# The Great Recession

## ECON 43370: Financial Crises

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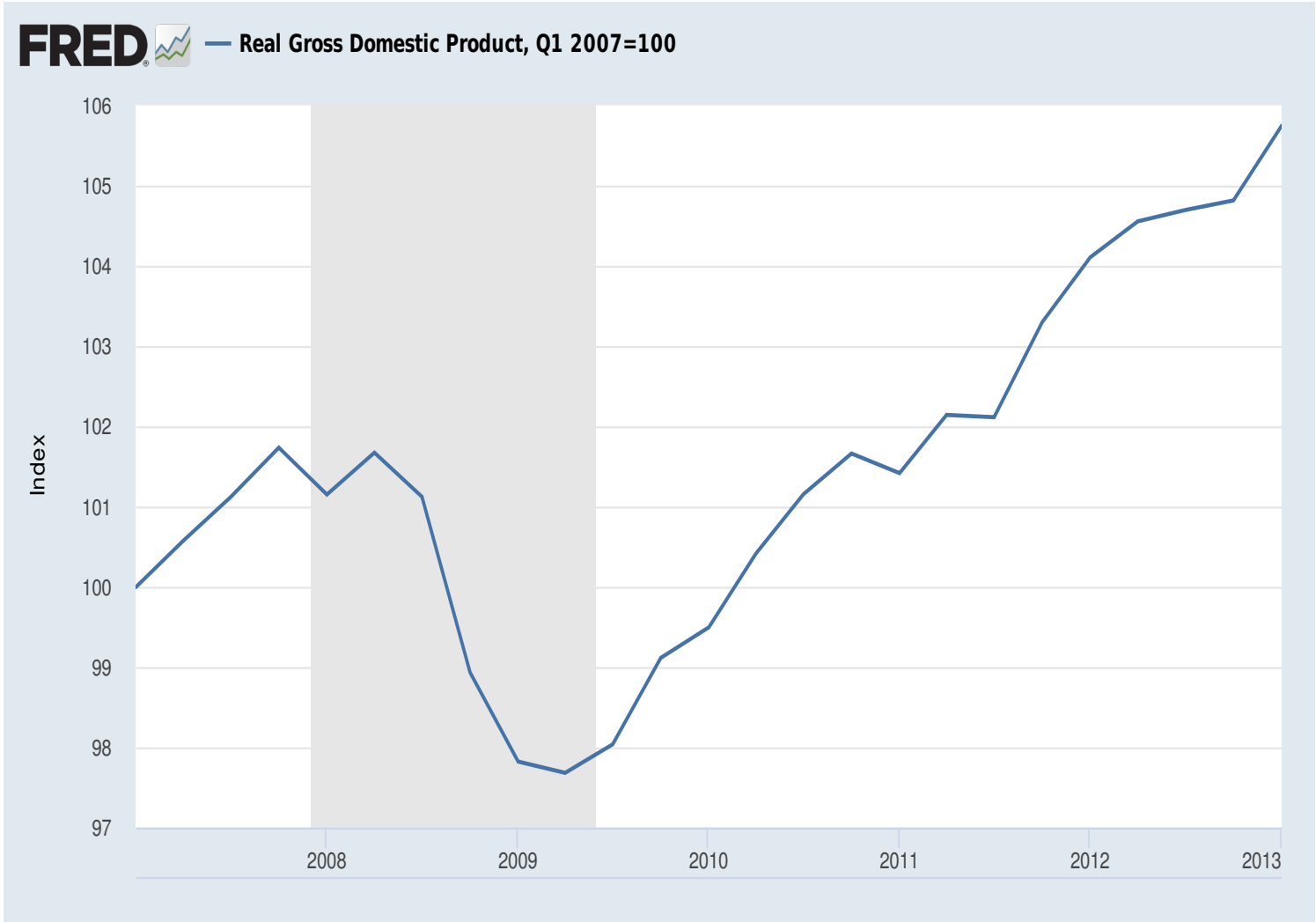
# Readings

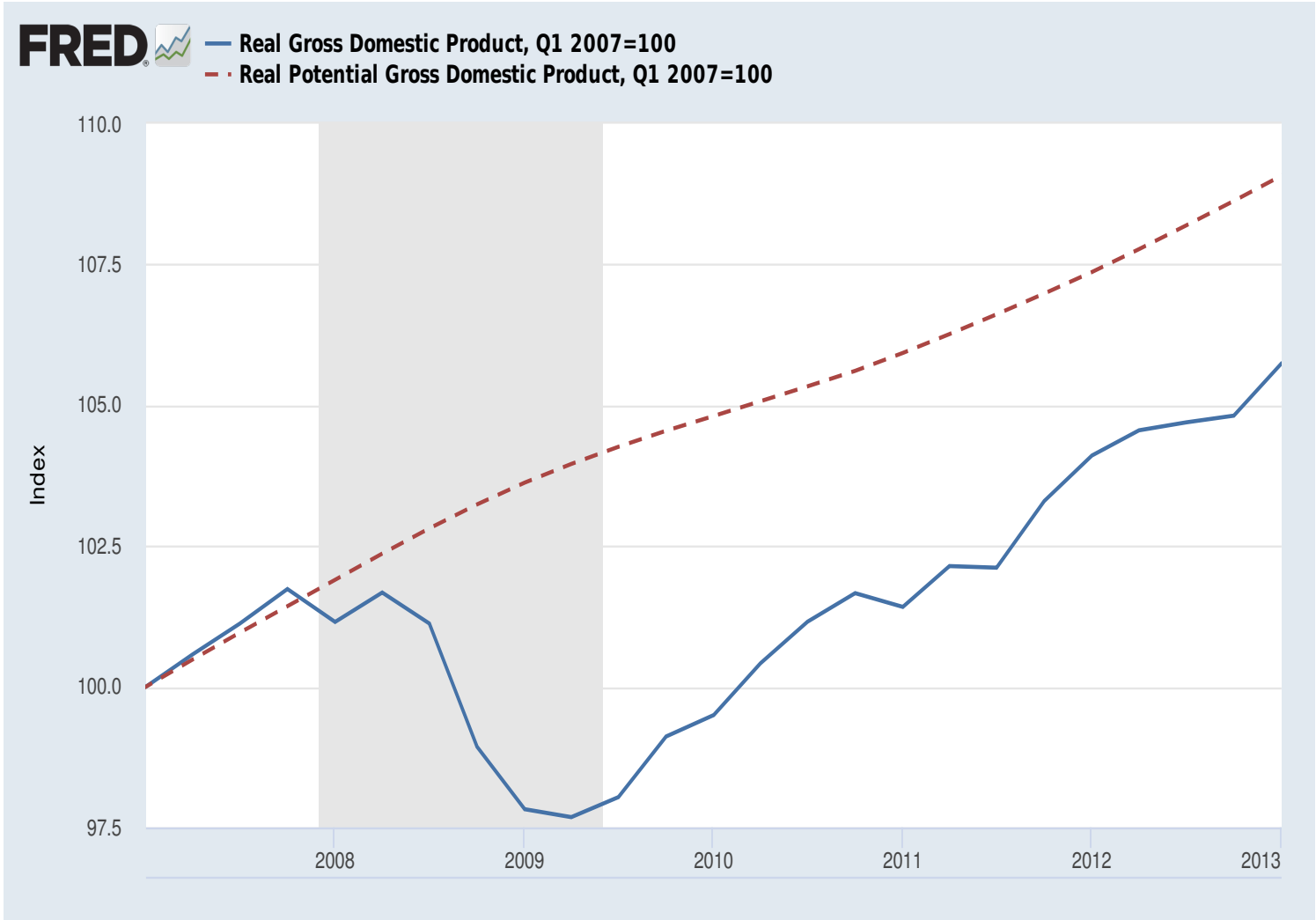
- Taylor (2014)
- Mishkin (2011)
- Other sources:
  - Gorton (2010)
  - Gorton and Metrick (2013)
  - Cecchetti (2009)
  - Bernanke *Courage to Act*
  - Geithner *Stress Test*

# The Financial Crisis and Great Recession

- These terms are often used synonymously
- The Great Recession is officially dated from December 2007 to June 2009. Most of the decline in output occurred in the fall of 2008 and winter/spring of 2009
- The financial crisis precedes that somewhat, typically dated to having begun in late summer of 2007
- The financial crisis has its origins in problems in the US housing market, particularly so-called "subprime" mortgages
- Conventional causal chain of events:

$$\text{Housing Market Collapse} \rightarrow \text{Financial Crisis} \rightarrow \text{Recession}$$


FRED
Real Gross Domestic Product, Q1 2007=100
106
105
104
103
102
101
100
99
98
97
Index
2008
2009
2010
2011
2012
2013
Shaded areas indicate U.S. recessions
Source: U.S. Bureau of Economic Analysis
myf.red/g/mXYq


