

Seventh Edition

Principles of  
**Economics**

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Wojciech Gerson (1831-1901)

CHAPTER  
**29**

**The Monetary  
System**

# In this chapter, look for the answers to these questions

- What assets are considered “money”? What are the functions of money? The types of money?
- What is the Federal Reserve?
- What role do banks play in the monetary system? How do banks “create money”?
- How does the Federal Reserve control the money supply?

# What Money Is and Why It's Important

- Without money, trade would require **barter**, the exchange of one good or service for another.
- Every transaction would require a **double coincidence of wants**—the unlikely occurrence that two people each have a good the other wants.
- Most people would have to spend time searching for others to trade with—a huge waste of resources.
- This searching is unnecessary with **money**, the set of assets that people regularly use to buy g&s from other people.

# The 3 Functions of Money

- **Medium of exchange:** an item buyers give to sellers when they want to purchase g&s
- **Unit of account:** the yardstick people use to post prices and record debts
- **Store of value:** an item people can use to transfer purchasing power from the present to the future

# The 2 Kinds of Money

## **Commodity money:**

takes the form of a commodity with intrinsic value

Examples: gold coins, cigarettes in POW camps



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## **Fiat money:**

money without intrinsic value, used as money because of govt decree

Example: the U.S. dollar

# The Money Supply

- The **money supply** (or **money stock**): the quantity of money available in the economy
- What assets should be considered part of the money supply? Two candidates:
  - **Currency**: the paper bills and coins in the hands of the (non-bank) public
  - **Demand deposits**: balances in bank accounts that depositors can access on demand by writing a check

# Measures of the U.S. Money Supply

- **M1**: currency, demand deposits, traveler's checks, and other checkable deposits.  
M1 = \$2.6 trillion (September 2013)
- **M2**: everything in M1 plus savings deposits, small time deposits, money market mutual funds, and a few minor categories.  
M2 = \$10.8 trillion (September 2013)

*The distinction between M1 and M2 will often not matter when we talk about “the money supply” in this course.*

# Central Banks & Monetary Policy

- **Central bank:** an institution that oversees the banking system and regulates the money supply
- **Monetary policy:** the setting of the money supply by policymakers in the central bank
- **Federal Reserve (Fed):** the central bank of the U.S.



# The Structure of the Fed

The Federal Reserve System consists of:

- **Board of Governors**  
(7 members),  
located in Washington, DC
- **12 regional Fed banks**,  
located around the U.S.
- **Federal Open Market Committee (FOMC)**,  
includes the Bd of Govs and  
presidents of some of the regional Fed banks.  
The FOMC decides monetary policy.

# Bank Reserves

- In a **fractional reserve banking system**, banks keep a fraction of deposits as **reserves** and use the rest to make loans.
- The Fed establishes **reserve requirements**, regulations on the minimum amount of reserves that banks must hold against deposits.
- Banks may hold more than this minimum amount if they choose.
- The **reserve ratio**,  $R$ 
  - = fraction of deposits that banks hold as reserves
  - = total reserves as a percentage of total deposits

# Bank T-Account

- **T-account:** a simplified accounting statement that shows a bank's assets & liabilities.

- Example:

| <b>FIRST NATIONAL BANK</b> |       |                    |       |
|----------------------------|-------|--------------------|-------|
| <b>Assets</b>              |       | <b>Liabilities</b> |       |
| Reserves                   | \$ 10 | Deposits           | \$100 |
| Loans                      | \$ 90 |                    |       |

- Banks' liabilities include deposits, assets include loans & reserves.
- In this example, notice that  $R = \$10/\$100 = 10\%$ .

# Banks and the Money Supply: An Example

Suppose \$100 of currency is in circulation.

To determine banks' impact on money supply, we calculate the money supply in 3 different cases:

1. No banking system
2. 100% reserve banking system:  
banks hold 100% of deposits as reserves,  
make no loans
3. Fractional reserve banking system

# Banks and the Money Supply: An Example

**CASE 1:** No banking system

Public holds the \$100 as currency.

Money supply = \$100.

# Banks and the Money Supply: An Example

**CASE 2:** 100% reserve banking system

Public deposits the \$100 at First National Bank (FNB).

