Financial Markets and the IS-LM model

GRADUATE MACRO – LAB SESSION 6

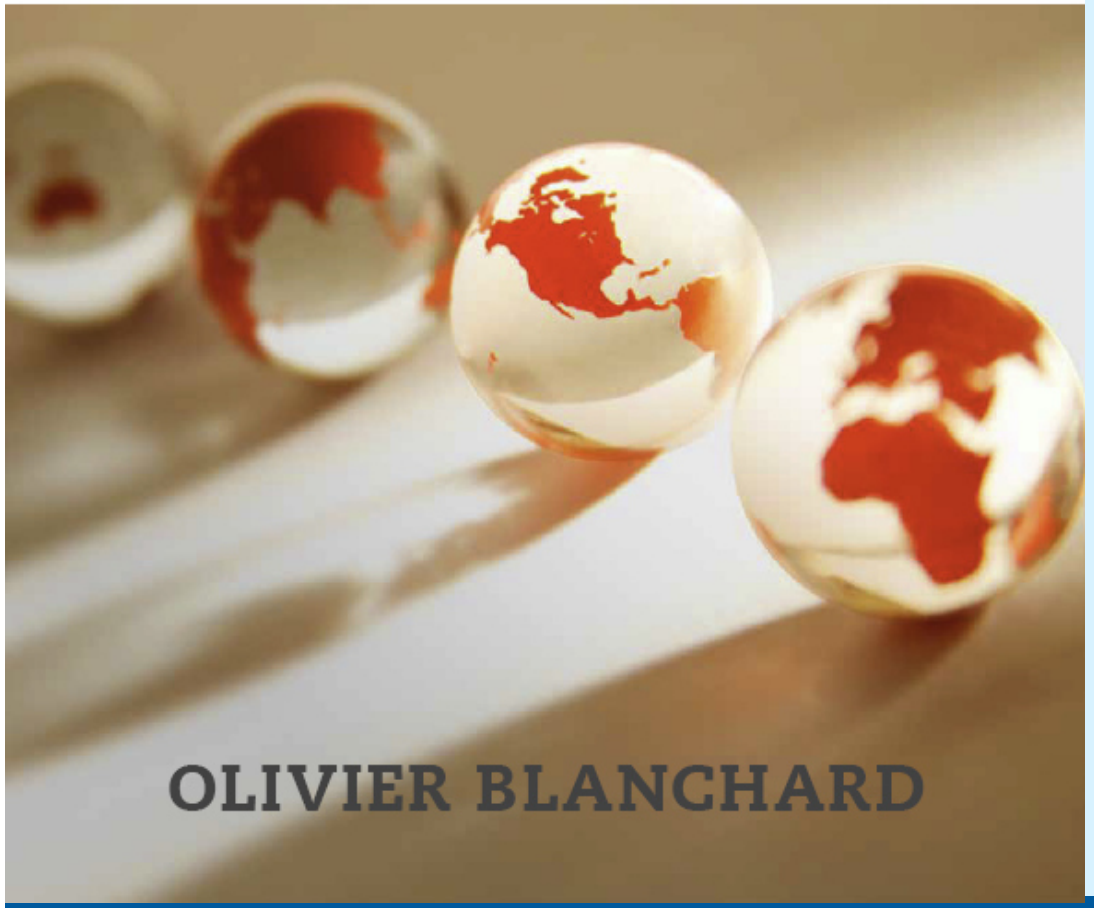
ETTORE GALLO

Class Outline

6-1	Nominal versus Real Interest Rates
6-2	Risk and Risk Premia
6-3	The Role of Financial Intermediaries
6-4	Extending the IS-LM
6-5	From a Housing Problem to a Financial Crisis

