Readings

- Mishkin Ch. 12
- Wheelock (2010): “Lessons Learned?”
- Gorton (2010): “Questions and Answers”
- Mishkin (2011): “Over the Cliff”
- Cecchetti (2009): “Crisis and Responses”
The Financial System and the Economy

- The financial system funnels savings into investment
- Because of information asymmetries and desire by savers to hold liquid assets, financial intermediation is extremely important for funneling to work well
- Although there isn’t an exact definition, we can think of a financial crisis as a situation in which financial intermediation does not work well
- Without effective financial intermediation, investment and aggregate demand collapse, and the economy goes into a recession
Financial crises are everywhere and always caused by problems related to short-term debt (Doug Diamond, 2007)

Intermediaries finance illiquid, long-term assets with short-term, liquid liabilities

When things start going south, holders of these short-term, liquid liabilities “want out”

This creates liquidity pressures for intermediaries – they need cash but have invested in long-term, illiquid assets

To come up with cash, they need to sell assets / reduce the supply of credit

But this causes asset prices to fall in the aggregate, which makes balance sheets look worse, which increases pressure on liability holders to “run”
Why is Short-Term Debt a Problem?

▶ Short-term debt promised **fixed face value** redemptions – i.e. $1 in deposits redeemable for $1 in cash
▶ But the asset side of a balance sheet “floats” in value, and everyone trying to sell at the same time causes assets to lose value
▶ This becomes a problem – e.g. you have to pay out $1 in cash for assets that used to be worth $1 but are now worth $0.8
▶ With fixed value, short-term debt, liquidity pressures can easily turn into a solvency problem
▶ In contrast, without debt finance (but in particularly short-term debt, which can be withdrawn or not rolled over on short notice), institutions cannot become insolvent
  ▶ e.g. difference between standard mutual fund (floating share value) and money market mutual fund (fixed share value)
Mishkin’s book lays out three stages of a financial crisis that are common:

1. Phase one: credit/asset boom and bust
2. Phase two: banking crisis
3. Stage three: debt deflation

We will discuss each of these before looking at specifics from the Great Depression and Great Recession.
Phase One: Initial Phase

▶ Financial crises often follow periods of excessive credit growth (banks and other financial institutions making increasingly risky loans) and asset price booms
▶ Eventually, the party stops
▶ With loans going bad, financial institutions try to de-leverage by cutting back on lending
▶ With asset prices falling, the collateral of non-financial firms deteriorates, which makes it harder for them to access credit
▶ As a result, credit declines, investment declines, and economic activity contracts
Phase Two: Banking Crisis

- Deteriorating balance sheets due to loans going bad and asset price declines lead some financial institutions to be insolvent (negative equity)
- But then fear takes over: depositors and other short term funders begin to fear that otherwise healthy banks / financial institutions might also go out of business
- Information asymmetry is important here: if you know that 10 percent of banks are bad, most banks are not bad. But your downside risk is sufficiently high that you have an individual incentive to “run” anyway
- But financial system can’t deal with runs because of maturity mismatch
- To try to deal with runs, banks and financial institutions try to sell off illiquid assets, which can result in fire sale dynamics – everyone trying to do this leads to falling prices, which means selling doesn’t raise much money and falling asset prices exacerbate other issues
Debt Deflation

- The large decline in aggregate demand often leads the aggregate price level to fall
- This is potentially bad for several reasons:
  1. Expectations of falling prices push real interest rates up, particularly if the central bank is constrained by the zero lower bound
  2. Falling prices increases the real burden of debt
- Higher real interest rates result in less demand, which can result in even further falls in prices ("deflationary spiral")
- Increasing real burden of debt makes credit markets operate less well
Great Depression

- The Great Depression is generally dated to be from 1929-1933
- The unemployment rate in the US rose to 25 percent (in comparison, only 10 percent during Great Recession)
- Worldwide GDP fell by an estimated 15 percent
- Associated with the stock market collapse in October 1929 and ensuing banking panics in the early 1930s
- Close to one-third of commercial banks failed
Stock Market

S&P 500 Index

Years:
- 1926.01
- 1927.01
- 1928.01
- 1929.01
- 1930.01
- 1931.01
- 1932.01
- 1933.01
- 1934.01
- 1935.01
- 1936.01

