money owed; you can no longer sell short and move.

Or, your mortgage is now worth more than your house.

- It is cheaper to buy another house than pay off the mortgage.
- What do you do? Walk away from the house.

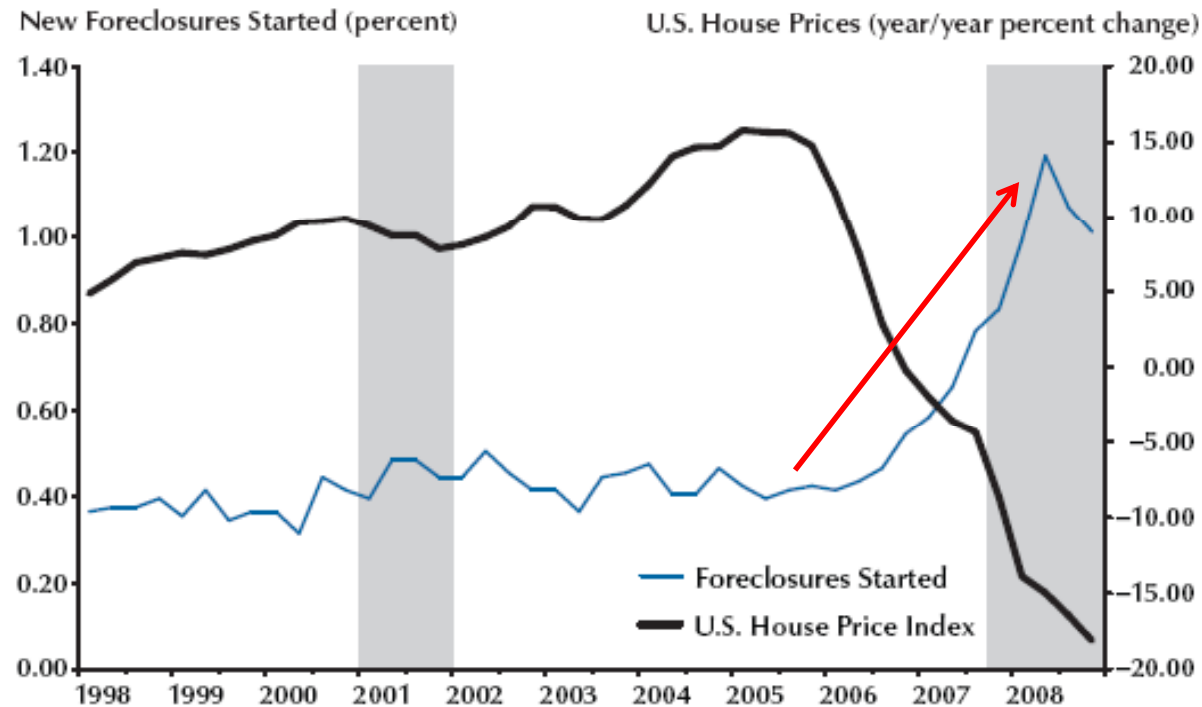
Securitization of mortgages hinders renegotiation.

Bad for lenders: Houses have modest collateral value.

Foreclosures

Figure 2

U.S. House Prices and Foreclosures



NOTE: Foreclosures data are from the Mortgage Bankers Association; the house price index (HPI) is the S&P/Case-Shiller National Home Price Index. Vertical gray bars indicate recessions.

Mortgage defaults

Borrowers don't pay: Lenders lose

Bond holders lose.

- Bonds are backed by mortgage payments.
- Pension funds, widows and orphans, small towns, insurance companies, hedge funds, investment banks, etc.

Bond insurers lose too.

Do firms have enough *capital* to weather the storm?

- Will they go bankrupt?

Capital and leverage

Capital is the owner's stake in a business

- o Capital = assets – liabilities
- High Capital = safety but low returns
 Low leverage
- Low Capital = risky but high returns
 High leverage

Capital and leverage

Financial firms typically must meet minimum capital requirements or be shut down.