MACROECONOMICS

SEVENTH EDITION



OLIVIER BLANCHARD

Financial Markets II

Chapter 6

ALWAYS LEARNING

PEARSON

Financial Markets II

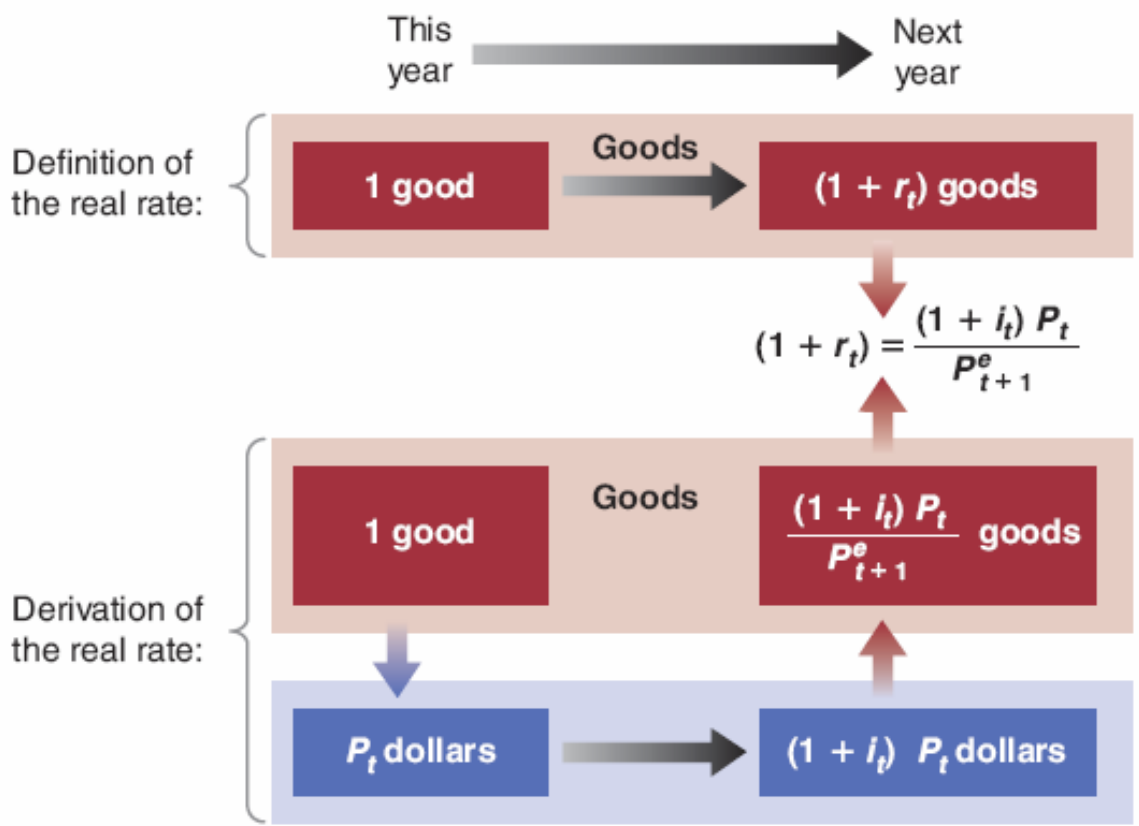
- Until now, we assumed that there were only two financial assets—money and bonds—and just one interest rate—the rate on bonds—determined by monetary policy.
- The financial system also plays a major role in the economy.
- This chapter looks more closely at the role of the financial system and its macroeconomic implications.

6-1 Nominal versus Real Interest Rates

- **Nominal interest rate** is the interest rate in terms of dollars.
- **Real interest rate** is the interest rate in terms of a basket of goods.
- We must adjust the nominal interest rate to take into account expected inflation.

6-1 Nominal versus Real Interest Rates

Figure 6-1 Definition and Derivation of the Real Interest Rate



6-1 Nominal versus Real Interest Rates

- One-year real interest rate r_t:

$$1 + r_t = (1 + i_t)\frac{P_t}{P^e_{t+1}} \tag{6.1}$$

- Denote expected inflation between t and $t + 1$ by:

$$\pi^e_{t+1} = \frac{(P^e_{t+1} - P_t)}{P_t} \tag{6.2}$$

so that equation (6.1) becomes

$$(1 + r_t) = \frac{1 + i_t}{1 + \pi^e_{t+1}} \tag{6.3}$$

6-1 Nominal versus Real Interest Rates

- If the nominal interest rate and expected inflation are not too large, a close approximately to equation (6.3) is:

