

# Money and Banking

## Lecture VII: 2007-2009 Financial Crisis

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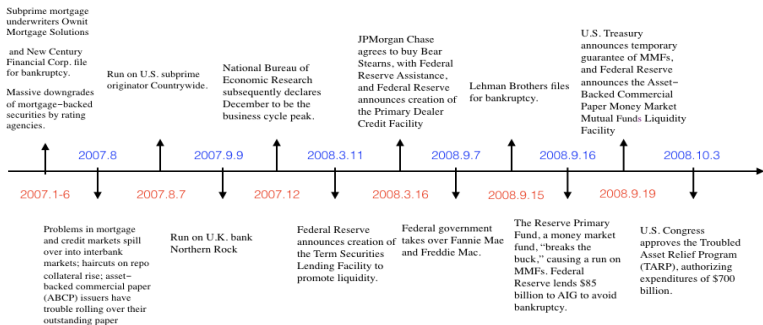
November 2nd, 2018

## Financial Crisis



- Timeline of the crisis
  - Bernanke (2010)
  - IMF (2010)
  - BIS (2009)
- The build-up to the crisis
  - Pozsar (2011)
  - Bernanke (2005)
  - Reinhart and Rogoff (2008)
  - Case and Shiller (2003)
- Panic phase of the crisis
  - Covitz, Liang and Suarez (2011)
  - McCabe (2010)
  - Gorton and Metrick (2012)
- Real effect of the crisis
  - IMF (2009)
  - Scharfstein and Ivashina (2010)
  - Puri, Rocholl and Steffen (2012)
  - Campello, Graham and Harvey (2010)

# Timeline



- Subprime mortgage loss is only the **trigger** of this financial crisis:
  - house prices started to decline → (prospect of) subprime mortgages losses
- This financial crisis was deeply rooted in the systemic vulnerability of US economy that originated from changes in the financial sector:
  - **Shadow banking**: financial entities other than regulated depository institutions (commercial banks, thrifts, and credit unions) that serve as intermediaries to channel savings into investment
  - The main vulnerability was short-term debt, mostly **repurchase agreements** and **commercial paper**, which were **unregulated**
  - Repo typically involve **haircuts**, which rose violently during a financial crisis.

- total outstanding repo in U.S. markets at between 20 and 30 percent of U.S. GDP in each of the years from 2002 to 2007.
- European Union are even higher, with a low of 30 percent and a peak just above 50 percent of E.U. GDP during the same time period.
- Disruptions in the U.S. short term debt markets created a shortage of U.S. dollars in global markets
- the failure of Lehman led to a run on money market mutual funds after one large fund “broke the buck”

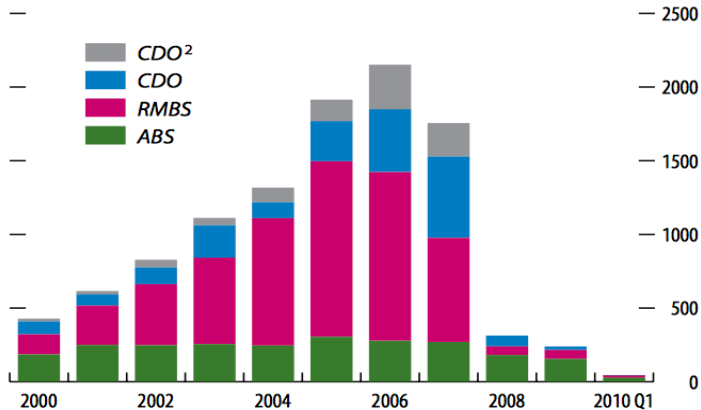
## How Shadow Banking Emerged: Supply

- The traditional banking model became less profitable in the face of competition from money market mutual funds and junk bonds.
- Securitization, the sale of loan pools to special purpose vehicles that finance the purchase of the loan pools via issuance of asset-backed securities in the capital markets, was an important response.

