

The Fed, Money, and Credit

Chapter #17

Introduction

- In Great Recession, Fed aggressively cut interest rates
 - Reduced to almost zero
 - Continued even after official end of recession

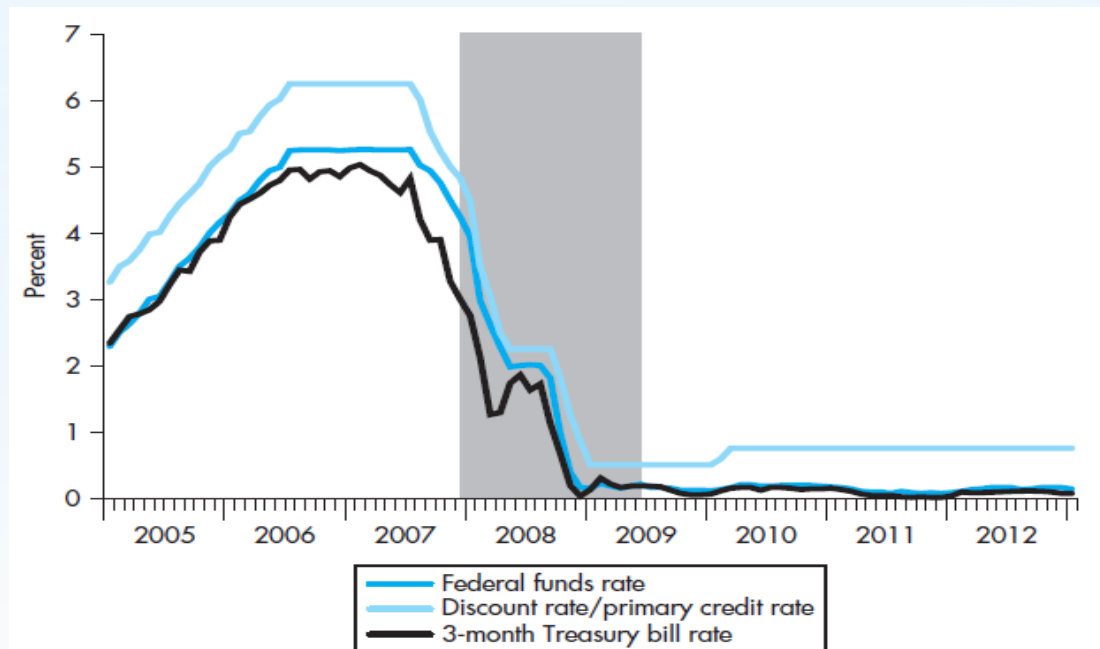


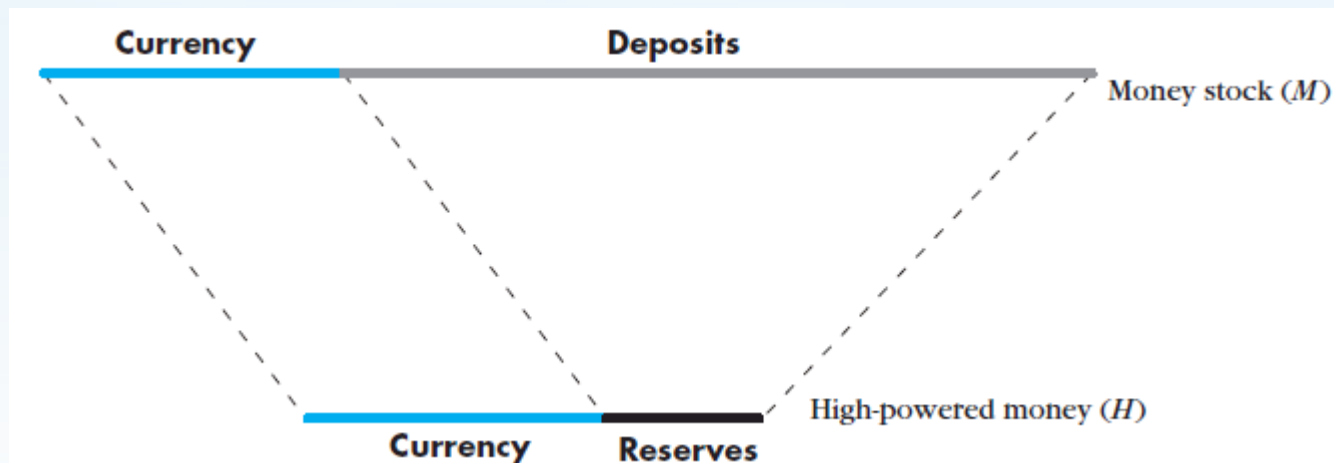
FIGURE 17-1 U.S. INTEREST RATES 2005–2013.

