Chapter 13: Money, Banks, and the Federal Reserve System

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Learning Objectives

1. Define money and discuss its four functions.
2. Discuss the definitions of the money supply.
3. Explain how banks create money.
4. Discuss the three policy tools the central bank uses to manage the money supply.
5. Explain the quantity theory of money and use it to explain how high rates of inflation occur.
What Is Money and Why Do We Need It?

- **Money**: Assets that people are generally willing to accept in exchange for G&S or for payment of debts.
- **Asset**: Anything of value owned by a person or a firm.
- **Barter Economies**: economies where G&S are traded *directly* for other G&S.
  - Shortcoming: requiring a *double coincidence of wants*. For a barter trade to take place bw. two people, each person must want what the other one has.
  - Hence, the problem of BE provides an incentive to identify a product that most people will accept in exchange for what they have to trade.
(Conti.) *Commodity money:* A good used as money; also has value independent of its use as money. E.g., silver, gold, and deerskin.

- Historically, once a good became widely accepted as money, people who didn’t have an immediate use for it would be willing to accept it.
- Trading G&S is much easier once money becomes available: people only need to sell what they have for money and then use the money to buy what they want.
Can mackerel serve as money?

Anything can be used as money—even pouches of fish—as long as people are willing to accept it in exchange for goods and services.
The Functions of Money

- Anything used as money—whether a deerskin, a seashell, cigarettes, or a dollar bill—should fulfill the following four functions:

1. *Medium of exchange (MOE)*: Money serves as a MOE when sellers are willing to accept it in exchange for G&S. An economy is more efficient when a single good is recognized as a MOE.

2. *Unit of account*: Instead of having to quote the price of a single good in terms of many other goods, each good has a single price. This function of money gives buyers and sellers a unit of account, a way of measuring value in terms of money. E.g., in U.S., every good has a price in terms of dollars.

3. *Store of value*: Money allows value to be stored easily: If you do not use all your accumulated dollars to buy G&Ss today, you can hold the rest to use in the future. Note that money is not the only store of value.

4. *Standard of deferred payment (SDP)*: Money can serve as a SDP in borrowing and lending. Money can facilitate exchange over time by providing a store of value and a standard of deferred payments.
What Can Serve as Money?

► Five criteria make a good suitable to use as a medium of exchange:

1. The good must be acceptable to (that is, usable by) most people.
2. It should be of standardized quality so that any two units are identical.
3. It should be durable so that value is not lost by spoilage.
4. It should be valuable relative to its weight so that amounts large enough to be useful in trade can be easily transported.
5. The medium of exchange should be divisible because different goods are valued differently.

► Dollar bills meet all these criteria.
Commodity Money

- *Commodity money (CM)* meets the criteria for a medium of exchange.

- But CM has a significant problem: its value depends on its *purity*. Unless traders trust each other completely, they needed to check the weight and purity of the metal at each trade.

- It is inefficient to use commodity good (transportation costs and risk, etc.). To get around this problem, private institutions or governments began to store gold and issue *paper certificates* that could be redeemed for gold.
Fiat Money

- It can be inefficient for an economy to rely on only gold or other precious metals for its money supply.
- Money, such as paper currency, that is *authorized* by a central bank or governmental body and that doesn’t have to be exchanged by the central bank for gold or some other commodity money.
- *Hong Kong Monetary Authority*: The central bank of Hong Kong.
How Do We Measure Money Today?

- Economists have developed several different definitions of the money supply (MS). Each definition includes a different group of assets and is based on how liquid the assets are.

- The most narrow measure of money is cash. Broader measures include other assets that can be easily converted into cash, such as checking account or saving account.

- \textit{M1:} The narrowest definition of the MS.
  - \textit{Currency:} All the \textit{paper money and coins} that are \textit{in circulation} – meaning what is \textit{not} held by banks or the government.
  - The value of all \textit{checking account balances} at banks.
  - The value of \textit{traveler’s checks}. (ignore it in our discussion of the money supply as it is too small.)

- Checking account deposits (CAD) are used much more often than currency to make payments. More than 80\% of all expenditures on G&S are made with checks rather than with currency.
How Is Money Measured in the United States Today?

