Key Concepts

What is Money?
Money is anything generally acceptable as a means of payment, that is, a method of settling a debt. Money has three functions:

♦ Medium of exchange — money is accepted in exchange for goods and services. Without money, barter (exchanging one good directly for another) would be necessary.

♦ Unit of account — prices are measured in units of money.

♦ Store of value — money can be held and exchanged for goods at a later date. A low inflation rate makes money as useful as possible as a store of value.

Currency is the notes and coins we use. Money consists of currency plus deposits at banks and other depository institutions. The two major measures of money in the United States are:

♦ M1 — currency outside of banks plus traveler’s checks plus checking deposits.

♦ M2 — M1 plus time deposits, savings deposits, money market mutual funds, and other deposits.

Liquidity means that an asset can be quickly converted into a means of payment with little loss of value. The assets in M2 that are not directly a means of payment are very liquid.

The deposits at depository institutions are money, but the checks transferring these deposits from one person to another are not money. Credit cards are not money; they are a way to get an instant loan.

Depository Institutions
A depository institution is a financial firm that takes deposits from households and firms. Depository institutions include commercial banks, thrift institutions (savings and loan associations, savings banks, and credit unions) and money market mutual funds.

Depository institutions such as banks earn profit by using the funds received from depositors to make loans or buy securities that pay a higher interest rate than what they pay their depositors. Banks keep some of their funds as reserves, notes and coins in the bank’s vault or in a deposit account at the Federal Reserve. In 2010, reserves were an extraordinarily higher percentage of banks’ funds. They divide the rest of their assets into three broad components: liquid assets, such as U.S. Treasury bills and commercial bills; investment securities, such as U.S. government bonds and other bonds; and loans.

The federal funds rate is the interest rate banks charge each other on overnight loans of reserves. The Federal funds rate is important because the Federal Reserve pays particular attention to this interest rate.

Depository institutions are regulated and must hold minimum levels of reserves and owners’ capital.

Depository institutions provide four economic services:

♦ Create liquidity — bank deposits are highly liquid, that is, easily convertible into money.

♦ Pool risk — depository institutions reduce risk by making loans to many borrowers.

♦ Lower the cost of obtaining funds — borrowing from one bank is cheaper than borrowing from a large number of different lenders.

♦ Lower the cost of monitoring borrowers — depository institutions specialize in monitoring borrowers.

Developing new financial products is called financial innovation. Mortgage-backed securities, which enabled banks to combine mortgages into securities which could then be sold, were developed during the 2000s.
The Federal Reserve System

The Federal Reserve System (or the Fed) is the central bank for the United States. A central bank is a bank for banks and a public authority that regulates the nation’s depository institutions and conducts the nation’s monetary policy. The Fed is responsible for monetary policy, so it adjusts the quantity of money in circulation and changes interest rates. Three key groups within the Fed are:

- The Board of Governors — seven members appointed by the President and confirmed by the Senate for 14-year terms. This group oversees operations of the Fed.
- The regional Federal Reserve Banks — 12 regional banks, each of which has a president.
- The Federal Open Market Committee (FOMC) — the Fed’s main policy-making group. Voting members are the Board of Governors, the president of the Federal Reserve Bank of New York and, on a rotating basis, presidents of four other regional Federal Reserve banks.

Assets on the Fed’s balance sheet are U.S. government securities and loans to depository institutions. The major liabilities are Federal Reserve notes (currency) and depository institution deposits (reserves). The monetary base is the sum of Federal Reserve notes and coins and depository institution deposits at the Fed.

The Fed has three policy tools it can use:

- Open market operation — the purchase or sale of securities by the Fed in the loanable funds market. When the Fed buys securities, it pays for the purchase by increasing reserves; when the Fed sells securities, it takes payment in the form of reserves.
- Lender of last resort — the Fed is the lender of last resort which means that if a bank needs reserves, it can borrow from the Fed. The interest rate on these loans is the discount rate.
- Required reserve ratio — the Fed sets the required reserve ratio, the minimum percentage of deposits that depository institutions must hold as reserves.

How Banks Create Money

Banks (more generally, depository institutions) create money by making loans. The process involves:

- The monetary base.
- A bank’s required reserves is the minimum quantity of reserves a bank must hold. The desired reserve ratio is the ratio of reserves to deposits that banks plan to hold. Excess reserves are actual reserves minus desired reserves.

