

# Economics

ELEVENTH EDITION

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# 25

## MONEY, THE PRICE LEVEL, AND INFLATION

## **After studying this chapter, you will be able to:**

- ◆ Define money and describe its functions
- ◆ Explain the economic functions of banks
- ◆ Describe the structure and functions of the Federal Reserve System (the Fed)
- ◆ Explain how the banking system creates money
- ◆ Explain what determines the quantity of money and the nominal interest rate
- ◆ Explain how the quantity of money influences the price level and the inflation rate

Money has been around a long time and it has taken many forms: wampum beads, whale's teeth, and tobacco.

Today, we use dollar bills or swipe a card or, in some places, tap a cell phone. Are all these things money?

What happens when the bank lends the money we've deposited to someone else?

How does the Fed influence the quantity of money?

What happens when the Fed creates too much money?



# What is Money?

**Money** is any commodity or token that is generally acceptable as a means of payment.

A **means of payment** is a method of settling a debt.

Money has three other functions:

- Medium of exchange
- Unit of account
- Store of value

# What is Money?

## Medium of Exchange

A *medium of exchange* is an object that is generally accepted in exchange for goods and services.

In the absence of money, people would need to exchange goods and services directly, which is called **barter**.

Barter requires a double coincidence of wants, which is rare, so barter is costly.

# What is Money?

## Unit of Account

A *unit of account* is an agreed measure for stating the prices of goods and services.

Table 25.1 illustrates how money simplifies comparisons.

## Store of Value

As a *store of value*, money can be held for a time and later exchanged for goods and services.

**TABLE 25.1** The Unit of Account Function of Money Simplifies Price Comparisons

Good	Price in money units	Price in units of another good
Movie	\$8.00 each	2 cappuccinos
Cappuccino	\$4.00 each	2 ice-cream cones
Ice cream	\$2 per cone	2 packs of jelly beans
Jelly beans	\$1 per pack	2 sticks of gum
Gum	\$0.50 per stick	

# What is Money?

## Money in the United States Today

Money in the United States consists of

- Currency
- Deposits at banks and other depository institutions

**Currency** is the notes and coins held by households and firms.



# What is Money?

## Official Measures of Money

The two main official measures of money in the United States are M1 and M2.

**M1** consists of currency and traveler's checks and checking deposits owned by individuals and businesses.

**M2** consists of M1 plus time, saving deposits, money market mutual funds, and other deposits.

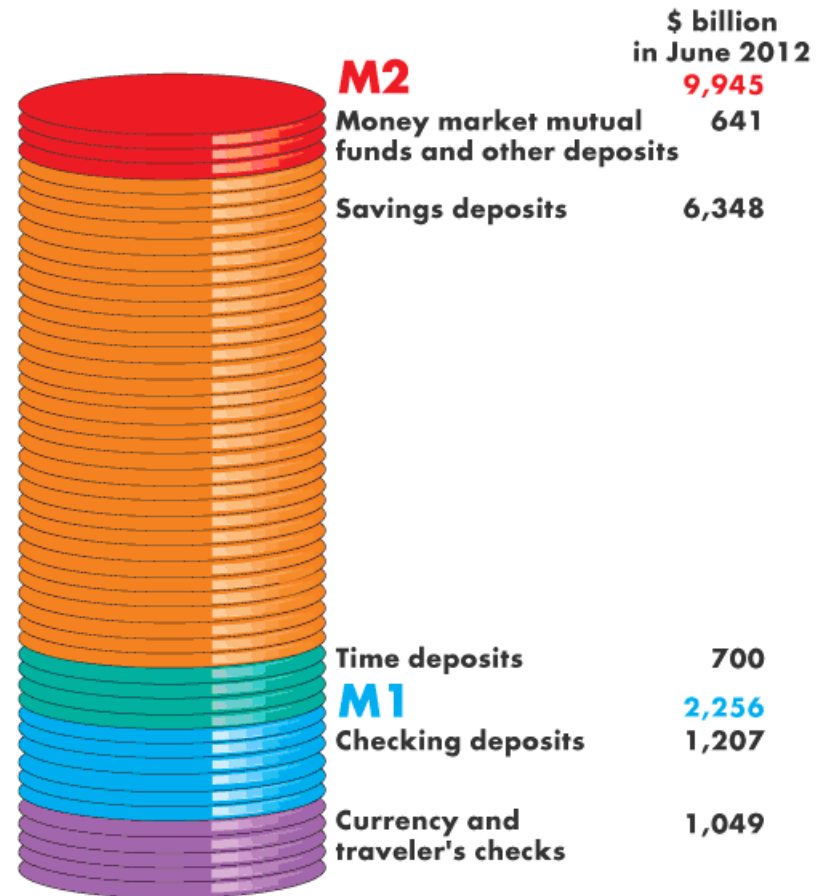
# What is Money?



The figure illustrates  
the composition of  
M1...

and M2.

It also shows the  
relative magnitudes of  
the components.



Two Measures of Money

# What is Money?

## Are M1 and M2 Really Money?

All the items in M1 are means of payment. They are *money*.

Some saving deposits in M2 are not means of payments—they are called liquid assets.

*Liquidity* is the property of being instantly convertible into a means of payment with little loss of value.

# What is Money

## Deposits are Money but Checks Are Not

In defining money, we include, along with currency, deposits at banks and other depository institutions.

But we do not count the checks that people write as money.

A check is an instruction to a bank to transfer money.

## Credit Cards Are Not Money?

Credit cards are not money.

A credit card enables the holder to obtain a loan, but it must be repaid with money.

# **Depository Institutions**

A **depository institution** is a firm that takes deposits from households and firms and makes loans to other households and firms.

## **Types of Depository Institutions**

Deposits at three institutions make up the nation's money. They are

- Commercial banks
- Thrift institutions
- Money market mutual funds



# Depository Institutions

## Commercial Banks

A *commercial bank* is a private firm that is licensed by the Comptroller of the Currency or by a state agency to receive deposits and make loans.

## Thrift Institutions

Savings and loan associations, savings banks, and credit unions are called *thrift institutions*.

## Money Market Mutual Funds

A money market mutual fund is a fund operated by a financial institution that sells shares in the fund and holds assets such as U.S. Treasury bills.



# **Depository Institutions**

## **What Depository Institutions Do**

The goal of any bank is to maximize the wealth of its owners.

To achieve this objective, the interest rate at which it lends exceeds the interest rate it pays on deposits.

But the banks must balance profit and prudence:

- Loans generate profit.
- Depositors must be able to obtain their funds when they want them.

# Depository Institutions

A commercial bank puts the depositors' funds into four types of assets:

1. Reserves—notes and coins in its vault or its deposit at the Federal Reserve
2. Liquid assets—U.S. government Treasury bills and commercial bills
3. Securities—longer-term U.S. government bonds and other bonds such as mortgage-backed securities
4. Loans—commitments of fixed amounts of money for agreed-upon periods of time

# Depository Institutions



Table 25.2 shows the sources and uses of funds in all U.S. commercial banks in June 2012.

**TABLE 25.2** Commercial Banks: Sources and Uses of Funds

	Funds (billions of dollars)	Percentage of deposits
<b>Total funds</b>	12,927	148.4
<b>Sources</b>		
Deposits	8,709	100.0
Borrowing	1,557	17.9
Own capital and other sources	2,661	30.5
<b>Uses</b>		
Reserves	1,525	17.5
Liquid assets	268	3.1
Securities and other assets	4,051	46.5
Loans	7,083	81.3

# **Depository Institutions**

## **Economic Benefits Provided by Depository Institutions**

Depository institutions make a profit from the spread between the interest rate they pay on their deposits and the interest rate they charge on their loans.

Depository institutions provide four benefits:

- Create liquidity
- Pool risk
- Lower the cost of borrowing
- Lower the cost of monitoring borrowers

# **Depository Institutions**

## **How Depository Institutions Are Regulated**

Depository institutions engage in risky business.

To make the risk of failure small, depository institutions are required to hold levels of reserves and owners' capital equal to or that surpass the ratios laid down by regulation.

