# The Monetary System

# 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.
    - Requires a double coincidence of wants: unlikely occurrence that two people each have a good the other wants.
    - Waste of resources: people spend time searching for others to trade with
- Using money
  - Solves those problems

# The 3 Functions of Money

1. Medium of exchange
   - Item that buyers give to sellers when they want to purchase goods and services
2. Unit of account
   - Yardstick people use to post prices and record debts
3. Store of value
   - Item that 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
- Fiat money:
  - Money without intrinsic value, used as money because of government decree
    - Example:  the U.S. dollar

# The Money Supply

- The money supply (or money stock):
  - Quantity of money available in the economy
- Currency:
  - 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

# The Money Supply

- M1 = $3.2 trillion (May 2016)
  - Currency, demand deposits, traveler's checks, and other checkable deposits.
- M2 =$12.7 trillion (May 2016)
  - Everything in M1 plus savings deposits, small time deposits, money market mutual funds, and a few minor categories.

*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:
  - Institution that oversees the banking system and regulates the money supply
- Monetary policy:
  - 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 Board of Governors 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
- 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.

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

- Banks' liabilities include deposits,
- Assets include loans & reserves.
- 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:

| FIRST NATIONAL BANK | | | |
|---|---|---|---|
| **Assets** | | **Liabilities** | |
| Reserves | $100 | Deposits | $100 |
| Loans | $ 0 | | |

Money supply
= currency + deposits = $0 + $100 = $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 = $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 |
| ... | ... |
| Total money supply | = $1,000.00 |

*In this example, $100 of reserves generates $1,000 of money.*

# The Money Multiplier

- Money multiplier = 1/R
  - Amount of money the banking system generates with each dollar of reserves
- In our example, R = 10%
  - Money multiplier = 1/R = 10
  - $100 of reserves creates $1,000 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
  money multiplier = 1/R = 1/0.2 = 5
- The maximum possible increase in deposits is
  5 x $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

# A More Realistic Balance Sheet

- Capital requirement:
  - A government regulation that specifies a minimum amount of capital,
  - Intended to ensure banks will be able to pay off depositors and debts
- Leverage:
  - The use of borrowed funds to supplement existing funds for investment purposes

# A More Realistic Balance Sheet

- Leverage ratio: ratio of assets to bank capital

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

- 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.

# Leverage and the Financial Crisis

- 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 Contro

- Earlier, we learned

money supply = money multiplier × 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.
- To increase bank reserves and the money supply:
  - The Fed buys a government bond from a bank
    - Pays by depositing new reserves in that bank's reserve account.
    - With more reserves, the bank can make more loans, increasing the money supply

# How the Fed Influences Reserves

- The Fed makes loans to banks, increasing their reserves
  - Traditional method: adjusting the discount rate (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

- 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

- The Fed does not control:
  - The amount of money that households choose to hold as deposits in banks
  - The amount that bankers choose to lend

*Yet, the Fed can compensate for household and bank behavior to retain fairly precise control over the money supply*