- Desired currency holding — the amount of money people want to hold as currency. The currency drain ratio is the ratio of currency to deposits.

When the monetary base increases, banks gain reserves. If actual reserves exceed desired reserves, banks loan the excess reserves, increasing borrowers’ deposits. This lending creates new deposits, that is, new money, which is then spent. Some of the money is deposited back in banks but some is held as currency. The money deposited back in banks creates more excess reserves and the process continues. The ultimate increase in the amount of money exceeds the initial increase in excess reserves.

- The money multiplier — the ratio of the change in the quantity of money to the change in the monetary base.

The Money Market

Four factors influence the demand for money:

- The price level — An increase in the price level increases the nominal demand for money.
- The nominal interest rate — An increase in the nominal interest rate raises the opportunity cost of holding money and decreases the quantity of real money demanded.
- Real GDP — An increase in real GDP increases the demand for money.
- Financial innovation — Innovations that lower the cost of switching between money and other assets decrease the demand for money.

The demand for money is the relationship between the quantity of real money demanded and the nominal interest rate when all other influences on the amount of money that people wish to hold remain the same. The real quantity of money equals the nominal quantity divided by the price level. Figure 8.1 (on the next page) shows the demand for money curve (MD). Changes in the nominal interest rate create movements along the demand curve; changes in the other relevant factors change the demand and shift the demand curve. Equilibrium in the money market occurs when the quantity of money demanded equals the quantity of money supplied.
Short run
The interest rate is determined by the equilibrium in the money market, as Figure 8.2 shows. The real supply of money is $3.0 trillion, so the supply of money curve is $MS$. The demand for money curve is $MD$, and the equilibrium interest rate is 5 percent. A change in the supply of money changes the (nominal) interest rate.

Long run
Supply and demand in the loanable funds market determines the real interest rate. The nominal interest rate equals the real interest rate plus the inflation rate. In the long run, the variable that adjusts to establish equilibrium in the money market is the price level. The price level changes to make the real quantity of money equal to the real quantity of real money demanded. (The price level changes because the short-run lower interest rate increases the demand for goods.)

The Quantity Theory of Money
The quantity theory of money holds that, in the long run, an increase in the quantity of money brings an equal percentage increase in the price level.

The velocity of circulation is the average number of times a dollar of money is used in a year to buy goods and services that make up GDP. In terms of a formula, the velocity of circulation, $V$, is given by $V = PY/M$, where $P$ is the price level, $Y$ is real GDP, and $M$ is the quantity of money.

The equation of exchange shows that the quantity of money multiplied by velocity equals (nominal) GDP.

In terms of a formula, the equation of exchange is $MV = PY$.

In growth rates, the equation of exchange becomes:

Money growth rate + Rate of velocity change = Inflation rate + Real GDP growth rate

If velocity growth is zero, then, using the equation of exchange in growth rates, the quantity theory concludes that:

Inflation rate = Money growth rate – Real GDP growth rate

The quantity theory assumes that velocity growth and real GDP growth are not influenced by the money growth rate. With these assumptions, inflation is correlated with money growth and higher money growth leads to higher inflation.

Historical evidence from the United States and international evidence show that in the long run, the money growth rate and the inflation rate are positively related as the quantity theory predicts. The year-to-year relationship between the money growth rate and the inflation rate is weaker.

Mathematical Note
The change in the quantity of money equals the change in the monetary base multiplied by the money multiplier. The money multiplier equals $(1 + CD)/(R/D + CD)$, where $R/D$ is the banks’ reserve ratio and $C/D$ is the currency drain, the ratio of currency to deposits. In the United States, the M1 money multiplier equaled 0.88 and the M2 money multiplier equaled 3.86.
Helpful Hints

1. **Money Versus Income**: Ordinary use of the term “money” does not make the important distinction that is made in economics. We often talk about income as the amount of money we earn, say, in a year. But this informal use of the term is not what is meant by the word in economics. In economics, “money” means M1 or M2. Informally, when we talk about the money we earn, actually we are talking about our “income.” Keep this distinction in mind, that money means M1 or M2.

2. **How Banks Create Money**: One of the most important concepts presented in this chapter is the process by which banks create money. There are two fundamental facts that allow banks to create money.