FRED
Real Gross Domestic Product, Q1 2007=100
Real Potential Gross Domestic Product, Q1 2007=100
110.0
107.5
105.0
102.5
100.0
97.5
Index
2008
2009
2010
2011
2012
2013
Shaded areas indicate U.S. recessions
Sources: BEA, CBO
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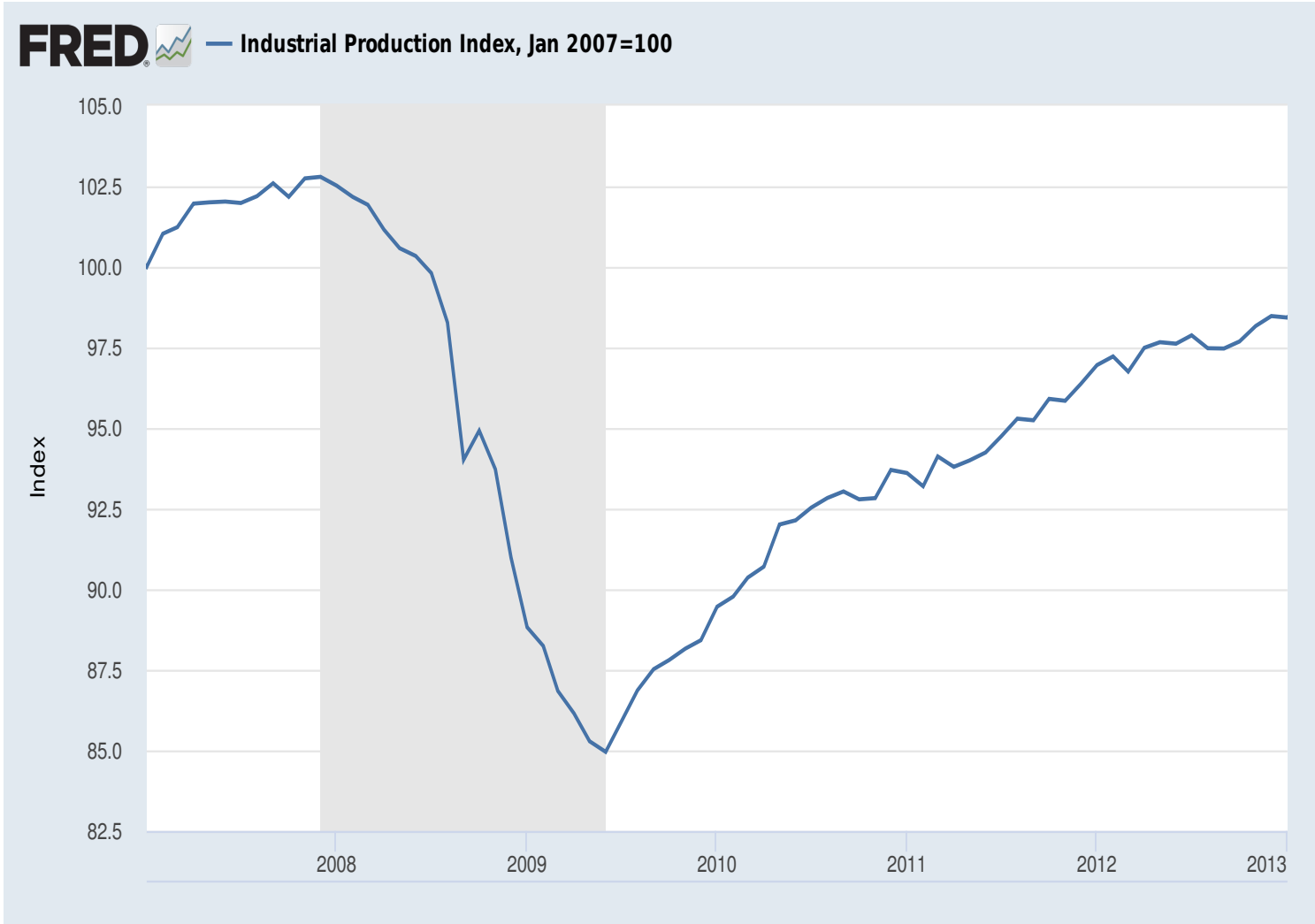
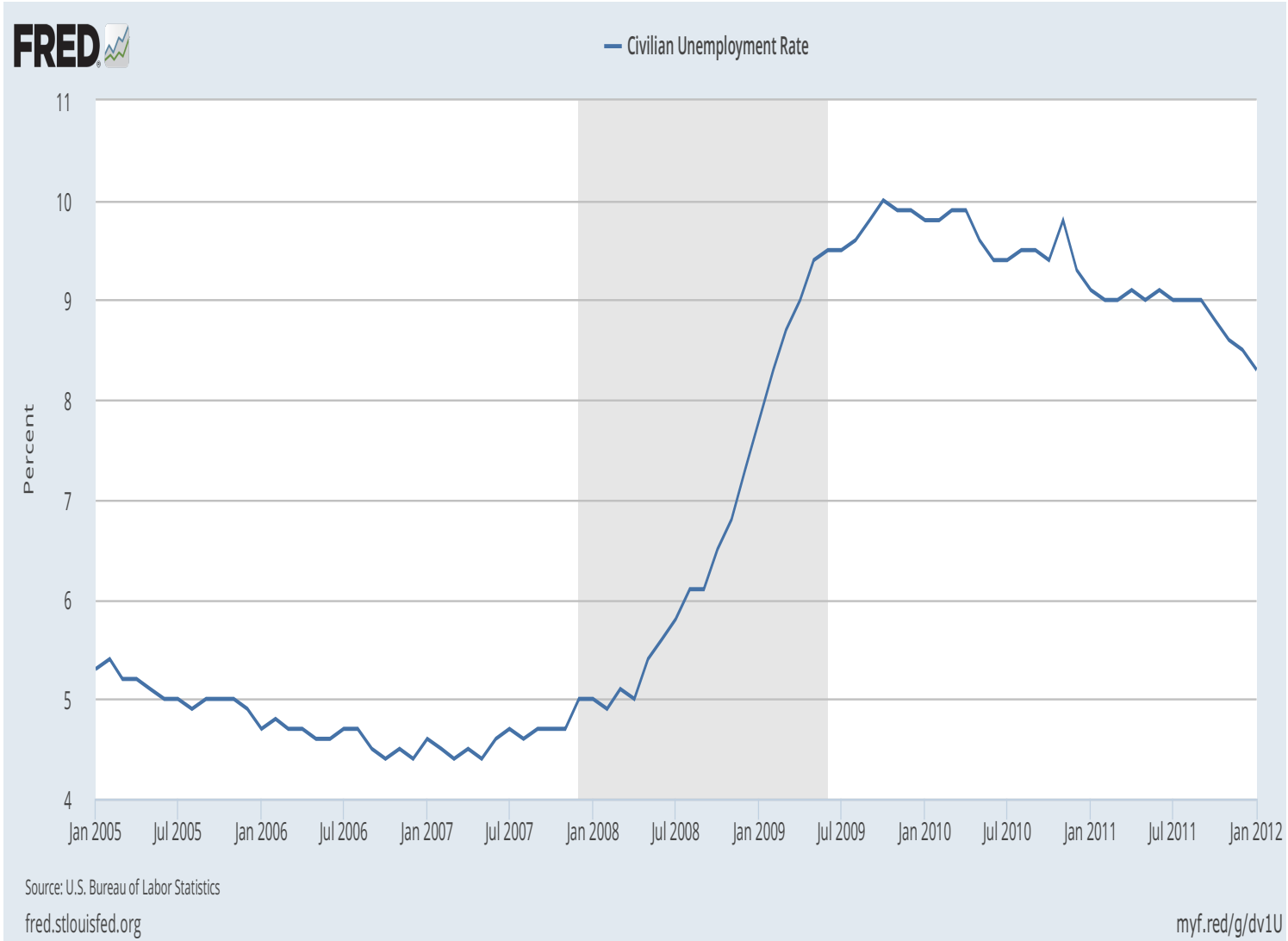
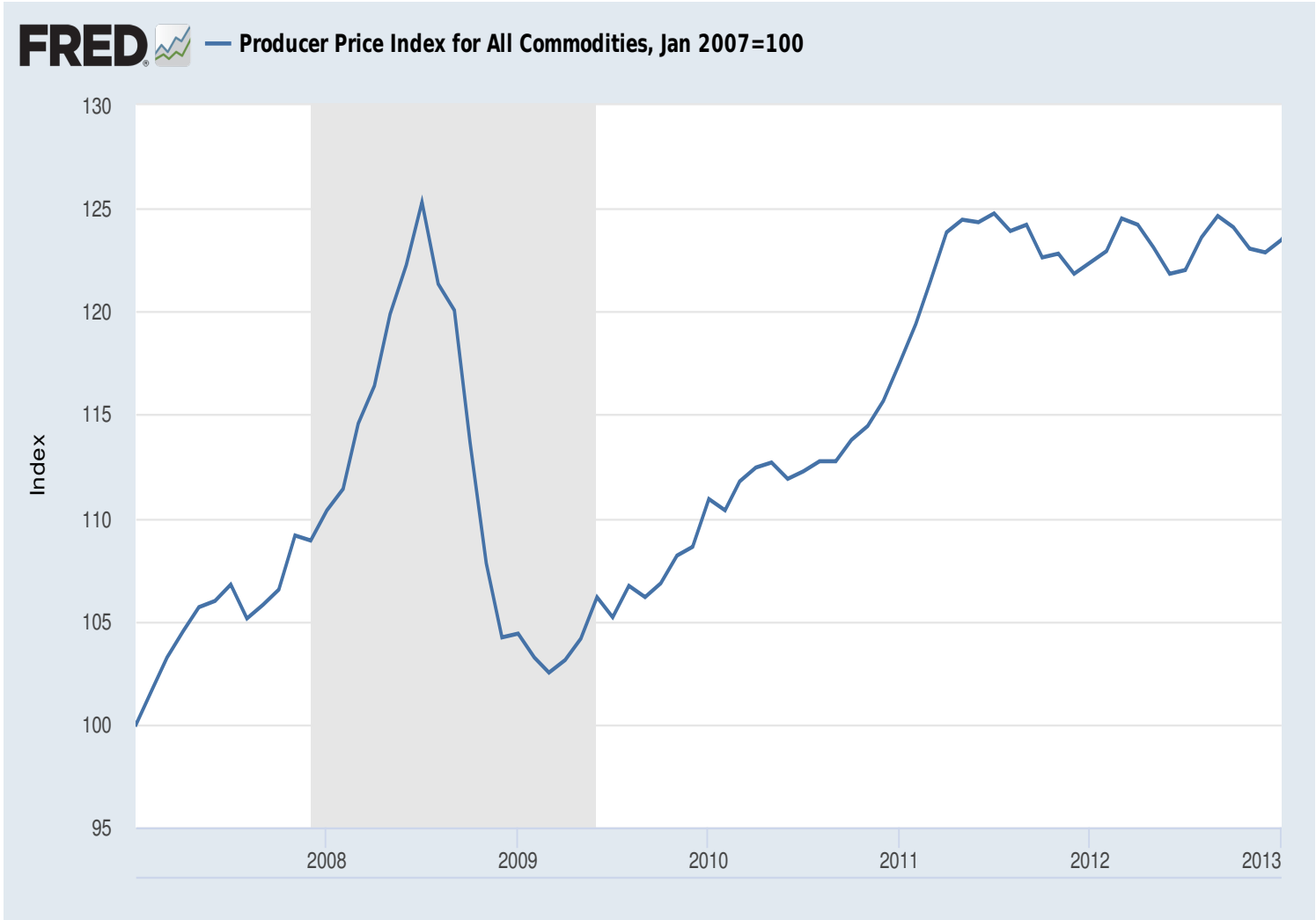