- A firm with very low capital has every incentive to make a big bet with other people's money.

E.g., the S&L crisis.

- Banks don't make business loans unless the owner has a significant stake in the business.

The role of derivatives

- Derivatives
 - ... can increase leverage.
 - ... can mask potential problems and losses.
 - ... are useful but dangerous.
 - ... use has increased substantially in the last 40 years.
- Examples: CDOs, MBS, & CDS.

Marking to market

Why have prices for MBSs dropped so much?

The market for MBSs dried up

1. Prices drop.
2. Risk-based capital requirements → dump risky assets.
3. Everyone dumps the same assets at once → prices collapse.
4. Prices are extremely low.

Where did the market go?

Why don't other investors buy these up?

The *Lemons problem*

- Used car market
- Asymmetric information
- Lemons drive down the prices of all cars

People only offer bad cars for sale; no one buys used cars.

A market can disappear entirely.

Who lost as house prices fell?

Bear Stearns was heavily invested in MBSs

- The Fed assumed the worst assets.

Fannie and Freddie had become hedge funds

- Politically popular; protected from regulators.

IndyMac Bank

Lehman had been in trouble for a while

- Widely anticipated. Less of a problem

AIG insured credit defaults

- A surprise

Systemic risk

- Some failures present a risk to the whole financial system.
 - Bank runs on the whole system.
 - Counterparty risk.
 - Financial firms are heavily leveraged and large transactions are settled every day.
 - You don't get to see your counterparty's books. What assets do they hold? With whom are they trading? You don't know.
 - If your counterparty goes under, you don't get paid. You go under.

Consequences of systemic risk

- Financial firms will not lend to each other.
 - Information is asymmetric.
 - You might not be paid back.
- Financial system is paralyzed.
- All economic activity is affected.

Consequences for bank lending

- Asset price declines reduce capital.
- Low capital constrains banks from lending.
- Banks hoard liquid assets (cash and Treasuries).
- Interbank lending temporarily dried up.
 - Bank lending recovered but it only substituted for commercial paper issue.
- The commercial paper market dried up.

What is the problem?

- A quick summary:
 - House prices fell; borrowers default on mortgages.
 - Assets backed by mortgages lose value.
 - Capital falls. Financial firms could go bankrupt.
 - Huge uncertainty dries up the market for these assets.
 - No one knows who owns these assets.
 - Bad idea to lend or trade with a risky counterparty.
 - Not much lending or trading among financial firms.
 - The whole economy suffers.

Federal Reserve policy responses

| | | Traditional Policy |
|---|-----------------------|---------------------------|
| ● Federal Funds and Discount Rate cuts | | |
| ● Swap lines with foreign central banks | | |
| ● Term Auction Facility (TAF) | | 12/2007 |
| ● Term Securities Lending Facility (TSLF) | | 3/2008 |
| ● Primary Dealer Credit Facility (PDCF) | Credit easing. | 3/2008 |
| ● ABCP MMMF LF (AMLF) | | 9/2008 |
| ● Commercial paper funding facility (CPFF) | | 10/2008 |
| ● Money Market Investor Funding Facility (MMIFF) | | 10/2008 |
| ● Term Asset-Backed Securities Loan Facility (TALF) | | 11/2008 |
| ● Purchase of Agency MBSs and long-term Treasuries | | 11/2008 -3/2010 |

Federal Reserve policy responses

- Traditional Open Market Operations
 - The FRBNY buys and (rarely) sells short-term Treasuries from and to Primary Dealers to control the federal funds rate.
 - Buying Treasuries increases bank reserves.
 - The most important OMO transactions are repurchase agreements (repos).
 - Primary dealers are 20 investment banks and securities brokers (as of February 2011).
 - Traditional OMO are not effective once short-term rates hit zero.