   First, banks create money by creating new checking deposits. Second, banks hold fractional reserves. That is, when a bank receives a deposit, it holds only part of it as reserves and loans the rest. When that loan is spent, part of the proceeds will likely be deposited in another bank, creating a new deposit (money).

   The key part of this process follows from this last point: Banks make loans when they receive new deposits; these loans are spent; and the proceeds are deposited in another bank, creating a new deposit (money).

   The process then repeats itself, adding more deposits (but in progressively smaller amounts) in each round. Practice going through examples until the process becomes clear to you.

3. **Use the Quantity Theory**: Analysts often use the quantity theory to help shape their thinking about the future inflation rate by using the rate of growth of the quantity of money to help predict whether the inflation rate is likely to rise or fall.

   Even though the relationship between the growth rate of the quantity of money and the inflation rate might not be one-to-one as suggested by the quantity theory, nonetheless the correlation between higher monetary growth rates and higher inflation rates is quite substantial.

   You, too, can use this relationship to help predict the inflation rate. For instance, if you note that the growth rate of the quantity of money has jumped sharply higher, you should expect higher inflation rates to occur.

Questions

**True/False and Explain**

**What is Money?**

1. Money is anything that is generally acceptable as a means of payment.
2. Checking accounts in banks are part of M1.
3. The amount of M2 money is more than the amount of M1 money.
4. In modern economies, credit cards are money.

**Depository Institutions**

5. A bank’s reserves consist of cash in its vault plus its deposits at Federal Reserve banks.
6. A savings and loan association is an example of a depository institution.
7. Depository institutions help minimize the cost of borrowing funds.

**The Federal Reserve System**

8. The presidents of each of the Federal Reserve banks are nominated by the President of the United States and confirmed by the Senate.
9. As voting members, the FOMC comprises all the presidents of the Federal Reserve regional banks, the chairman of the Federal Reserve, and, on a rotating basis, four of the members of the Board of Governors.
10. The discount rate is the interest rate banks charge the Fed on the last resort loans the Fed borrows from banks.
11. Federal Reserve notes in circulation are an asset to the Federal Reserve.

**How Banks Create Money**

12. If a depositor withdraws currency from a bank, that bank’s total reserves decrease.
13. A bank helps create money by loaning excess reserves.
14. Banks use their required reserves to make loans and retain their excess reserves to meet depositors’ demands for currency and to make loans.
The Money Market
15. The price level is the opportunity cost of holding money.
16. An increase in real GDP increases the demand for money.
17. In the short run, if the supply of money increases, the nominal interest rate falls.

The Quantity Theory of Money
18. Velocity equals $MV/P$.
19. The quantity theory of money predicts that inflation is the result of rapidly growing velocity.
20. Almost surely, high inflation rates cause high monetary growth rates.

Multiple Choice

What is Money?
1. Which of the following is NOT a function of money?
   a. Medium of exchange
   b. Barter
   c. Unit of account
   d. Store of value
2. The fact that prices are quoted in terms of money reflects money’s role as a
   a. cause of inflation.
   b. medium of exchange.
   c. unit of account.
   d. store of value.
3. Which is the largest component of M1 money?
   a. Currency
   b. Traveler’s checks
   c. Checking deposits
   d. Savings deposits
4. U.S. currency is
   a. part of M1 only.
   b. part of M2 only.
   c. part of M1 and M2.
   d. part of neither M1 nor M2.

5. _____ is a component of M2 but not of M1.
   a. Currency
   b. Checking accounts at banks
   c. Traveler’s checks
   d. Savings accounts at banks

6. Which of the following is money?
   a. A check written for $200.
   b. A $200 checking deposit at a bank.
   c. A credit card with a $200 line of credit.
   d. All of the above.

 Depository Institutions
7. A bank’s reserves equal its
   a. cash in its vaults.
   b. cash in its vaults plus its deposits at the Federal Reserve banks.
   c. cash in its vaults plus its liquid deposits.
   d. cash in its vaults plus its liquid deposits plus its deposits at the Federal Reserve banks.

8. Depository institutions do all the following EXCEPT
   a. lower the cost of borrowing.
   b. create liquidity.
   c. pool risks.
   d. create required reserve ratios.