If a depository institution fails, deposits are guaranteed up to \$250,000 per depositor per bank by the FDIC—Federal Deposit Insurance Corporation.

# Depository Institutions

## Financial Innovation

The aim of *financial innovation*—the development of new financial products—is to lower the cost of deposits or to increase the return from lending.

Two influences on financial innovation are

1. Economic environment
2. Technology



# The Federal Reserve System

The **Federal Reserve System** (the Fed) is the central bank of the United States.

A **central bank** is the public authority that regulates a nation's depository institutions and controls the quantity of money.

The Fed's goals are to keep inflation in check, maintain full employment, moderate the business cycle, and contribute toward achieving long-term growth.

In pursuit of its goals, the Fed pays close attention to the **federal funds rate**—the interest rate that banks charge each other on overnight loans of reserves.

# The Federal Reserve System

## The Structure of the Fed

The key elements in the structure of the Fed are

- The Board of Governors
- The regional Federal Reserve banks
- The Federal Open Market Committee

# The Federal Reserve System

## The Board of Governors

Has seven members appointed by the president of the United States and confirmed by the Senate.

Board terms are for 14 years and terms are staggered so that one position becomes vacant every 2 years.

The president appoints one member to a (renewable) four-year term as chairman.

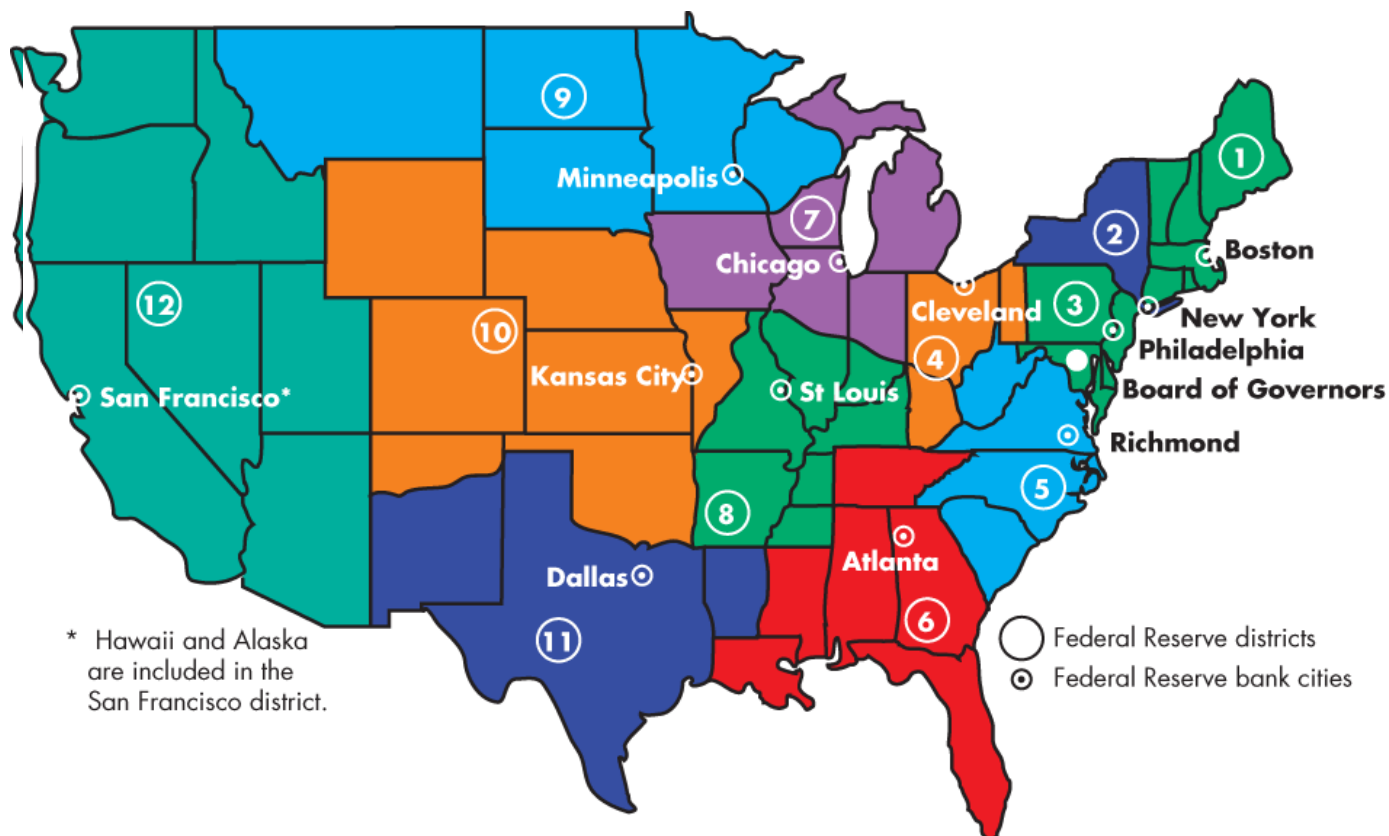
Each of the 12 Federal Reserve Regional Banks has a nine-person board of directors and a president.

# The Federal Reserve System



## The Federal Reserve Banks

Figure 25.1 shows the 12 regions.



# The Federal Reserve System

## The Federal Open Market Committee

The **Federal Open Market Committee** (FOMC) is the main policy-making group in the Federal Reserve System.

It consists of the members of the Board of Governors, the president of the Federal Reserve Bank of New York, and the 11 presidents of other regional Federal Reserve banks of whom, on a rotating basis, 4 are voting members.

The FOMC meets every six weeks to formulate monetary policy.

# The Federal Reserve System

In practice, the chairman of the Board of Governors (since 2006 Ben Bernanke) is the largest influence on the Fed's policy.

He controls the agenda of the Board, has better contact with the Fed's staff, and is the Fed's spokesperson and point of contact with the federal government and with foreign central banks and governments.



# The Federal Reserve System

## The Fed's Balance Sheet

On the Fed's balance sheet, the largest and most important asset is U.S. government securities.

The most important liabilities are Federal Reserve notes in circulation and banks' deposits.

The sum of Federal Reserve notes, coins, and depository institutions' deposits at the Fed is the **monetary base**.

# The Federal Reserve System



Table 25.3 shows the sources and uses of the monetary base in June 2012.

The Fed's assets are the sources of monetary base.

The Fed's liabilities are its uses of monetary base.

**TABLE 25.3** The Sources and Uses of the Monetary Base

Sources (billions of dollars)		Uses (billions of dollars)	
U.S. government securities	1,656	Currency	1,059
Loans to depository institutions	5	Reserves of depository institutions	1,556
Other items (net)	<u>954</u>		
Monetary base	<u><u>2,615</u></u>	Monetary base	<u><u>2,615</u></u>

# The Federal Reserve System

## The Fed's Policy Tools

To achieve its objectives, the Fed uses three main policy tools:

- Open market operations
- Last resort loans
- Required reserve ratios



# The Conduct of Monetary Policy

## Open Market Operations

An **open market operation** is the purchase or sale of government securities by the Fed from or to a commercial bank or the public.

When the Fed *buys* securities, it pays for them with newly created reserves held by the banks.

When the Fed *sells* securities, they are paid for with reserves held by banks.

So open market operations influence banks' reserves.