M1: The Narrowest Definition of the Money Supply

The Federal Reserve uses two different measures of the money supply: M1 and M2. M2 includes all the assets in M1, as well as the additional assets shown in panel (b).

Figure 13-1
Measuring the Money Supply, July 2009

The Federal Reserve measures the money supply by examining various financial assets. M1 includes cash, traveler’s checks, checking account deposits, and small-time deposits. M2 includes all the assets in M1, as well as money market mutual fund shares and savings deposits.
(Conti.) \( M2 \): A broader definition of the money supply: \( M1 \) plus savings account balances, small-denomination time deposits (such as CD), balances in money market deposit accounts in banks, and non-institutional money market fund shares.

In the following discussion, we will use the \( M1 \) definition of the MS because it corresponds most closely to money as a \textit{medium of exchange}.

There are two key points about the MS to keep in mind:

1. The money supply consists of both currency and checking account deposits.
2. Because balances in checking account deposits are included in the MS, banks play an important role in the process by which the MS increases and decreases.
Two examples

- *The Definitions of M1 and M2.* Suppose you decide to withdraw $2,000 from your checking account and use the money to buy a bank certificate of deposit (CD). How this will affect M1 and M2? Answers: Reduce M1 by $2000 but leaves M2 unchanged.

- *What About Credit Cards and Debit Cards?* They are not included in the definitions of the money supply. When you buy G&S with a credit card, you are in effect taking out a loan from the bank issuing the card. Only when you pay your bill at the end of the month from your checking account is the transaction complete. With a debit card, the funds to make the purchase are taken directly from your checking account.
The key assets on a bank’s balance sheet are its reserves, loans, and holdings of securities, such as U.S. treasury bills.

**Reserves**: Deposits that a bank keeps as cash in its vault or on deposit with the Federal Reserve.

**Required reserves**: Reserves that a bank is legally required to hold, based on its checking account deposits.

**Required reserve ratio**: The minimum fraction of deposits banks are required by law to keep as reserves.

**Excess reserves**: Reserves that banks hold over and above the legal requirement.
How Do Banks Create Money?

Bank Balance Sheets

Figure 13-2

Balance Sheet for Bank of America, December 31, 2008

The items on a bank’s balance sheet of greatest economic importance are its reserves, loans, and deposits.

Notice that the difference between the value of Bank of America’s total assets and its total liabilities is equal to its stockholders’ equity.

As a consequence, the left side of the balance sheet always equals the right side.

<table>
<thead>
<tr>
<th>ASSETS (IN MILLIONS)</th>
<th>LIABILITIES AND STOCKHOLDERS’ EQUITY (IN MILLIONS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves 32,857</td>
<td>Deposits 382,997</td>
</tr>
<tr>
<td>Loans 1,022,307</td>
<td>Short-term borrowing 458,533</td>
</tr>
<tr>
<td>Securities 277,589</td>
<td>Long-term debt 299,001</td>
</tr>
<tr>
<td>Buildings and equipment 13,161</td>
<td>Other liabilities 360</td>
</tr>
<tr>
<td>Other assets 472,029</td>
<td>Total liabilities 1,540,891</td>
</tr>
<tr>
<td>Total assets 1,817,943</td>
<td>Stockholders’ equity 177,052</td>
</tr>
<tr>
<td></td>
<td>Total liabilities and stockholders’ equity 1,817,943</td>
</tr>
</tbody>
</table>
## How Do Banks Create Money?

### Using T-Accounts to Show How a Bank Can Create Money

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves</td>
<td>Deposits</td>
</tr>
<tr>
<td>+$1,000</td>
<td>+$1,000</td>
</tr>
</tbody>
</table>

Your deposit of $1,000 into your checking account increases Bank of America’s assets and liabilities by the same amount.
How Do Banks Create Money?

Using T-Accounts to Show How a Bank Can Create Money

1. By loaning out $900 in excess reserves...

2. ...Bank of America has increased the money supply by $900.
### How Do Banks Create Money?