## U.S. Private-Label Term Securitization Issuance by Type

### Figure 2.1. U.S. Private-Label Term Securitization Issuance by Type

(In billions of U.S. dollars)



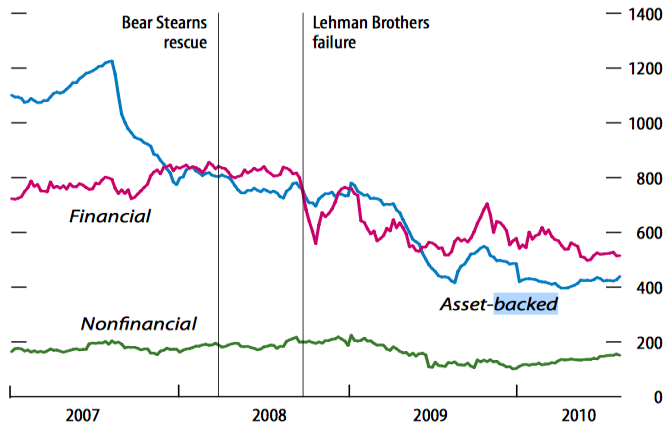
Source: IMF (2010)



# United States: Outstanding Amount of Commercial Paper

## Figure 2.2. United States: Outstanding Amount of Commercial Paper

(In billions of U.S. dollars; seasonally adjusted)



Source: IMF (2010)

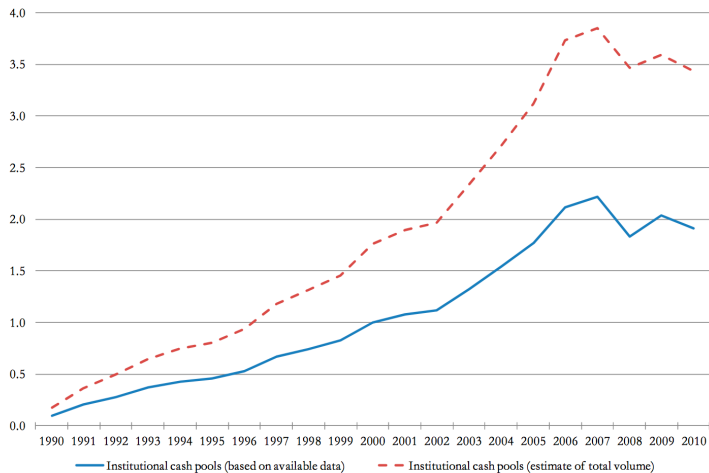
## How Shadow Banking Emerged: Demand

- Securitization is off-balance sheet financing for banks and other financial intermediaries
- Who is going to buy the asset-backed securities?
- **institutional cash pools**: all subsidiaries of a MNC, all funds of an asset manager ( \$200 million in 1990 and \$4 trillion in 2007)
- The amounts of money that **institutional cash pools** wanted to allocated to “safe” asset classes far exceeded the amount that could be insured in a demand deposit account.

# The Secular Rise of Institutional Cash Pools

**Figure 1:** The Secular Rise of Institutional Cash Pools

*\$ trillions*



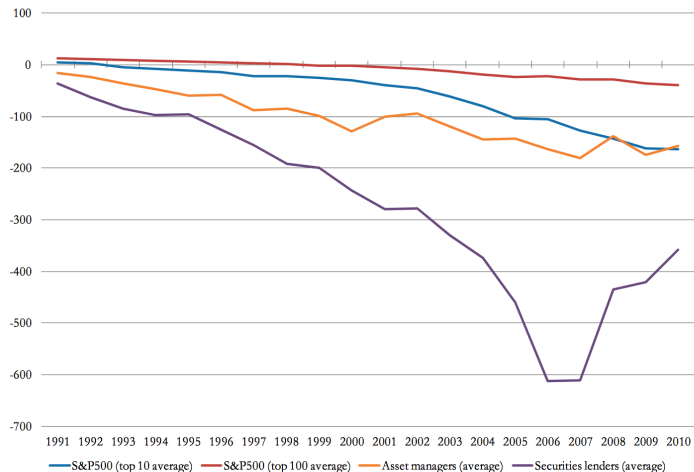
Source: CapitalIQ, RMA, ICI, BIS, *The Economist*, Pozsar (2011)