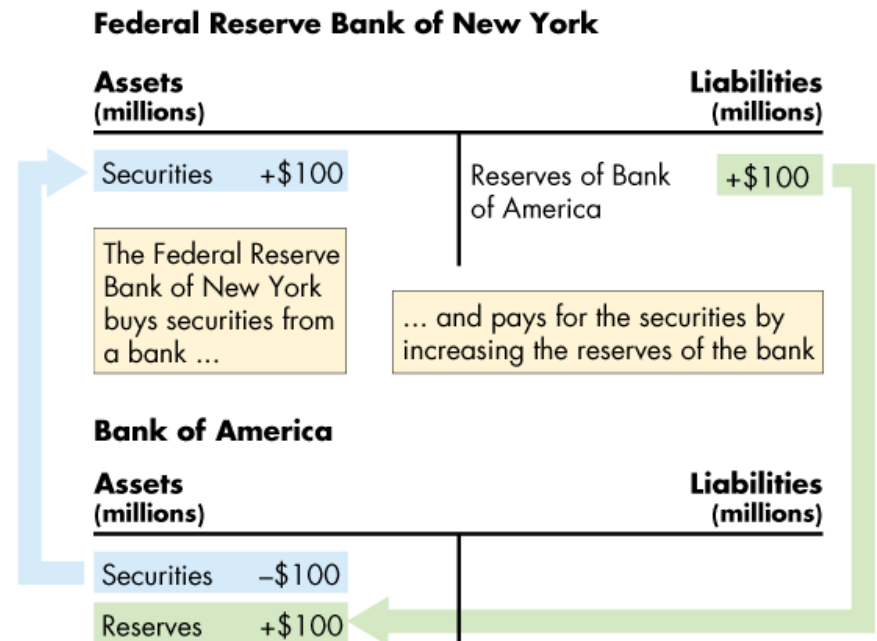
# The Conduct of Monetary Policy



## ***An Open Market Purchase***

Figure 25.2 shows the effects of an open market *purchase* on the balance sheets of the Fed and the Bank of America.

The open market purchase *increases* bank reserves.





## Federal Reserve Bank of New York

### Assets (millions)

Securities +\$100

The Federal Reserve Bank of New York buys securities from a bank ...

### Liabilities (millions)

Reserves of Bank of America +\$100

... and pays for the securities by increasing the reserves of the bank

## Bank of America

### Assets (millions)

Securities -\$100

Reserves +\$100

### Liabilities (millions)



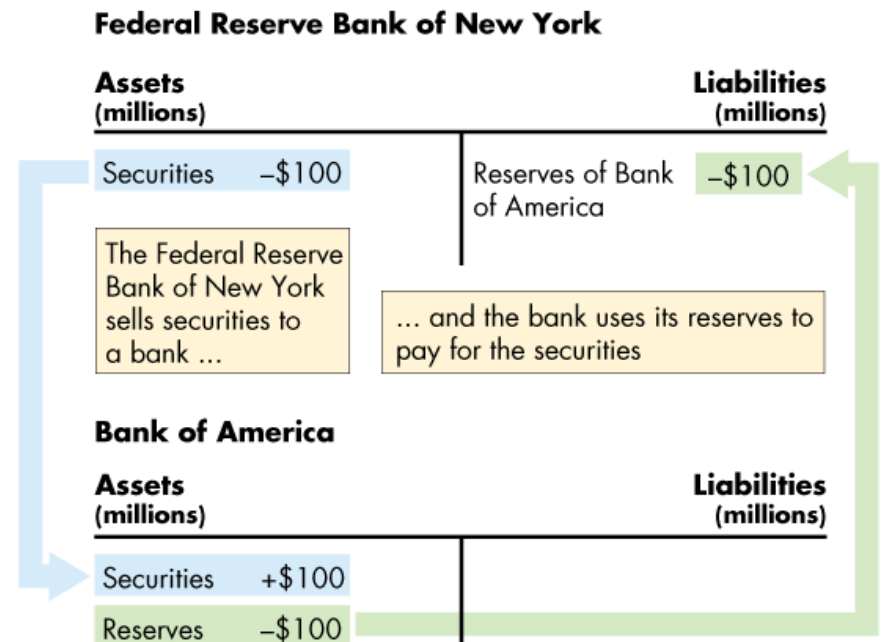
# The Conduct of Monetary Policy



## *An Open Market Sale*

This figure shows the effects of an open market *sale* on the balance sheets of the Fed and Bank of America.

The open market sale *decreases* bank reserves.



# The Federal Reserve System

## Last Resort Loans

The Fed is the **lender of last resort**, which means the Fed stands ready to lend reserves to depository institutions that are short of reserves.

## Required Reserve Ratio

The Fed sets the **required reserve ratio**, which is the minimum percentage of deposits that a depository institution must hold as reserves.

The Fed rarely changes the required reserve ratio.

# How Banks Create Money

## Creating Deposits by Making Loans

Banks create deposits when they make loans and the new deposits created are new money.

The quantity of deposits that banks can create is limited by three factors:

- The monetary base
- Desired reserves
- Desired currency holding

# How Banks Create Money

## The Monetary Base

The *monetary base* is the sum of Federal Reserve notes, coins, and banks' deposits at the Fed.

The size of the monetary base limits the total quantity of money that the banking system can create because

1. Banks have desired reserves
2. Households and firms have desired currency holdings

And both these desired holdings of monetary base depend on the quantity of money.

# How Banks Create Money

## Desired Reserves

A bank's *actual reserves* consists of notes and coins in its vault and its deposit at the Fed.

The **desired reserve ratio** is the ratio of the bank's reserves to total deposits that a bank *plans* to hold.

The desired reserve ratio exceeds the required reserve ratio by the amount that the bank determines to be prudent for its daily business.

# How Banks Create Money

## Desired Currency Holding

People hold some fraction of their money as currency.

So when the total quantity of money increases, so does the quantity of currency that people plan to hold.

Because desired currency holding increases when deposits increase, currency leaves the banks when they make loans and increase deposits.

This leakage of reserves into currency is called the *currency drain*.

The ratio of currency to deposits is the **currency drain ratio**.

# How Banks Create Money

## The Money Creation Process

The money creation process begins with an increase in the monetary base.

The Fed conducts an open market operation in which it buys securities from banks.

The Fed pays for the securities with newly created bank reserves.

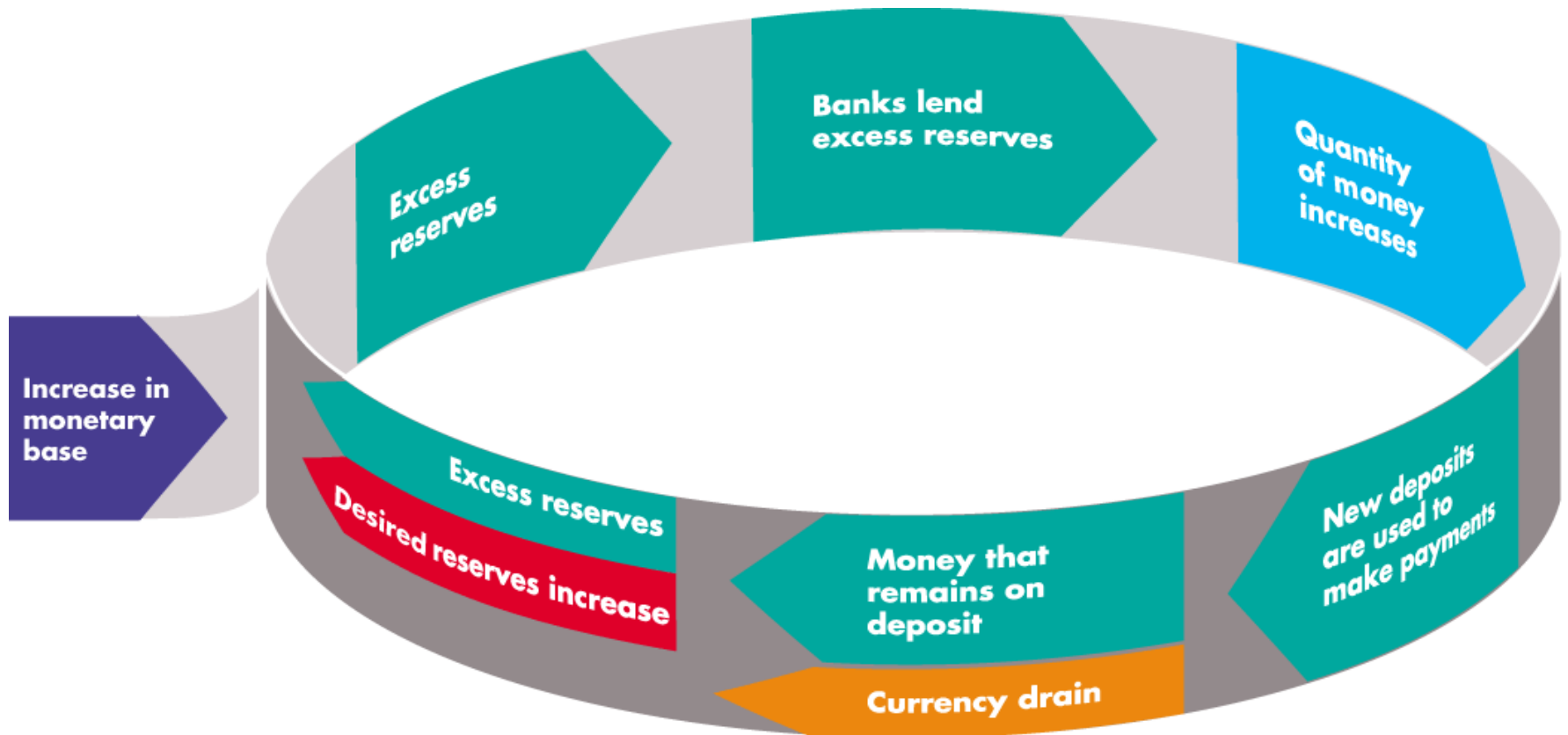
Banks now have more reserves but the same amount of deposits, so they have excess reserves.

