



MACROECONOMICS I

The Monetary System

Lecture 6

March 18, 2022

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

- 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/ramen noodles

Fiat money:

- Money without intrinsic value, used as money because of government decree

Example: the Czech Koruna, Euro, etc.

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 = \$18.4 trillion (Feb 2021)

- Currency, demand deposits, traveler's checks, and other checkable deposits.

M2 = \$19.7 trillion (Feb 2021)

- 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

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

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

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 = $C + D = \$90 + \$100 = \$190$ (!!!)

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.

Case 3: Fractional reserve banking system

Borrower deposits the \$90 at Second National Bank.

Initially,

SNB's
T-account

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

looks like this:

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

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.

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

While cleaning your apartment, you look under the sofa cushion and find a czk 5000 bill. You deposit the bill in your checking account.

The CNB'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?

You deposit czk 5000 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

$$5 \times 5000 = \text{czk}25000$$

But money supply also includes currency, which falls by czk 5000.

Hence, max increase in money supply = **czk 20000**.

You deposit czk 5000 in your checking account.

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

Answer = czk 20000.

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

Answer: czk 0

- If your bank makes no loans from your deposit, currency falls by czk 5000, deposits increase by czk 5000, 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 CONTROL

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.

PROBLEMS CONTROLLING THE MONEY SUPPLY

The Fed does not control:

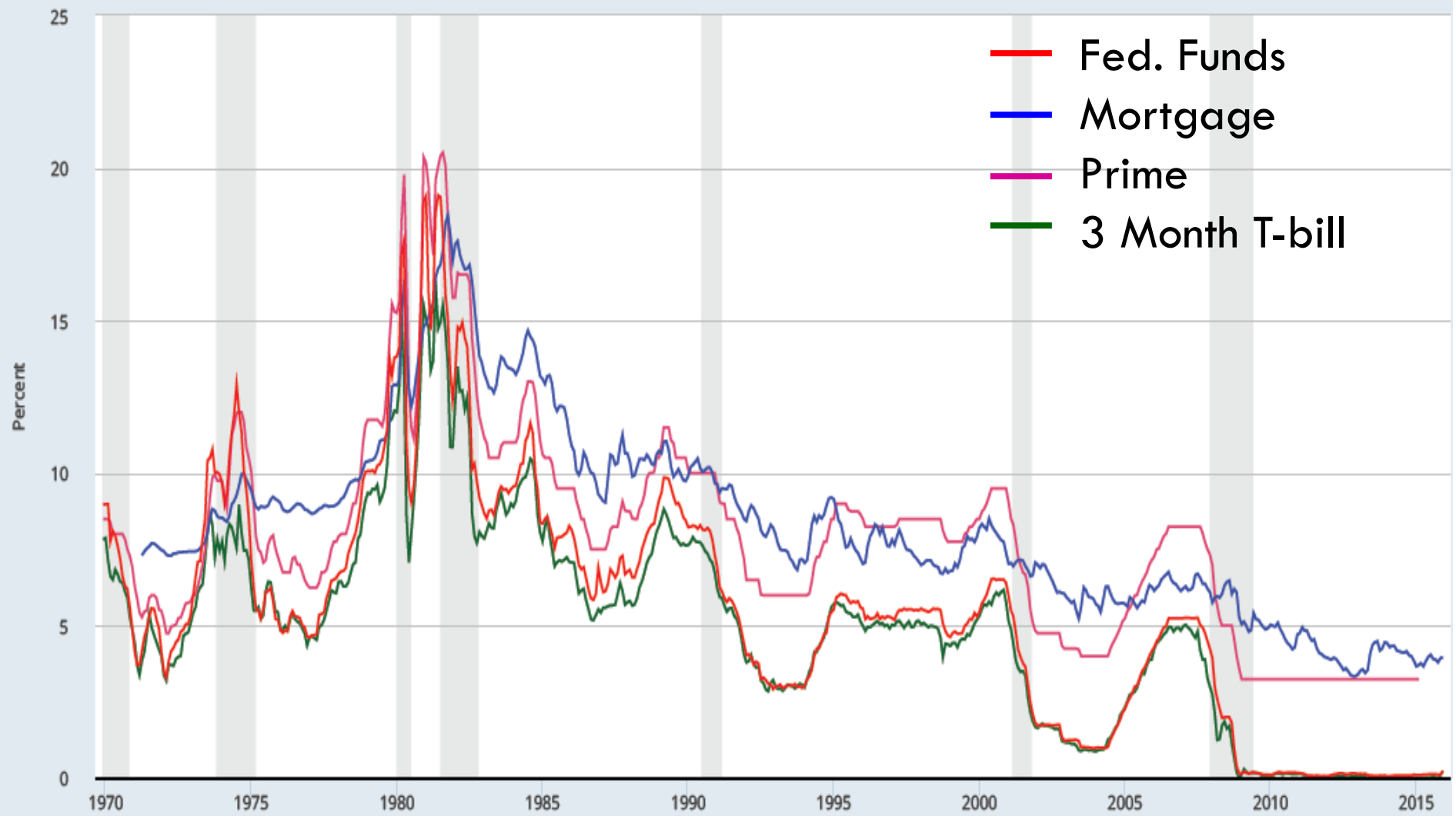
- The amount of money that households choose to hold as deposits in banks
- The amount that bankers choose to lend