#### Using T-Accounts to Show How a Bank Can Create Money

<table>
<thead>
<tr>
<th>Bank of America</th>
<th>PNC Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td><strong>Assets</strong></td>
</tr>
<tr>
<td>Reserves</td>
<td>+$100</td>
</tr>
<tr>
<td>Loans</td>
<td>+$900</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Liabilities</strong></td>
<td><strong>Liabilities</strong></td>
</tr>
<tr>
<td>Deposits</td>
<td>+$1,000</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. When the $900 check that was deposited in a PNC account arrives to be cleared, the increase in Bank of America’s reserves (shown in the previous T-account) falls by $900, to $100...

2. ... and the increase in Bank of America’s deposits falls by $900, to $1,000.

After the check drawn on the account at Bank of America clears, PNC’s reserves and deposits both increase by $900.
How Do Banks Create Money?

Using T-Accounts to Show How a Bank Can Create Money

<table>
<thead>
<tr>
<th>BANK</th>
<th>INCREASE IN CHECKING ACCOUNT DEPOSITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank of America</td>
<td>$1,000</td>
</tr>
<tr>
<td>PNC</td>
<td>+ 900 ((= 0.9 \times $1,000))</td>
</tr>
<tr>
<td>Third Bank</td>
<td>+ 810 ((= 0.9 \times $900))</td>
</tr>
<tr>
<td>Fourth Bank</td>
<td>+ 729 ((= 0.9 \times $810))</td>
</tr>
<tr>
<td></td>
<td>+ + +</td>
</tr>
<tr>
<td></td>
<td>+ +</td>
</tr>
<tr>
<td></td>
<td>+ +</td>
</tr>
<tr>
<td>Total change in checking account deposits</td>
<td>= $10,000</td>
</tr>
</tbody>
</table>
How Do Banks Create Money?

The Simple Deposit Multiplier

**Simple deposit multiplier** The ratio of the amount of deposits created by banks to the amount of new reserves.

\[
\text{Simple deposit multiplier} = \frac{1}{RR}
\]

Change in checking account deposits = Change in bank reserves \( \times \frac{1}{RR} \)

Don’t Let This Happen to YOU!
Don’t Confuse Assets and Liabilities

**YOUR TURN:** Test your understanding by doing related problem 3.10 at the end of this chapter.
### Solved Problem 13-3

**Showing How Banks Create Money**

#### PNC Bank

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves</td>
<td>+$500</td>
</tr>
<tr>
<td>Loans</td>
<td>+$4,500</td>
</tr>
</tbody>
</table>

#### Bank of America

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reserves</td>
<td>+$4,500</td>
</tr>
<tr>
<td>Deposits</td>
<td>+$4,500</td>
</tr>
</tbody>
</table>

**YOUR TURN:** For more practice, do related problem 3.8 at the end of this chapter.
The Simple Deposit Multiplier versus the Real-World Deposit Multiplier

- We can summarize these important conclusions: Whenever banks gain reserves, they make new loans, and the money supply expands.
- Whenever banks lose reserves, they reduce their loans, and the money supply contracts.
- **Fractional reserve banking system**: A banking system in which banks keep less than 100% of deposits as reserves.

- **Bank run**: A situation in which many depositors simultaneously decide to withdraw money from a bank.

- **Bank panic**: A situation in which many banks experience runs at the same time.
How the Federal Reserve Manages the Money Supply?

- **Monetary policy**: The actions the Federal Reserve takes to manage the money supply (MS) and interest rates to pursue economic objectives.
- To manage the MS, the Fed uses three monetary policy tools:
  1. Open market operations
  2. Discount policy
  3. Reserve requirements
The Federal Reserve System

The Establishment of the Federal Reserve System

The United States is divided into 12 Federal Reserve districts, each of which has a Federal Reserve bank. The real power within the Federal Reserve System, however, lies in Washington, DC, with the Board of Governors.

Figure 13-3
Federal Reserve Districts

The United States is divided into 12 Federal Reserve districts, each of which has a Federal Reserve bank. The real power within the Federal Reserve System, however, lies in Washington, DC, with the Board of Governors.

