CHAPTER 4

The Monetary System: What it Is and How It Works

Presentation Slides

Macroeconomics

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IN THIS CHAPTER, YOU WILL LEARN:

The definition, functions, and types of money

How banks “create” money

What a central bank is and how it controls the money supply

Money: Definition

Money is the stock of assets that can be readily used to make transactions.

Money: Functions

- *Medium of exchange*
  we use it to buy stuff
- *Store of value*
  transfers purchasing power from the present to the future
- *Unit of account*
  the common unit by which everyone measures prices and values

Money: Types

1. Fiat money
   - has no intrinsic value
   - example: the paper currency we use

2. Commodity money
   - has intrinsic value
   - examples:
     gold coins,
     cigarettes in POW camps

   - The Shawshank Redemption

NOW YOU TRY Discussion question

Which of these are money?

a. Currency
b. Checks
c. Deposits in checking accounts (“demand deposits”)
d. Credit cards

Money: Examples, part 1

- Deposits in checking accounts (“demand deposits”)
  - Yes, the funds in a checking account serve the three purposes
- Checks
  - The check itself is not money, but the funds in the checking account are money
- Currency
  - Yes; U.S. dollar bills, Mexican pesos, and other currencies are all money

Money: Examples, part 2

- Credit cards
  - No, they are a means of deferred payment
  - For credit card purchases, you agree to pay back your credit card company in the future
  - Cryptocurrency: Bitcoin
  - Libra

Two definitions

- The **money supply** is the quantity of money available in the economy.
- **Monetary policy** is control over the money supply.

The central bank and monetary control

- Monetary policy is conducted by a country's **central bank**.
- The U.S. central bank is called the **Federal Reserve** ("the Fed").
- To control the money supply, the Fed uses **open-market operations**, the purchase and sale of government bonds.

Money supply measures, July 2017

Symbol	Assets Included	Amount in July 2017 (billions of dollars)
C	Currency	$ 1,486
*M*1	Currency plus demand deposits, traveler's checks, and other checkable deposits	3,528
*M*2	*M*1 plus retail money market mutual fund balances, saving deposits (including money market deposit accounts), and small time deposits	13,602

Banks' role in the monetary system, part 1

The money supply equals currency plus demand (checking account) deposits:

$$M = C + D$$

Since the money supply includes demand deposits, the banking system plays an important role.

A few preliminaries

- **Reserves** (***R***): the portion of deposits that banks have not lent.
- A bank's liabilities include deposits; assets include reserves and outstanding loans.

- **100-percent-reserve banking**: a system in which banks hold all deposits as reserves.
- **Fractional-reserve banking**:
  a system in which banks hold a fraction of their deposits as reserves.

Banks' role in the monetary system, part 2

- To understand the role of banks, we will consider three scenarios:
  1. No banks
  2. 100-percent-reserve banking (banks hold all deposits as reserves)
  3. Fractional-reserve banking (banks hold a fraction of deposits as reserves, use the rest to make loans)
- In each scenario, we assume C = \$1,000.

Scenario 1: No banks

With no banks,
D = 0 and ***M*** = ***C*** = $1,000.

Scenario 2: 100-percent-reserve banking

- Initially ***C*** = $1000, ***D*** = $0, ***M*** = $1,000
- Now suppose households deposit the $1,000 at "Firstbank.

FIRSTBANK'S balance sheet

Assets	Liabilities
Reserves $1,000	Deposits $1,000

After the deposit:
C = $0,
D = $1,000,
M = $1,000

LESSON:
100%-reserve banking has no impact on size of money supply.

Scenario 3: Fractional-reserve banking (1 of 4)

- Suppose banks hold 20% of deposits in reserve, making loans with the rest.
- Firstbank will make $800 in loans.

FIRSTBANK'S balance sheet

Assets	Liabilities
Reserves $200 Loans $800	Deposits $1,000

The money supply now equals $1,800:

- Depositor has $1,000 in demand deposits.
- Borrower holds $800 in currency.