Values:
- 0.00
- 5.00
- 10.00
- 15.00
- 20.00
- 25.00
- 30.00
- 35.00
Bank Runs
Credit Market Distress

Uncertainty in financial markets increased the spread between corporate bonds and low-risk Treasury bonds.
Decline in Economic Activity

Source: Board of Governors of the Federal Reserve System (US)
fred.stlouisfed.org
Deflation

Source: U.S. Bureau of Labor Statistics
fred.stlouisfed.org
Friedman and Schwartz

- A fairly strong consensus about the severity of the Great Depression comes out of Friedman and Schwartz’s *A Monetary History of the United States*
- The main thrust of the argument is summarized in Bernanke (2002)
- In essence, excessively tight monetary policy allowed an ordinary recession to become a full-fledged financial crisis and depression
- Bank failures shot through the roof, and the money supply declined precipitously
- This worsened financial conditions and led to the observed deflation
- Fed either did not understand its role as lender of last resort (which is why it was founded) or misinterpreted market signals (particularly the stigma associated with discount lending)
Bank Failures in the 1920s and 1930s

Source: The Great Depression by Murray Rothbard
Non-Accommodative Monetary Policy

Reserve credit surged briefly following the stock market crash and during the banking panics of October-December 1930, September-December 1931 (which followed the United Kingdom’s decision to leave the gold standard), and January-March 1933. On each occasion, the increase in Federal Reserve credit (and its impact on the monetary base) was quickly reversed. Moreover, as Figure 5 shows, when Federal Reserve credit finally began to grow in 1932, it only temporarily halted the decline in the broader money stock. This pattern is in marked contrast with the behavior of Federal Reserve credit and the monetary aggregates in 2008-09. Although the Fed did not increase the monetary base significantly until September 2008, the broader monetary aggregates continued to grow and the price level continued to rise, albeit slowly, throughout the financial crisis.21 In addition, the monetary base rose sharply in the final four months of 2008 and remained large throughout 2009 (see Figure 2).

Why did the Fed permit its credit to contract after each financial shock of 1929-33? Meltzer (2003) argues that Fed officials misinterpreted the signals from money market interest rates and discount window borrowing. Consistent with guidelines developed during the 1920s, during the Depression, Fed officials inferred that low levels of interest rates and borrowing meant that monetary conditions were exceptionally easy, and that there was no benefit—and possibly some risk—from adding more liquidity. Federal Reserve Bank of New York Governor Benjamin Strong explained the use of the level of discount window borrowing as a guide to policy as follows:

21 Although not apparent in the year-over-year growth rate shown in Figure 3, M2 growth slowed markedly between mid-March 2008 and mid-September 2008, which Hetzel (2009) contends is evidence of a tightening of monetary policy, along with the lack of any reduction in the FOMC’s federal funds rate target between April 30 and October 8, 2008.

Federal Reserve Credit and the Monetary Aggregates

SOURCE: Federal Reserve credit (see Figure 4); St. Louis adjusted monetary base (FRED; http://research.stlouisfed.org/aggreg/newbase.html); money stock (Friedman and Schwartz, 1963; Appendix A, Table A-1).
Bernanke’s Famous Quote

- In 2002, on the occasion of Milton Friedman’s 90th birthday, Ben Bernanke, then a Fed governor, said:
  
  “Regarding the Great Depression. You’re right, we did it. We’re very sorry. But thanks to you, we won’t do it again.”

- This quote proved to be quite prescient with the financial crisis and ensuing Great Recession with Bernanke as chair of the Fed
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:

  Housing Market Collapse $\rightarrow$ Financial Crisis $\rightarrow$ Recession

- We have some idea of how a financial crisis can lead to a recession. But how can a housing market collapse lead to a financial crisis?
Housing Prices
Why do declines in house prices matter?
Can trigger defaults by pushing homeowners underwater
Suppose someone gets a no-down payment home loan:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities + Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home $100,000</td>
<td>Mortgage $100,000</td>
</tr>
<tr>
<td>Equity $0</td>
<td>Equity $0</td>
</tr>
</tbody>
</table>