Federal Reserve policy responses

- Federal funds rate cuts

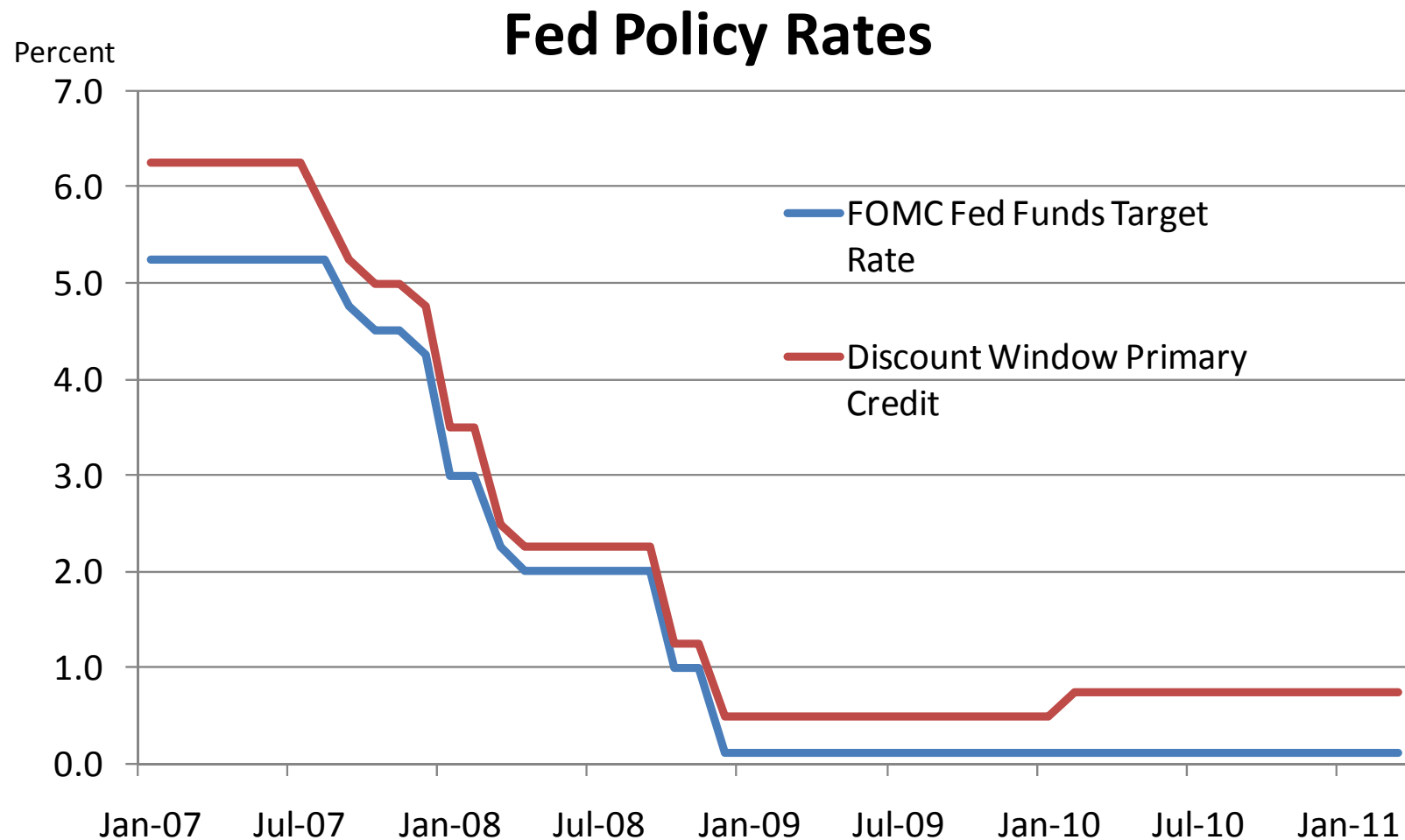
- From September 2007 to December 2008, the FOMC cut the funds rate 10 times, for a total of 500 basis points.
- Helps the banks by reducing borrowing costs
- Tends to inject liquidity