Source: Board of Governors of the Federal Reserve System (US) myf.red/g/mXYI


FRED
Civilian Unemployment Rate
Percent
11
10
9
8
7
6
5
4
Jan 2005
Jul 2005
Jan 2006
Jul 2006
Jan 2007
Jul 2007
Jan 2008
Jul 2008
Jan 2009
Jul 2009
Jan 2010
Jul 2010
Jan 2011
Jul 2011
Jan 2012
Source: U.S. Bureau of Labor Statistics
fred.stlouisfed.org
myf.red/g/dv1U


FRED
Producer Price Index for All Commodities, Jan 2007=100
Index
130
125
120
115
110
105
100
95
2008
2009
2010
2011
2012
2013
Shaded areas indicate U.S. recessions
Source: U.S. Bureau of Labor Statistics
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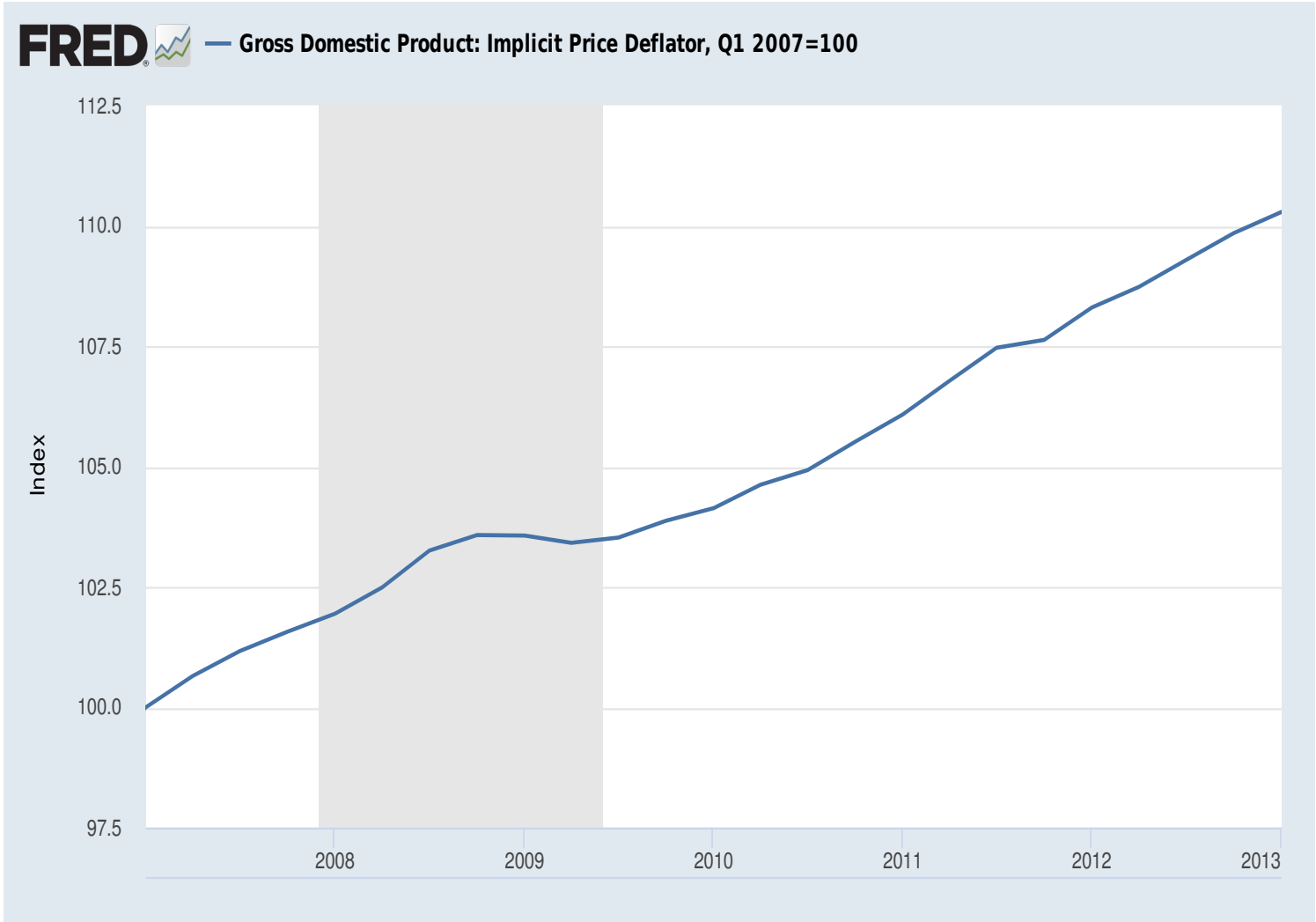
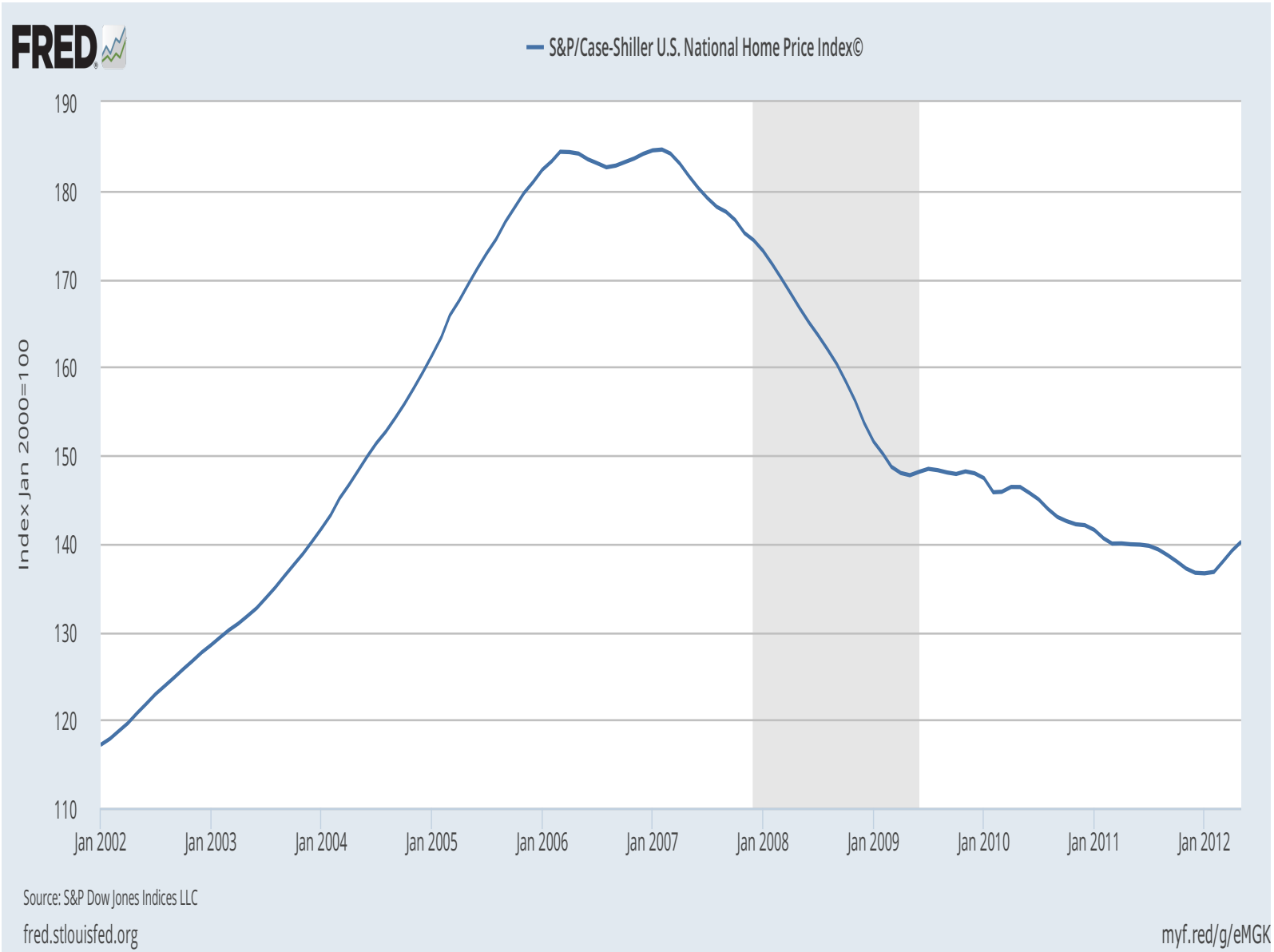

FRED
Gross Domestic Product: Implicit Price Deflator, Q1 2007=100
112.5
110.0
107.5
105.0
102.5
100.0
97.5
Index
2008
2009
2010
2011
2012
2013
Shaded areas indicate U.S. recessions
Source: U.S. Bureau of Economic Analysis
myf.red/g/mXYa