Source: Pozsar (2011)

# Not Enough Banks to Source Safety for Cash Pools

**Figure 4:** Not Enough Banks to Source Safety for Cash Pools

*# of additional banks needed to get safety through insured, \$100,000 deposits, thousands*



Source: CapitalIQ, RMA, ICI, FDIC, Pozsar (2011)

Source: Pozsar (2011)

## Global Saving Glut to Blame

*If a country's saving exceeds its investment during a particular year, the difference represents excess saving that can be lent on international capital markets. By the same token, if a country's saving is less than the amount required to finance domestic investment, the country can close the gap by borrowing from abroad. In the United States, national saving is currently quite low and falls considerably short of U.S. capital investment. Of necessity, this shortfall is made up by foreign net borrowing.*

—Bernanke (2005)

## Global Current Account Balance ( billions of dollars)

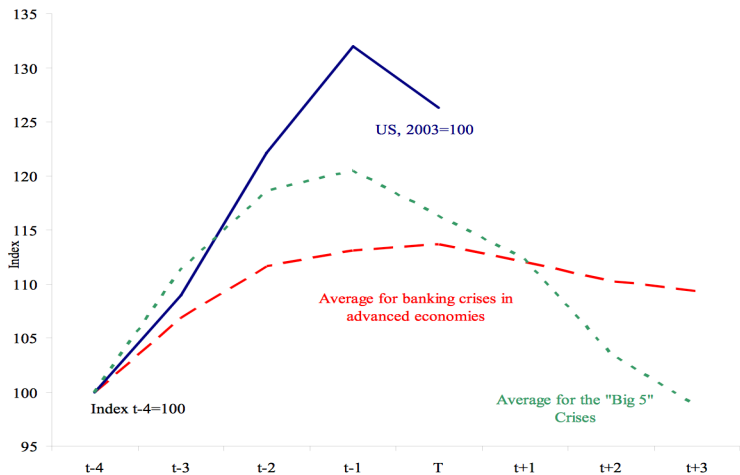
<b>Countries</b>	<b>1996</b>	<b>2003</b>
<b>Industrial</b>	<b>46.2</b>	<b>-342.3</b>
United States	-120.2	-530.7
Japan	65.4	138.2
Euro Area	88.5	24.9
France	20.8	4.5
Germany	-13.4	55.1
Italy	39.6	-20.7
Spain	0.4	-23.6
Other	12.5	25.3
Australia	-15.8	-30.4
Canada	3.4	17.1
Switzerland	21.3	42.2
United Kingdom	-10.9	-30.5
<b>Developing</b>	<b>-87.5</b>	<b>205.0</b>
Asia	-40.8	148.3
China	7.2	45.9
Hong Kong	-2.6	17.0
Korea	-23.1	11.9
Taiwan	10.9	29.3
Thailand	-14.4	8.0

## House Price Run-ups

- The joining together of the supply of asset-backed securities with the demand for private alternatives to insured deposits led to the shadow banking system, a genuine banking system providing products with a convenience yield, short-term debt of intermediaries, often based on privately-produced collateral.
- Historically, for the private production of high quality asset-backed securities, mortgages have been the preferred collateral
- Indeed as shown by Reinhart and Rogoff (2008): house price run-ups prior to crises are common.