Federal Reserve policy responses

- Discount rate reductions

- Discount borrowing traditionally subjects banks to additional scrutiny.
- The Federal Reserve would like to change this.
- Reduce the fed funds/discount rate gap from 100 to 25 b.p..
- Provide end-of-day funds.
- Collateralized borrowing: Accept poor collateral in lender of last resort function (e.g., the Bank's buildings)

Federal Reserve Policy Responses



Federal Reserve policy responses

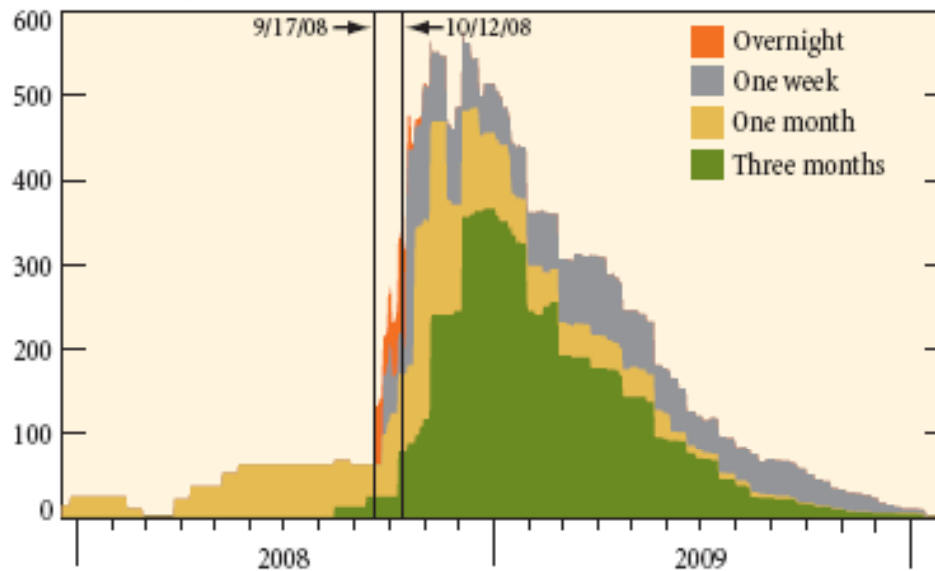
- Swap lines with foreign central banks
 - Foreign bank subsidiaries deal in USD
 - The NY lending markets are not open 24 hours.
 - Foreign central banks can now provide USD liquidity.
 - Swap lines started out small (ECB: \$20b, SNB: \$4b) and grew enormously – **included 14 countries/central banks by December 2008.**
 - Program ended in early 2010; restarted May 9, 2010; extended December 21, 2010.
 - The Federal Reserve is at very low risk in these swaps.
 - See Fleming and Klagge (2010) http://www.newyorkfed.org/research/current_issues/ci16-4.pdf

Federal Reserve policy responses

Chart 5

Foreign Exchange Swap Line Amounts Outstanding, by Loan Term

Billions of U.S. dollars



Source: Authors' calculations, based on data from Bloomberg L.P. and foreign central banks.

Note: A small share of swap line loan terms were somewhat shorter or longer than the most common terms. We group loans of up to four days as overnight, 5-16 days as one week, 17-45 days as one month, and more than 45 days as three months.

- Chart from Fleming and Klagge (2010)
- http://www.newyorkfed.org/research/current_issues/ci16-4.pdf

Federal Reserve policy responses

- Term Auction Facility
 - Lack of borrowing from the discount window.
 - TAF begun on December 17, 2007.
 - **Bypass primary dealers; get liquidity to 7000+ commercial banks.**
 - Mechanics:
 - Let banks bid on borrowing biweekly.
 - What interest rate will a bank pay for what quantity of funds?
 - Bidding is anonymous, overcollateralized
 - Assign collateral to Fed to receive funds.