Money Stock Determination

- The money supply consists mainly of deposits at banks → Fed does not control directly
 - A key concept concerning money in the U.S. is the *fractional reserve banking system*: banks required to keep only a fraction of all deposits on hand or on reserve (not loaned out)
- High powered money (monetary base) consists of currency and banks' deposits at the Fed
 - The part of the currency held by the public forms part of the money supply
 - Currency in bank vaults and banks' deposits at the Fed are used as reserves backing individual and business deposits at banks
 - Fed's control over the monetary base is the main route through which it determines the money supply

Money Stock Determination

- The Fed has direct control over high powered money (H)
- Money supply (M) is linked to H via the money multiplier, mm
 - Top of figure 17-2 is the money stock
 - Bottom of figure is the stock of high-powered money = *monetary base*
- Money multiplier (mm) is the ratio of the stock of money to the stock of high powered money $\rightarrow mm > 1$
 - The larger deposits are, as a fraction of M, the larger the multiplier



Money Stock Determination

- Money supply consists of currency, CU , plus deposits:
(1) $M = CU + D$
- High powered money consists of currency plus reserves:
 $H = (2)U + reserves$
- Summarize the behavior of the public, the banks, and the Fed in the money supply process by three variables:
 - Currency-deposit ratio: $cu \equiv CU/D$
 - Reserve ratio: $re \equiv reserves/D$
 - Stock of high powered money: H

Money Stock Determination

- We can rewrite equations (1) and (2) as:

$$M = (cu + 1)D \quad \text{and} \quad H = (cu + re)D$$

→ This allows us to express the money supply in terms of its principal determinants, re , cu , and H :

$$M = \frac{1 + cu}{re + cu} H \equiv mm^{(3)} \times H$$

where mm is the money multiplier, given by:

$$mm \equiv \frac{1 + cu}{re + cu}$$

Money Stock Determination

- Some observations of the money multiplier:

$$mm \equiv \frac{1 + cu}{re + cu}$$

- The money multiplier is larger the smaller the reserve ratio, re
- The money multiplier is larger the smaller the currency-deposit ratio, cu
- The smaller is cu , the smaller the proportion of H that is being used as currency AND the larger the proportion that is available to be reserves