**Excess reserves** = Actual reserves – desired reserves.

# How Banks Create Money



Figure 25.3 illustrates one round in how the banking system creates money by making loans.





# How Banks Create Money

## The Money Multiplier

The **money multiplier** is the ratio of the change in the quantity of money to the change in the monetary base.

For example, if the Fed increases the monetary base by \$100,000 and the quantity of money increases by \$250,000, the money multiplier is 2.5.

The quantity of money created depends on the desired reserve ratio and the currency drain ratio.

The smaller these ratios, the larger is the money multiplier.

# The Money Market

How much money do people want to hold?

## The Influences on Money Holding

The quantity of money that people plan to hold depends on four main factors:

- The price level
- The *nominal* interest rate
- Real GDP
- Financial innovation

# The Money Market

## The Price Level

A rise in the price level increases the quantity of *nominal* money but doesn't change the quantity of *real* money that people plan to hold.

*Nominal money* is the amount of money measured in dollars.

*Real* money equals nominal money  $\div$  price level.

The quantity of nominal money demanded is proportional to the price level—a 10 percent rise in the price level increases the quantity of nominal money demanded by 10 percent.



# The Money Market

## The *Nominal* Interest Rate

The nominal interest rate is the opportunity cost of holding wealth in the form of money rather than an interest-bearing asset.

A rise in the nominal interest rate on other assets decreases the quantity of real money that people plan to hold.

## Real GDP

An increase in real GDP increases the volume of expenditure, which increases the quantity of real money that people plan to hold.



# The Money Market

## Financial Innovation

Financial innovation that lowers the cost of switching between money and interest-bearing assets decreases the quantity of real money that people plan to hold.

## The Demand for Money

The **demand for money** is the relationship between the quantity of real money demanded and the nominal interest rate when all other influences on the amount of money that people wish to hold remain the same.

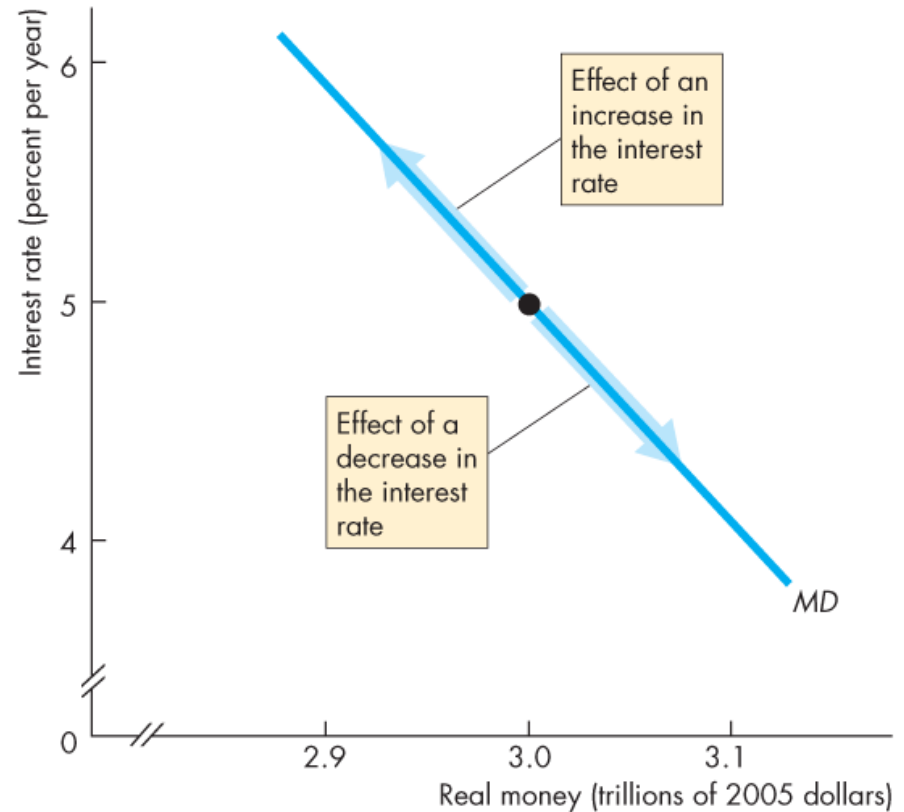
# The Money Market



Figure 25.4 illustrates the demand for money curve.

A rise in the interest rate brings a decrease in the quantity of real money demanded.

A fall in the interest rate brings an increase in the quantity of real money demanded.



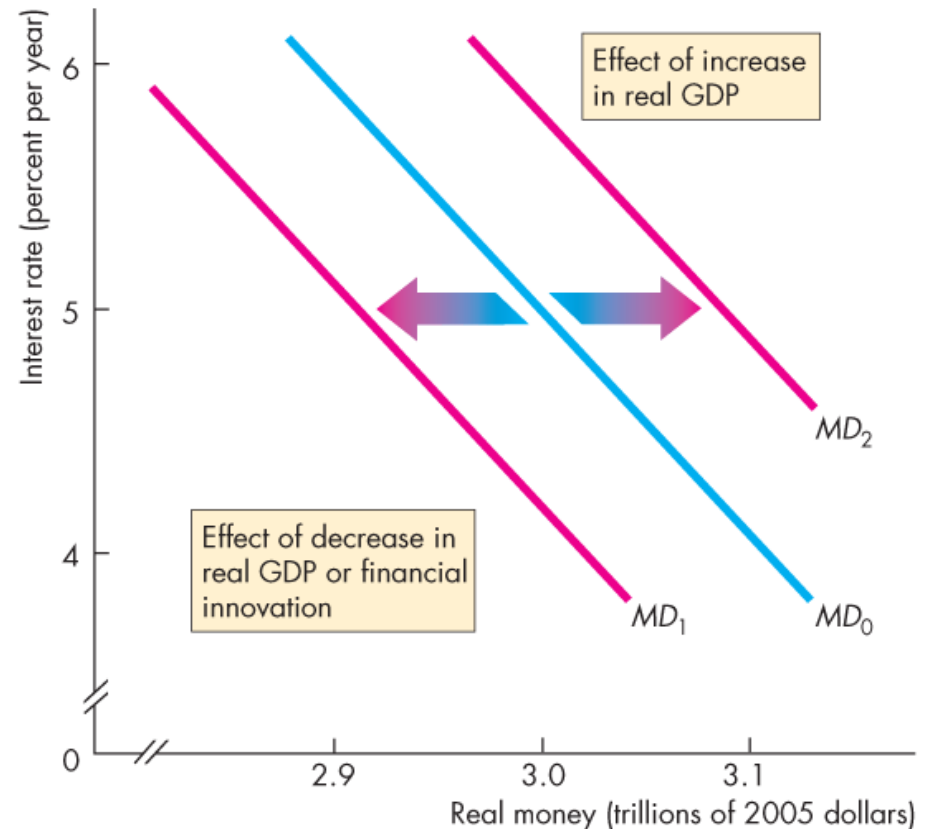
# The Money Market



## Shifts in the Demand for Money Curve

Figure 25.5 shows that a decrease in real GDP or a financial innovation decreases the demand for money and shifts the demand curve leftward.