# Housing Price and Banking Crisis

Figure 1: Real Housing Prices and Banking Crises



Source: Reinhart and Rogoff (2008)



## Housing Bubble?

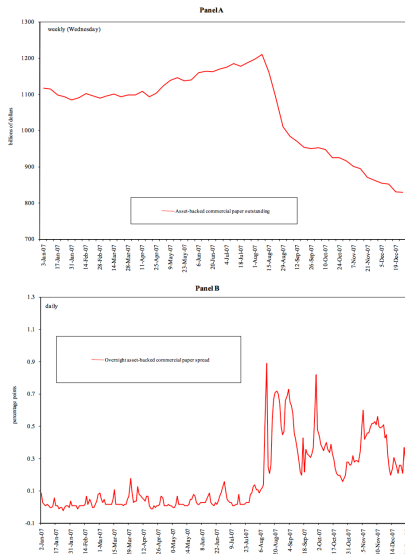
- Credit booms seem to often coincide with house price increases. But the **causality** is not clear:
  - financial intermediaries lower their lending standards and fuel house price increases
  - house prices going up (for some other reason) and intermediaries are willing to lend against collateral that is then more valuable
- **Housing bubble**: a situation in which excessive public expectations of future price increases cause prices to be temporarily elevated
- Was this time a housing bubble? Case and Shiller (2003) found yes:
  - U.S. state data on fundamentals, such as income and employment, over 1985 to 2002, seventy one quarters, can not explain the move of housing prices
  - survey conducted in 2003 of people who bought homes in 2002 in four metropolitan areas shows that many people buy houses as expecting future housing price growth

As the market began to panic, we saw runs from sorts of short-term debt markets:

- Covitz, Liang, and Suarez (2011): asset-backed commercial papers
- McCabe (2010): money market mutual funds
- Gorton and Metrick (2012): repo markets

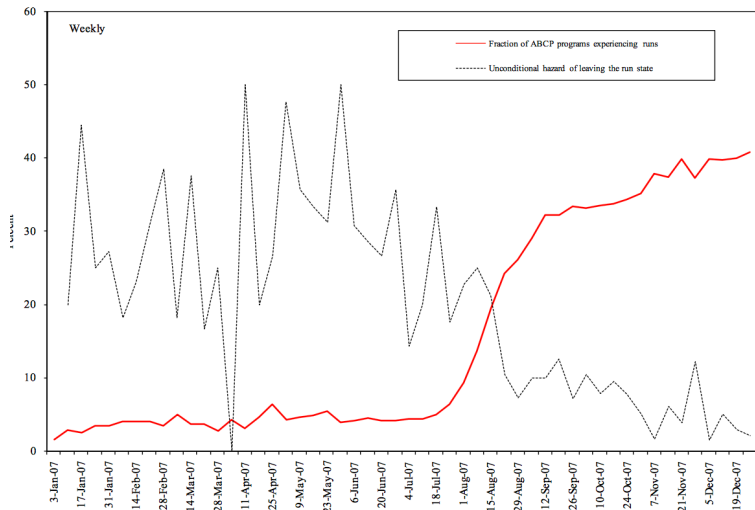
- a “run” on an ABCP: occurring in any week where a program does not issue any new paper despite having at least ten percent of its CP maturing
- Beginning in the week of August 7, the frequency of runs increased dramatically, and the likelihood of exiting a run with later issuance fell in tandem.
- By the end of 2007, about 40 percent of programs were in a run and unable to finance themselves in their traditional short-term markets.
- Programs were more likely to experience a run if they had high credit risk (from holdings of subprime-related securities) or high liquidity risk (from a missing or incomplete liquidity support from the plan sponsor).
- More importantly, in the first few weeks of August, there was also a high level of run activity unrelated to program-specific measures.

