Chapter 11. The Monetary System

1. Money, like *fire and the wheel*, has been around for a long time, and it has taken many forms. Money was wampum (beads made from shells) for North American Indians, whale's teeth for Fijians, and tobacco for early American colonists. Cakes of salt served as money in Ethiopia and Tibet. Today when we want to buy something, we use **coins** or **dollar bills**, write **a check**, or **swipe a debit card** or **a credit card**. Soon, we will be using a "smart card" that keeps track of spending and that our pocket computer can read. *Are all these things money*?

2. The quantity of money in our economy is regulated by the Federal Reserve – the Fed. *How does the Fed influence the quantity of money? And what happens if the Fed creates too much money or too little money?*

3. **The cost of living** is the number of dollars it takes to buy the goods and services that achieve a given standard of living. A rising cost of living, which is called **inflation**, means a shrinking value of the dollar. A falling cost of living, which is called **deflation**, means a rising value of the dollar.

4. **Barter exchange** is the direct exchange of goods or services for another. It needs to exchange goods and services directly for other goods and services and then requires *a double coincidence of wants*. The barter exchange is cumbersome and inconvenient and inhibited the specialization.
5. **Monetary economy:** An economy in which trade takes place through a generally accepted medium of exchange (money). By accepting money, people can specialize in producing a few goods and trade them for others; without money, we would waste much time constantly bartering one good for another.

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6. **Money**: Any commodity or token that is generally accepted as *a means of payment*.
7. **Means of payment:** A means of payment is a method of settling a *debt*.
8. **Credit**: The use or possession of goods without immediate payment. **Debt**: A sum of money or other property owed by one person to another. Debt comes into being through the granting of credit.

9. **Three functions of money:**

(1) *Medium of exchange*: An object that is generally accepted in return for goods and services.
(2) *Unit of account*: An agreed-upon measure for stating the prices of goods and services.
(3) *Store of value*: Money can be held and exchanged later for goods and services.

10. **Money** today in the world is called **fiat money** (i.e., objects that are money because **the law decrees or orders them to be money**). The objects that we use as money are (1) **currency**, and (2) **deposits**.

a. **Currency**: the bills and coins. Bills are money because the government declares them so with the words "**This note is legal tender for all debts, public and private.**"
b. **Deposits**: Deposits at banks and other depository institutions such as banks, savings and loan associations (S&L). Deposits are money because they can be converted into currency and used to settle **debts**.

11. The following *financial assets or tools are not money*: (1) currency in a bank is not money; (2) deposits are money but checks are not; (3) credits, debit cards, E-Checks are not money.

12. **Official Measures of Money**: The money stock that can freely be exchanged for goods and services.

09/30/2009. Federal Reserve Board

M1	**1,650**	**100%.**
Currency and traveler's check	863	52.3%
Checkable deposits	787	47.7%

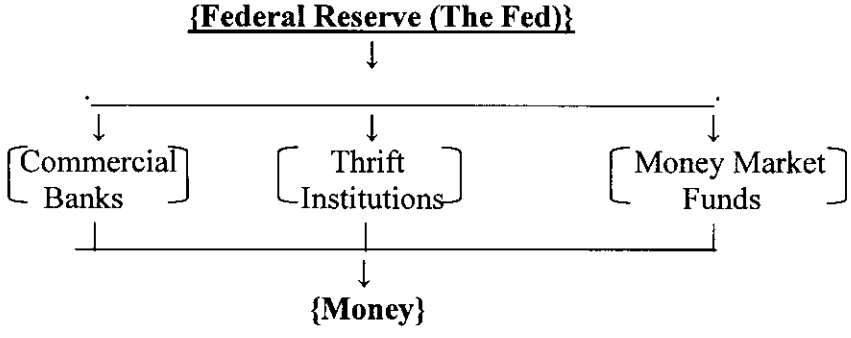
M2	**8,298**	**100%.**
Currency and traveler's check	863	10.4%
Checkable deposits	787	9.5%
Saving deposits	4,531	54.6%
Time deposits	1,218	14.7%
Money market fund and other deposits	899	10.8%.