13.4 LEARNING OBJECTIVE
Discuss the three policy tools the Federal Reserve uses to manage the money supply.
Open Market Operations

- **Federal Open Market Committee (FOMC)**: The Federal Reserve committee responsible for OMOs and managing the MS in the U.S. It meets eight times per year to discuss monetary policy.

- **Open market operations**: The buying and selling of Treasury securities by the Federal Reserve in order to control the MS. Note that the US treasury borrows money by selling bills, note, and bonds.

- To increase (decrease) MS, the FOMC directs the trading desk, located in the New York Fed, to buy (sell) US treasury securities from the public. When the sellers (buyers) deposit (withdraw) the funds in (from) their banks, the reserve of banks will rise (decline). This will start the process of increasing (decreasing) loans and checking account deposits that increases (decrease) MS.
Three reasons why the Fed conducts MP principally through OMO:

1. The Fed initiate OMO, it completely controls their volume.
2. The Fed can make both large and small OMO.
3. The Fed can implement its OMO quickly.

The main way the Fed increases the MS is not by printing more paper money but buying Treasury securities.
Discount Policy

- *Discount loans* Loans the Federal Reserve makes to banks.

- *Discount rate* The interest rate the Federal Reserve charges on discount loans.

- When a bank receives a loan from the Fed, its reserves increase by the amount of the loan. By lowering the DR, the Fed can encourage banks to take additional loans and thereby increase their reserves. As a result, MS will increase.

- Note that in practice, this policy is used to help banks that experience temporary problems with deposit withdrawals, rather than to use them to increase or decrease MS.
Reserve Requirements

- When the Fed reduces the RR ratio, it converts required reserves into excess reserves.
- This policy is not conducted frequently because frequent adjustments would be disruptive and costly for banks.
The nonbank public and banks also affect MS in practice. The public decide how much money to deposit in banks and banks decide how much to reserve and how to loan out. The Fed staff monitors information on banks’ reserves and deposits every week, and the Fed can respond quickly to shifts in behavior by depositors or banks. It can therefore steer the MS close to the desired level.
The “Shadow Banking System”

- Small firms and households have traditionally relied on bank loans for their credit needs. However, two important developments have occurred in the financial system:
  1. Banks have begun to resell many of their loans rather than keep them until they are paid off;
  2. financial firms (i.e., investment banks) other than commercial banks have become sources of credit to businesses.

- **Security** A financial asset—such as a loan, a stock or a bond— is considered a security if it can be bought and sold in a financial market. Prior to 1970, most loans were not securities because they could not be resold.

- **Securitization** The process of transforming loans or other financial assets into securities.
The Federal Reserve System

The “Shadow Banking System” and the Financial Crisis of 2007–2009

13.4 LEARNING OBJECTIVE
Discuss the three policy tools the Federal Reserve uses to manage the money supply.

Figure 13-4
The Process of Securitization

Panel (a) shows how in the securitization process banks grant loans to households and bundle the loans into securities that are then sold to investors.

Panel (b) shows that banks collect payments on the original loans and, after taking a fee, send the payments to the investors who bought the securities.
The Federal Reserve System

The Financial Crisis of 2007–2009

As banks and other financial firms sold assets and cut back on lending to shore up their financial positions, the flow of funds from savers to borrowers was disrupted. The resulting credit crunch significantly worsened the recession that had begun in December 2007.

The Fed’s Response

Although the recession continued into 2009, the extraordinary actions of the Treasury and Fed appeared to have stabilized the financial system. Still, by mid-2009, the flow of funds from savers to borrowers had not yet returned to normal levels, and economists and policymakers were debating the wisdom of some of the Fed’s actions.
(Conti.) The financial system was transformed in the 1990s and 2000s by the increasing importance of non-bank financial firms. Investment banks, such as Goldman Sachs and Morgan Stanley, differ from commercial banks in that they do not take in deposits and rarely lend directly to households. They concentrate on providing advice to firms issuing stocks and bonds or considering mergers with other firms.

In the late 1990s, investment banks expanded their buying of mortgages, bundling large numbers of them together as bonds known as mortgage-backed securities, and reselling them to investors. They proved very popular with investors because they often paid higher interest rates than other securities with comparable default risk.