9. Of the following, which can create an incentive for financial innovation?
   a. Technological change
   b. Removal of government regulation
   c. Low inflation and interest rates
   d. Liquidity creation

The Federal Reserve System
10. Which group makes decisions about the course of the nation’s monetary policy?
    a. The Fed’s Board of Governors
    b. The FOMC
    c. The presidents of the Fed’s regional banks
    d. The President and the Senate

11. _____ a liability of the Federal Reserve.
    a. Government securities are
    b. Loans to depository institutions are
    c. Depository institutions’ deposits at the Fed are
    d. U.S. coinage is
12. The discount rate is the interest rate
   a. the Fed charges for its last resort loans to banks.
   b. banks charge their finest loan customers.
   c. banks pay on savings accounts.
   d. the Fed pays on reserves held by banks.

13. The purchase of $1 billion of securities by the Fed is an example of
   a. a last resort loan.
   b. a multiple contraction of the quantity of money.
   c. an open market operation.
   d. a change in the required reserve ratio.

How Banks Create Money
14. The desired reserve ratio on deposits is 10 percent. A bank has $2 million of deposits and reserves of $300,000. The bank has excess reserves of
   a. $300,000.
   b. $200,000.
   c. $100,000.
   d. $0.

15. A bank has desired reserves of $10 million and actual reserves of $9 million. Its excess reserves equal
   a. $10 million.
   b. $1 million.
   c. $1 million.
   d. $0.

16. When a bank helps create money, it does so by
   a. selling some of its investment securities.
   b. increasing its reserves.
   c. lending its excess reserves.
   d. printing more checks.

17. A bank has desired reserves of $10 million and actual reserves of $9 million. Its can loan a maximum of
   a. $10 million.
   b. $1 million.
   c. $1 million.
   d. $0.

18. If the currency drain increases, the amount of money the banking system can create
   a. increases.
   b. does not change.
   c. decreases.
   d. might change but the direction of change depends on the desired reserve ratio.

The Money Market
19. An increase in ____ decreases the quantity of money people want to hold.
   a. the price level
   b. real GDP
   c. the interest rate
   d. the quantity of money

20. Which of the following does NOT directly shift the demand for money curve?
   a. A change in GDP.
   b. A change in the quantity of money.
   c. Financial innovation.
   d. None of the above because they all directly shift the demand for money curve.

21. Since 1970, in the United States the demand curve for M2 money has shifted
   a. rightward in all but 2 years.
   b. leftward in all but 2 years.
   c. rightward in most years until 1989, then leftward for a few years, and rightward most years afterwards.
   d. leftward in most years until 1989 and then rightward in some years and leftward in others.

22. If the interest rate exceeds the equilibrium interest rate, then the quantity of money demanded is ____ than the quantity of money supplied and the interest rate ____.
   a. less; rises
   b. less; falls
   c. greater; rises
   d. greater; falls

The Quantity Theory of Money
23. The quantity theory of money is the idea that
   a. the quantity of money is determined by banks.
   b. the quantity of money serves as a good indicator of how well money functions as a store of value.
   c. the quantity of money determines real GDP.
   d. in the long run, an increase in the quantity of money causes an equal percentage increase in the price level.

24. The equation of exchange is
   a. \( MV = PY \).
   b. \( MP = VY \).
   c. \( MY = PV \).
   d. \( M/Y = PV \).
25. Velocity equals
   a. $YM/P$.
   b. $PM/Y$.
   c. $PY/M$.
   d. $M/PY$.

26. Nominal GDP, $PY$, is $12$ trillion. The quantity of money is $4$ trillion. Velocity is
   a. 12 trillion.
   b. 12.
   c. 3.
   d. 2.

27. Historical evidence shows that higher monetary growth rates are associated with
   a. higher inflation rates.
   b. no change in the inflation rate.
   c. lower inflation rates.
   d. higher growth rates of real GDP.

**Short Answer Problems**

1. Explain why credit cards are not money. Be sure to mention the role actually played by credit cards, that is, what they allow their owner to do.

2. Briefly explain how banks create money.

3. While digging in a local cemetery, Igor uncovers a musty chest containing $1,000 in currency. He rushes to deposit all $1,000 in his checking account at his bank. The desired reserve ratio is 10 percent. How does Igor’s deposit affect the bank’s actual reserves and excess reserves? What is the maximum amount that the bank can loan? Will Igor’s bank’s actions play any role in creating more money?