Scenario 3: Fractional-reserve banking (2 of 4)

- Suppose banks hold 20% of deposits in reserve, making loans with the rest.
- Firstbank will make $800 in loans.

FIRSTBANK'S balance sheet

Assets	Liabilities
Reserves $200 Loans $800	Deposits $1,000

The money supply now equals $1,800:

- Depositor has $1,000 in demand deposits.
- Borrower holds $800 in currency.

LESSON: In a fractional-reserve banking system, banks create money.

Scenario 3: Fractional-reserve banking (3 of 4)

- Suppose the borrower deposits the $800 in Secondbank.
- Initially, Secondbank's balance sheet is:

FIRSTBANK'S balance sheet

Assets	Liabilities
Reserves $160 Loans $640	Deposits $800

Secondbank will loan 80% of this deposit.

Scenario 3: Fractional-reserve banking (4 of 4)

- If this $640 is eventually deposited in Thirdbank,
- Then Thirdbank will keep 20% of it in reserve and loan out the rest:

FIRSTBANK'S balance sheet

Assets	Liabilities
Reserves $128 Loans $512	Deposits $640

Finding the total amount of money

Original deposit = $1000

+ Firstbank lending = $ 800

+ Secondbank lending = $ 640

+ Thirdbank lending = $ 512

+ other lending…

Total money supply = (1/***rr***) × $1,000

where ***rr*** = ratio of reserves to deposits

Money creation in the banking system

A fractional-reserve banking system creates money, but it doesn't create wealth.

Bank loans give borrowers some new money and an equal amount of new debt.

Bank capital, leverage, and capital requirements, part 1

- **Bank capital**: the resources a bank's owners have put into the bank
- A more realistic balance sheet:

Assets	Assets	Liabilities and owners' equity	Liabilities and owners' equity
Reserves	$200	Deposits	$750
Loans	500	Debt	200
Securities	300	Capital (owners' equity)	50

Bank capital, leverage, and capital requirements, part 2

Leverage: the use of borrowed money to supplement existing funds for purposes of investment

Leverage ratio = assets/capital

= $(200 + 500 + 300)/$50 = **20**

Assets	Assets	Liabilities and owners' equity	Liabilities and owners' equity
Reserves	$200	Deposits	$750
Loans	500	Debt	200
Securities	300	Capital (owners' equity)	50

Bank capital, leverage, and capital requirements, part 3

- Being highly leveraged makes banks vulnerable.
- Example: Suppose a recession causes our bank's assets to fall by 5%, to $950.
- Then, capital = assets – liabilities = 950 – 950 = 0

Assets	Assets	Liabilities and owners' equity	Liabilities and owners' equity
Reserves	$200	Deposits	$750
Loans	500	Debt	200
Securities	300	Capital (owners' equity)	50

Bank capital, leverage, and capital requirements, part 4

Capital requirement:

- minimum amount of capital mandated by regulators
- intended to ensure that banks will be able to pay off depositors
- higher for banks that hold more risky assets

2008–2009 financial crisis:

- Losses on mortgages shrank bank capital, slowed lending, exacerbated the recession.
- Govt injected billions of dollars of capital into banks to ease the crisis and encourage more lending.

A model of the money supply

Exogenous variables

- **Monetary base**, ***B*** = ***C*** + ***R***

  controlled by the central bank

- **Reserve-deposit ratio**, ***rr*** = ***R/D***

  depends on regulations and bank policies

- **Currency-deposit ratio**, ***cr*** = ***C/D***

  depends on households' preferences

Solving for the money supply (1 of 2)

$$M = C + D = \frac{C + D}{B} \times B = m \times B$$

where :

$$m = \frac{C + D}{B}$$

$$= \frac{C + D}{C + R} = \frac{(C/D) + (D/D)}{(C/D) + (R/D)} = \frac{cr + 1}{cr + rr}$$

Solving for the money supply (2 of 2)

$$M = m \times B, \text{ where } m = \frac{cr + 1}{cr + rr}$$

- If $rr < 1$, then $m > 1$
- If monetary base changes by ΔB, then $\Delta M = m \times \Delta B$
- m is the **money multiplier**, the increase in the money supply resulting from a one-dollar increase in the monetary base.