$$r_t \approx i_t - \pi^e_{t+1} \tag{6.4}$$

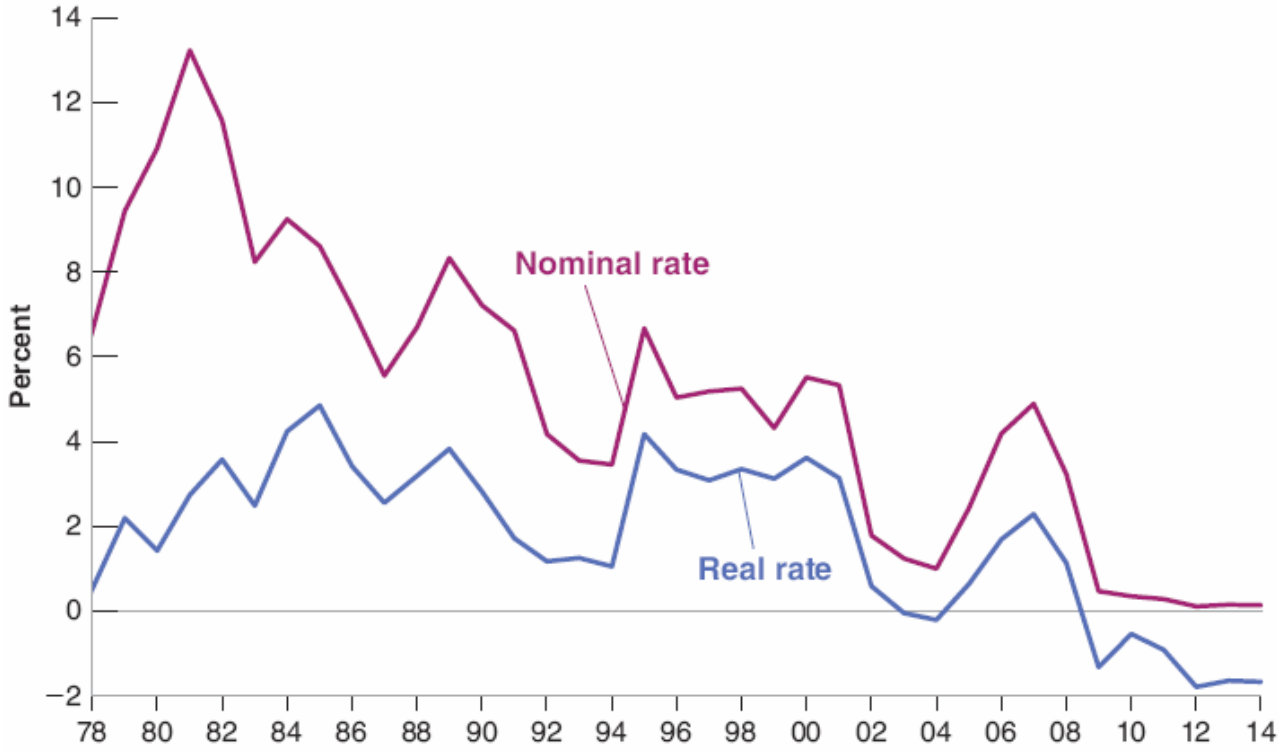
- When expected inflation equals zero, the nominal interest rate and the real interest rate are equal.
- Because expected inflation is typically positive, the **real interest rate is typically lower than the nominal interest rate.**
- For a given nominal interest rate, the higher expected inflation, the lower the real interest rate.

6-1 Nominal versus Real Interest Rates

- The real interest rate is based on expected inflation $(1 - \pi^e)$, so it is sometimes called the ***ex-ante*** ("before the fact") *real interest rate*.
- The realized real interest rate is based on actual inflation $(1 - \pi)$. Therefore, it is called the *ex-post* ("after the fact") *interest rate*.
- The interest rate that enters the *IS* relation is the **real interest rate.**
- The zero lower bond of the nominal interest rate implies that the real interest rate cannot be lower than the negative of inflation $(-\pi)$.

6-1 Nominal versus Real Interest Rates

Figure 6-2 Nominal and Real One-Year T-Bill Rates in the United States since 1978



Source: Nominal interest rate is the 1-year Treasury bill in December of the previous year: Series TB1YR, Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/ (Series TB6MS in December 2001, 2002, 2003, and 2004.) Expected inflation is the 12-month forecast of inflation, using the GDP deflator, from the December OECD Economic Outlook from the previous year.

The nominal interest rate has declined considerably since the early 1980s, but because expected inflation has declined as well, the real rate has declined much less than the nominal rate.

6-1 Nominal versus Real Interest Rates

- Some bonds are risky, so bond holders require a **risk premium**.
    - Some firms present little risk and others more: the higher the risk, the higher the risk premium

- What determines this risk premium?
  - The first factor is the **probability of default**
    - The higher this probability of default the higher the interest rate investors will ask for.
  - The second factor is the degree of **risk aversion** of the bond holders
    - Even if the expected return on the risky bond was the same as on a riskless bond, the risk itself will make them reluctant to hold the risky bond. Thus, they will ask for an even higher premium to compensate for the risk.

6-1 Nominal versus Real Interest Rates

- Let ***i*** be the **nominal interest rate** on a riskless bond, ***x*** be the **risk premium**, and ***p*** is the **probability of defaulting**, then to get the same expected return on the risky bonds as on the riskless bond:

$$(1 + i) = (1 - p)(1 + i + x) + (p)(0)$$

so that

$$x = (1 + i)p / (1 - p)$$

2. Suppose the interest rate in France is 1.7%, and the expected French inflation is 0.8%. The Swiss interest rate is also 1.7% and the expected Swiss inflation is 0.5%.