# ABCP: Aggregate Amount of Paper Outstanding and Overnight Spreads



Source: Covitz, Liang, and Suarez (2011)

# Runs on ABCP Programs in 2007

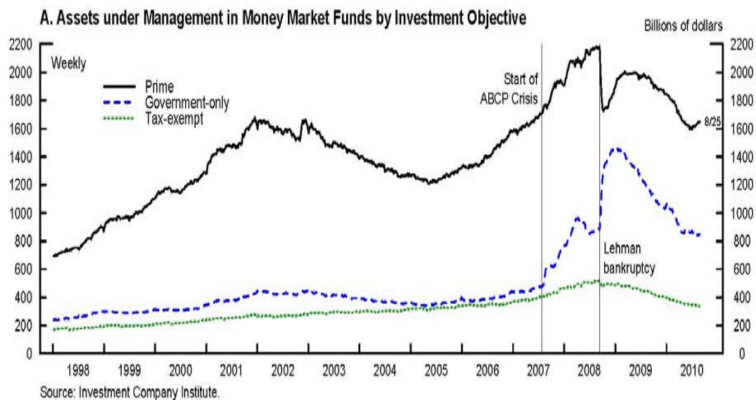


Source: Covitz, Liang, and Suarez (2011)

- Reserve Primary Fund, a large MMF that “broke the buck” after the failure of Lehman in September 2008.
- As the main holders of ABCP, MMFs saw the values of their stakes decline when ABCP yields rose.
- Furthermore, shrinking ABCP programs were forced to sell their underlying assets, placing further downward pressure on asset classes held by many MMFs.
- The sponsor-based rescue of MMFs in 2007 prevented any runs by investors on those funds that year, but may have also solidified the expectation that MMFs would always be bailed out by their sponsors.

- Three types of MMFs: **Tax-exempt**, **government-only**, and **prime**.
- The Lehman bankruptcy was a major shock to MMFs. The drop from parity of the Reserve Primary Fund led to an almost one-for-one transfer into government-only funds.
- Because prime MMFs are a crucial supplier of funds to corporations and to financial intermediaries, this liquidity supply was lost from private credit markets.

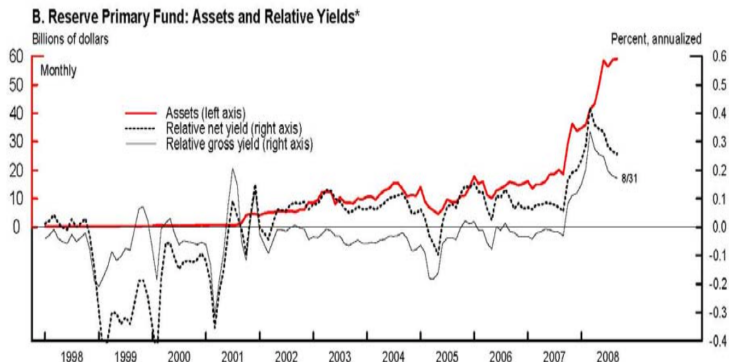
# Assets under Management in MMFs



Source: McCabe (2010)



## Reserve Primary Fund: Assets and Relative Yields



Source: iMoneyNet and author's calculations.

\*Institutional share classes only.

Note: Relative net (gross) yield is net (gross) yield less asset-weighted average net (gross) yield for all institutional prime money market funds.

Source: McCabe (2010)

## Reserve Primary Fund: Market Share and Relative Yields



Source: iMoneyNet and author's calculations.

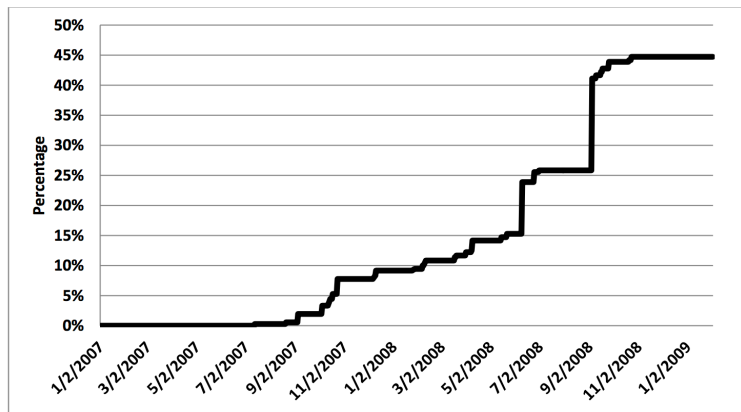
\*Institutional share classes only.