The Currency Deposit Ratio

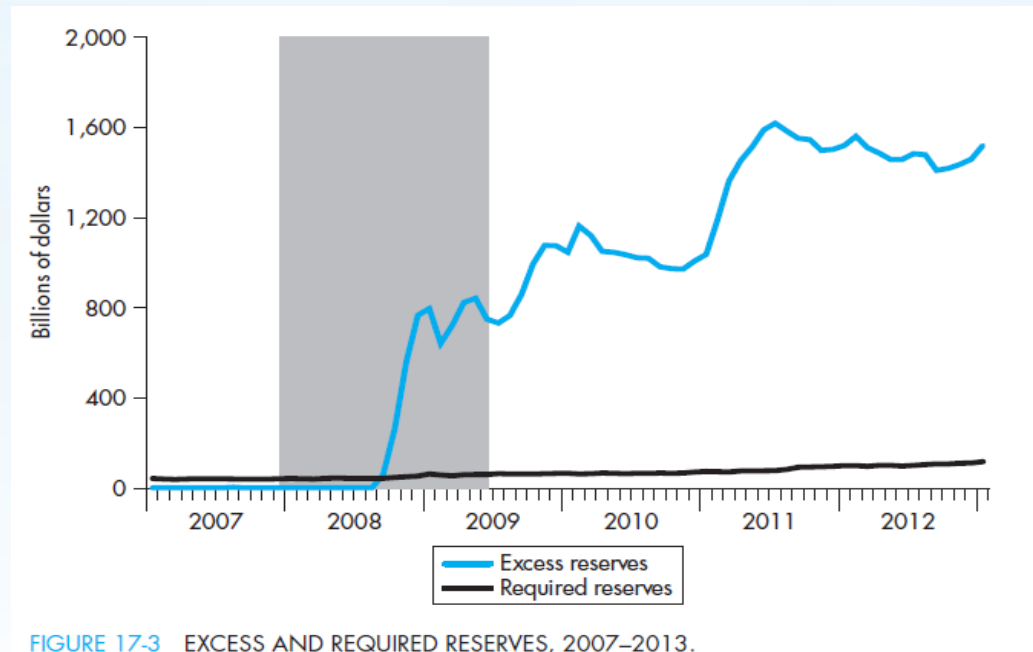
- The payment habits of the public determine how much currency is held relative to deposits
 - The currency deposit ratio is affected by the cost and convenience of obtaining cash
 - Currency deposit ratio falls with shoe leather costs
 - Ex. If there is a cash machine nearby, individuals will on average carry less cash with them because the costs of running out are lower
 - The currency deposit ratio has a strong seasonal pattern (highest around Christmas)

The Reserve Ratio

- Bank reserves = deposits banks hold at the Fed and “vault cash” (notes and coins held by banks)
- In the absence of regulation, banks would hold reserves to meet:
 1. The demands of their customers for cash
 2. Payments their customers make by checks that are deposited in other banks
- In the U.S. banks hold reserves primarily because the Fed requires them to (*required reserves*)
 - In addition to required reserves, banks hold *excess reserves* to meet unexpected withdrawals

The Reserve Ratio

- Fed began paying interest on required and excess reserves during Great Recession
- During Great Recession, excess reserves grew as banks made fewer loans which had a significant impact on the money multiplier



The Instruments of Monetary Control

- The Federal Reserve has three instruments for controlling money supply
 1. Open market operations
 - Buying and selling of government bonds
 2. Discount rate
 - Interest rate Federal Reserve “charges” commercial banks for borrowing money
 - Federal Reserve is often the lender of last resort for commercial banks
 3. Required-reserve ratio
 - Portion of deposits commercial banks are required to keep on hand, and not loan out

Open Market Operations

- Table 17-1 illustrates the impact of the Fed buying \$1 million of government bonds on the Fed's balance sheet:
 - Fed's ownership of securities increases by \$1 million
 - Fed writes a check for the purchase, which is deposited by the seller, and then deposited with the Fed → Bank deposits at the Fed increases by \$1 million

TABLE 17-1 Effects of an Open Market Purchase on the Fed Balance Sheet
(Millions of Dollars)

ASSETS		LIABILITIES	
Government securities	+1	Currency	0
All other assets	<u>0</u>	Bank deposits at Fed	<u>+1</u>
Monetary base (sources)	+1	Monetary base (uses)	+1

Open Market Operations

- Table 17-1 illustrates the impact of the Fed buying \$1 million of government bonds on the Fed's balance sheet:
 - NOTE: Commercial banks have increased reserves by \$1 million, which are initially held with the Fed
 - NOTE: The Fed can create H at will by buying assets and paying for them with its own liabilities