An increase in real GDP increases the demand for money and shifts the demand curve rightward.



# The Money Market

## Money Market Equilibrium

Money market equilibrium occurs when the quantity of money demanded equals the quantity of money supplied.

Adjustments that occur to bring about money market equilibrium are fundamentally different in the short run and the long run.



# The Money Market

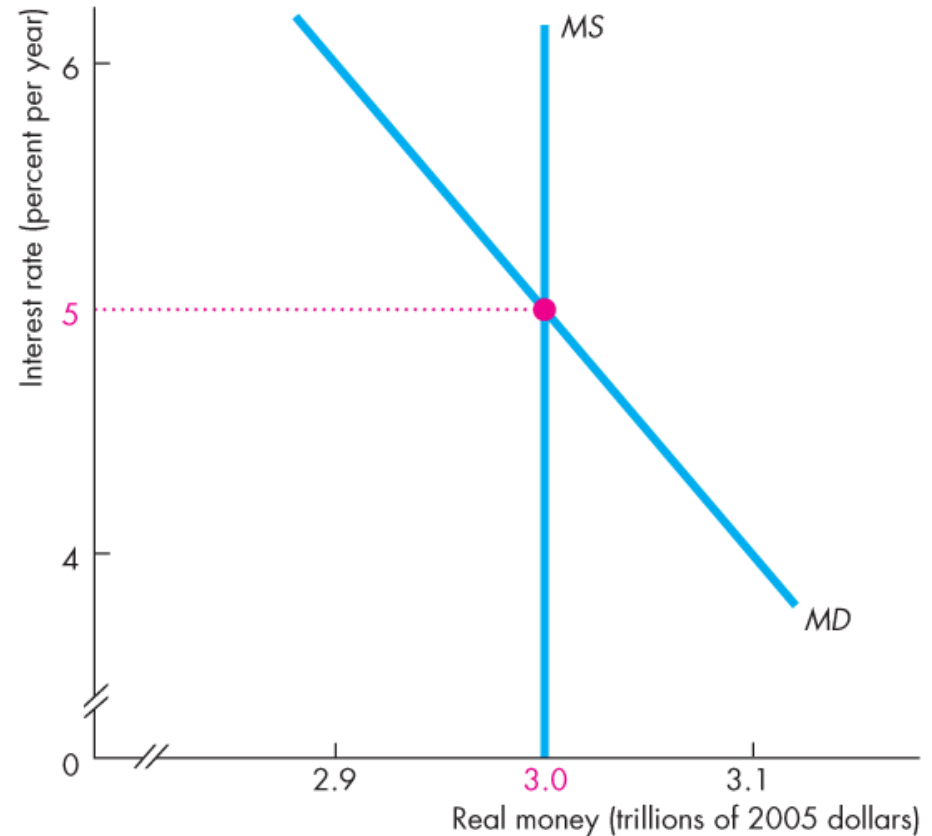


## Short-Run Equilibrium

Figure 25.6 shows the demand for money.

Suppose that the Fed uses open market operations to make the quantity of money \$3 billion.

The equilibrium interest rate is 5 percent a year.



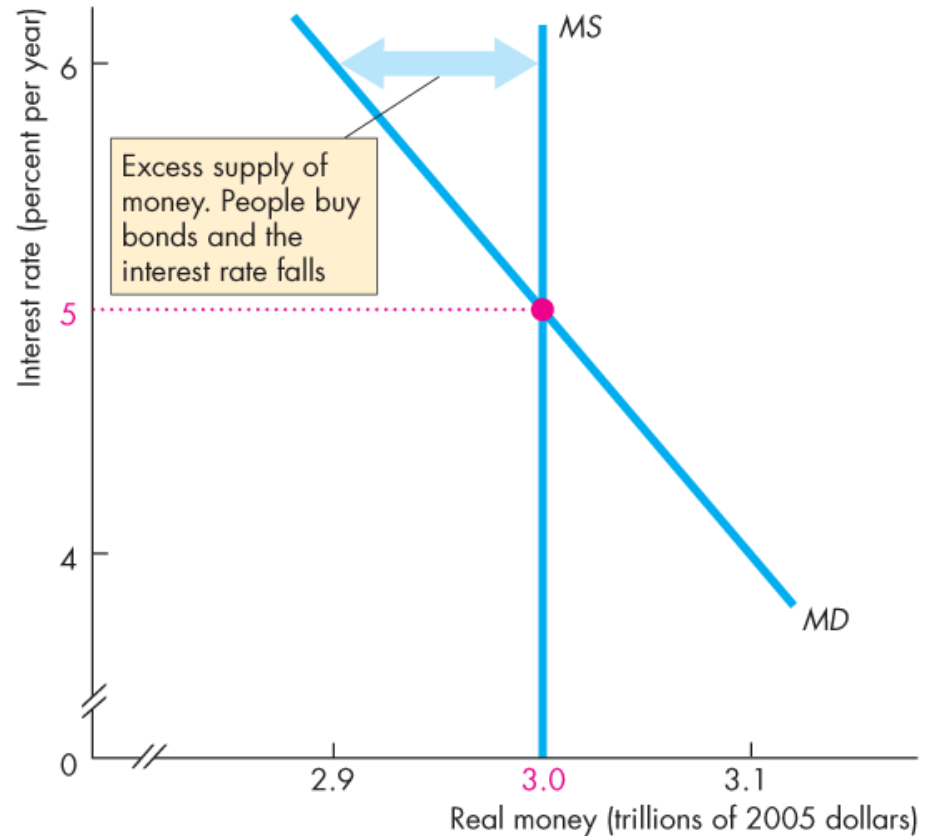
# The Money Market

If the interest rate is 6 percent a year, ...

the quantity of money that people are willing to hold is less than the quantity supplied.

People try to get rid of the “excess” money they are holding by buying bonds.

This action lowers the interest rate.



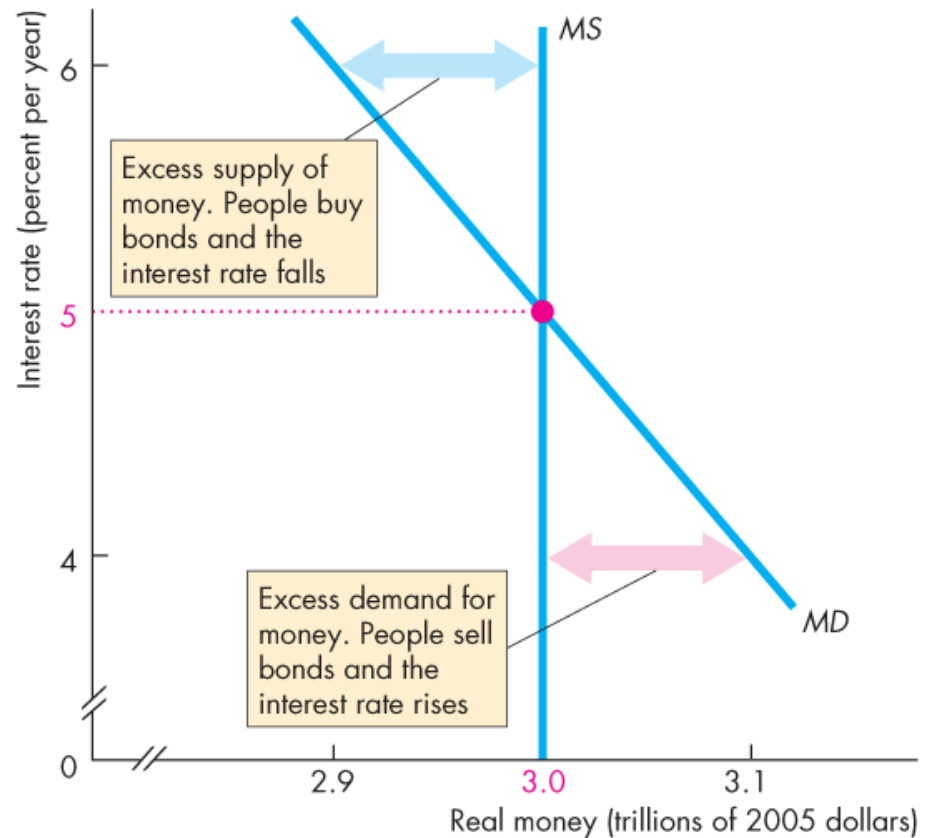
# The Money Market

If the interest rate is 4 percent a year, ...

the quantity of money that people plan to hold exceeds the quantity supplied.