Note: Relative net (gross) yield is net (gross) yield less asset-weighted average net (gross) yield for all institutional prime money market funds.

Source: McCabe (2010)

- ABCP panic → ? → Lehman Brothers bankruptcy → run on MMFs
- Gorton and Metrick (2012) stressed the role of repo market;
- repo is the shadow-banking equivalent of a deposit market: large institutional money pools can lend short-term to a financial institution and receive collateral as protection.
- there is typically a “haircut” : following the Lehman failure, the “haircut” index rose by an additional 20 percentage points, including 100 percent haircuts (= no trade at all) for some assets.
- “haircut” of non-subprime assets moved closely with measures of distress in interbank funding markets, and not with an index of default risk on subprime securities.

## Average Haircuts



Source: Gorton and Metrick (2012)

## Real Effects of Financial Crisis (Credit Channel)

- Scharfstein and Ivashina (2010): analyze the **syndicated loan** market
- Puri, Rocholl, and Steffen (2012): exploit differential exposures of German banks to subprime securities
- Campello, Graham, and Harvey (2010): use detailed survey evidence to examine responses from firms with credit constraints

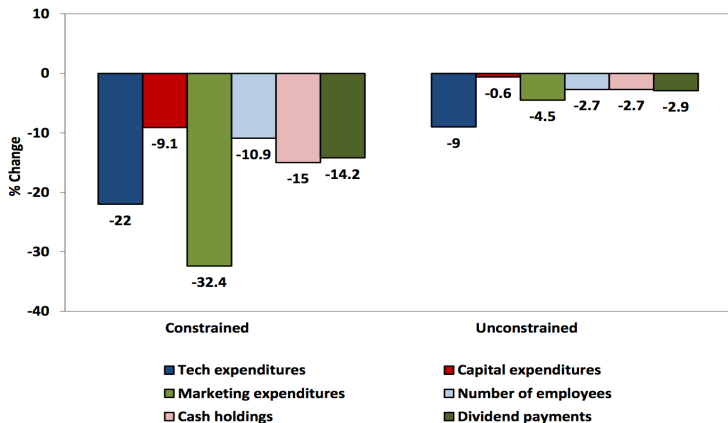
- syndicated loans fell across all types of loans;
- but commercial and industrial loans reported by the U.S. regulated banking sector rose by about \$100 billion from September to mid-October 2008;
- they believe that this is because corporate borrowers drawing down existing credit lines
- more importantly, because they are using loan level data, they can control the effect of demand shock by showing that:
  - banks that were more vulnerable to a run, those that were to a greater extent financed by short-term debt other than insured deposits, cut their syndicated lending by more.
  - that banks that co-syndicated a large fraction of their credit lines with Lehman reduced their lending more

- German savings banks: operate in defined geographical areas and are mandated by law to serve only their local customers
- in each geographical area there is a regional bank, a Landesbank, owned by the savings banks in that area. These German Landesbanken (the regional banks, each in a province) had exposures to U.S. subprime mortgages to varying degrees.
- make use of this natural experiment in which some savings banks faced a shock because their Landesbanken had to be assisted
- they found: the average rejection rate of affected savings banks is significantly higher than of non-affected savings banks

- directly survey over 1000 entrepreneurs on their credit constraints and how these constraints affect their decision
- they found: While all firms cut back on expenditure and dividend payments and see their cash holdings and the number of employees decline, the constrained firms contract these policies much more, in a very noticeable way
- robust check using PSM



## Plans of Constrained vs Unconstrained Firms



Source: Campello, Graham, and Harvey (2010)