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The Fed's Balance Sheet

- Tables 17-2 and 17-3 show two ways of looking at the balance sheets of the Fed

- Table 17-2 shows the principal assets and liabilities of the Fed

- Government bonds
- Currency

TABLE 17-2 Main Assets and Liabilities of All Federal Reserve Banks, February 13, 2013
(Billions of Dollars)

ASSETS (SOURCES)		LIABILITIES (USES)	
Gold and special drawing rights	\$ 16	Federal Reserve notes	\$1,113
U.S. government securities	1,728	Deposits	1,795
Mortgage-backed securities	1,010		

Source: Federal Reserve Board, *Factors Affecting Reserve Balances*, February 14, 2013.

TABLE 17-3 Aggregate Reserves of Depository Institutions and the Monetary Base, April 2006 and January 2013
(Billions of Dollars)

	2006	2013
Reserves of depository institutions	\$ 44.58	\$1,630.88
Required reserves	42.77	111.42
Excess reserves	1.82	1,519.46
Reserves of depository institutions	44.58	1,630.88
Nonborrowed reserves	44.33	1,630.31
Borrowed reserves	0.25	0.57
Monetary base	801.96	2,740.90
Vault cash in excess of required reserves	18.78	12.33
Currency	738.60	1,097.70
Reserves	44.58	1,630.88

Source: Federal Reserve Board, *Aggregate Reserves of Depository Institutions and the Monetary Base; Money Stock Measures*, June 15, 2006, and February 28, 2013. Federal Reserve Economic Data (FRED II).

The Fed's Balance Sheet

- Tables 17-2 and 17-3 show two ways of looking at the balance sheets of the Fed
 - Table 17-3 shows the monetary base and two different ways of looking at reserves
 - Most reserves are required
 - Only a small fraction is borrowed at the discount window

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Loans and Discounts

- A bank that runs short on reserves can borrow to make up the difference
 - Borrow from either the Fed or other commercial banks
- The cost of borrowing from the Fed is the *discount rate*
 - Discount rate also serves as a signal of the Fed's intentions

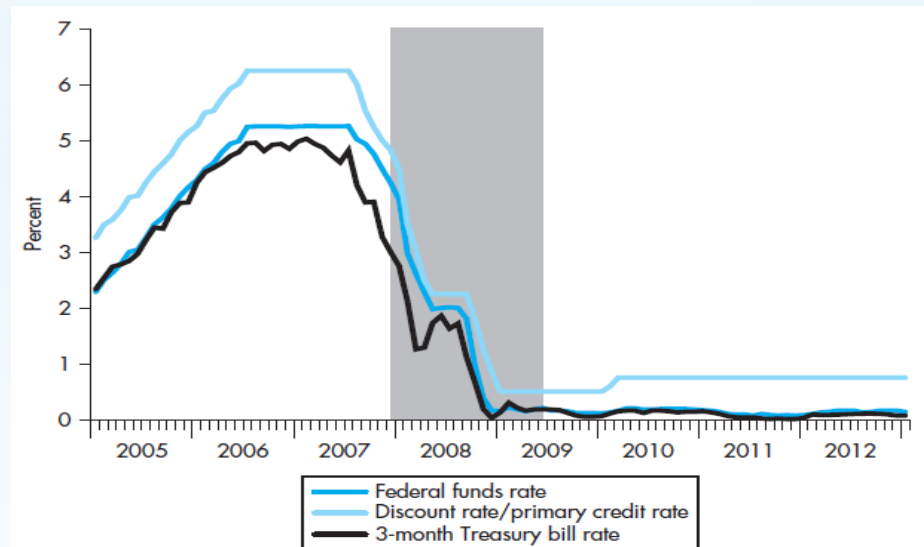


FIGURE 17-1 U.S. INTEREST RATES 2005–2013.