CASE STUDY

# 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.

CASE STUDY

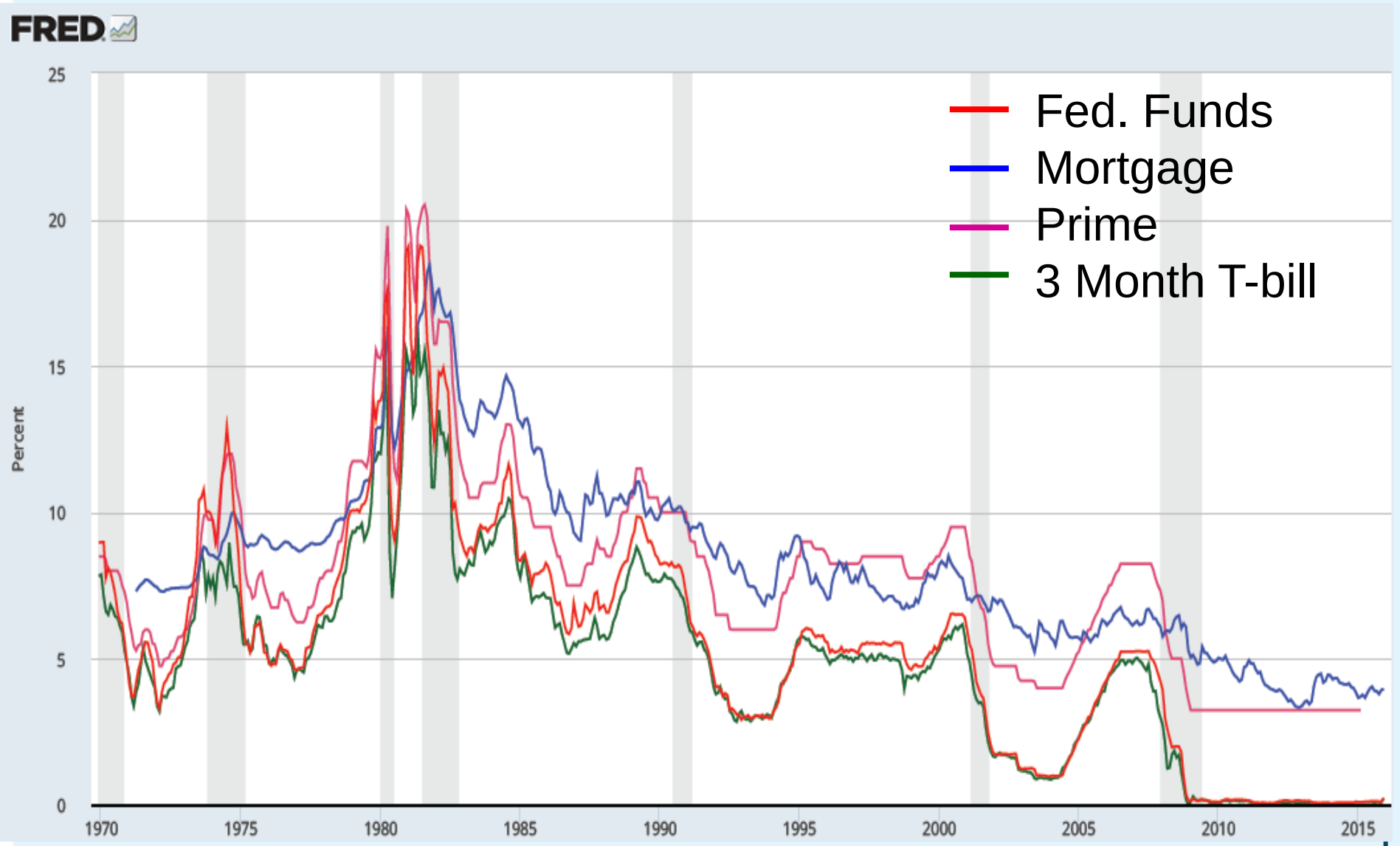
# Bank Runs and the Money Supply

- 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
  - Helped prevent bank runs in the U.S.
- 2007, bank run in the U.K.
  - Northern Rock bank - was eventually taken over by the British government.