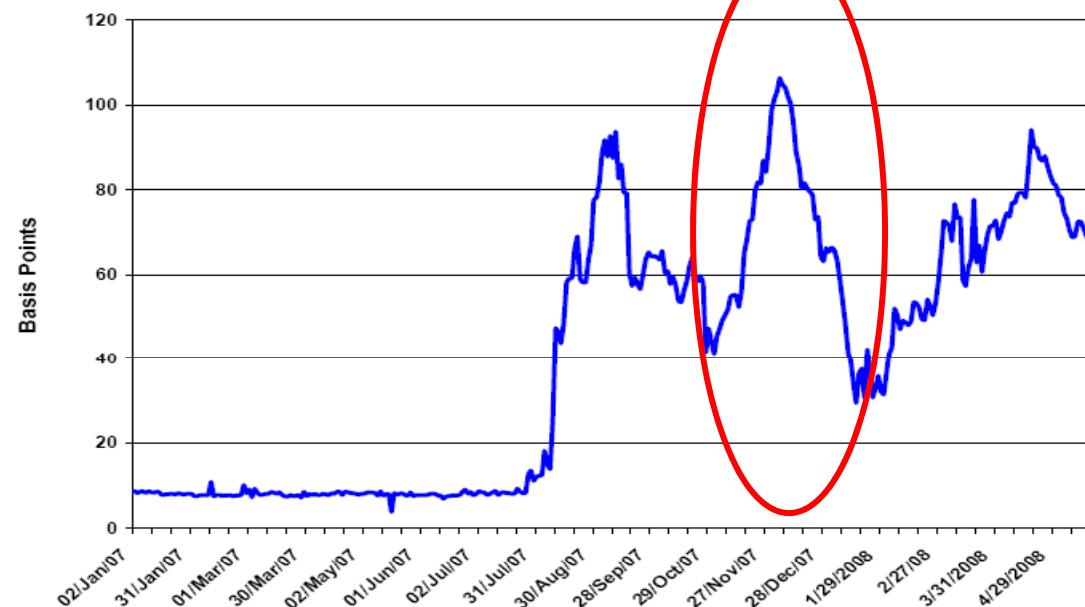
Federal Reserve policy responses

- Term Auction Facility
 - Auctions substitute for OMO. (Auctions are sterilized.)
 - Remove the stigma from discount borrowing
 - Allows banks to trade illiquid assets for liquid assets.
 - Illiquid collateral might otherwise have little market value.
 - Might have reduced the spread between Treasuries and interbank loans temporarily.
 - TAF was playing for time.
 - First TAF sale on December 17, 2007; Final TAF sale on March 8, 2010.

Federal Reserve policy responses

Source for the figure: Cecchetti, Stephen G.,
CRISIS AND RESPONSES: THE
FEDERAL RESERVE AND THE
FINANCIAL CRISIS OF 2007-2008
NBER Working Paper 14134, June 2008

**Figure 1: Spread between 3-month LIBOR
and 3-month Expected Federal Funds Rate
January 2007 to May 2008, Daily**



Source: LIBOR data are from the British Bankers' Association www.bba.org. The expected federal funds rate data are from Exhibit 2.10 of Greenlaw, Hatzius, Kashyap and Shin (2008). Note that because the LIBOR rate is determined at 11am UK time, which is 5am Eastern US time, I plot the expected federal funds rate on date t minus LIBOR at $t-1$. This avoids spurious spikes that would occur on dates with the FOMC made unexpected, inter-meeting, changes in the target federal funds rate.

Federal Reserve policy responses

- Term Securities Lending Facility
 - The scramble for safe, liquid assets meant Treasuries became scarce.
 - Treasury prices up => yields fall.
 - Overnight Treasury repo rate plunged.