# Housing Prices



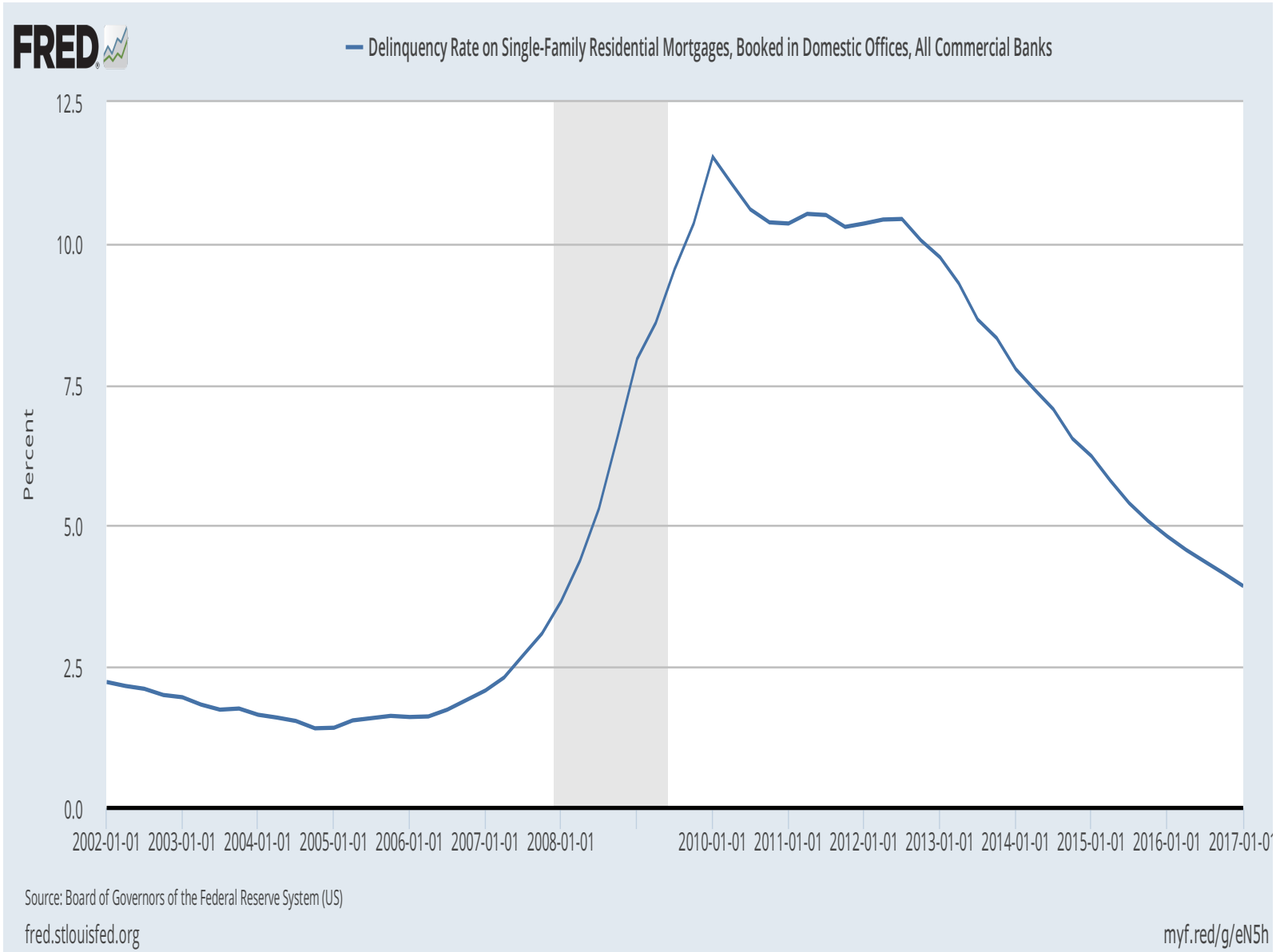
# Subprime Balance Sheet

- Why do declines in house prices matter?
- Can trigger defaults by pushing homeowners underwater
- Suppose someone gets a no-down payment home loan:

| Assets | | Liabilities + Equity | |
|---|---|---|---|
| Home | \$100,000 | Mortgage | \$100,000 |
| | | Equity | \$0 |

- If the value of the home goes up, homeowner can refinance – take out a loan to pay off the existing mortgage, and then has positive equity
- But if value of home declines, homeowner is underwater and has negative equity
- No incentive to keep paying the mortgage at that point and mortgage can go into default

# Mortgage Delinquency

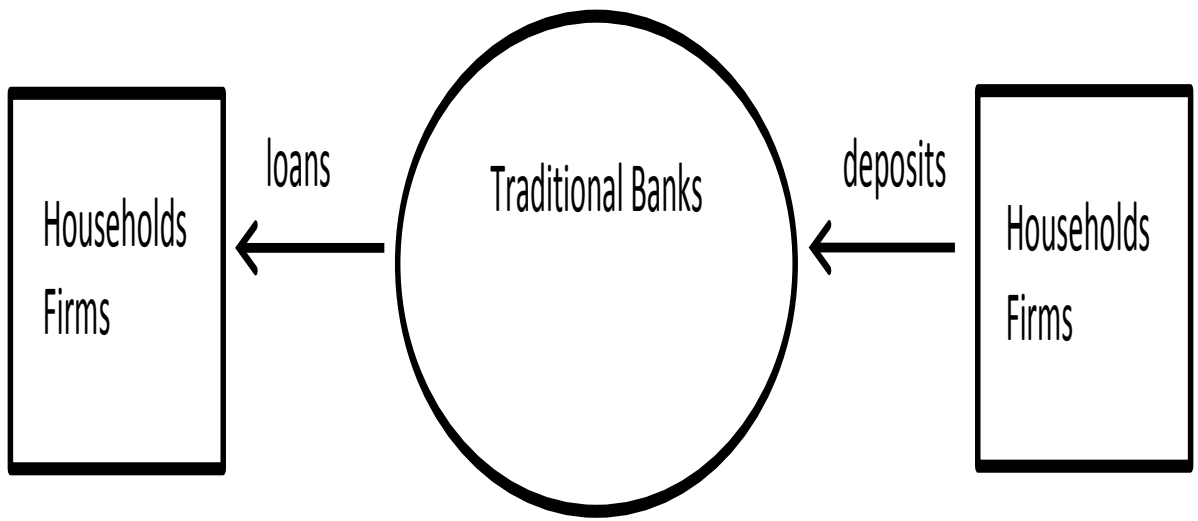


# Defaults

- Mortgages going into default means that owner of mortgage (e.g. a bank) takes a loss
- Financial system at large was broadly exposed to the housing market via mortgage backed securities (MBS)
- In the traditional banking system, the loss from a mortgage going into default would be felt by the bank that issued the loan
- Not so in the modern banking system, where the loss was distributed to holders of MBSs

# Traditional Banking

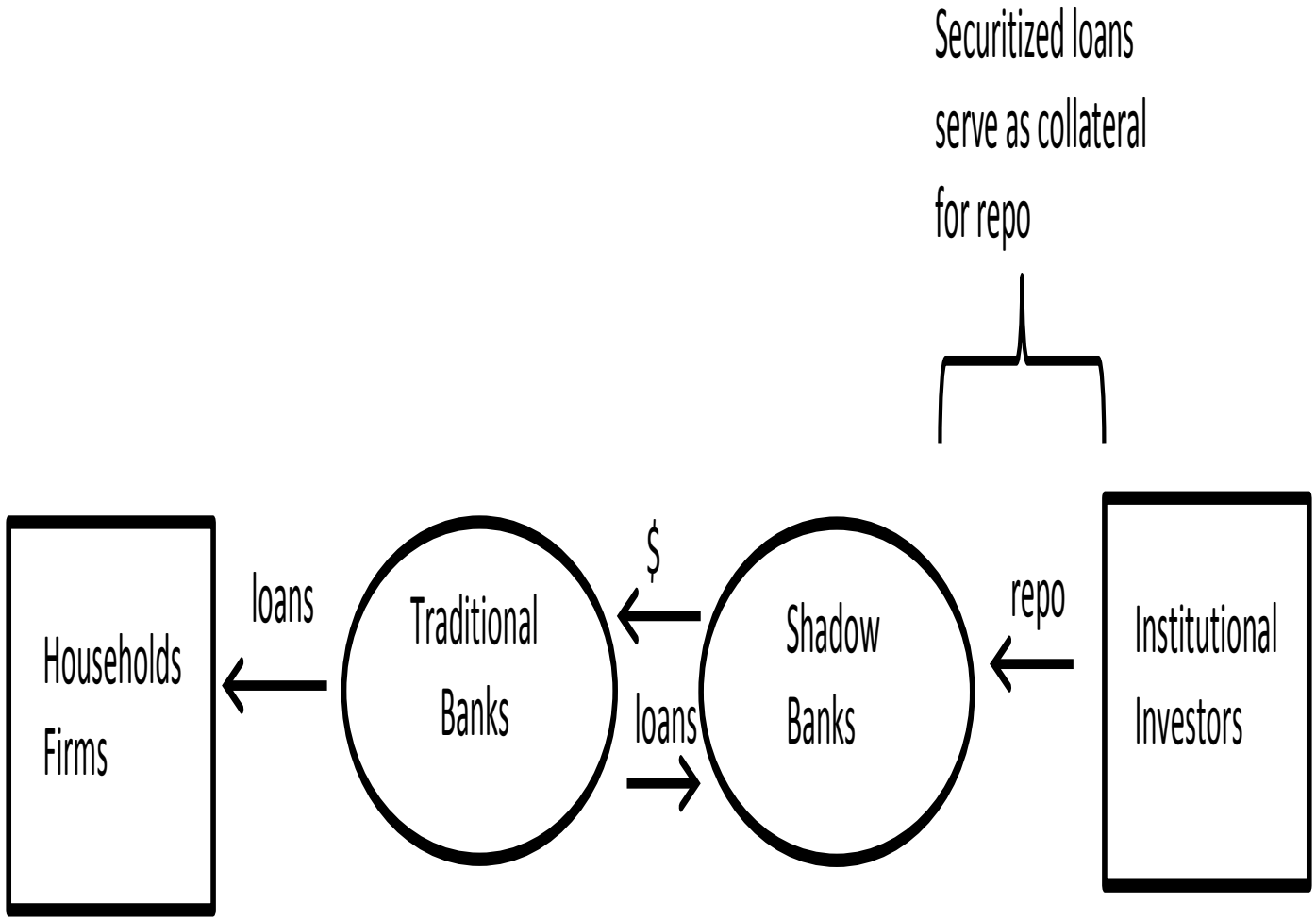
- In traditional banking, the bank funds itself with deposits (short term liabilities) and invests in longer term, illiquid loans to households and businesses
- Banks "borrow" (get liabilities) at a lower interest rate than they lend (make loans), thereby earning a profit