FNB holds  
100% of  
deposit  
as reserves:

| <b>FIRST NATIONAL BANK</b> |       |                    |       |
|----------------------------|-------|--------------------|-------|
| <b>Assets</b>              |       | <b>Liabilities</b> |       |
| Reserves                   | \$100 | Deposits           | \$100 |
| Loans                      | \$ 0  |                    |       |

Money supply

$$= \text{currency} + \text{deposits} = \$0 + \$100 = \underline{\underline{\$100}}$$

***In a 100% reserve banking system,  
banks do not affect size of money supply.***

# Banks and the Money Supply: An Example

## CASE 3: Fractional reserve banking system

Suppose  $R = 10\%$ . FNB loans all but 10% of the deposit:

| FIRST NATIONAL BANK |       |             |       |
|---------------------|-------|-------------|-------|
| Assets              |       | Liabilities |       |
| Reserves            | \$ 10 | Deposits    | \$100 |
| Loans               | \$ 90 |             |       |

Depositors have \$100 in deposits,  
borrowers have \$90 in currency.

Money supply =  $C + D = \$90 + \$100 = \underline{\$190}$  (!!!)

# Banks and the Money Supply: An Example

## **CASE 3:** Fractional reserve banking system

How did the money supply suddenly grow?

When banks make loans, they create money.

The borrower gets

- \$90 in currency—an asset counted in the money supply
- \$90 in new debt—a liability that does not have an offsetting effect on the money supply

***A fractional reserve banking system creates money, but not wealth.***



# Banks and the Money Supply: An Example

## CASE 3: Fractional reserve banking system

Borrower deposits the \$90 at Second National Bank.

Initially, SNB's T-account looks like this:

| SECOND NATIONAL BANK |       |             |       |
|----------------------|-------|-------------|-------|
| Assets               |       | Liabilities |       |
| Reserves             | \$ 9  | Deposits    | \$ 90 |
| Loans                | \$ 81 |             |       |

If  $R = 10\%$  for SNB, it will loan all but 10% of the deposit.

# Banks and the Money Supply: An Example

## CASE 3: Fractional reserve banking system

SNB's borrower deposits the \$81 at Third National Bank.

Initially, TNB's T-account looks like this:

| THIRD NATIONAL BANK |         |             |       |
|---------------------|---------|-------------|-------|
| Assets              |         | Liabilities |       |
| Reserves            | \$ 8.10 | Deposits    | \$ 81 |
| Loans               | \$72.90 |             |       |

If  $R = 10\%$  for TNB, it will loan all but 10% of the deposit.

# Banks and the Money Supply: An Example

## CASE 3: Fractional reserve banking system

The process continues, and money is created with each new loan.

Original deposit = \$ 100.00

FNB lending = \$ 90.00

SNB lending = \$ 81.00

TNB lending = \$ 72.90

⋮

⋮

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Total money supply = \$1000.00

*In this example, \$100 of reserves generates \$1000 of money.*

# The Money Multiplier

- **Money multiplier**: the amount of money the banking system generates with each dollar of reserves
- The money multiplier equals  $1/R$ .
- In our example,  
 $R = 10\%$   
money multiplier =  $1/R = 10$   
\$100 of reserves creates \$1000 of money

## ACTIVE LEARNING 1

# Banks and the money supply

While cleaning your apartment, you look under the sofa cushion and find a \$50 bill (and a half-eaten taco). You deposit the bill in your checking account. The Fed's reserve requirement is 20% of deposits.

- A.** What is the maximum amount that the money supply could increase?
- B.** What is the minimum amount that the money supply could increase?

# ACTIVE LEARNING 1

## Answers

You deposit \$50 in your checking account.

**A.** What is the maximum amount that the money supply could increase?

If banks hold no excess reserves, then

$$\text{money multiplier} = 1/R = 1/0.2 = 5$$

The maximum possible increase in deposits is

$$5 \times \$50 = \$250$$

But money supply also includes currency, which falls by \$50.

Hence, max increase in money supply = **\$200.**

# ACTIVE LEARNING 1

## Answers

You deposit \$50 in your checking account.

**A.** What is the maximum amount that the money supply could increase?

**Answer:** \$200

**B.** What is the minimum amount that the money supply could increase?

**Answer:** \$0

If your bank makes no loans from your deposit, currency falls by \$50, deposits increase by \$50, money supply does not change.

# A More Realistic Balance Sheet

- Assets: Besides reserves and loans, banks also hold securities.
- Liabilities: Besides deposits, banks also obtain funds from issuing debt and equity.
- **Bank capital:** the resources a bank obtains by issuing equity to its owners
  - Also: bank assets minus bank liabilities
- **Leverage:** the use of borrowed funds to supplement existing funds for investment purposes



# A More Realistic Balance Sheet

| MORE REALISTIC NATIONAL BANK |        |             |        |
|------------------------------|--------|-------------|--------|
| Assets                       |        | Liabilities |        |
| Reserves                     | \$ 200 | Deposits    | \$ 800 |
| Loans                        | \$ 700 | Debt        | \$ 150 |
| Securities                   | \$ 100 | Capital     | \$ 50  |

**Leverage ratio:** the ratio of assets to bank capital

In this example, the leverage ratio =  $\$1000/\$50 = 20$

Interpretation: for every \$20 in assets,

\$ 1 is from the bank's owners,

\$19 is financed with borrowed money.