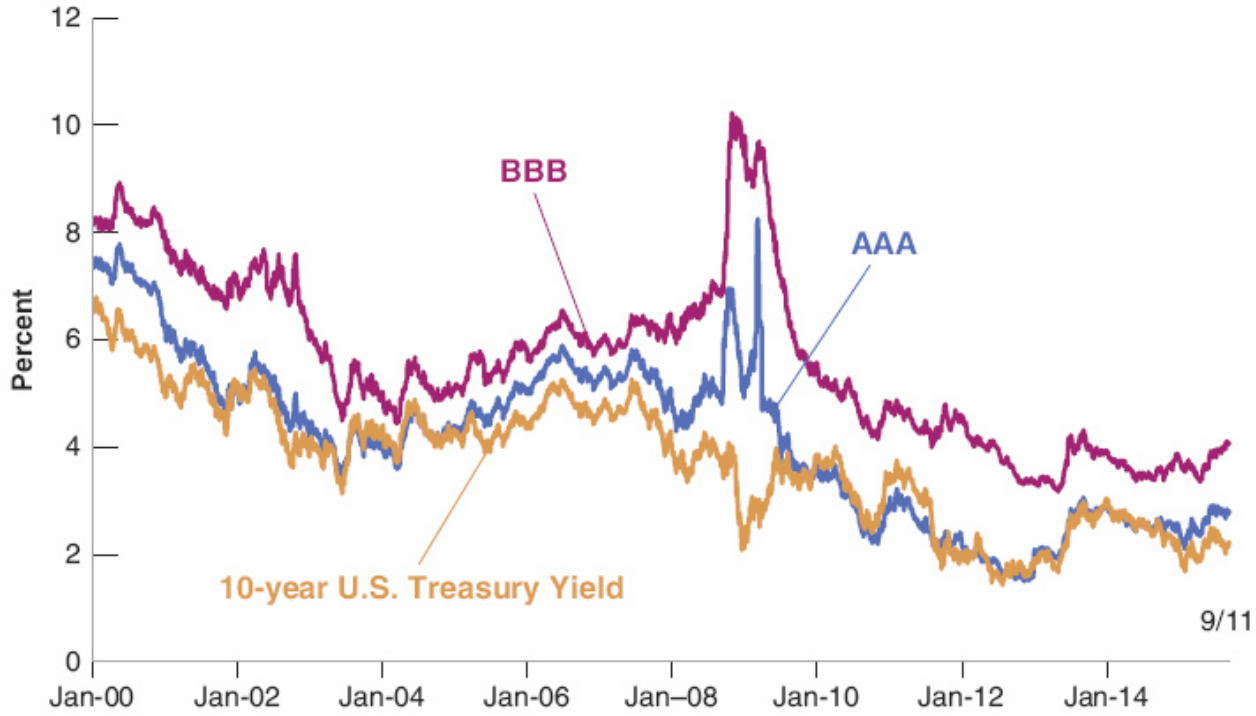
a. What are the exact real interest rates in France and Switzerland?
b. What are the approximate real interest rates in France and Switzerland?
c. How do you explain the difference in real rates between France and Switzerland?

$$(1 + r_t) = \frac{1 + i_t}{1 + \pi^e_{t+1}} \qquad (6.3)$$

6-2 Risk and Risk Premia

Figure 6-3 Yields on 10-Year U.S. Government Treasury, AAA, and BBB Corporate Bonds, since 2000

In September 2008, the financial crisis led to a sharp increase in the rates at which firms could borrow.



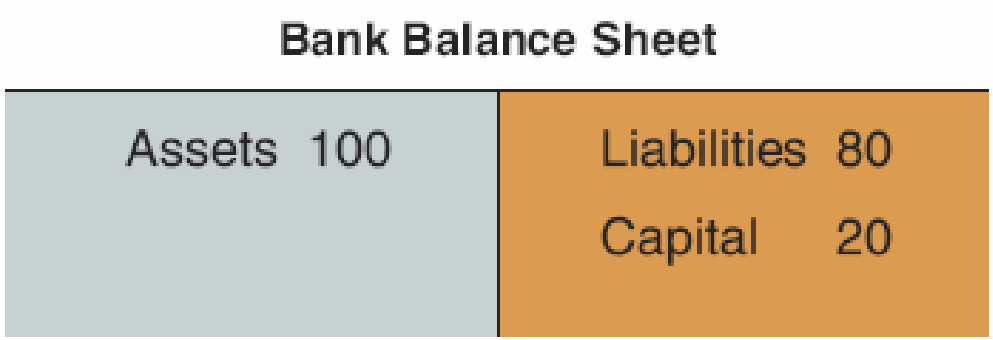
Source: For AAA and BBB corporate bonds, Bank of America Merrill Lynch; for 10-year U.S. treasury yield, Federal Reserve Board.