Federal Reserve policy responses

- Term Securities Lending Facility

- Solution was the TSLF

- Grew out of an old program to lend particular Treasuries to Primary Dealers overnight.
- Lend up to \$200 billion in Treasuries for 28 days in exchange for broad collateral.
- First auction was March 27, 2008; TSLF ended on February 1, 2010.

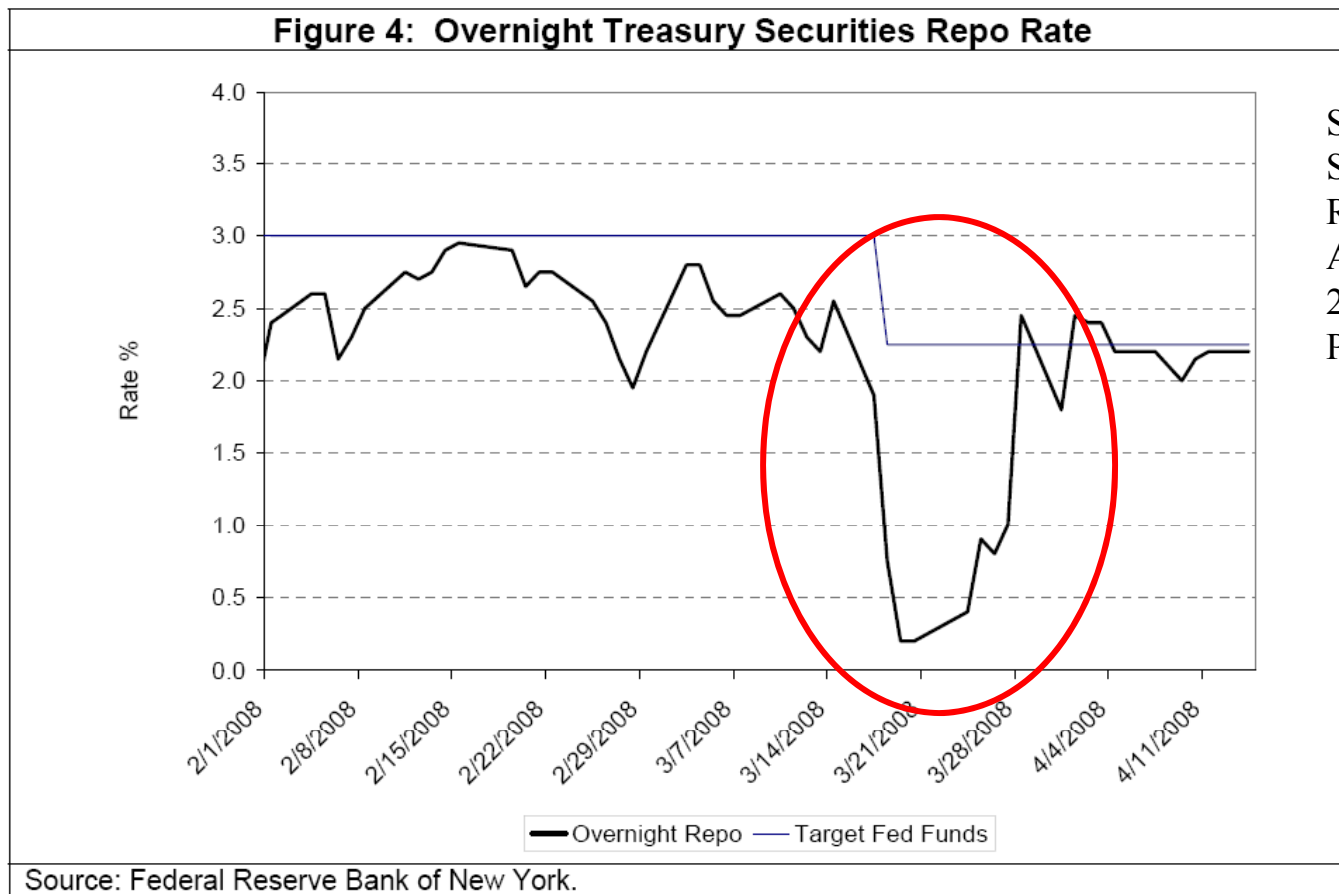
Federal Reserve policy responses

● Term Securities Lending Facility

- TSLF changes the composition of Fed's balance sheet without changing its size.
- **Goal: Reduce the risk premium by substituting Treasuries for risky MBSs.**
- TSLF was very successful in increasing the Treasury repo rate.
 - http://www.federalreserve.gov/monetarypolicy/bst_lendingprimary.htm

Federal Reserve policy responses

- TSLs increased the Treasury repo rate. (Reduced their prices.)



Source for the figure: Cecchetti, Stephen G., Crisis And Responses: The Federal Reserve And The Financial Crisis Of 2007-2008. NBER Working Paper 14134, June 2008

Federal Reserve policy responses

- Primary Dealer Credit Facility
 - PDs are not eligible for discount lending.
 - Goals
 - Short-term funding for investment banks
 - Reduce interest rate spreads on ABSs.
 - PDCF allows PDs to post a variety of collateral.
 - Created March 16, 2008 under Section 13(3).
 - Very popular.
 - Spread between Agencies and Treasuries declined immediately.
 - PDCF ended on February 1, 2010.
 - <http://www.newyorkfed.org/markets/pdcf.html>

Asset Backed Commercial Paper (ABCP) Money Market Mutual Fund (MMMMF) Liquidity Facility (AMLF or "the Facility")

- Money market mutual funds
 - Borrow from consumers
 - Lend to businesses by purchasing ABCP
- Significant demands for redemption?
 - Can't sell the ABCP; **risks a run on MMMFs?**
- The Fed (AMLF) loans depository institutions money to purchase ABCP, reliquifying the Money Market funds.
 - Begun September 22, 2008; closed February 1, 2010.
 - http://www.federalreserve.gov/monetarypolicy/bst_lendingother.htm

Commercial paper funding facility (CPFF)