# Leverage Amplifies Profits and Losses

- In our example, suppose bank assets appreciate by 5%, from \$1000 to \$1050. This increases bank capital from \$50 to \$100, doubling owners' equity.
- Instead, if bank assets decrease by 5%, bank capital falls from \$50 to \$0.
- If bank assets decrease more than 5%, bank capital is negative and bank is insolvent.
- **Capital requirement:** a govt regulation that specifies a minimum amount of capital, intended to ensure banks will be able to pay off depositors and debts.

# Leverage and the Financial Crisis

- In the financial crisis of 2008–2009, banks suffered losses on mortgage loans and mortgage-backed securities due to widespread defaults.
- Many banks became insolvent:  
In the U.S., 27 banks failed during 2000–2007, 166 during 2008–2009.
- Many other banks found themselves with too little capital, responded by reducing lending, causing a **credit crunch**.

# The Government's Response

- To ease the credit crunch, the Federal Reserve and U.S. Treasury injected hundreds of billions of dollars' worth of capital into the banking system.
- This unusual policy temporarily made U.S. taxpayers part-owners of many banks.
- The policy succeeded in recapitalizing the banking system and helped restore lending to normal levels in 2009.

# The Fed's Tools of Monetary Control

- Earlier, we learned

$$\text{money supply} = \text{money multiplier} \times \text{bank reserves}$$

- The Fed can change the money supply by changing bank reserves or changing the money multiplier.

# How the Fed Influences Reserves

- **Open-Market Operations (OMOs):**  
the purchase and sale of U.S. government bonds by the Fed.
  - If the Fed buys a government bond from a bank, it pays by depositing new reserves in that bank's reserve account.  
With more reserves, the bank can make more loans, increasing the money supply.
  - To decrease bank reserves and the money supply, the Fed sells government bonds.

# How the Fed Influences Reserves

- The Fed makes loans to banks, increasing their reserves.
  - Traditional method: adjusting the **discount rate**—the interest rate on loans the Fed makes to banks—to influence the amount of reserves banks borrow
  - New method: *Term Auction Facility*—the Fed chooses the quantity of reserves it will loan, then banks bid against each other for these loans.
- The more banks borrow, the more reserves they have for funding new loans and increasing the money supply.

# How the Fed Influences the Reserve Ratio

- Recall:  $\text{reserve ratio} = \text{reserves}/\text{deposits}$ , which inversely affects the money multiplier.
- The Fed sets **reserve requirements**: regulations on the minimum amount of reserves banks must hold against deposits.

Reducing reserve requirements would lower the reserve ratio and increase the money multiplier.

- Since 10/2008, the Fed has paid interest on reserves banks keep in accounts at the Fed. Raising this interest rate would increase the reserve ratio and lower the money multiplier.



# Problems Controlling the Money Supply

- If households hold more of their money as currency, banks have fewer reserves, make fewer loans, and money supply falls.
- If banks hold more reserves than required, they make fewer loans, and money supply falls.
- Yet, Fed can compensate for household and bank behavior to retain fairly precise control over the money supply.

# Bank Runs and the Money Supply

- A **run on banks**:  
When people suspect their banks are in trouble, they may “run” to the bank to withdraw their funds, holding more currency and less deposits.
- Under fractional-reserve banking, banks don't have enough reserves to pay off ALL depositors, hence banks may have to close.
- Also, banks may make fewer loans and hold more reserves to satisfy depositors.
- These events increase  **$R$** , reverse the process of money creation, cause money supply to fall.