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

Delinquency Rate on Single-Family Residential Mortgages, Booked in Domestic Offices, All Commercial Banks

Source: Board of Governors of the Federal Reserve System (US)
fred.stlouisfed.org
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

Securitized loans serve as collateral for repo

Households
Firms

Traditional
Banks

$ 

Shadow
Banks

Institutional
Investors

loans

$ 

loans

repo
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.
13

be a big problem for McDonald's, Burger King, Wendy's and so on. They would go bankrupt. That's what happened.
The evidence is in the figure below, which shows the increase in haircuts for securitized bonds (and other structured bonds) starting in August 2007.

The figure is a picture of the banking panic. We don't know how much was withdrawn because we don't know the actual size of the repo market. But, to get a sense of the magnitudes, suppose the repo market was $12 trillion and that repo haircuts rose from zero to an average of 20 percent. Then the banking system would need to come up with $2 trillion, an impossible task.

Source: Gorton and Metrick (2009a).
Suppose a shadow bank (e.g. Bear Sterns) has the following balance sheet before the crisis with no haircut:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities + Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortgage Securities</td>
<td>$120 million</td>
</tr>
<tr>
<td>Other assets</td>
<td>$40 million</td>
</tr>
<tr>
<td></td>
<td>Repos</td>
</tr>
<tr>
<td></td>
<td>$100 million</td>
</tr>
<tr>
<td></td>
<td>Borrowings</td>
</tr>
<tr>
<td></td>
<td>$40 million</td>
</tr>
<tr>
<td></td>
<td>Equity</td>
</tr>
<tr>
<td></td>
<td>$20 million</td>
</tr>
</tbody>
</table>

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).
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.

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.
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).
These kinds of forced sales are called "firesales"—sales that must be made to raise money, even if the sale causes prices to fall because they reflect underlying fundamentals. Bank regulators and academics were not aware of these developments. Regulators did not measure or understand this development. As we have seen, sales rated ‘distressed, corporate’ should not be purchased unless a firm is willing to pay a sizable premium. Aa bonds fetched prices of less than 40 cents on the dollar.

However, this example. This is not the only example. In 2006, the managers of the New York bank bought $100 million in 50-year AAA-rated corporate bonds. They figured the money would be invested in a hedge fund. Aa bonds fetched prices of less than 40 cents on the dollar.

Unfortunately, just as they were hoping the managers of the New York firm planned on figuring the money would be invested in a hedge fund. Aa bonds fetched prices of less than 40 cents on the dollar.

This is exactly what happened. Instead, the managers sold the bonds at a huge loss. The actual loss of the New York firm was not, however, what we have seen, sales rates, but the bailout to the hedge fund. Aa bonds fetched prices of less than 40 cents on the dollar.

Money these...
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
(Total Credit to Private Non-Financial Sector, Adjusted for Breaks, for United States©), Q3 2008=100

Source: Bank for International Settlements
fred.stlouisfed.org
Banking Panic

- What we had was a good old-fashioned banking panic
- Although different than previous panics (e.g. Great Depression)
  - Not a run by people on banks, but by institutions on other institutions
  - These institutions (the shadow banking system) were not regulated as banks
  - There was nothing like FDIC deposit insurance like there was for regular banks
  - And because they weren’t technically banks, they couldn’t borrow from the Fed
Back to Bernanke’s Quote

- Bernanke assured Friedman that “they” (the Fed) “wouldn’t do it again”
- The Fed either explicitly or implicitly tried “whatever it takes” to provide liquidity to the financial system more broadly, not just traditional banks
- The Fed relied on Section 13(3) of the Federal Reserve Act, which allows the Fed to “lend to any individual, partnership or corporation” in “unusual and exigent” circumstances
- The Fed significantly increased the size of its balance sheet (the value of the assets it holds) and significantly increased the monetary base
- To a much smaller degree, it increased the money supply (or, perhaps more accurately, kept the money supply from declining)
Notable Fed Interventions

▶ December 2007: Term Auction Facility (TAF): basically a way to make anonymous discount lending/borrowing

▶ March 2008: Term Securities Lending Facility (TSLF): expanded available collateral for Fed loans – e.g. taking “toxic” mortgage securities out of the marketplace and replacing them with government debt