People try to get more money by selling bonds.

This action raises the interest rate.



# The Money Market



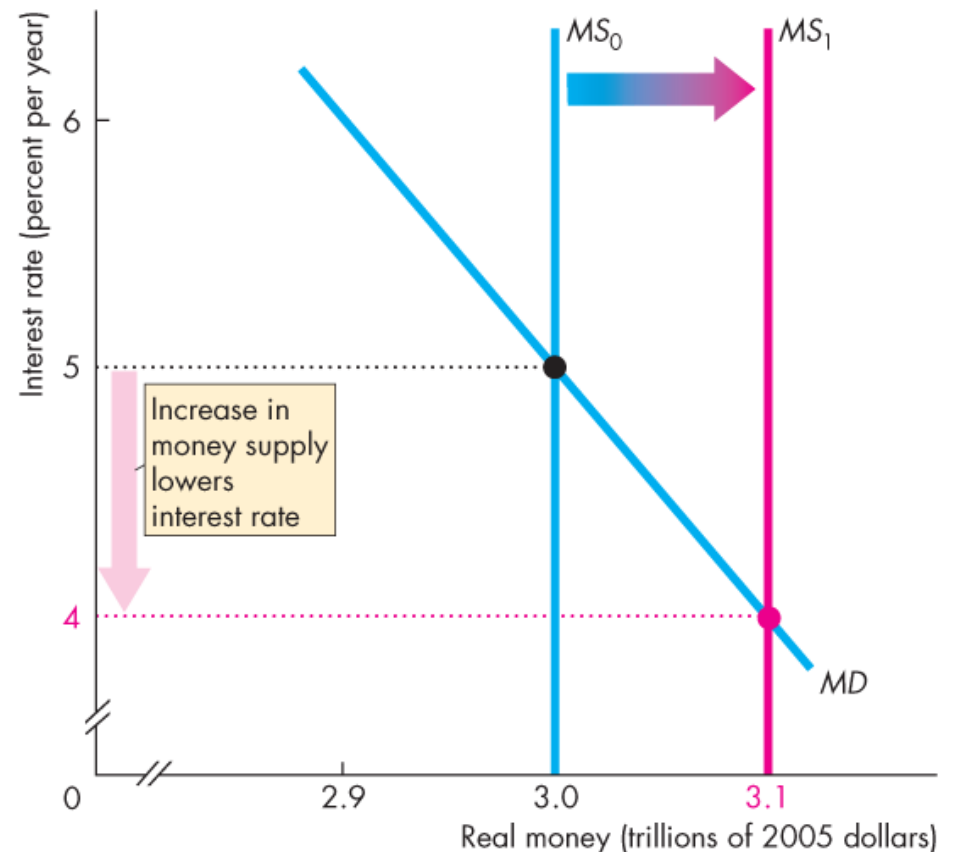
## The Short-Run Effect of a Change in the Supply of Money

Initially, the interest rate is 5 percent a year.

If the Fed increases the quantity of money, people will be holding more money than the quantity demanded.

They buy bonds.

The increased demand for bonds raises the bond price and lowers the interest rate.



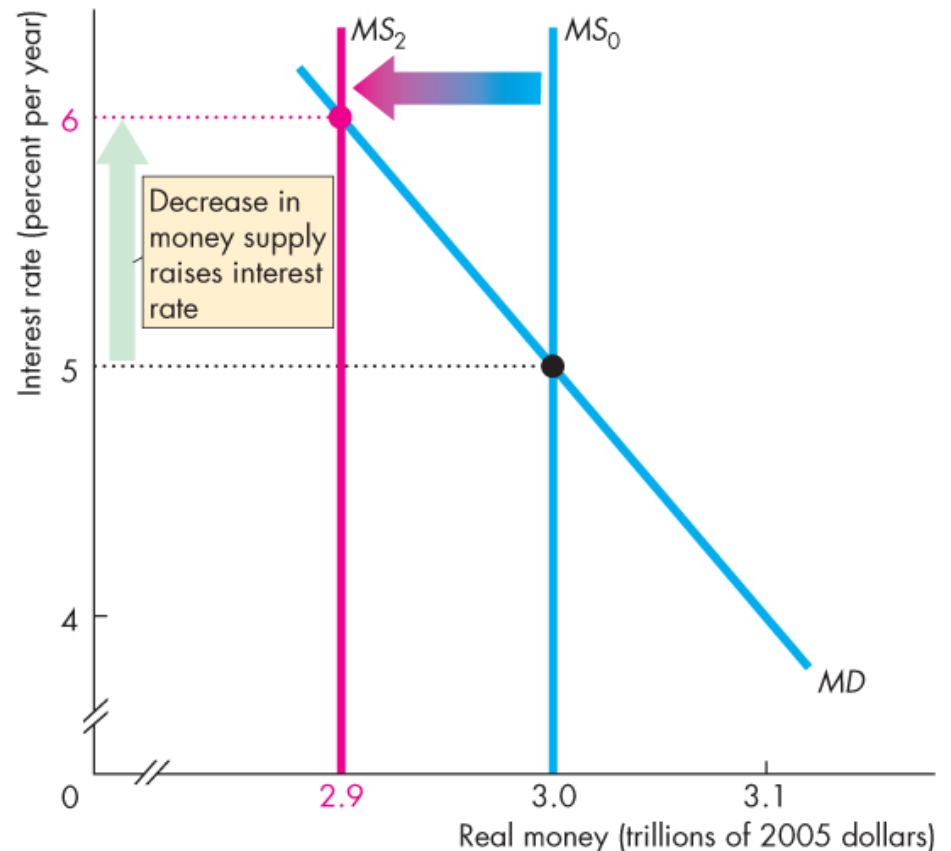
# The Money Market

Initially, the interest rate is 5 percent a year.

If the Fed decreases the quantity of money, people will be holding less money than the quantity demanded.

They sell bonds.

The increased supply of bonds lowers the bond price and raises the interest rate.



# The Money Market

## Long-Run Equilibrium

In the long run, the loanable funds market determines the real interest rate.

The nominal interest rate equals the equilibrium real interest rate plus the expected inflation rate.

In the long run, real GDP equals potential GDP, so the only variable left to adjust in the long run is the *price level*.

# The Money Market

The price level adjusts to make the quantity of real money supplied equal to the quantity demanded.

If in long-run equilibrium, the Fed increases the quantity of money, the price level changes to move the money market to a new long-run equilibrium.

In the long run, nothing *real* has changed.

Real GDP, employment, quantity of real money, and the real interest rate are unchanged.

In the long run, the price level rises by the same percentage as the increase in the quantity of money.

# The Money Market

## The Transition from the Short Run to the Long Run

Start in full-employment equilibrium:

If the Fed increases the quantity of money by 10 percent, the nominal interest rate falls.

As people buy bonds, the real interest rate falls.

As the real interest rate falls, consumption expenditure and investment increase. Aggregate demand increases.

With the economy at full employment, the price level rises.



# The Money Market

As the price level rises, the quantity of real money decreases.

The nominal interest rate and the real interest rate rise.

As the real interest rate rises, expenditure plans are cut back and eventually the original full-employment equilibrium is restored.

In the new long-run equilibrium, the price level has risen 10 percent but nothing real has changed.