M1 = currency held **outside** banks and traveler's checks + checking deposits owned by individuals and business

M2 = M1 + savings deposits + time deposits + money market mutual funds and other deposits.

13. All of M1 is money. Some of saving deposits in M2 are not *means of payments*, but can be quickly and easily converted into currency or checking accounts (means of payment), thus they are counted as money.

14. **Monetary system:** (1) The Federal Reserve, and (2) the depository institutions (i.e., commercial banks, thrift institutions, and money market mutual funds).



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(1) **The Federal Reserve System (Fed):** The central bank of US. It is a public authority that provides banking service to banks and regulates financial institutions and markets. *It conducts the monetary policy to keep inflation in check, maintain full employment, moderate the business cycle, and contribute toward achieving economic growth.*

(2) **A depository institution** is a financial firm that takes *deposits* from households and businesses and makes *loans* to other households and businesses. **These deposits are components of M1 and M2.** The objective of a depository institution is to make *maximum profit from deposits and loans*.

(3) **Deposit**: Money placed in an account at a depository institution and constituting **a claim** on the depository institution.

(4) **Loan**: The borrowing of a sum of money by households or businesses from the depository institution.

(5) Three types of depository institution:

Commercial banks: It is a firm, licensed by the Controller of the Currency or by a state agency to receive deposits and make loans. In 2008, there are about 7,000 commercial banks in U.S.

Thrift institutions:

(a) *Saving and loan associations* (S&L). S&L receives deposits and makes personal, commercial, and home purchase loans.

(b) *Savings banks* accept saving deposits and make mostly mortgage loans.

(c) *Credit unions*, owned by a social or economic group that accepts saving deposits and makes mostly consumer loans.

Money market mutual funds: It obtains funds by selling shares and uses these funds to buy liquid assets such as U.S. Treasury bills and short-term commercial bills. There are restrictions on shareholders' accounts. For example, the minimum deposits might be $2,500 and a smallest check is permitted to write might be $500.

(6) The goal of the depository institution is to **maximize profit**. To achieve this goal, a depository institution makes a profit by **borrowing** from depositors at **a low interest rate** and **lending** at **a higher interest rate**. The depository institution earns no interest on reserves, but it must hold enough reserves to meet withdrawals. So the depository institution must perform **a balancing act** to balance *the risk of loans* (profits for stockholders) against *the safety of reserves* (the security for depositors).

(7) The depository institution business is summarized in **its balance sheet, (the balance sheet is a statement of a firm's financial position as of a given date, listing assets, liabilities and net worth to the owners of this firm)**.

Balance Sheet: Commercial Banks (6/30/2008)

Assets		**Liabilities**	
Reserves & cash	$32	Checkable deposits	$320
Loans	990	Saving deposits	896
Liquidity assets	620	Small time deposits	840
Government Securities	634	Borrowing	120
		Own Capital	100
Total	**$ 2,276**		**$2,276**

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Basic Accounting Equation: Assets = Liabilities + Net Worth

Assets: Valuable properties or rights owned by the firm (bank).

Liabilities: Money or obligations owed by the firm (bank).

Own capital and other (Net worth): Net value of the firm (bank) to its owners.

Own capital and other **(Net worth) = Assets – Liabilities.**

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(8). *Reserves* (reserve requirement) are an obligation on a bank or other depository institutions to maintain a specified proportion of total assets in liquid form. *Reserves* are cash in a bank's vault plus its deposits at Federal Reserve Banks.

(9). *Loans* are commitments of fixed amounts of money for agree-upon periods of time. Most banks loans are made to corporations to finance the purchase of capital equipment and to households to finance consumer durable goods, such as car.