▶ October 2008: Commercial Paper Funding Facility (CPFF): took commercial paper (short term unsecured corporate debt) as collateral

▶ November 2008: Term Asset-Backed Securities Loan Facility (TALF): similar to TSLF, but took securitized consumer loans as collateral

▶ Dollar swap lines: a way to help foreign central banks provide liquidity to financial institutions which needed dollar funding

▶ “Bailouts” or “Engineered Rescues” of Bear Stearns, AIG, Fannie Mae and Freddie Mac

▶ Notably didn’t do anything for Lehman Brothers
Federal Reserve Assets and the Monetary Base (2007-09)

The graph shows the Federal Reserve’s total assets and the monetary base from January 2007 to December 2009. The monetary base, which consists of currency in circulation and the reserves held by depository institutions, was relatively constant until September 2008. After that, the Fed stopped using open market sales to prevent its lending to banks and other financial firms from increasing the System’s total assets. Figure 3 shows that the growth rate of the M2 monetary aggregate also increased sharply in the fourth quarter of 2008 and remained correlated with monetary base growth throughout 2009.

Chairman Bernanke (2009a) has described the Fed’s response to the financial crisis as “credit easing” to distinguish the policy from the “quantitative easing” approach that Japan and some other countries have at times adopted. Unlike a pure quantitative easing policy, which targets the growth of the monetary base or a similar narrow monetary aggregate, the Fed’s credit-easing policy was at least as much concerned with the allocation of credit supplied by the Fed to the financial system as with the quantity.

Policy entered a new phase in September 2008, when the Fed’s rescue operations and later its large purchases of U.S. Treasury and agency debt and mortgage-backed securities caused the monetary base to grow significantly. The figure highlights the sharp increase in the monetary base following the financial crisis.


16 Figure 2 shows the St. Louis Adjusted Monetary Base, which is a measure of the base that is adjusted for changes in reserve requirements over time. Other measures of the monetary base, including unadjusted measures, show essentially the same relationship with the Federal Reserve balance sheet. These data are available from the Federal Reserve Bank of St. Louis (http://research.stlouisfed.org/fred2/).

17 Thornton (2009a) notes that the Fed’s initial attempt to satisfy heightened liquidity concerns without increasing the monetary base contrasted with its use of open market operations to increase the monetary base sharply at the century date change (Y2K) in December 1999 and following the terrorist attacks on September 11, 2001. He argues that the Fed may have been reluctant to increase the monetary base to better control the federal funds rate or because Fed officials viewed targeted credit allocation as a more effective means of encouraging banks to lend and avoid selling illiquid assets.
System's total assets and the monetary base to more than double in size. However, the Fed's objective in purchasing mortgage-backed securities was to reduce mortgage interest rates and promote recovery of housing markets, rather than simply to increase the total amount of credit available to the financial system. Nonetheless, the program helped to increase the growth of broader monetary aggregates and thereby likely reduced the risk of deflation.

THE FED'S RESPONSE TO THE CRISES OF 1929-33

The Federal Reserve's response to the financial crisis and recession of 2007-09 was markedly more aggressive than the Fed's anemic response to the Great Depression. The Fed's policy failures during the Great Depression are legendary. The Fed—specifically, the Federal Reserve Bank of New York—reacted swiftly to the October 1929 stock market crash by lowering its discount rate and lending heavily to banks. However, the Fed largely ignored the banking panics and failures of 1930-33 and did little to arrest large declines in the price level and output. This section reviews Federal Reserve policy during the Great Depression and discusses prominent explanations for the Fed's behavior.

Fed Policy from the Stock Market Crash to Bank Holiday

Figure 4 shows the level and composition of Federal Reserve credit during 1929-34, providing one measure of the Fed's response to the major financial crises of the Great Depression. In recent years, Federal Reserve credit has been by far the largest component of Federal Reserve assets. However, before World War II, the Federal Reserve Banks held significant gold reserves and other assets aside from Federal Reserve credit. Hence, for the Great Depression period, we present data on Federal Reserve credit, rather than total assets, for better comparison with policy during the recent financial crisis.