- Provide liquidity to term funding markets
- Response to stress in MMMF (Sept 2008)
- Cited by Bernanke as hallmark of success for Federal Reserve “credit easing” programs
- Started on Oct 27, 2008; Ended on February 1, 2010.
 - http://www.federalreserve.gov/monetarypolicy/bst_lendingother.htm

Money Market Investor Funding Facility (MMIFF)

- Goal: Provide liquidity to U.S. money market mutual funds and other money market investors, allowing these institutions to honor withdrawals.
- The FRBNY set up LLCs to purchase CDs and CP with remaining maturity of 90 days or less.
- Announced in October 2008; Ended October 30, 2009
 - http://www.federalreserve.gov/monetarypolicy/bst_lendingother.htm
 - <http://www.federalreserve.gov/monetarypolicy/mmiff.htm>

Term Asset-Backed Securities Loan Facility (TALF)

- Goal: support credit to households and small businesses.
- Accept ABSs collateralized by consumer and business loans, including high quality commercial MBSs (as of May 19 2009).
- FRB New York will lend up to \$200 billion, with \$20 billion in credit protection from the Treasury
- Announced November 25, 2008; First issued on March 25, 2009; Ended June 30, 2010 for CMBS and March 31, 2010 for loans collateralized by other assets.
 - <http://www.federalreserve.gov/monetarypolicy/talf.htm>

Purchase of long-term debt

- QE1 announced November 25, 2008 and March 18, 2009.
 - Purchase up to \$1.25 trillion of agency mortgage-backed securities, \$175 billion GSE debt and \$300 billion of long-term Treasuries from December 2008 through March 2010.
 - Attempt to reduce long term rates, particularly in the mortgage market
 - <http://www.federalreserve.gov/newsevents/press/monetary/20081125b.htm>
 - <http://www.federalreserve.gov/newsevents/press/monetary/20090318a.htm>
- QE2 announced November 3, 2009.
 - QE2: Purchase up to \$600 billion of Long Term Treasuries from November 2010 through June 2011.
 - Lots of rumors prior to the actual announcement.
 - <http://www.federalreserve.gov/newsevents/press/monetary/20101103a.htm>