6-3 The Role of Financial Intermediaries

- Until now, we have looked at direct finance—borrowing directly by the ultimate borrowers from the ultimate lenders.
- In fact, much of the borrowing and lending takes place through financial intermediaries—financial institutions that receive funds from investors and then lend these funds to others.

6-3 The Role of Financial Intermediaries

Figure 6-4 Bank Assets, Capital, and Liabilities



- Capital ratio (the ratio of capital to assets) = 20/100 = 20%
- Leverage ratio (the ratio of assets to capital) = 100/20 = 5
- A higher leverage ratio implies a higher expected profit rate, but also implies a higher risk of **insolvency** and bankruptcy.

6-3 The Role of Financial Intermediaries

- The lower the liquidity of bank assets means the more difficult they are to sell, the higher the risk of being sold at **fire sale prices** (prices far below the true value) and the risk that the bank becomes insolvent.
- The higher the liquidity of the liabilities (e.g., checkable or **demand deposits**), the higher the risk of fire sales, and the risk that the bank becomes insolvent and thus faces **bank runs**.

FOCUS: Bank Runs

- The U.S. financial history up to the 1930s is full of bank runs, as seen in the classic movie *It's a Wonderful Life*.
- One potential solution to bank runs is **narrow banking**, which restricts banks from making loans, and to hold liquid and safe government bonds.
- To limit bank runs, the United States introduced **federal deposit insurance** in 1934.
- The Fed also implemented **liquidity provision** so that banks could borrow overnight from other financial institutions.

6-4 Extending the IS-LM

- Now we extend the *IS-LM* to reflect the distinction between:
  1. the nominal interest rate and the real interest rate
  2. the policy rate set by the central bank and the interest rates faced by borrowers
- Rewrite the *IS relation*:

$$\text{IS relation:} \quad Y = C(Y - T) + I(Y, i - \pi^e + x) + G$$

where expected inflation π^e and the risk premium x enter the *IS* relation.

6-4 Extending the IS-LM

- The central bank now chooses the real **policy rate** r, which enters the *IS* equation as part of the **borrowing rate** $(r + x)$ for consumers and firms:

$$\text{IS relation:} \quad Y = C(Y - T) + I(Y, r + x) + G \tag{6.5}$$

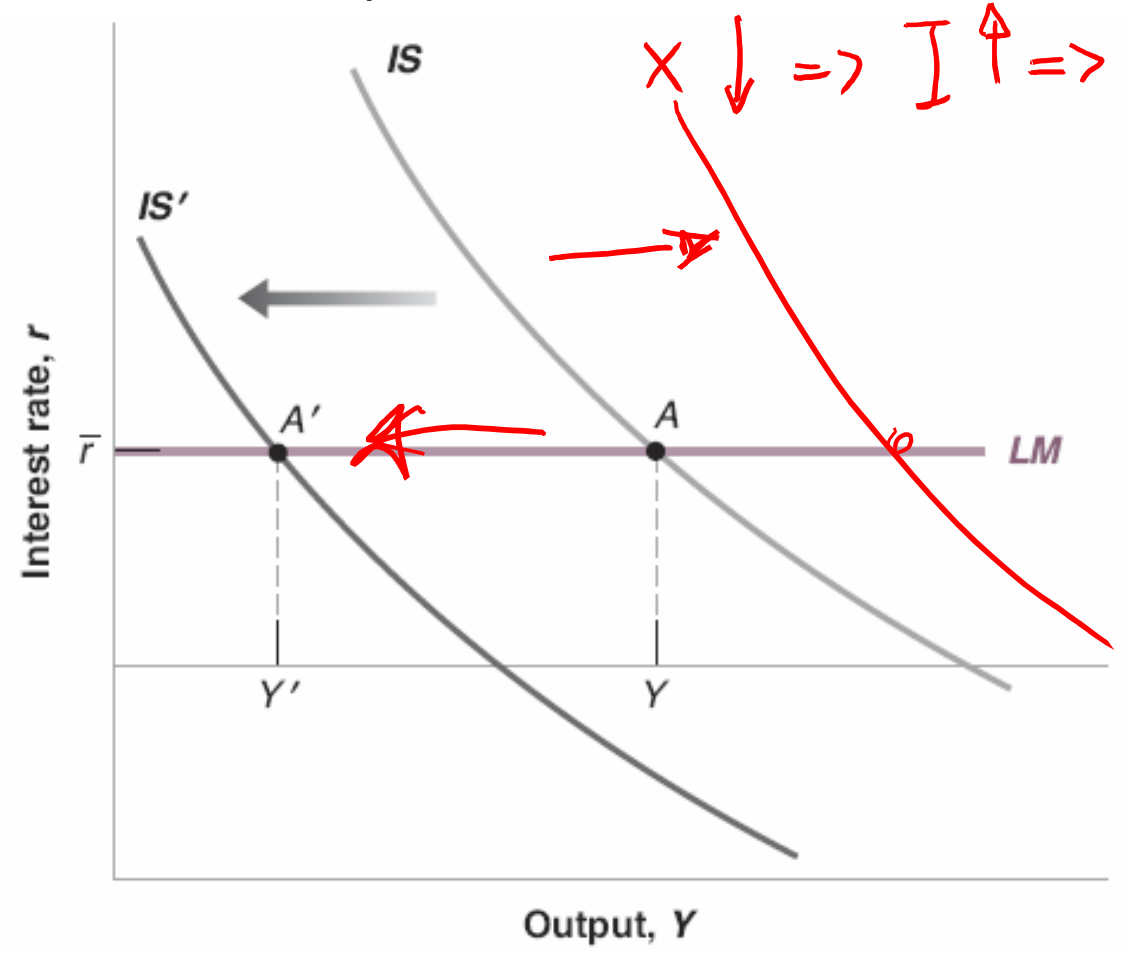
$$\text{LM relation:} \quad r = \bar{r} \tag{6.6}$$