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

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.

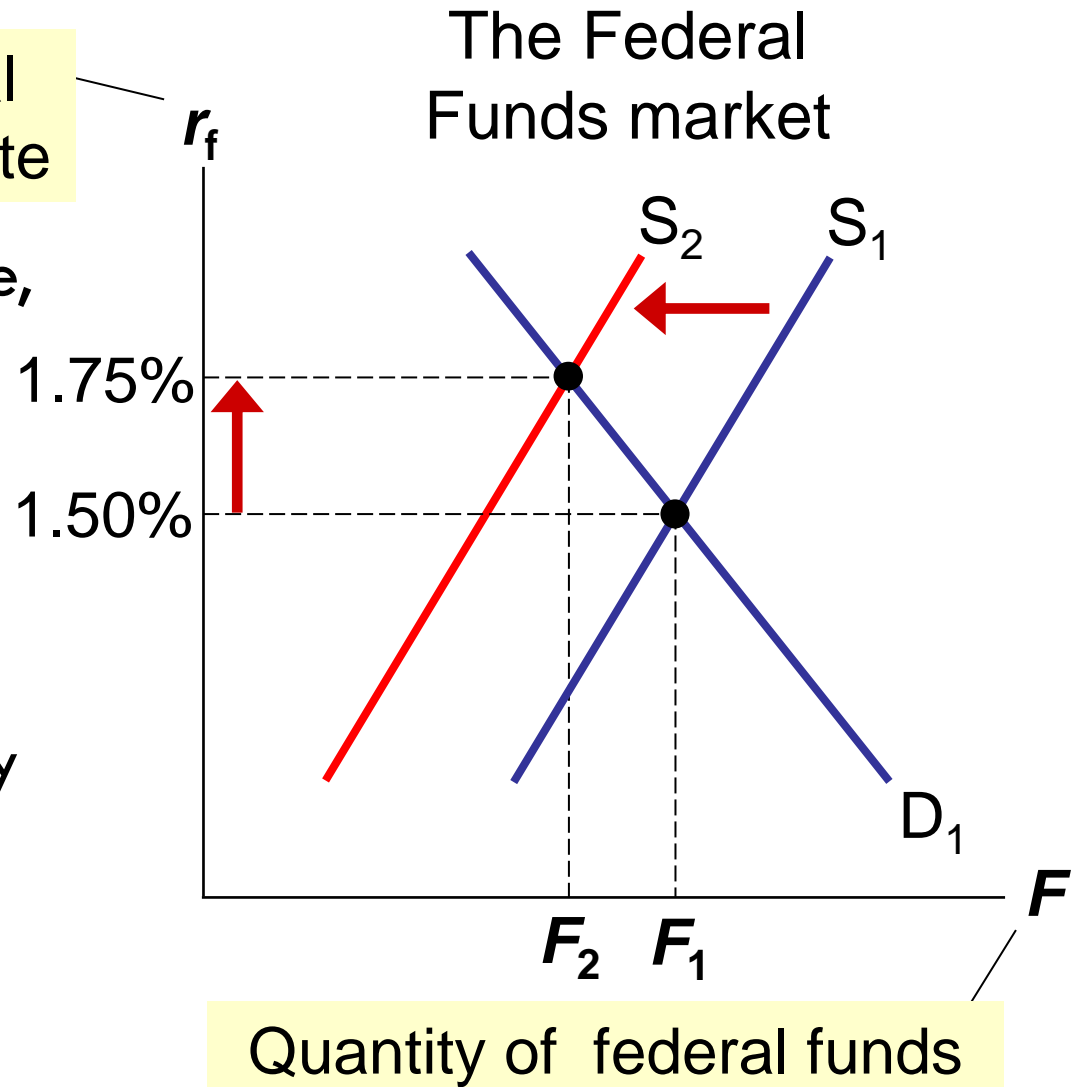


MONETARY POLICY AND THE FED FUNDS RATE

Federal 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.