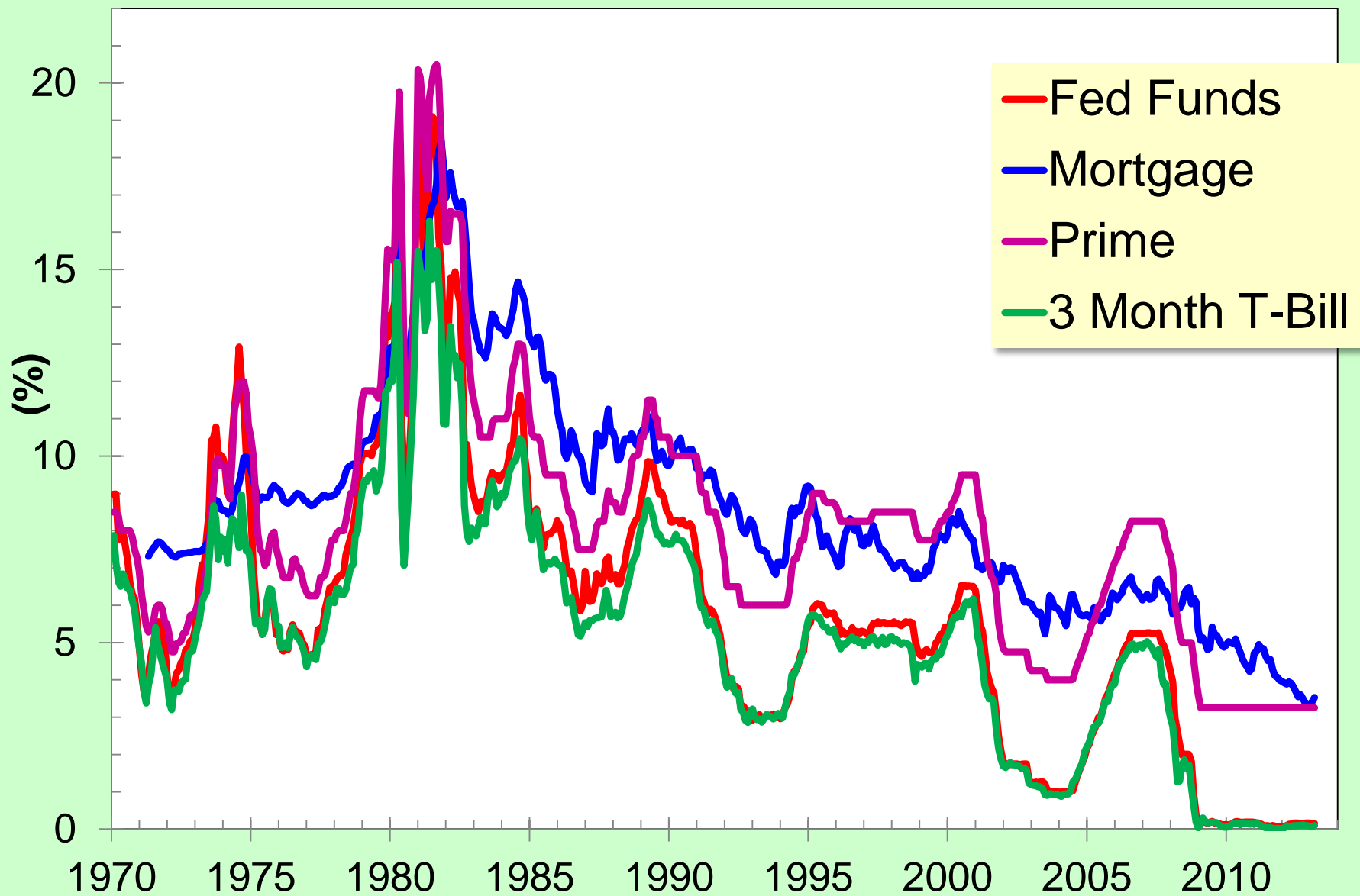
# Bank Runs and the Money Supply

- During 1929–1933, a wave of bank runs and bank closings caused money supply to fall 28%.
- Many economists believe this contributed to the severity of the Great Depression.
- Since then, federal deposit insurance has helped prevent bank runs in the U.S.
- In the U.K., though, Northern Rock bank experienced a classic bank run in 2007 and was eventually taken over by the British government.

# The Federal Funds Rate

- On any given day, banks with insufficient reserves can borrow from banks with excess reserves.
- The interest rate on these loans is the **federal funds rate**.
- The FOMC uses OMOs to target the fed funds rate.
- Changes in the fed funds rate cause changes in other rates and have a big impact on the economy.