NOW YOU TRY

The money multiplier

$$M = m \times B, \text{ where } m = \frac{cr + 1}{cr + rr}$$

Suppose households decide to hold more of their money as currency and less in the form of demand deposits.

1. Determine the impact on the money supply.
2. Explain the intuition for your result.

NOW YOU TRY

The money multiplier, solution

Impact of an increase in the currency-deposit ratio $\Delta cr > 0$.

1. An increase in ***cr*** increases the denominator of ***m*** proportionally less than the numerator. So ***m*** falls, causing ***M*** to fall.

2. If households deposit less of their money, then banks can't make as many loans, so the banking system won't be able to create as much money.

The instruments of monetary policy, part 1

The Fed can change the monetary base by using:

- open market operations (the Fed's preferred method of monetary control)
  - To increase the base, the Fed could buy government bonds, paying with new dollars.
- the **discount rate**: the interest rate the Fed charges on loans to banks
  - To increase the base, the Fed could lower the discount rate, encouraging banks to borrow more reserves.

The instruments of monetary policy, part 2

The Fed can change the reserve–deposit ratio by using:

- **reserve requirements**: Fed regulations impose a minimum reserve–deposit ratio.
  - To reduce the reserve–deposit ratio, the Fed could reduce reserve requirements.
- **interest on reserves**: The Fed pays interest on bank reserves deposited with the Fed.
  - To reduce the reserve–deposit ratio, the Fed could pay a lower interest rate on reserves.