(10). *Liquidity assets* are U.S. government Treasury bills and commercial bills. These assets are the banks' first line of defense if they need reserves. Liquidity assets can be sold and instantly converted into reserve (cash) with virtually no risk of loss. Because they have a low risk, they also earn a low interest rate.

(11). *Securities* are U.S. government bonds and other bonds such as mortgage-backed securities. These assets can be sold and converted into reserves (cash) but at prices that fluctuate. Because their prices fluctuate, these assets are riskier than liquidity assets, but they also have a higher interest rate.

(12). *Deposits* include (a) checking deposit (a bank's deposit can be withdrawn without notice) and (b) saving and time deposits: a bank's deposit can be withdrawn with notice usually of up three months.

(13). *Borrowing* is that a depository institution borrows reserves (cash) from the federal funds market. It is called inter- bank loan. The interest rate in this market is *the federal funds rate*. It is **the central target of the Fed's monetary policy actions**.

(14). *Own capital and other (Net worth)* is a depository institution's equity.

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Depository institutions are required to hold *a minimum percentage of deposits* as reserves, which is known as a required reserve ratio (rrr). In 2008, (1) rrr = 3% for checking deposits from 0 to $44.4 million; (2) rrr = 10% for deposits in excess of $44.4 million; (3) rrr = 0 on other types of deposits (saving deposits, time deposits and other deposits).

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The Federal Reserve System

15. **Monetary policy**: A tool of macroeconomic policy under control of monetary authority (e.g. Federal Reserve System) that seeks to achieve such objectives as **price stability, low level of unemployment and economic growth by influencing the money supply**.
16. **Federal Reserve System** (Fed) is the central bank of US.
17. **Central bank** is a bank's bank and a public authority charged with regulating and controlling US's monetary policy, financial institutions and markets.

18. **The Structure of Fed**:

a. *The Board of Governors*: It has 7 members who are appointed by the president and confirmed by the Senate. Each for a 14 years term. The terms are staggered so that one seat on the board becomes vacant every two years. The president appoints one member as a Chairman for a term of 4 years, which is renewable.
b. *The Federal Reserve Banks*: 12 Fed banks (Boston, New York, Philadelphia, Richmond, Cleveland, Atlanta, Chicago, St. Louis, Minneapolis, Kansas City, Dallas, San Francisco). Each Fed bank has 9 directors. (3 are appointed by the Board of Governors. 6 are elected by

the commercial banks in their Fed district). These 9 directors appoint the bank's president, and the Board of Governors approves this appoint. New York Fed implements Fed's most important policy decisions.

c. *The Federal Open Market Committee* (FOMC) is the main monetary policy making organ of Fed. Voting members include (1) Chairman + 6 Board of Governors. (2) The president of New York Fed. (3) 4 votes are from the president of other regional Fed banks. FOMC meets every 6 weeks to review the state of the economy and to decide the actions to be carried out by the New York Fed.

19. **The Fed's power center**: The Chairman of the Board of Governors has the largest influence on monetary policy. Current chairman is Ben Bernanke. Former chairman is Alan Greenspan (1987-2006).

20. **Fed's monetary policy tools**:

a. **Required reserve ratios** (rrr) = (reserves/checking deposits) x 100%: It is the ratio of reserves to checking deposits that banks are required. In 2008, required reserve ratio (rrr) = 3% for checking deposits from $0 to 44.4 million, and rrr = 10% for checking deposits excess $44.4 million. rrr = 0% on other types of deposits.
b. **Discount Rate** (r_d): The interest rate that Fed reserve banks charge commercial banks for borrowing reserves from Fed. On the proposal of the 12 Fed banks, the Board of Governors sets discount rate.
c. **Open market operation**: Fed purchases or sells government securities – *US Treasury bills and bonds* - in the open market.
d. **Extraordinary crisis measures**: Before the financial crisis of 2008, a, b. c tools are sufficient for all situations. But following the collapse of Lehman Brothers in Sept. 2008, the Fed took new policy tools: quantitative easing and credit easing, to stable the economy.