Loans and Discounts

- A bank that runs short on reserves can borrow to make up the difference
 - Borrow from either the Fed or other commercial banks
- The cost of borrowing from other banks is the *federal funds rate*
 - Federal funds are reserves that some banks have in excess and others need

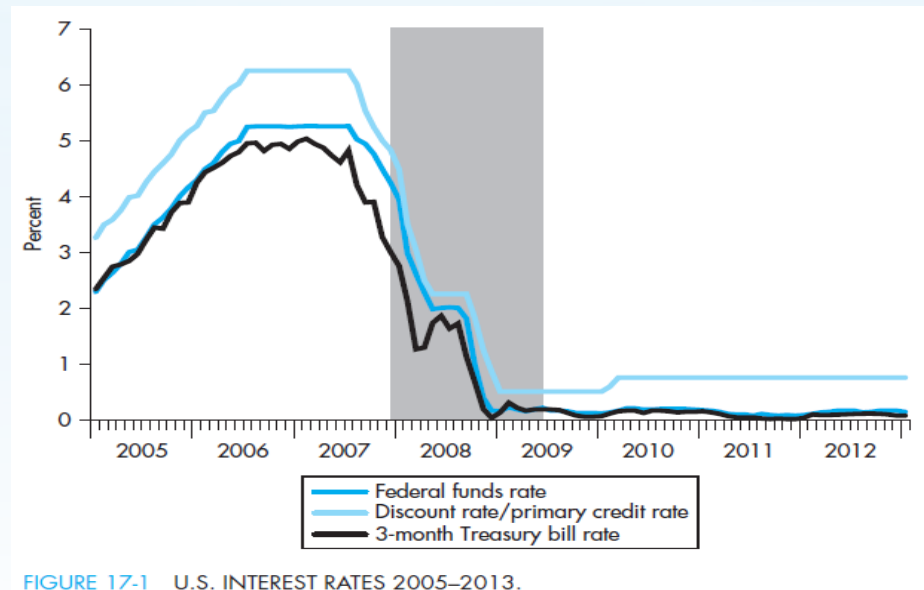


FIGURE 17-1 U.S. INTEREST RATES 2005–2013.

The Reserve Ratio

- The Federal Reserve sets the required reserve ratio: the portion of each deposit commercial banks must keep on hand
- Looking at the money multiplier shown in equation (3), it is easy to see that the Fed can increase the money supply by reducing the required reserve ratio (RRR):

$$M = \frac{1 + cu}{re + cu} H \equiv mm \times H$$

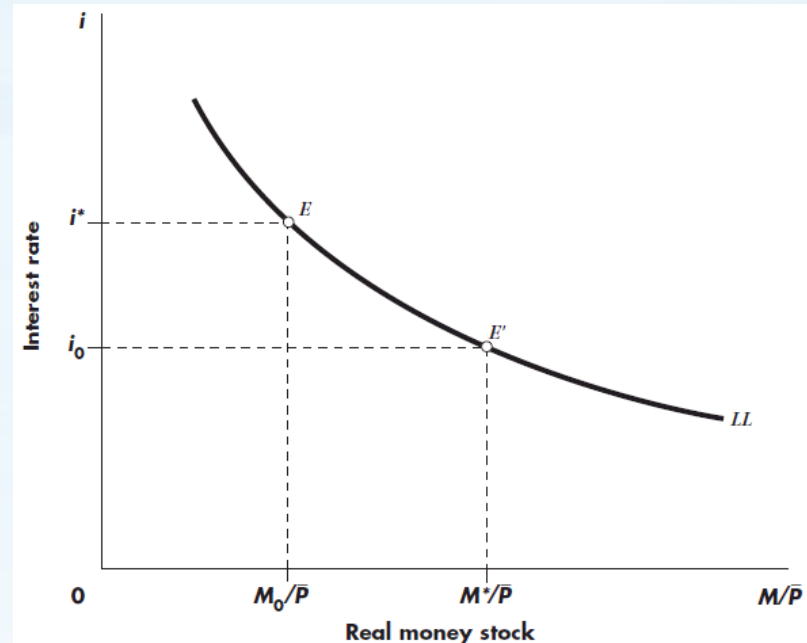
- RRR is not a policy tool of choice as reserves pay no interest, and thus are an interest free loan from banks to the Fed
 - Changes in the RRR have undesirable effects on bank profits