# From Traditional Banking to Modern Banking

- A variety of factors have led traditional banking (funding in the form of deposits, and then holding on to loans) to cease to be profitable
- Furthermore, there are now very large institutional investors (e.g. pension funds, life insurance companies) that have a desire for demand deposit like liabilities that are safe, liquid, and offer some return
- This has given rise to securitization, which has been going on for decades but became well-known in the last decade
- In securitization, a financial entity buys loans from issuers (e.g. traditional banks) and bundles a bunch of loans into one fixed income product
- These securitized loans then serve as collateral for short term demand deposit-like liabilities that institutional investors desire

# Shadow Banking

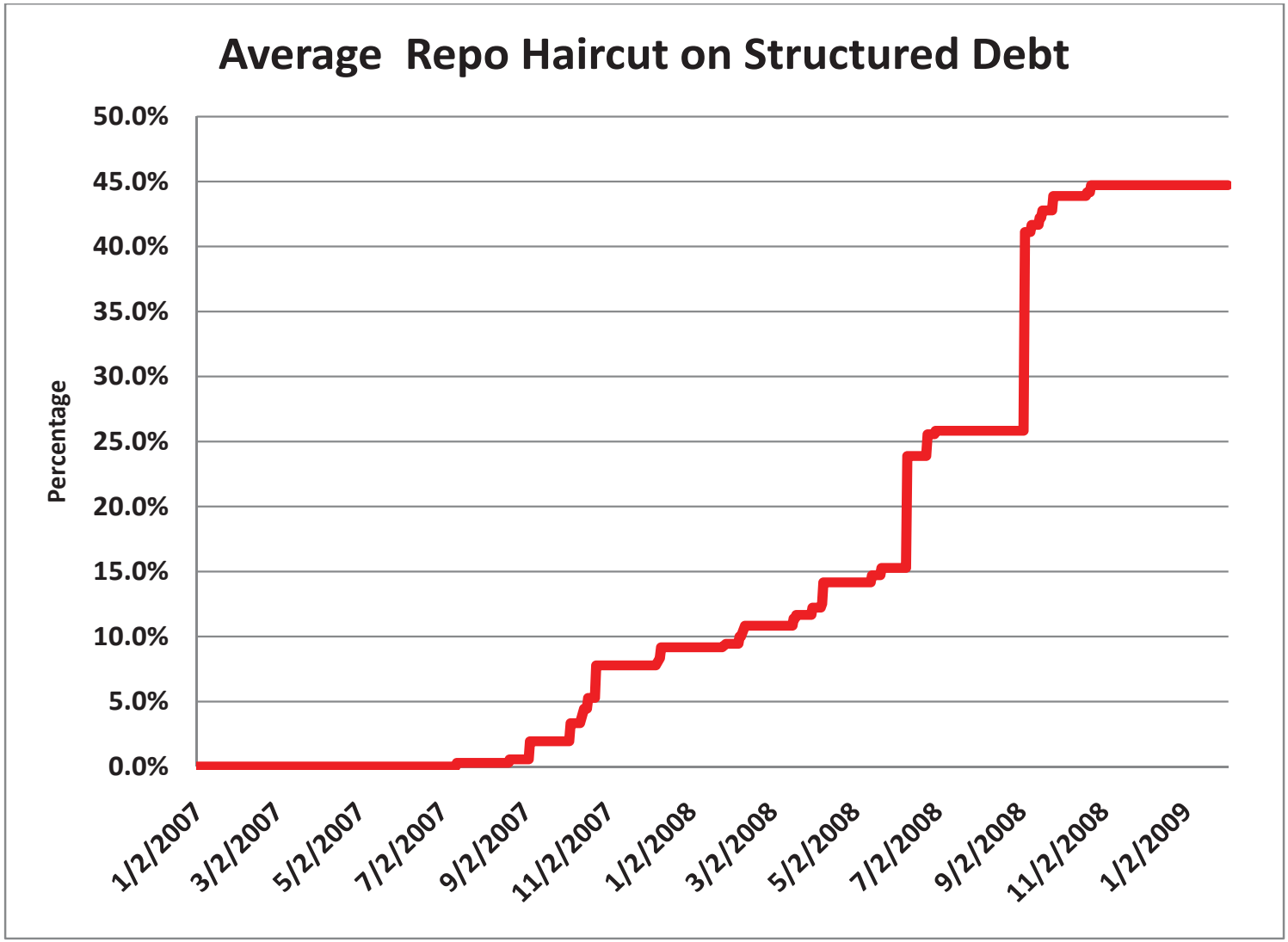


# Shadow Banking Continued

- In modern banking, traditional banks (increasingly) rely upon the shadow banking system for funding
- Shadow banks buy loans which earn interest (e.g. monthly mortgage payments). These purchases fund the traditional banks
- Shadow banks fund themselves from "deposits" from large institutional investors – e.g. repurchase agreements (repos)
- Repo: you buy an asset for a given price on a given date, with an agreement to sell the asset back to the owner on a future specified date at an agreed upon price
- When you sell it back for more than you buy, this difference is effectively interest
- Think about a repo like a deposit, and the actual asset (frequently, securitized loans) serves as collateral and hence makes the deposit safe. If the issuer refuses or is unable to buy back, you get to keep the asset
- Repos typically very short term (e.g. overnight), so quite liquid

# Haircuts

- Haircut: the (percentage) difference in the amount of the repo and the value of collateral
- For example: I "deposit" $90 million in exchange for $100 million in collateral. Haircut is 10 percent
- Idea: haircut protects "depositor" in the event that repo issuer doesn't make good on the promise and the "depositor" is stuck with the collateral, which might lose value
- Prior to crisis, haircuts were (essentially) zero
- Haircuts rose markedly during crisis


Average Repo Haircut on Structured Debt
Percentage
50.0%
45.0%
40.0%
35.0%
30.0%
25.0%
20.0%
15.0%
10.0%
5.0%
0.0%
1/2/2007
3/2/2007
5/2/2007
7/2/2007
9/2/2007
11/2/2007
1/2/2008
3/2/2008
5/2/2008
7/2/2008
9/2/2008
11/2/2008
1/2/2009

# Shadow Bank Balance Sheet

- Suppose a shadow bank (e.g. Bear Sterns) has the following balance sheet before the crisis with no haircut

| Assets | | Liabilities + Equity | |
|---|---|---|---|
| Mortgage Securities | \$120 million | Repos | \$100 million |
| Other assets | \$40 million | Borrowings | \$40 million |
| | | Equity | \$20 million |

- Equity finances \$20 million of the mortgage securities, repos the other \$100 million
- Shadow bank makes money by paying less for its liabilities (say 3 percent for repo) than it earns on its assets (say 6 percent on mortgage securities)

# A Haircut is Like a Withdrawal

- Suppose that the haircut goes from 0 to 40 percent
- This means large institutional investor will only "deposit" \$60 million in exchange for \$100 million in securities
- This is just like a withdrawal of \$40 million

| Assets | | Liabilities + Equity | |
|---|---|---|---|
| Mortgage Securities | \$120 million | Repos | \$60 million |
| Other assets | \$0 | Borrowings | \$40 million |
| | | Equity | \$20 million |

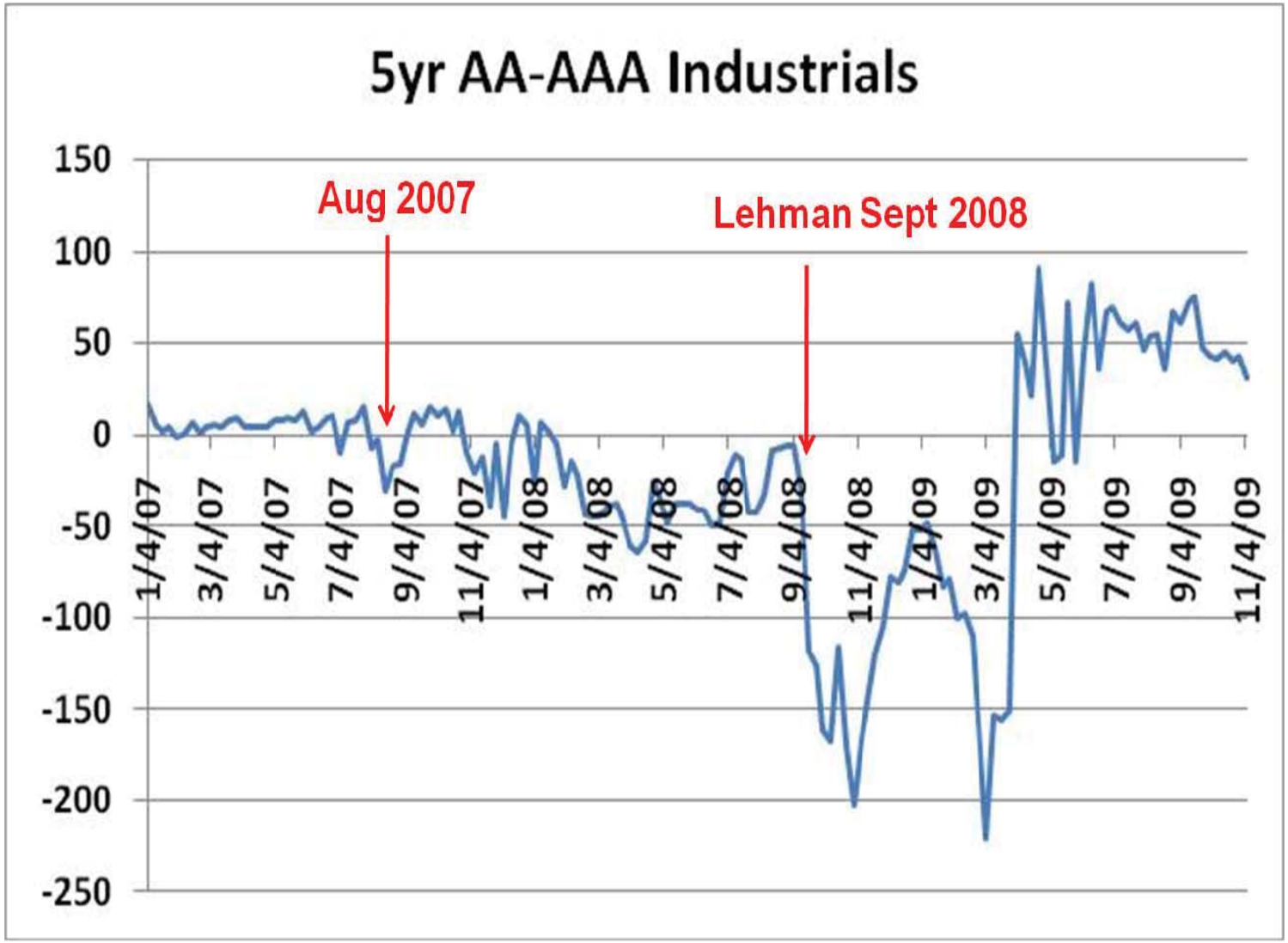
- To maintain equity, shadow bank must self off its other assets to be able to hold the \$120 million in mortgage securities