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Quantitative Easing: When the Fed creates bank reserves by conducting a large scale open market purchase at low or possible zero federal funds rate, the action is called quantitative easing.

Credit easing: When the Fed buys private securities or makes loans to financial institutions to stimulate their lending, the action is called credit easing.

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How Banks Create Money

21. Money consist **currency** (10%) and **deposits** (90%). Most money is bank deposits that are created by depository institutions (banks). They do so by making loans.

22. **How banks create money**? Banks create money by **making loans and creating- deposits**. The amount of deposits they can create is limited by their **reserves**.

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Example: Creating deposits by making **loans**:

(1) Assume that only one bank, i.e., Citibank, in an economy.

(2) Andy, who has a Visa card issued by Citibank, uses his card to buy a tank of gas, $50, from Chevron.
(3) When Andy signs the card sales slip, he takes **a loan, $50,** from Citibank and obligates himself to repay the loan at a later day.
(4) If a Chevron clerk takes the card sales slip to Citibank. This transaction will be recorded in T account of Citibank as

Citibank

A	L
Loan to Andy $50	Deposit (Chevron) $50

(5) Since **deposits** are **money**, Citibank has created **money**.
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23. The quantity of deposits that the banking system can create is limited by three factors:
(1) The monetary base.
(2) Desired reserves → desired reserve ratio (R) = (reserves/deposits)x100%.
(3) Desired currency holding → currency deposit ratio (currency drain ratio) (C) = (currency/deposits)x100%.
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Monetary Base: It acts like a base that supports the national money supply. Monetary base = currency (Federal Reserve notes + coins) + banks' deposits in Fed. It should be noted coins are issued by Treasury and are not liabilities of the Fed. It also should be noted that the larger the monetary base, the greater is the supply of money.
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24. The magnitude of the change in the quantity of money brought about by an increase in the monetary base (MB) is determined by the money multiplier. **Money multiplier**: The number by which a change in the monetary base MB) is multiplied to find the resulting change in the quantity of money.
25. **The derivation of money multiplier**.
M = Currency + Deposits
Desired reserves = R x deposits, where R = (desired reserves/deposits)
Currency = C x deposits, where C = (currency/deposits).
→ $0 < R < 1$ and $0 < C < 1$ →
(1) Monetary base (MB) = desired reserves + currency
= (R x deposits) + (C x deposits)
= (R + C) x deposits
(2) M = currency + deposits = C x deposits + deposits
= (1+C) deposits
(2)/(1), we get **money multiplier** as:
(3) M/MB = (1 + C)/(R + C)

(3) can be rewritten as

(4) M = [(1 + C)/(R + C)] x MB.

It can shown that R↑(↓) and C↑(↓) → money multiplier ↓(↑).

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Example:

Let R = 0.1 (10%) and C = 0.5 (50%)
Money multiplier = [(1+C)/(R+C)] = [(1+0.5)/(0.1+0.5)] = 2.5
Suppose MB_0 = 1,000 and Fed prints more currency and increases MB to MB_1 = 1,100. That is
$\Delta MB = MB_1 - MB_0 = 1{,}100 - 1{,}000 = 100$.
$\Delta M = 2.5 \times \Delta MB = 2.5 \times 100 = 250$.
In other words, **an increase in MB by 100, money supply will increase 250**.