4. How does an increase in the required reserve ratio affect banks’ excess reserves?

<table>
<thead>
<tr>
<th>Table 8.1 The Demand For Money</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest rate (percent per year)</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
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<tr>
<td>6</td>
</tr>
</tbody>
</table>

5. Table 8.1 gives data on the demand for money. Suppose that the equilibrium nominal interest rate is 6 percent.
   a. What is the quantity of money?
   b. Suppose that the Fed wants to lower the interest rate to 4 percent. By how much must it change the quantity of money?

6. Initially, the money market is in equilibrium, as illustrated in Figure 8.3. Then, the Fed increases the quantity of money by $0.1$ trillion.
   a. Draw this increase in Figure 8.3.
   b. What was the initial equilibrium interest rate? What happens to the equilibrium interest rate?
   c. Explain, in general, the adjustment process to the new equilibrium interest rate.

<table>
<thead>
<tr>
<th>Table 8.2 Quantity Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money, $M$ (billions of dollars)</td>
</tr>
<tr>
<td>$500$</td>
</tr>
<tr>
<td>$550$</td>
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<tr>
<td>$605$</td>
</tr>
</tbody>
</table>

7. a. Complete Table 8.2.
   b. Between the second and third rows of Table
8.2, what is the percentage increase in the quantity of money? What is the inflation rate?
c. Between the third and fourth rows of Table 8.2, what is the percentage increase in the quantity of money? What is the inflation rate?
d. Comment on your answers to parts (b) and (c).

Mathematical Note
8. The desired reserve ratio is 0.05 and the currency drain ratio is 0.30.
   a. What is the money multiplier?
   b. Suppose the Federal Reserve raises the required reserve ratio so that the desired reserve ratio increases to 0.10. The currency drain ratio remains equal to 0.30. What now is the money multiplier?
   c. With the desired reserve ratio equal to 0.10, suppose people decide they want to hold more currency, so the currency drain ratio rises to 0.45. Now what is the money multiplier?
   d. How does an increase in the desired reserve ratio affect the money multiplier? An increase in the currency drain ratio?

You're the Teacher
1. “I couldn’t believe what I read in this chapter! Do you mean to tell me that when I deposit $100 in my checking account at my bank that the bank doesn’t keep all $100? That should be illegal! I mean, how can this work? How can I ever get my money back?” Your friend has just discovered “fractional reserve banking.” Your friend also has some strong opinions. Making sure to stay out of arm’s reach — or at least, fist’s reach — explain to your friend how fractional reserve banking works and how the $100 deposited in the bank will be there, awaiting your friend’s withdrawal.
**Answers**

### True/False Answers

**What is Money?**
1. **T** This is the general definition of money.
2. **T** Checking accounts are a large component of M1.
3. **T** M2 equals M1 plus additional “savings” assets, so the amount of M2 must be larger than the amount of M1.
4. **F** Credit cards give their owners the ability to obtain a loan but are not money.

**Depository Institutions**
5. **T** This is the definition of bank reserves.
6. **T** Intermediaries, such as savings and loan associations, stand between — are intermediate to — savers and borrowers.
7. **T** Minimizing the cost of borrowing is a service provided by depository institutions.

**The Federal Reserve System**
8. **F** The members of the Board of Governors are nominated by the President and confirmed by the Senate.
9. **F** As voting members, the FOMC comprises all the members of the Board of Governors, the president of the New York Federal Reserve Bank and, on a rotating basis, the presidents of four other regional Federal Reserve banks.
10. **F** The discount rate is the interest rate the Fed charges banks for the loans that the banks borrow from the Fed.
11. **F** Federal Reserve notes in circulation are a liability to the Federal Reserve.

**How Banks Create Money**
12. **T** Part of the bank’s reserves is its currency, so if a depositor withdraws currency, the bank loses reserves.
13. **T** The process of loaning (and then relending) excess reserves is the method by which banks create money.
14. **F** Banks use excess reserves for loans and to meet demands for currency but they must retain their required reserves.

### The Money Market

15. **F** The interest rate is the opportunity cost of holding money.
16. **T** An increase in real GDP means more transactions occur and increases the demand for money.
17. **T** When the supply of money increases, in the short run the supply of money curve shifts rightward and the interest rate falls.