# From Subprime to General Financial Distress

- The subprime mortgage market was not large enough to cause a widespread crisis on its own – roughly $1.2 trillion out of $20 trillion in outstanding credit at the time
- Subprime mortgages started deteriorating well before the height of the financial panic in Fall 2008
- The issue is one of asymmetric information – the distribution of risks was not well known or understand, and the financial system was increasingly interconnected
- Gorton likens this to an e-coli scare – there's not much e-coli, but since you don't know where it is, you don't buy any beef
- Likewise, institutional investors didn't know what was good collateral or bad, started demanding very high haircuts

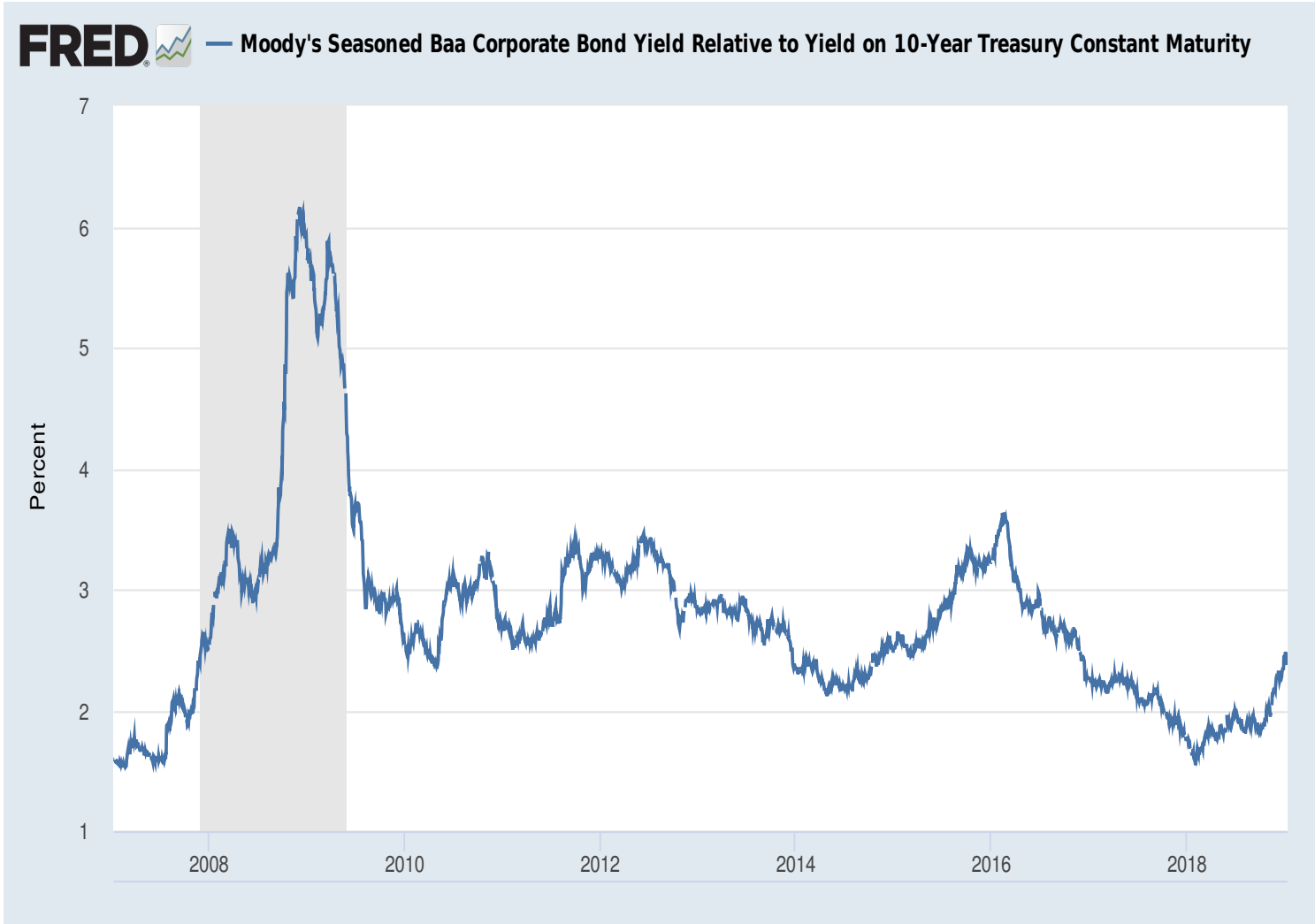
# Fire Sales

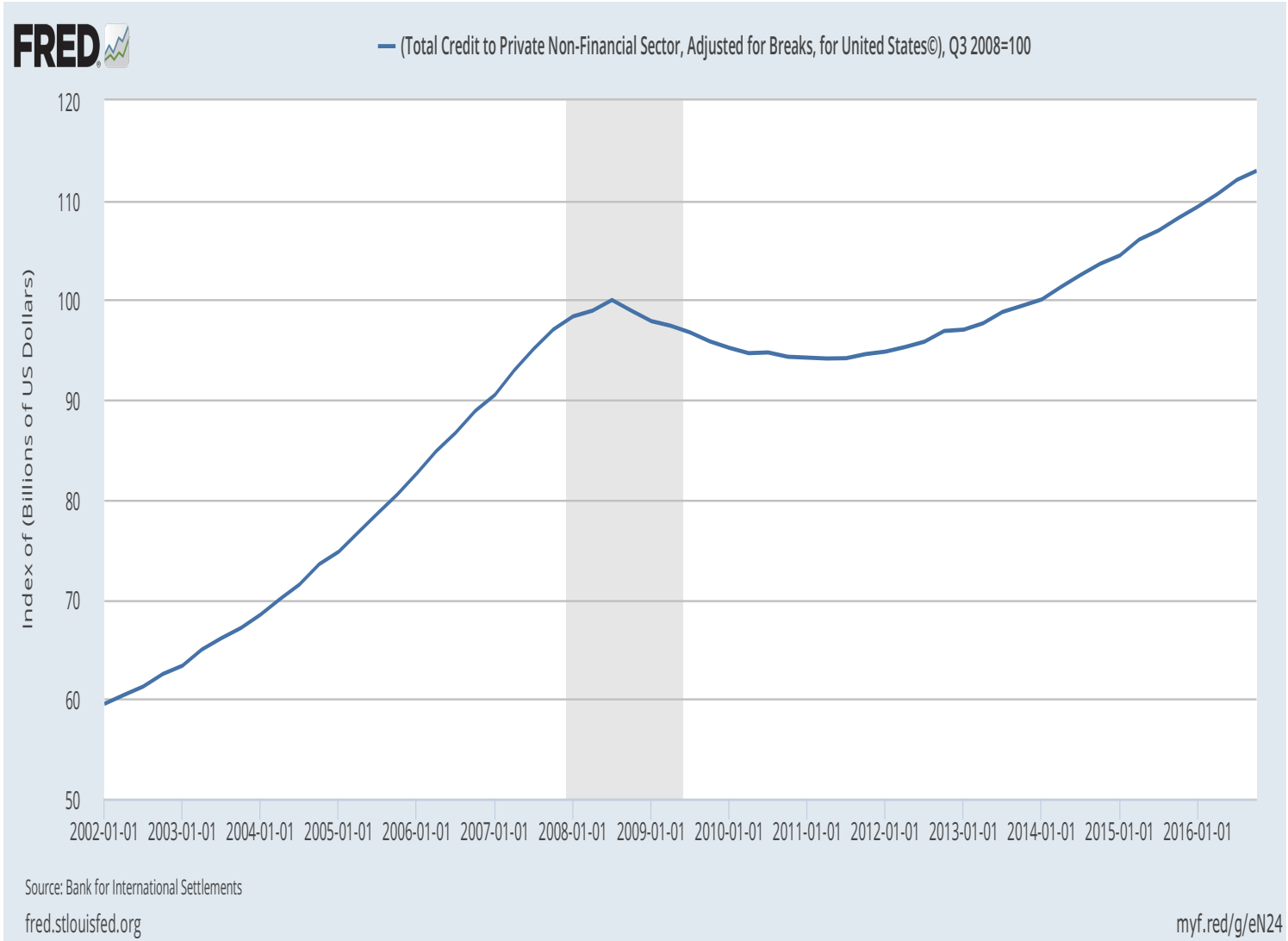
- Faced with large "withdrawals," shadow banks have to sell assets to raise funds to finance the collateral underlying the repos
- Lots of institutions trying to sell at the same time with few buyers: big decline in price, which makes the entire enterprise of selling to raise funds less effective
- Naturally, try to sell the "best" assets to fetch the highest price
- But when everyone is doing this, you get perverse outcomes (next slide)