where expected inflation π^e and the risk premium x enter the *IS* relation.

6-4 Extending the IS-LM

Figure 6-5 Financial Shocks and Output

An increase in *x* leads to a shift of the *IS* curve to the left and a decrease in equilibrium output.

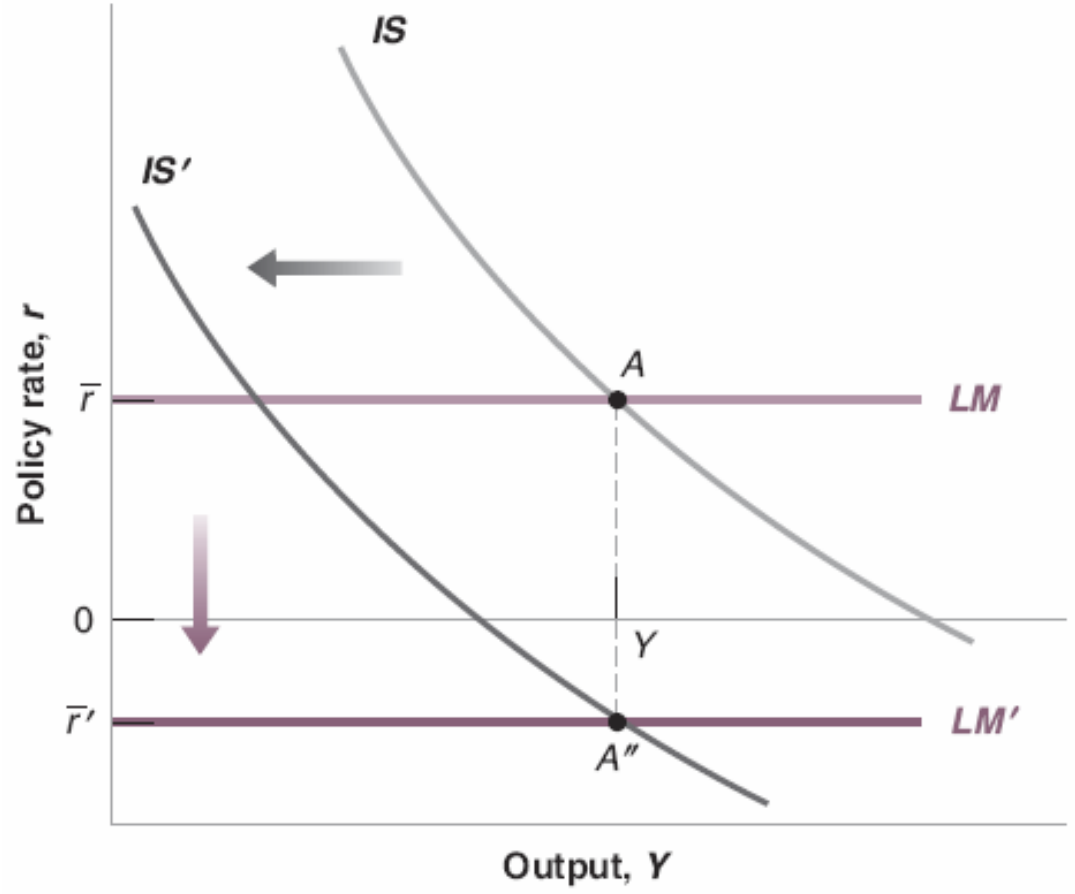


6-4 Extending the IS-LM

Figure 6-6 Financial Shocks, Monetary Policy, and Output

If sufficiently large, a decrease in the policy rate can in principle offset the increase in the risk premium.