# The Quantity Theory of Money

The **quantity theory of money** is the proposition that, in the long run, an increase in the quantity of money brings an equal percentage increase in the price level.

The quantity theory of money is based on the *velocity of circulation* and the *equation of exchange*.

The **velocity of circulation** is the average number of times in a year a dollar is used to purchase goods and services in GDP.

# The Quantity Theory of Money

Calling the velocity of circulation  $V$ , the price level  $P$ , real GDP  $Y$ , and the quantity of money  $M$ :

$$V = PY \div M.$$

The *equation of exchange* states that

$$MV = PY.$$

The equation of exchange becomes the quantity theory of money if  $M$  does not influence  $V$  or  $Y$ .

So in the long run, the change in  $P$  is proportional to the change in  $M$ .

# The Quantity Theory of Money

Expressing the equation of exchange in growth rates:

$$\begin{array}{lcl} \text{Money growth rate} + & = & \text{Inflation rate} + \\ \text{Rate of velocity change} & & \text{Real GDP growth} \end{array}$$

Rearranging:

$$\begin{array}{l} \text{Inflation rate} = \text{Money growth rate} + \text{Rate of velocity change} \\ \quad \quad \quad - \text{Real GDP growth} \end{array}$$

In the long run, velocity does not change, so

$$\text{Inflation rate} = \text{Money growth rate} - \text{Real GDP growth}$$



## Mathematical Note: The Money Multiplier

To see how the process of money creation works, suppose that the desired reserve ratio is 10 percent of deposits and the currency drain ratio is 50 percent of deposits.

The process starts when all banks have zero excess reserves and the Fed increases the monetary base by \$100,000.

The figure in the next slide illustrates the process and keeps track of the numbers.



# Mathematical Note: The Money Multiplier



The bank with excess reserves of \$100,000 loans them.

Of the amount loaned, \$33,333 drains from the bank as currency and \$66,667 remains on deposit.

Currency drain is 50 percent of deposits.

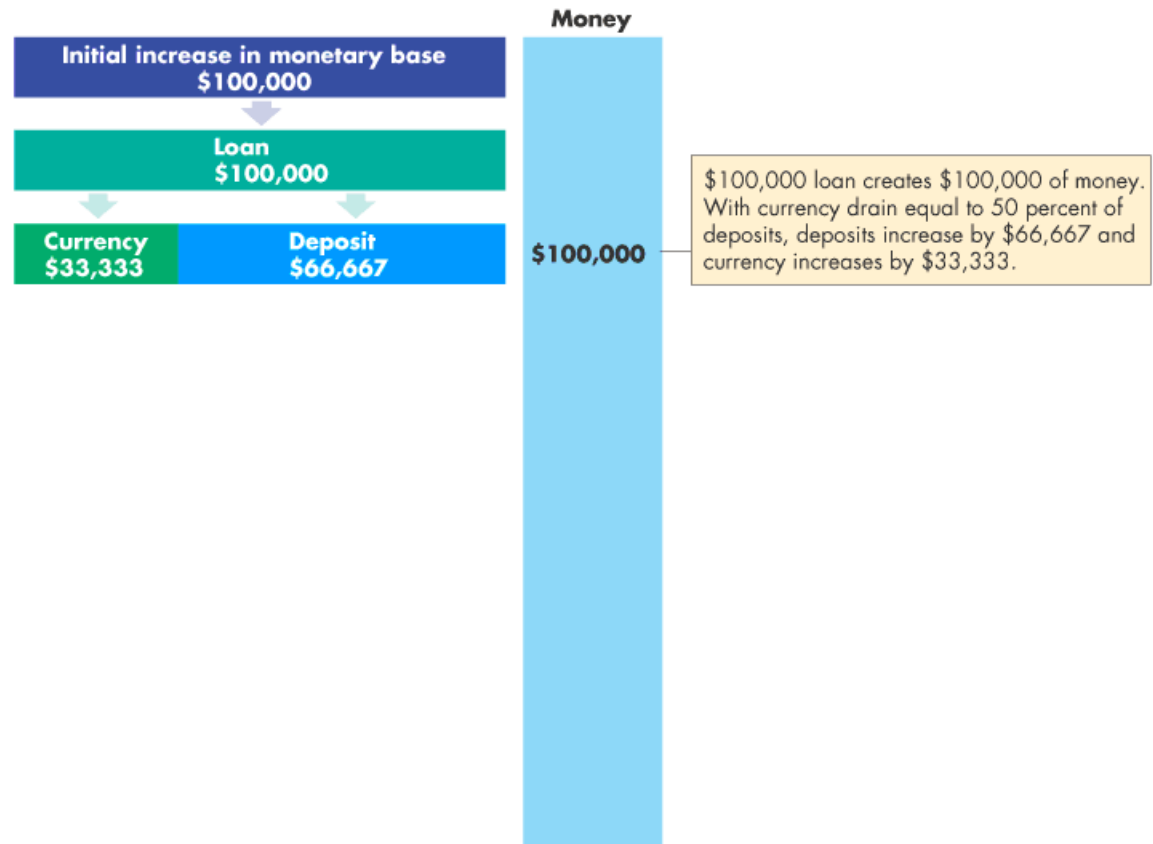


Figure 1 The Money Creation Process



# Mathematical Note: The Money Multiplier

The bank's reserves and deposits have increased by \$66,667, so the bank keeps \$6,667 (10 percent of deposits) as reserves and loans out \$60,000.

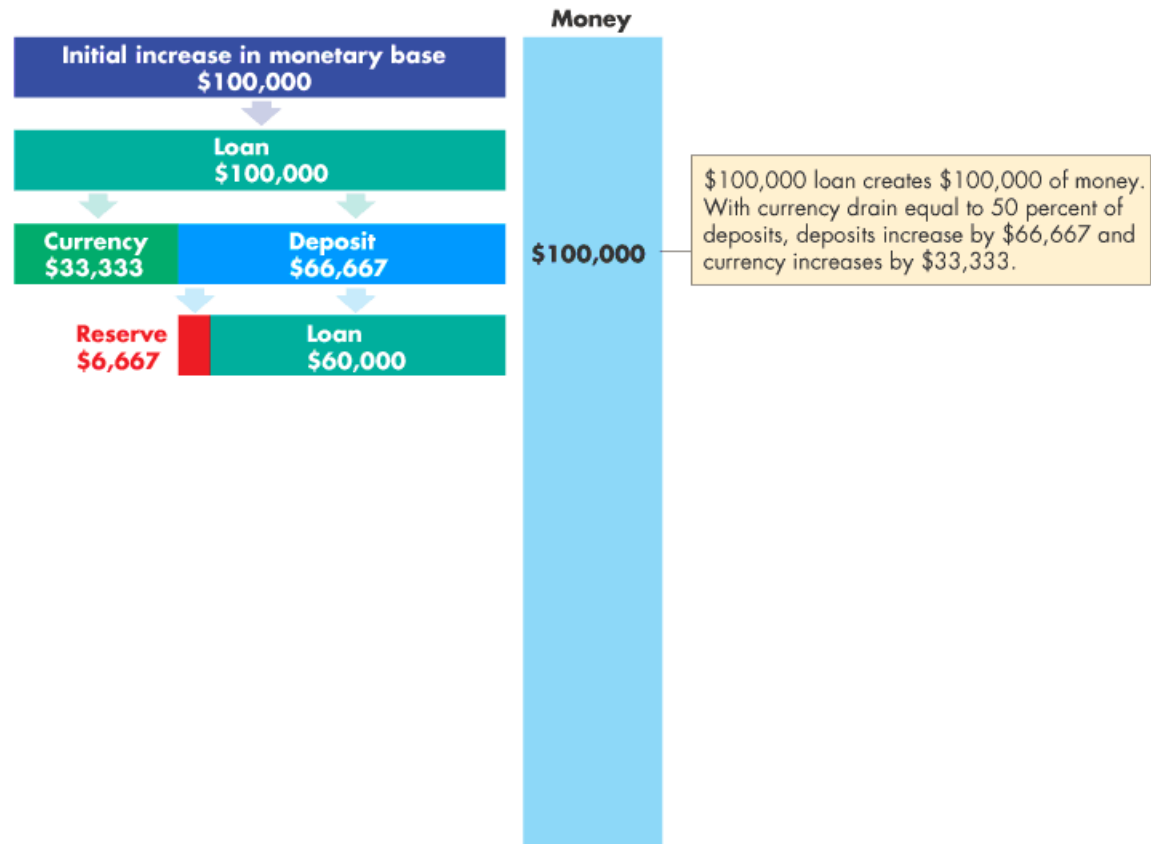


Figure 1 The Money Creation Process



# Mathematical Note: The Money Multiplier

\$20,000 drains off  
as currency and  
\$40,000 remains on  
deposit.