In 2008, Geithner, Treasury Secretary of the Obama administration, referred to investment banks, and other financial firms engaged in similar activities as the “shadow” banking system because they were carrying out a function that at one time was almost exclusively the domain of commercial banks.
The Financial Crisis of 2007–2009

- The firms in the shadow banking system differed from commercial banks:
  1. The government agencies did not regulate these firms;
  2. these firms are more highly leveraged, i.e., they relied more heavily on borrowed money to finance their operations than were commercial banks. Leveraged investments have a potential for both larger gains and larger losses.

- During the 2007-09 financial crisis, as banks and other financial firms sold assets and cut back on lending to shore up their financial positions, the flow of funds from savers to borrowers was disrupted. The resulting credit crunch significantly worsened the recession that had begun in December 2007.

- Although the recession continued into 2009, the extraordinary actions of the Treasury and Fed appeared to have stabilized the financial system. Still, by mid-2009, the flow of funds from savers to borrowers had not yet returned to normal levels.
Connecting Money and Prices: The Quantity Theory of Money

- *Velocity of money*: The average number of times each dollar in the MS is used to purchase G&Gs included in GDP.

- *Quantity theory of money*: A theory of the connection between *money* and *prices* that assumes that the velocity of money is constant (proposed by Irving Fisher in the early 20th century):

\[ M \times V = P \times Y, \]  
\[ V = \frac{P \times Y}{M}. \]
(Conti.) The quantity equation above also means that: Growth rate of the MS + Growth rate of velocity = Growth rate of the price level (or inflation rate) + Growth rate of real output.

The growth rate of the price level is just the inflation rate, so we can rewrite the quantity equation to help us understand the factors that determine inflation: Inflation rate = Growth rate of the MS + Growth rate of velocity − Growth rate of real output.

If Irving Fisher was correct that velocity is constant, then the growth rate of velocity will be zero. This allows us to rewrite the equation one last time: Inflation rate = Growth rate of the MS − Growth rate of real output.
Some Predictions

- If the MS grows at a faster rate than real GDP, there will be inflation.
- If the MS grows at a slower rate than real GDP, there will be deflation. (Recall that deflation is a decline in the price level.)
- If the MS grows at the same rate as real GDP, the price level will be stable, and there will be neither inflation nor deflation.

- Very high rates of inflation—in excess of hundreds or thousands of percentage points per year—are known as hyperinflation.
Solved Problem 13-5

Showing the Link between Growth in the Money Supply and the Inflation Rate

Use the quantity equation to state the relationship between the inflation rate and the other variables given.

\[
\text{Inflation rate} = \text{Growth rate of the money supply} + \text{Growth rate of velocity} - \text{Growth rate of real GDP.}
\]

Calculate the inflation rate. Substituting the numbers from the problem into the equation given in step 2, we have:

\[
\text{Inflation rate} = 20\% + 5\% - 1\% = 24\%
\]

YOUR TURN: For more practice, do related problem 5.6 at the end of this chapter.
The German Hyperinflation of the Early 1920s

The total number of marks—the German currency—in circulation rose from 115 million in January 1922 to 1.3 billion in January 1923 and then to 497 billion billion, or 497,000,000,000,000,000,000, in December 1923. Just as the quantity theory predicts, the result was a staggeringly high rate of inflation.

During the hyperinflation of the 1920s, people in Germany used paper currency to light their stoves.

YOUR TURN: Test your understanding by doing related problem 5.10 at the end of this chapter.

13.5 LEARNING OBJECTIVE
Explain the quantity theory of money and use it to explain how high rates of inflation occur.
Key Terms in Chapter 13

- Asset; Money; Commodity money; Fiat money
- Bank panic; Bank run
- M1; M2
- Discount rate; Open market operations; Reserves; Required reserves; Required reserve ratio
- Excess reserves; Fractional reserve banking system;
- Simple deposit multiplier
- Federal Reserve System; Federal Open Market Committee (FOMC)
- Securitization; Security
- Monetary policy
- Quantity theory of money; Velocity of money