Quantitative vs. credit easing

- Chairman Bernanke distinguishes between Q easing and credit easing.
 - Q easing: Increase bank reserves.
 - Japanese strategy in the 1990s.
 - Credit easing: Ease credit conditions—risk spreads—in specific segments of the market.
 - Markets are segmented; dollar effects vary.
 - Conditions are different than in Japan.
- It is difficult to communicate a target for credit easing.

Why “rescue packages”? Why not let “them” go bankrupt?

- An economy without bankruptcy is like religion without hell.
- Ideally: Let them all go bankrupt.
- But bankruptcy takes time.
 - Except for commercial banks.
- Assets are tied up as creditors fight for claims.
- We need a functioning financial system.

Why didn't economists predict the crisis?

- Financial crises are inherently hard to predict. If they could be predicted easily, they could be avoided or immediately triggered.
 - Investors would short assets if they knew the price would fall soon.
- Even the housing bubble wasn't obvious in real time.
 - E.g., asset prices should double when long-term interest rates halve.
- People recognized the housing bubble.
 - Prediction: Price fall; borrowers default; bondholders lose.
- Interconnectedness, derivatives/leverage magnified the problem.

How do we avoid future financial crises?

- We live in a democracy; financial institutions are difficult to regulate.
 - Regulation avoidance promoted growth of *shadow banking*:
 - No deposits; Avoid bank regulation.
 - Link institutional lenders with institutional borrowers.
 - MMMFs, hedge funds, investment banks, etc.
- Strongly regulating the financial sector has its own costs.
 - Financial innovation has reduced the cost of loans.
 - Can't have your cake and eat it too. There are trade-offs.

How do we avoid future financial crises?

- The summary of Dodd-Frank is 16 pages long, single spaced.
 - Consumer Financial Protection Bureau
 - “End too-big-to-fail” by capital and leverage requirements.
 - Easier said than done.
 - Fed cannot aid individual firms.
 - The Financial Stability Oversight Council
 - Heads of many Federal agencies, including the Treasury and Fed.
 - Can impose macroprudential regulation.
 - Regulate OTC derivatives; Push derivatives to exchanges.
 - Shareholders get “non-binding” say on executive compensation.
 - 5% “Skin-in-the-game” provisions for reselling mortgages.

How do we avoid future financial crises?

- The Dodd-Frank solution for resolving too-big-to-fail firms is institutionally cumbersome and will take a long time.
- Will regulators be able to take politically unpopular steps?
 - Regulators usually know what to do. Doing it can be hard.
 - Regulators have little incentive to avoid excessive restrictions; politicians hear from the people who are restricted.
 - Politicians ultimately do what the people tell them to do.

How do we avoid future financial crises?

- Many potential solutions are politically unpalatable.
 - Require higher mortgage down payments.
 - Restrict use of ARMs for mortgages.
 - Require high levels of subordinated debt for financial firms to reduce need for rescues.
- Even when a solution is legal for regulators to impose, it is sometimes easier said than done.

Sources on the Policy Responses

- Bullard, James, Christopher J. Neely and David C. Wheelock, "Systemic Risk and the Financial Crisis: A Primer," Federal Reserve Bank of St. Louis Review, September/October 2009, 91(5, Part 1), pp. 403-17.
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- Gagnon, J.E., Raskin, M., Remache, J., Sack, B.P., 2010. Large-scale asset purchases by the Federal Reserve: did they work? FRB of New York Staff Report No. 441.
- Neely, Christopher J. "The Large-Scale Asset Purchases Had Large International Effects," FRB St. Louis WP 2010-018C, Revised January 2011.

The End