Again, the currency  
drain is 50 percent  
of deposits.

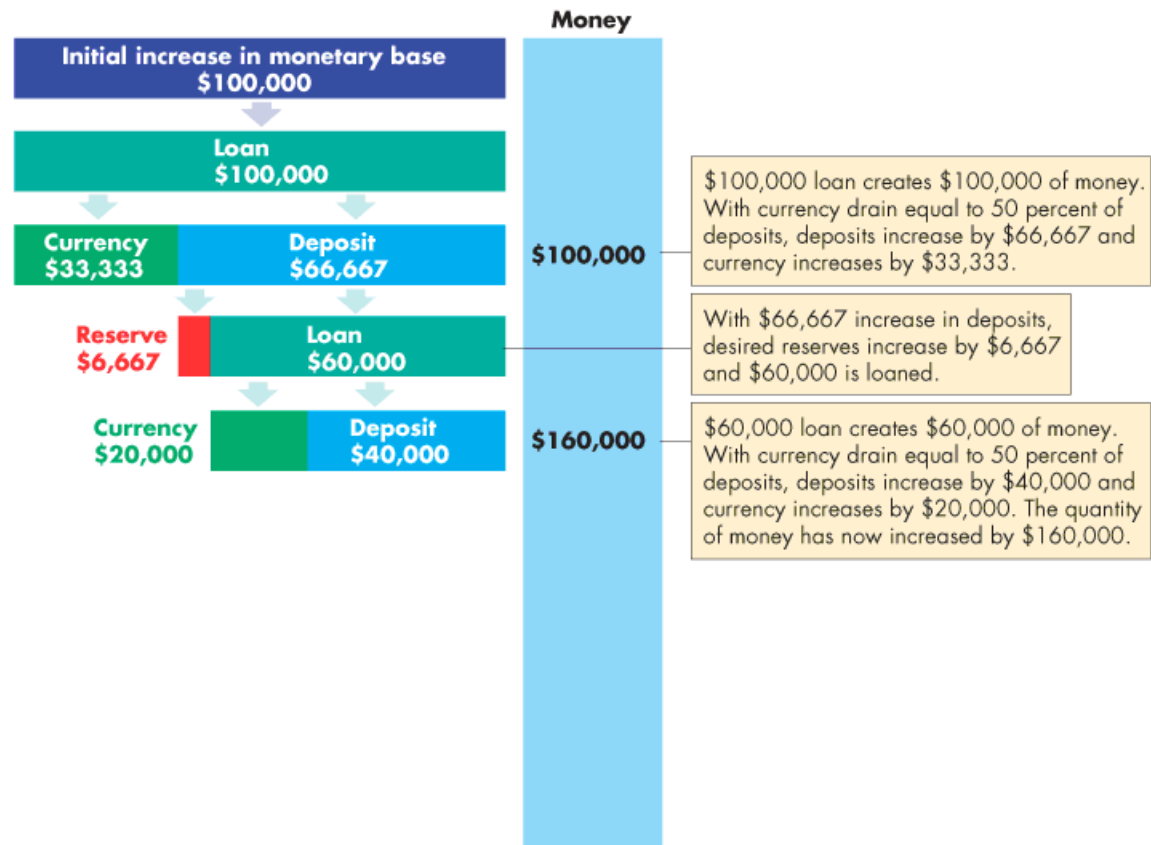


Figure 1 The Money Creation Process





# Mathematical Note: The Money Multiplier

The process repeats until the banks have created enough deposits to eliminate the excess reserves.

The \$100,000 increase in monetary base has created \$250,000 of money.

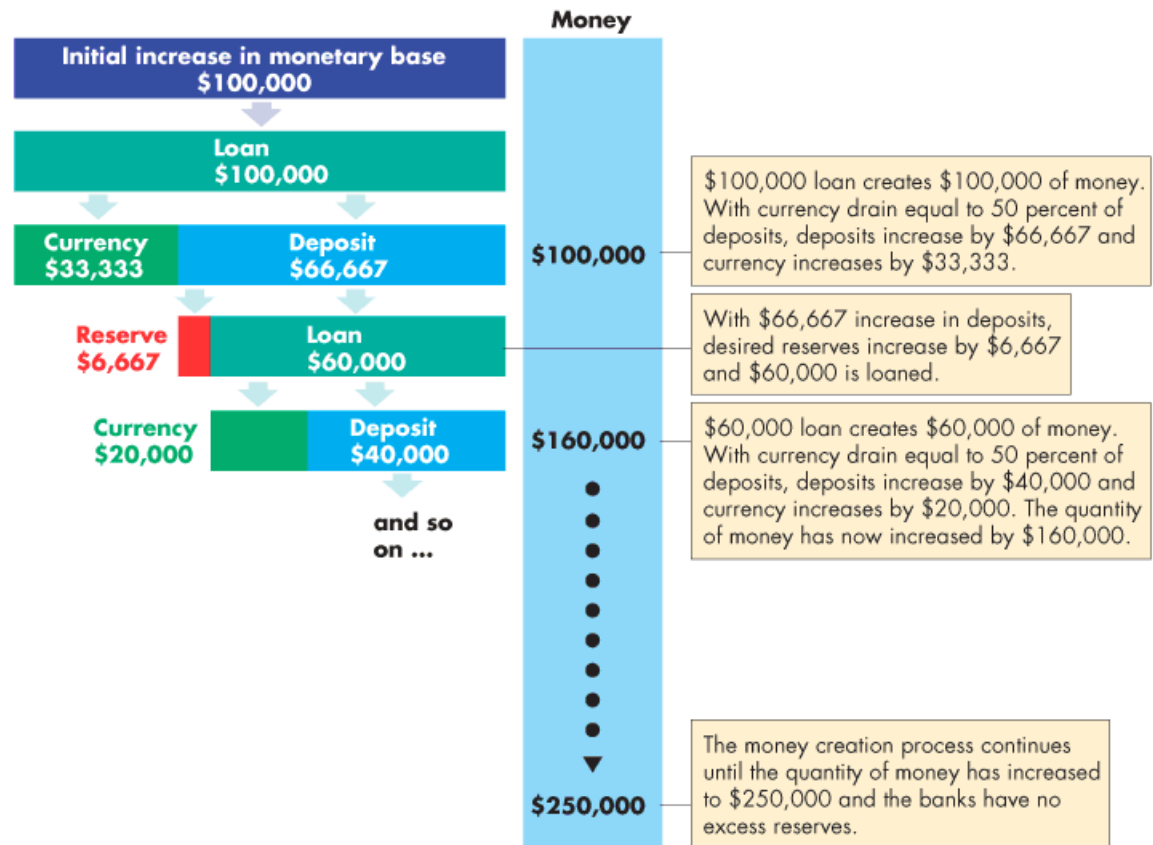


Figure 1 The Money Creation Process



## Mathematical Note: The Money Multiplier

The size of the money multiplier depends on

- The currency drain ratio ( $C/D$ )
- The desired reserve ratio ( $R/D$ )

$$\text{Money multiplier} = (1 + C/D)/(R/D + C/D)$$

In our example,  $C/D$  is 0.5 and  $R/D$  is 0.1, so

$$\begin{aligned}\text{Money multiplier} &= (1 + 0.5)/(0.1 + 0.5) \\ &= (1.5)/(0.6) \\ &= 2.5\end{aligned}$$