Alternative way to look this
(1) $M_0 = 2.5 \times MB_0 = 2.5 \times 1{,}000 = 2{,}500$.
(2) $M_1 = 2.5 \times MB_1 = 2.5 \times 1{,}100 = 2{,}750$.
(3) $\Delta M = M_1 - M_0 = 2{,}750 - 2{,}500 = 250$.
Note that
M_0 = currency + deposits = 1,000 + 1,500 = 2,500
M_1 = currency + deposits = 1,100 + 1,650 = 2,750.
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How the Fed Controls Supply of Money (M)

26. The Fed constantly monitors and adjusts the quantity of money (M) in the economy. To control the quantity of money, the Fed normally uses any of its three tools:

(1) **Required reserve ratios**: It is the ratio of reserves to checking deposits that banks are required.
(2) **Discount Rate**: The interest rate that Fed reserve banks charge commercial banks for borrowing reserves from Fed. On the proposal of the 12 Fed banks, the Board of Governors sets discount rate.
(3) **Open market operation**: Fed purchases or sells government securities – US Treasury bills and bonds - in the open market.

27. An increase in the required reserve ratio forces the banks to hold more reserve, i.e., R↑, and decrease the quantity of money (M↓) that can be supported by a given amount of monetary base MB).
28. An increase in the discount rate makes the banks pay a higher price for borrowing reserves, makes them less willing to borrow reserves, i.e., R↑, and decrease the quantity of money (M↓) by a given amount of monetary base (MB).

29. Open market operations are **the Fed's major policy tool**. When the Fed buys government securities in an open market operation, it pays for them with newly created bank reserves and money. Therefore, an open market purchase will increase monetary base (MB↑) and then increase the quantity of money (M↑). When the Fed sells government securities in an open market operation, people pays for them with bank reserves and money. Therefore, an open market sell will decrease monetary base (MB↓) and then decrease the quantity of money (M↓).

30. Put another way,

Change in quantity of money = money multiplier x change in monetary base
→ ΔM = money multiplier x ΔMB.
(a) Open market purchases ⇒ monetary base (MB)↑ ⇒ quantity of money (M)↑.
(b) Open market sells ⇒ monetary base (MB) ↓ ⇒ quantity of money (M) ↓.

31.**Example:** How open market operations change the monetary base.

(a) **An open market purchase of $100**

Federal Reserves

Assets		Liabilities	
Treasury Bills	+ 100	commercial banks reserves (deposits)	+ 100

Commercial Banks

Assets		Liabilities
Treasury bills	- 100	no change
Reserves (in Fed)	+ 100	

Let money multiplier = [(1+0.5)/(0.1+0.5)] = 2.5.
$\Delta M = 2.5 \times \Delta MB = 2.5 \times 100 = 250$

(b) **An open market sale of $100**

Federal Reserves

Assets		Liabilities	
Treasury Bills	- 100	commercial banks reserves (deposits)	- 100

Commercial Banks

Assets		Liabilities
Treasury bills	+ 100	no change
Reserves (in Fed*)	- 100	

Let money multiplier = [(1+0.5)/(0.1+0.5)] = 2.5.
$\Delta M = 2.5 \times \Delta MB = 2.5 \times (-100) = -250$

Appendix: **Fractional-reserve banking**

Deposits are money placed in an account at a bank and constituting **a claim** on the bank. They are payable on demand. However, they are not all withdrawn together. *Reserves equal to total deposits would be necessary if all deposits suddenly had to be paid of in full at the same time, but this almost never occurred.* On a given day, some people make withdraws while others make deposits. These two kinds of transactions generally balanced out. Thus, **banks can use the money entrusted to them to make loans, or buy bonds and other earning assets**. They find that investing their deposits was beneficial because depositors could still be paid on demand while the bank could make some extra earning.

By putting most of money deposited with them in earning assets and keeping only fractional cash reserve against deposits, **banks could maximize their profits**.

The transformation into fractional-reserve banks – holding fraction rather than 100% reserve against deposits – was **revolutionary**. It enables banks to create **money**. That is, banks could turn each dollar of reserve into several dollars of deposits.

Making imitation dollar bills is a serious crime. But creating billions of dollars' worth of money is a perfectly legal activity that banks perform every day. In this chapter, you have learned how banks create money by making loans.