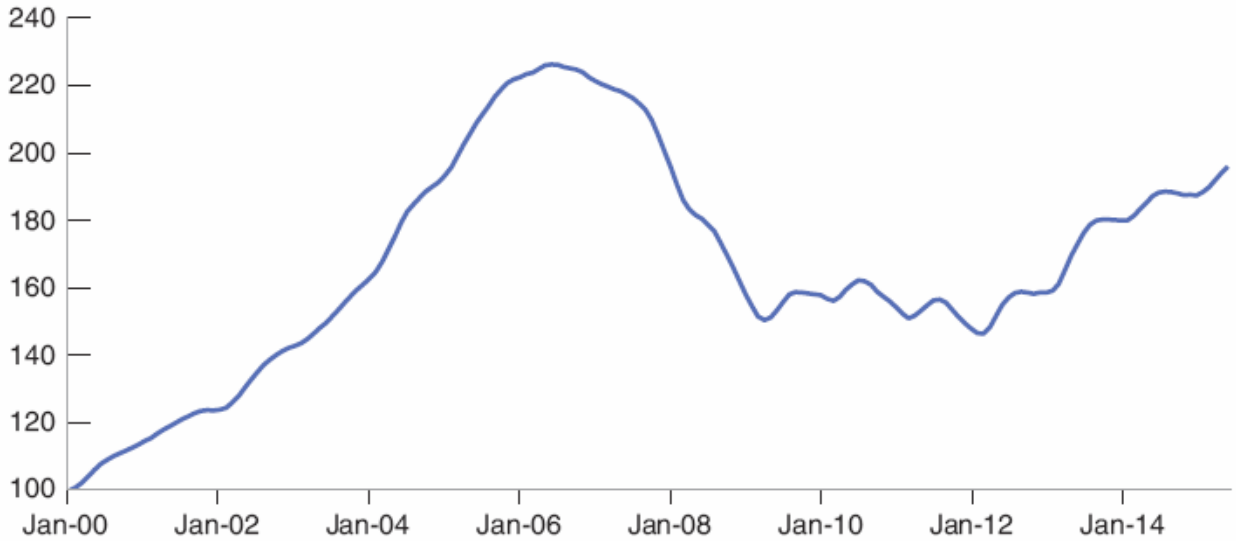
The zero lower bound may however put a limit on the decrease in the real policy rate.



6-5 From a Housing Problem to a Financial Crisis

Figure 6-7 U.S. Housing Prices since 2000

The increase in housing prices from 2000 to 2006 was followed by a sharp decline thereafter.



Source: Case-Shiller Home Price Indices, 10-city home price index, http://www.standardandpoors.com/indices/main/en/us

6-5 From a Housing Problem to a Financial Crisis

- The 2000s were a period of unusually low interest rates, which stimulated housing demand.
- Mortgage lenders was increasingly willing to make loans to risky borrowers with **subprime mortgages**, or **subprimes**.
- From 2006 on, many home mortgages went **underwater** (when the value of the mortgage exceeded the value of the house).
- Lenders faced large losses as many borrowers defaulted.

6-5 From a Housing Problem to a Financial Crisis

- Banks were highly leveraged because:
  - Banks probably underestimated the risk,
  - Bank managers had incentives to go for high expected returns without fully taking the risk of bankruptcy,
  - Banks avoided financial regulations with **structured investment vehicles (SIVs)**
- **Securitization** is the creation of securities based on a bundle of assets, such as **mortgage-backed securities (MBS)**.