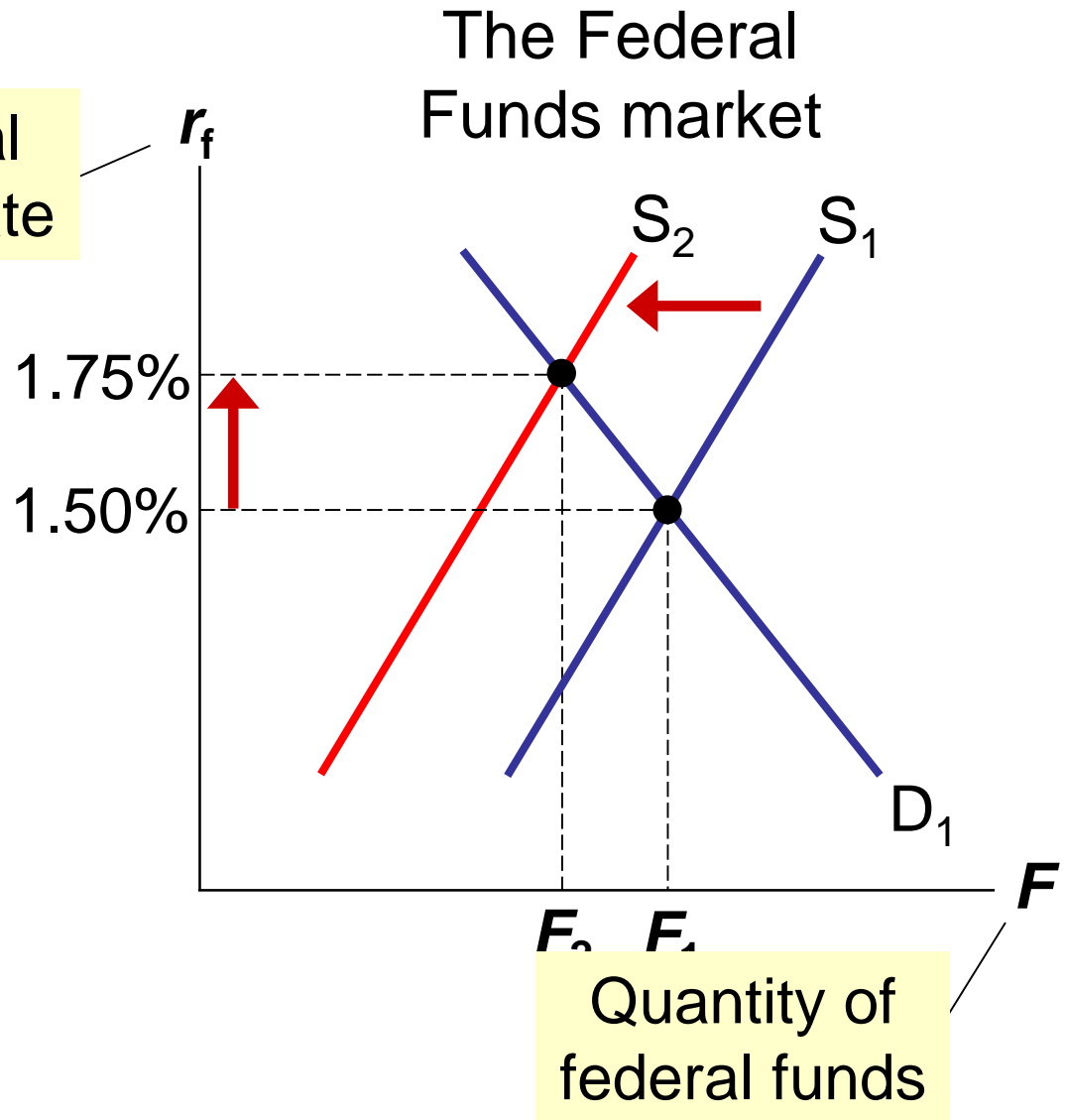
# The Fed Funds rate and other rates, 1970–2013



# Monetary Policy and the Fed Funds Rate

To raise fed funds rate, Fed sell Federal govt bonds (Federal funds rate)

This removes reserves from the banking system, reduces supply of federal funds, causes  $r_f$  to rise.



# Summary

- Money serves three functions: medium of exchange, unit of account, and store of value.
- There are two types of money: commodity money has intrinsic value; fiat money does not.
- The U.S. uses fiat money, which includes currency and various types of bank deposits.

# Summary

- In a fractional reserve banking system, banks create money when they make loans. Bank reserves have a multiplier effect on the money supply.
- Because banks are highly leveraged, a small change in the value of a bank's assets causes a large change in bank capital. To protect depositors from bank insolvency, regulators impose minimum capital requirements.



# Summary

- The Federal Reserve is the central bank of the U.S. The Fed is responsible for regulating the monetary system.
- The Fed controls the money supply mainly through open-market operations. Purchasing govt bonds increases the money supply, selling govt bonds decreases it.
- In recent years, the Fed has set monetary policy by choosing a target for the federal funds rate.