The Money Multiplier and Bank Loans

- Provide an alternative way of describing the working of the multiplier by showing how adjustments by banks and the public following an increase in H produce a multiple expansion of M
 - A Fed open market purchase increases H , and increases bank reserves (as discussed in earlier example)
 - The bank in which the original check was deposited has a reserve ratio that is too high (has excess reserves) → increase lending
 - When bank makes loan, person receiving a loan gets a bank deposit of the amount of the loan → money supply has increased by more than the amount of the open market operation
 - The expansion of loans (and money) continues until the reserve-deposit ratio has fallen to the desired level and the public has achieved its desired currency deposit ratio

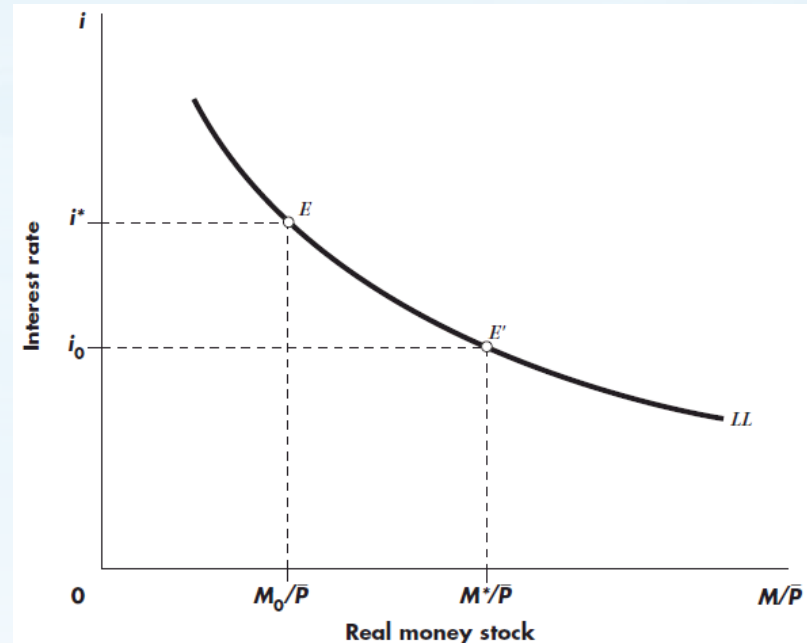
Control of the Money Stock and Control of the Interest Rate

- The Fed cannot simultaneously set the interest rate AND the stock of money at any given target levels that it may choose
- Suppose that the Fed wants to set the interest rate at i^* and the money stock at M^* , with the demand for money at LL