6-5 From a Housing Problem to a Financial Crisis

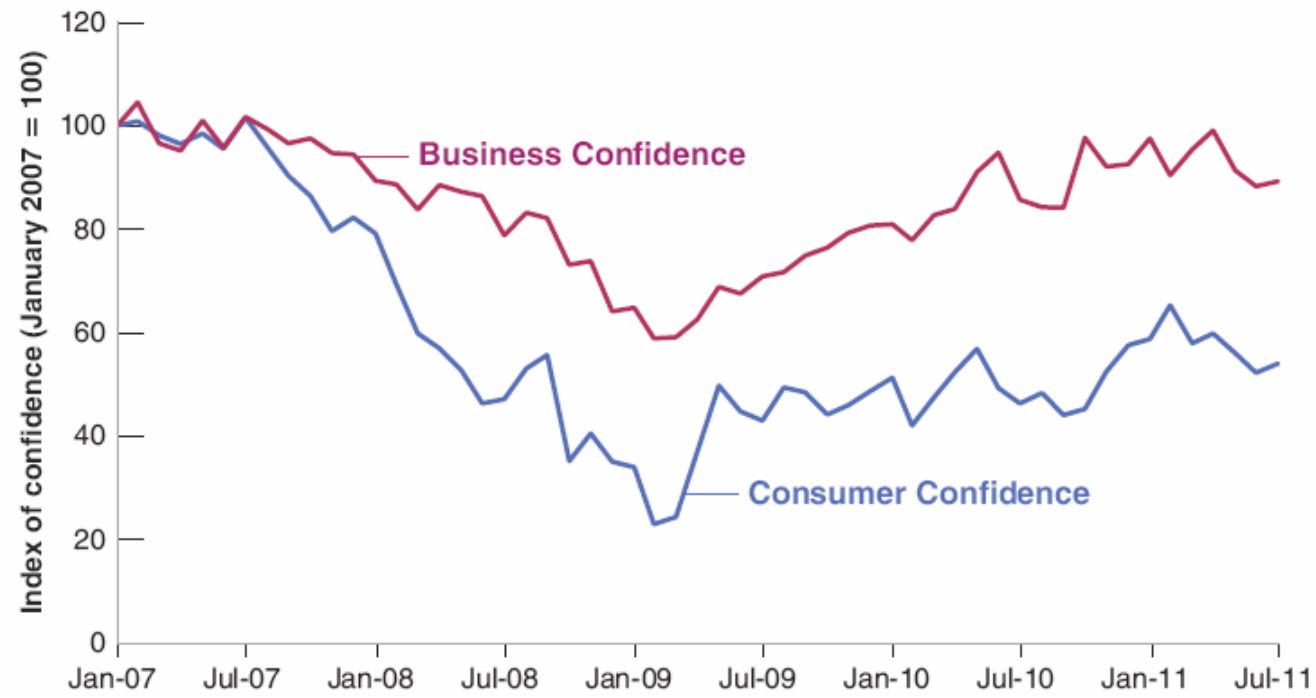
- **Senior securities** have first claims on the return from the bundle of assets; **junior securities,** such as **collateralized debt obligations (CDOs),** come after.
- Securitization was a way of diversifying risk, but it came with costs:
  - The bank that sold the mortgage had few incentives to keep the risk low
  - Even for **toxic assets**, the risk is difficult for **rating agencies** to assess

6-5 From a Housing Problem to a Financial Crisis

- **Wholesale funding** is a process in which banks rely on borrowing from other banks or investors to finance the purchase of their assets.
- In 2000s, SIVs were entirely funded through wholesale funding.
- Wholesale funding resulted in liquid liabilities.

6-5 From a Housing Problem to a Financial Crisis

Figure 6-8 U.S. Consumer and Business Confidence, 2007–2011



Source: Bloomberg L.P.

The financial crisis led to a sharp drop in confidence, which bottomed in early 2009.

6-5 From a Housing Problem to a Financial Crisis

- The demand for goods decreased due to the high cost of borrowing, lower stock prices, and lower confidence.
- The *IS* curve shift to the left.
- Policy makers responded to this large decrease in demand.

6-5 From a Housing Problem to a Financial Crisis

- Financial Policies:
  - Federal deposit insurance was raised from $100,000 to $250,000,
  - The Fed provided widespread liquidity to the financial system through liquidity facilities, and increased the number the assets that could serve as collateral,
  - The government introduced the Troubled Asset Relief Program (TARP)

6-5 From a Housing Problem to a Financial Crisis

- Monetary policy:
  - The federal funds rate was down to zero by December 2008.
  - The Fed also used unconventional monetary policy, which involved buying other assets as to directly affect the rate faced by borrowers.
- Fiscal Policy:
  - The American Recovery and Reinvestment Act was passed in February 2009, calling for $780 billion in tax reductions and spending increases

6-5 From a Housing Problem to a Financial Crisis

Figure 6-9 The Financial Crisis, and the Use of Financial, Fiscal, and Monetary Policies

The financial crisis led to a shift of the *IS* to the left.

Financial and fiscal policies led to some shift back to the *IS* to the right.

Monetary policy led to a shift of the *LM* curve down.

Policies were not enough however to avoid a major recession.