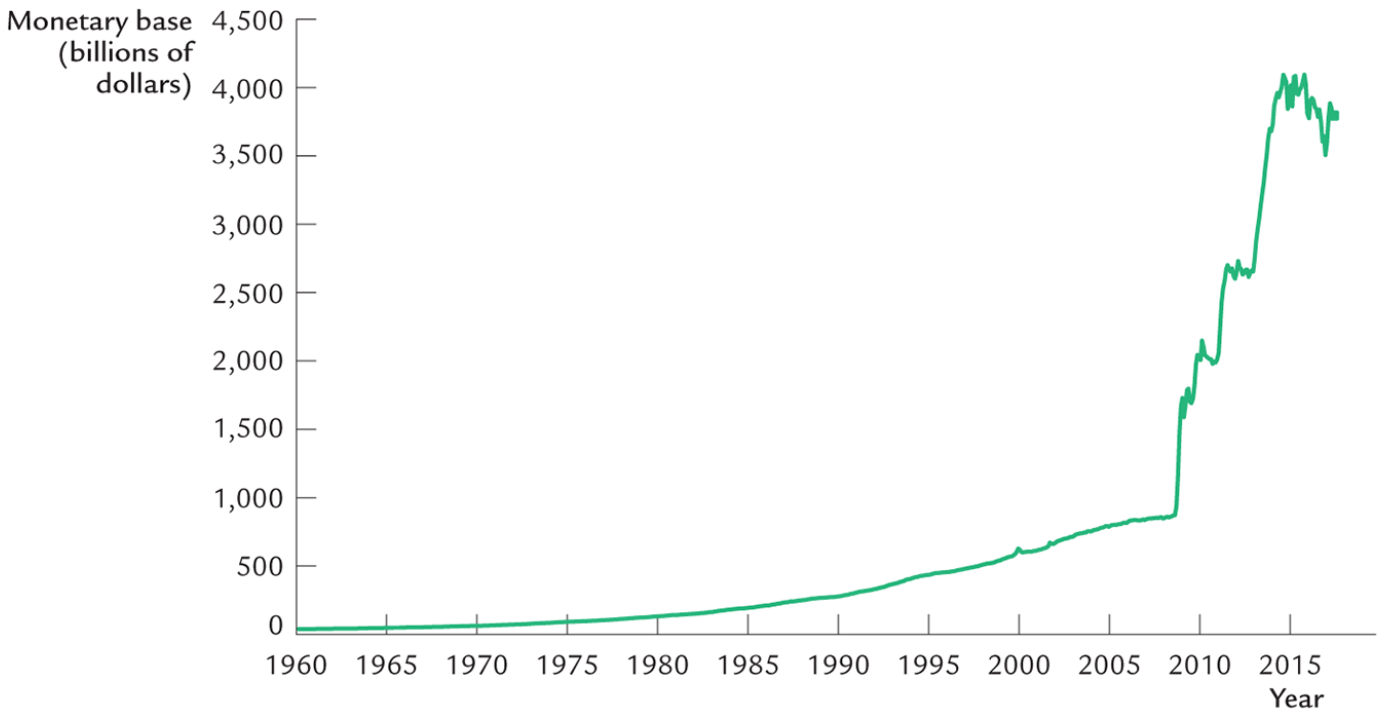
Why the Fed can't precisely control *M*

$$M = m \times B, \text{ where } m = \frac{cr + 1}{cr + rr}$$

- Households can change ***cr***, causing ***m*** and ***M*** to change.
- Banks often hold **excess reserves** (reserves above the reserve requirement).

If banks change their excess reserves, then ***rr***, ***m***, and ***M*** change.

CASE STUDY: Quantitative easing (1 of 2)



Mankiw, *Macroeconomics*, 10e, © 2019 Worth Publishers

Monetary base

From 8/2008 to 8/2011,
the monetary base tripled,
but *M*1 grew only about 40%.

CASE STUDY: Quantitative easing (2 of 2)

- ***Quantitative easing***: The Fed bought long-term govt bonds instead of T-bills to reduce long-term rates.
- The Fed also bought mortgage-backed securities to help the housing market.
- But after losses on bad loans, banks tightened lending standards and increased excess reserves, causing the money multiplier to fall.
- If banks start lending more as the economy recovers, rapid money growth may cause inflation. To prevent this, the Fed is considering various “exit strategies.”

CASE STUDY: Bank failures in the 1930s, part 1

- From 1929 to 1933:
  - more than 9,000 banks closed
  - the money supply fell 28%

- This drop in the money supply may not have caused the Great Depression, but it certainly contributed to its severity.

CASE STUDY: Bank failures in the 1930s, part 2

$$M = m \times B, \text{ where } m = \frac{cr + 1}{cr + rr}$$

- Loss of confidence in banks: increases ***cr***, reduces ***m***
- Banks became more cautious: increases ***rr***, reduces ***m***
- *It`s a Wonderful Life*

CASE STUDY: Bank failures in the 1930s, part 3

	August 1929	March 1933	% change
M	26.5	19.0	−28.3%
C	3.9	5.5	41.0
D	22.6	13.5	−40.3
B	7.1	8.4	18.3
C	3.9	5.5	41.0
R	3.2	2.9	−9.4
m	3.7	2.3	−37.8
rr	0.14	0.21	50.0
cr	0.17	0.41	141.2

Could this happen again?

- Many policies have been implemented since the 1930s to prevent such widespread bank failures.
- An example is federal deposit insurance to prevent bank runs and large swings in the currency–deposit ratio.

CHAPTER SUMMARY (1 of 3)

Money

- Definition: the stock of assets used for transactions
- Functions: medium of exchange, store of value, unit of account
- Types: commodity money (has intrinsic value), fiat money (no intrinsic value)
- Money supply controlled by the central bank

CHAPTER SUMMARY (2 of 3)

Fractional reserve banking creates money because each dollar of reserves generates many dollars of demand deposits.

The money supply depends on the:

- monetary base
- currency–deposit ratio
- reserve ratio

The Fed can control the money supply with:

- open market operations
- the reserve requirement
- the discount rate
- interest on reserves

CHAPTER SUMMARY (3 of 3)

Bank capital, leverage, and capital requirements

- Bank capital is the owners' equity in the bank.
- Because banks are highly leveraged, a small decline in the value of bank assets can have a huge impact on bank capital.
- Bank regulators require that banks hold sufficient capital to ensure that depositors can be repaid.