Control of the Money Stock and Control of the Interest Rate

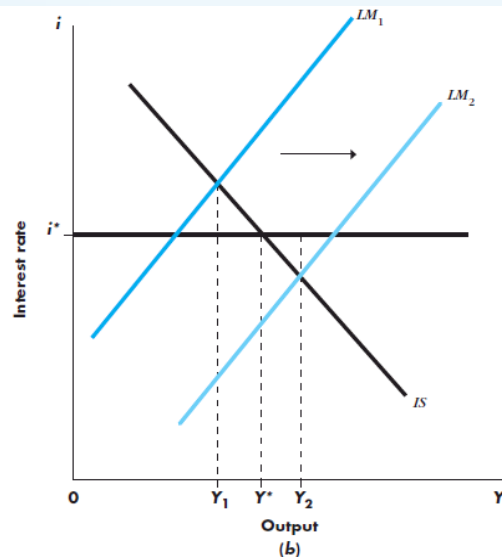
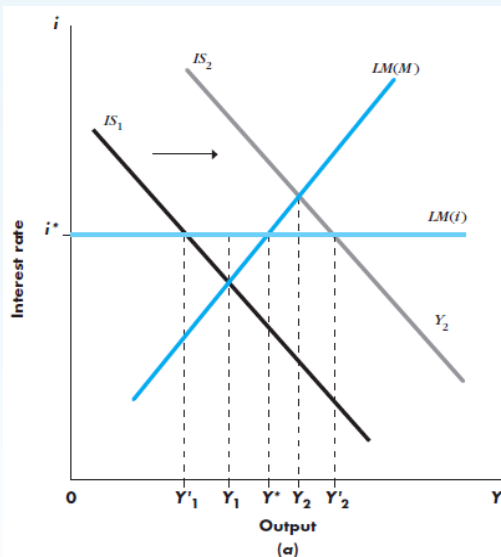
- The Fed cannot simultaneously set the interest rate AND the stock of money at any given target levels that it may choose
- The Fed can move the money supply around, but not LL
 - It can only set combinations of i and M that lie along LL
 - At interest rate i^* , can have M_0/P
 - At the target money supply, M^*/P , can have interest rate of i_0



Cannot achieve BOTH targets

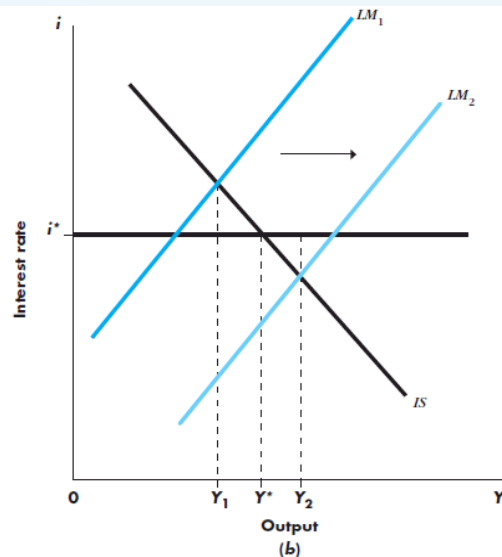
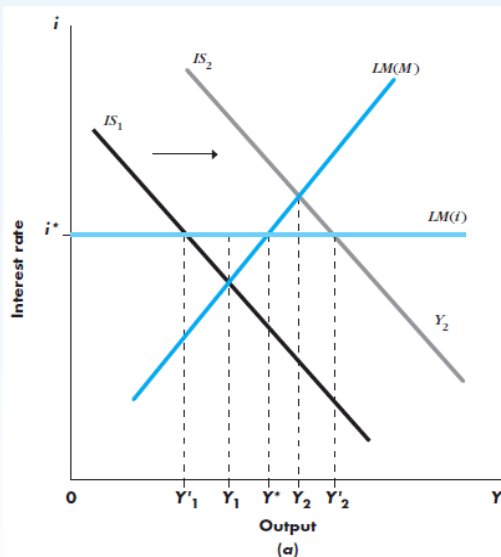
Money Stock and Interest Rate Targets

- William Poole presented an article discussing the issues involved in the choice between interest rate and money stock targets
 - Assume Fed's aim is to have the economy reach a particular level of output \rightarrow uses IS-LM model, in the short-run
 - $LM(M)$ = LM curve that exists when Fed fixes money stock
 - $LM(i)$ = LM curve that exists when Fed fixes the interest rate