5yr AA-AAA Industrials
Aug 2007
Lehman Sept 2008
150
100
50
0
-50
-100
-150
-200
-250
1/4/07
3/4/07
5/4/07
7/4/07
9/4/07
11/4/07
1/4/08
3/4/08
5/4/08
7/4/08
9/4/08
11/4/08
1/4/09
3/4/09
5/4/09
7/4/09
9/4/09
11/4/09

# End Result

- Massive decline in bond prices (other than government bonds) across the board, with huge increases in yields, due to fire sales
- Value of collateral destroyed, high yields: credit markets stop functioning
- Credit completely dries up
- Economic activity contracts

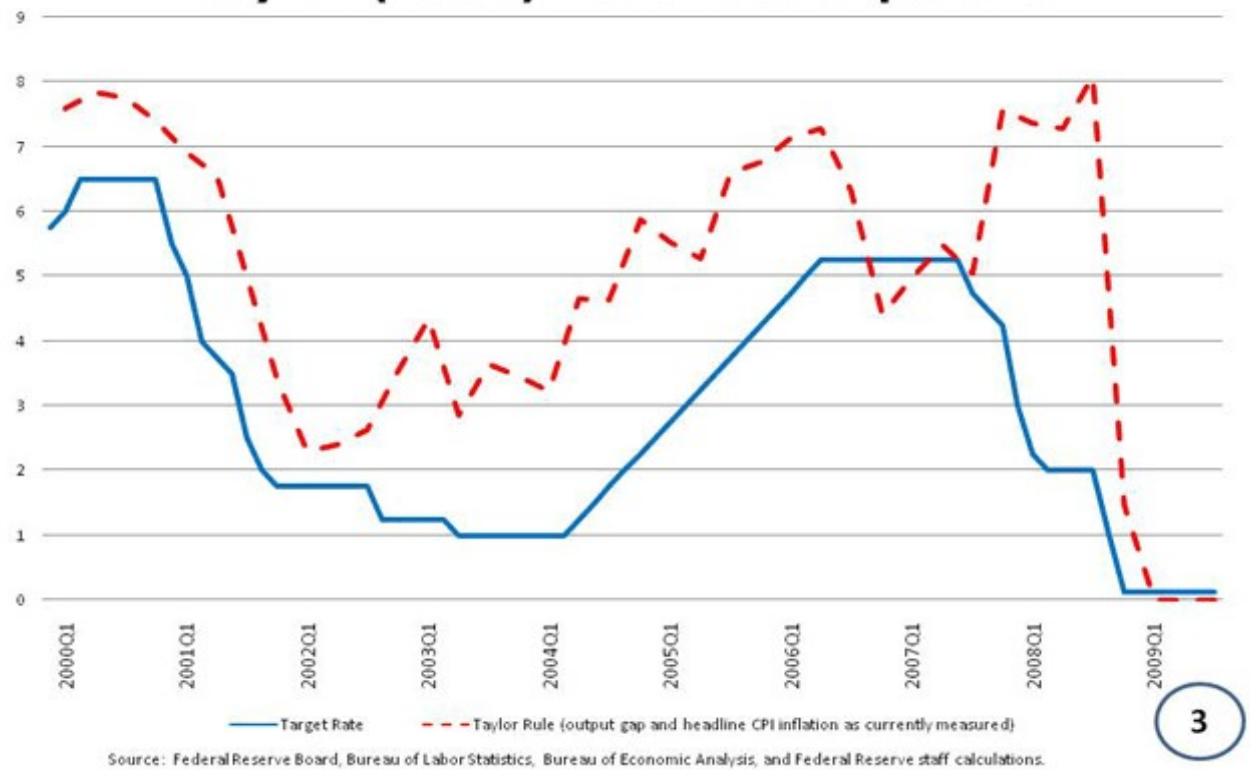

FRED
Moody's Seasoned Baa Corporate Bond Yield Relative to Yield on 10-Year Treasury Constant Maturity
Percent
7
6
5
4
3
2
1
2008
2010
2012
2014
2016
2018
Shaded areas indicate U.S. recessions
Source: Federal Reserve Bank of St. Louis
myf.red/g/mEye


FRED
(Total Credit to Private Non-Financial Sector, Adjusted for Breaks, for United States©), Q3 2008=100
Index of (Billions of US Dollars)
120
110
100
90
80
70
60
50
2002-01-01
2003-01-01
2004-01-01
2005-01-01
2006-01-01
2007-01-01
2008-01-01
2009-01-01
2010-01-01
2011-01-01
2012-01-01
2013-01-01
2014-01-01
2015-01-01
2016-01-01
Source: Bank for International Settlements
fred.stlouisfed.org
myf.red/g/eN24

# Taylor (2014)

- The central thesis of this paper is that policy mistakes before the crisis led to the crisis, and that policy mistakes after the crisis have slowed the recovery
- In contrast, thinks that the Fed's immediate "lender of last resort" actions at the height of the crisis (Fall 2008) were okay
- Big beefs:
  1. Lax monetary policy in run-up
  2. Poor regulation and regulatory capture (Fannie and Freddie)
  3. Ad-hoc, inconsistent bailout policy
  4. Expansionary and ineffective policy post-Crisis

# The Target Federal Funds Rate and the Taylor (1993) Rule Prescriptions




Source: Federal Reserve Board, Bureau of Labor Statistics, Bureau of Economic Analysis, and Federal Reserve staff calculations.

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# Other Issues

- Fannie Mae and Freddie Mac were under pressure from Congress to promote "affordable housing" which resulted in lower standards for mortgages they would purchase and securitize
- This helped fuel the subprime boom
- Bear Sterns was effectively bailed out, whereas Lehman was not – this created confusion
- The roll out of TARP was messy and generated uncertainty
- Huge expansion in central bank balance sheet post-crisis (QE1, QE2, QE3)

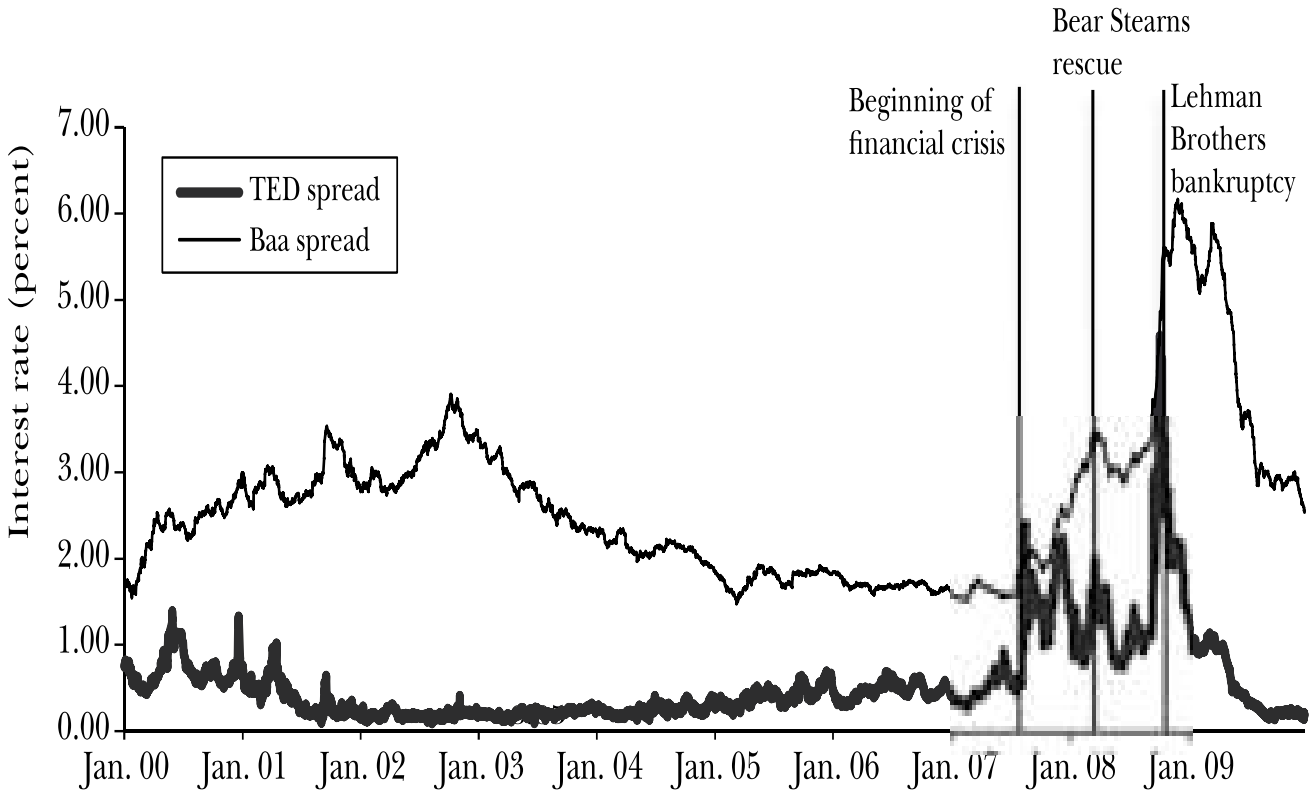
# Evaluation

- Policy was probably too easy post 2001 but unclear how this alone could drive massive expansion in house prices
- Fannie Mae and Freddie Mac were problematic, and as government sponsored enterprises they were able to borrow at very low rates
- The Lehman failure was chaotic and virtually everyone agrees it was a mistake
- TARP was messy (Treasury program)
- All that said:
  1. The economy did not decline nearly as much as in the Great Depression
  2. The recession was comparatively short (18 months compared to 43 for Depression)
  3. Huge expansion in central bank balance sheet has not created inflation, and some evidence that it has been effective even with ZLB on FFR (Wu and Xia (2016))

# Mishkin (2011)

- Provides a good rundown of:
  1. Sequencing of events
  2. How subprime spilled over to general financial distress
  3. Review of policy actions
- Much more favorable take than Taylor (2014)

# Spreads Tell Story




*Source:* FRED, Federal Reserve Bank of St. Louis, and British Bankers' Association.
*Note:* The TED spread is the difference between the 3-month LIBOR rate and the constant maturity 3-month Treasury bill rate. The Baa spread is the difference between the constant maturity Baa rate and the 10-year constant maturity Treasury bond rate.