# The Federal Funds Rate

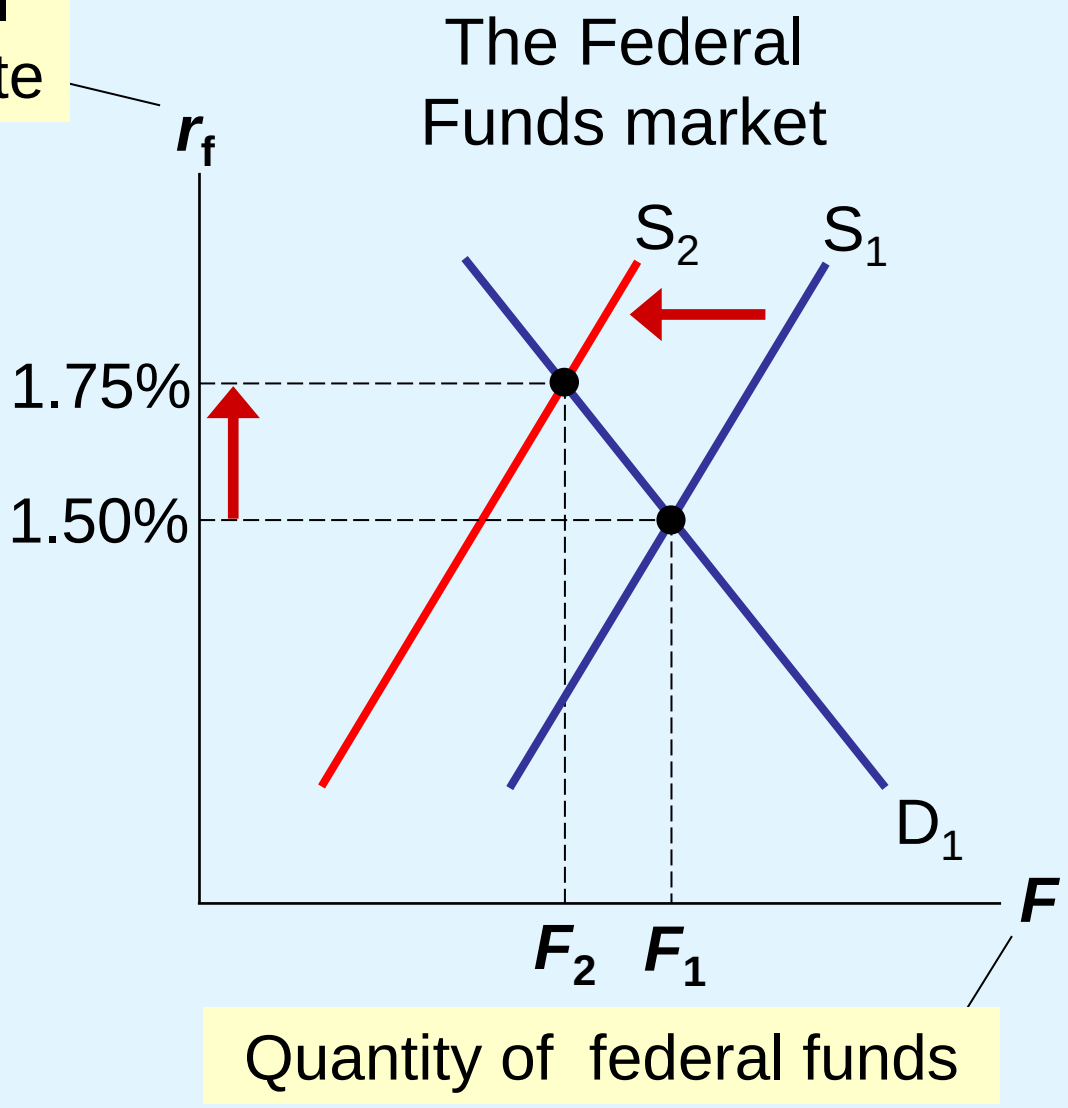
- The federal funds rate
  - Interest rate at which banks make overnight loans to one another
    - Lender – has excess reserves
    - Borrower – needs reserves
  - A change in federal funds rate
    - Cause changes in other rates and have a big impact on the economy.

# The Fed Funds rate and other rates, 1970–2016



# Monetary Policy and the Fed Funds Rate

To raise fed funds rate, Fed sells government bonds (OMO).
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 government bonds increases the money supply, selling government bonds decreases it.
- In recent years, the Fed has set monetary policy by choosing a target for the federal funds rate.