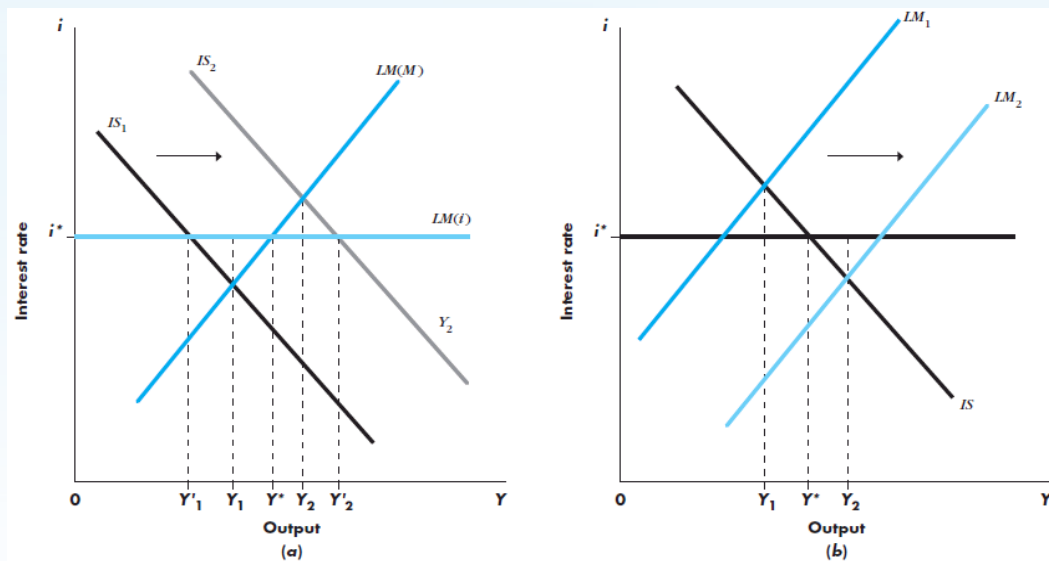
Money Stock and Interest Rate Targets

- The problem: IS and LM curves shift unpredictably
 - When shift, output moves away from the target level
- Figure 17-5(a) shows two possible IS curves, and Fed does not know in advance which is the true IS curve
 - Fed's aim is to achieve Y^*
 - Output closer to Y^* when LM is $LM(M)$



Money Stock and Interest Rate Targets

- Figure 17-5(b) assumes IS is stable, and uncertainty arises from shifts in the LM curve
 - Assuming the Fed sets M , LM shifts due to shifts in money demand
 - When Fed sets money supply, does not know what i will be \rightarrow LM could be either LM_1 or LM_2
 - Alternatively, Fed could set i at i^* to ensure $Y=Y^*$



Which Targets for the Fed?

Three key points:

1. There is a distinction is between ultimate targets and intermediate targets.
 - Ultimate targets are variables such as the inflation rate and unemployment rate whose behavior matters.
 - Intermediate targets, including the interest rate, are targets the Fed aims at in order to hit the ultimate targets more accurately
 - The discount rate, RRR, and OMO are the instruments Fed has to hit the targets

Which Targets for the Fed?

Three key points:

2. It matters how often the intermediate targets are reset.
 - If the Fed were to commit itself to a 5.5% money growth over a period of several years, it would have to be sure that the velocity of money was not going to change unpredictably
→ else the actual level of GDP would be far different from the targeted level
 - If the money target were reset more often, as velocity changed, the Fed could come closer to hitting its ultimate targets

Which Targets for the Fed?

Three key points:

3. The need for targeting arises from a lack of knowledge
 - If the Fed had the right ultimate goals and knew exactly how the economy worked, it could do whatever was needed to keep the economy as close to its ultimate targets as possible
 - but the Fed does not have a crystal ball or perfect foresight

Which Targets for the Fed?

- Intermediate targets give the Fed something concrete and specific to aim for in the next year
 - Enables the Fed itself to focus on what it should be doing
 - Helps the private sector know what to expect
- Specifying targets also makes it possible to hold the Fed *accountable* for its actions
- Ideal target is a variable that:
 1. The Fed can control exactly
 2. Has exact relationship with the ultimate target