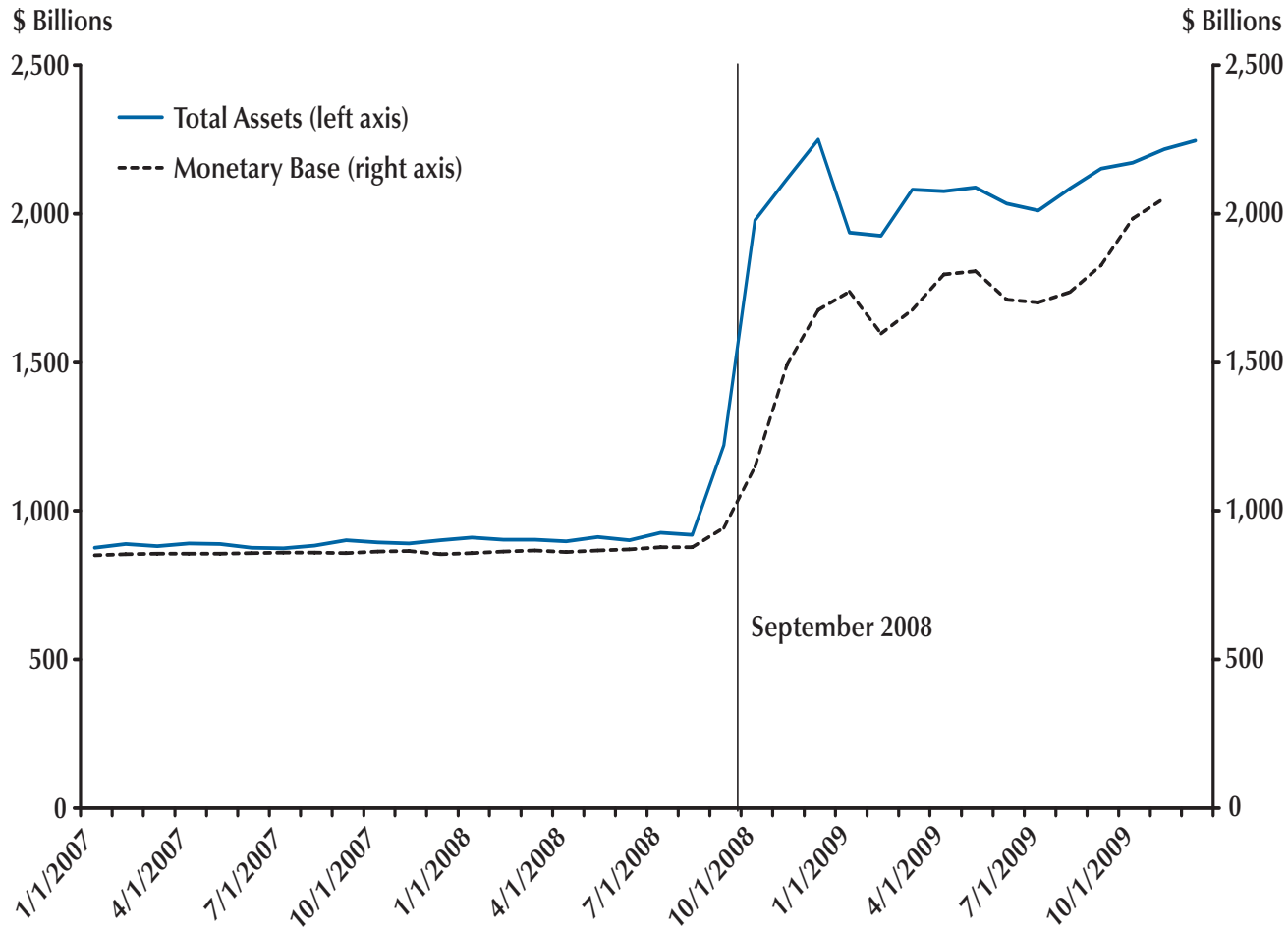
# Key Events

- August 2, 2007: BNP Paribas suspends redemptions of some money market funds
- March 14, 2008: Bear Stearns. Fed brokered deal for JP Morgan to purchase Bear (Fed essentially bought a bunch of Bear assets to entice JP Morgan to do this)
- September 15, 2008: Lehman bankruptcy. Largest US bankruptcy ever.
  - Fed couldn't put into conservatorship
  - Couldn't find buyer like it did for Bear
- September 16, 2008: failure and rescue of AIG (credit default swaps)
  - Fed made $85 billion loan from Fed. Total assistance $170 billion
- September 16, 2008: Reserve Primary Fund "breaks buck"
- TARP fiasco:
  - Original plan to buy bad assets, ended up being equity injections

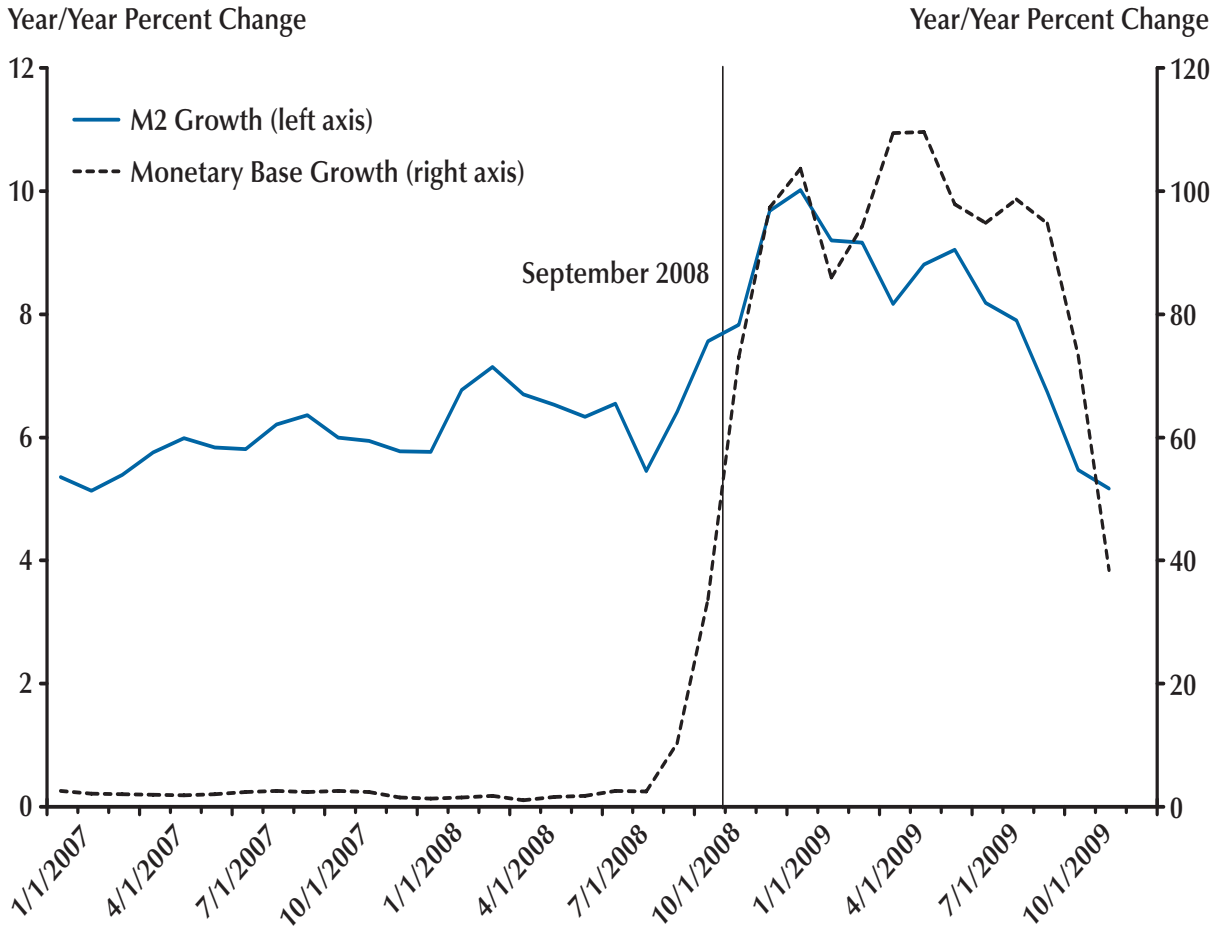
# Policy Responses

- Very different from Great Depression
- In addition to *conventional* policy (lowering policy rate down to zero), pursued unconventional policy
- Emergency liquidity provision:
  - TAF, TSLF, PDCF, AMLF, MMIFF, CPFF, TALF
  - Foreign exchange swap lines
  - Ways to (i) overcome stigma of discount window and (ii) extend liquidity to non-bank financial intermediaries
- Asset purchases (QE) and forward guidance
- Stress tests: "Supervisory Capital Assessment Program"
  - "the stress tests were a key factor that helped increase the amount of information in the market place"

## Federal Reserve Assets and the Monetary Base (2007-09)



## Monetary Base and M2 Growth (2007-09)



# Problem of the Counterfactual

- Did policies work?
- Difficult to say definitively one way or another – need to know the counterfactual
- What we can say: crisis not nearly as bad nor as long as Great Depression *and* policy was quite different
- Was policy perfect? Surely not. But seemingly lessons from mistakes of Great Depression were learned
- Quite a few issues going forward that arose as a consequence of non-standard policy interventions (e.g. size of Fed balance sheet, the problem of "too big to fail," massive fiscal debts)