**The Quantity Theory of Money**
18. **F** Velocity equals $\frac{PY}{M}$.
19. **F** The quantity theory predicts that inflation is caused by growth in the quantity of money.
20. **F** Almost surely, the reverse is true: High monetary growth rates cause high inflation rates.

### Multiple Choice Answers

**What is Money?**
1. **b** Money eliminates the use of barter.
2. **c** A unit of account is the factor in which prices are given (e.g., 3 dollars per slice of pizza).
3. **c** Checking deposits are approximately 50 percent of M1.
4. **c** U.S. currency is part of M1 and M1 is part of M2.
5. **d** Savings accounts are not part of M1.
6. **b** Checking accounts, not the checks themselves, represent money. In addition, credit cards simply allow loans to be made quickly and are not money.

**Depository Institutions**
7. **b** Answer (b) is the definition of a bank’s reserves.
8. **d** Required reserve ratios are set by regulators, in particular, by the Federal Reserve.
9. **a** Technological change can help foster innovation.

**The Federal Reserve System**
10. **b** The FOMC is an important committee because it makes decisions about the nation’s monetary policy.

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11. Banks’ deposits are a Fed liability because banks own the deposits, and the Fed must return the funds to a bank that wants to make a withdrawal from its deposit.

12. The discount rate is the interest rate that banks must pay when they borrow reserves from the Fed.

13. An open market operation occurs whenever the Fed buys or sells securities.

How Banks Create Money

14. Desired reserves equal 10 percent of deposits, or 
\(0.10 \times \$2\text{ million} = \$200,000\). The bank has reserves of \$300,000, so its excess reserves are \$300,000 – \$200,000, which is \$100,000.

15. Excess reserves equal actual reserves (\$9 million) minus desired reserves (\$10 million), or \$1 million.

16. By lending its reserves, the loan becomes deposits in another bank and, because deposits are part of money, the loan has helped create money.

17. The bank can loan the amount of its excess reserves.

18. An increase in the currency drain means that fewer funds are redeposited in banks, so the smaller the quantity of money the banking system can create.

The Money Market

19. The interest rate is the opportunity cost of holding money, so an increase in the interest rate reduces the quantity of money demanded.

20. Changes in the quantity of money create movements along the demand for money curve; they do not shift the curve.

21. Until about 1989, growth in real GDP generally increased the demand for M2. Since 1989, innovation has decreased the demand for M2 while GDP growth has increased it.

22. When the interest rate exceeds the equilibrium interest rate, the quantity of money demanded is less than the quantity supplied and the interest rate falls to restore the equilibrium.

The Quantity Theory of Money

23. The quantity theory traces the cause of inflation to monetary growth.

24. This answer is the definition of the equation of exchange.

25. The equation of exchange, \(MV = PY\), can be rearranged to show that velocity equals \(PY/M\).

26. The answer to this question can be calculated using the formula in the previous question. Intuitively, velocity equals the number of times an average dollar is spent on goods and services in GDP.

27. Historical evidence supports the general thrust of the quantity theory.

Answers to Short Answer Problems

1. A credit card is not money, but a mechanism for borrowing money, which must be repaid. In other words, a credit card is merely a mechanism for rapidly arranging a loan. Repayment of the loan takes place when the credit card bill is repaid with money.

2. Banks create money by making new loans. When the loans are spent, the person receiving the funds deposits much of it in a bank, which is new money.

3. Deposits at Igor’s bank have increased by \$1,000. Igor’s bank wants to keep 10 percent or \$100 as additional reserves. The entire \$1,000 increases the bank’s total reserves, so the bank now has \$900 of excess reserves. The maximum amount the bank can loan is equal to its excess reserves, or \$900. The bank will help create additional money by loaning the excess reserves.

4. An increase in the required reserve ratio means that for every dollar of deposits banks must keep more reserves either in their vault or at the Federal Reserve. The increase in the required reserve ratio will increase banks’ desired reserve ratio. As a result, banks’ excess reserves — the reserves over and above the desired reserves — fall. Because banks will keep more reserves on hand for each dollar of deposits, they can make fewer loans. Then, with fewer loans, the quantity of money decreases.

5. a. When the nominal interest rate is 6 percent, the quantity of money demanded is \$300 billion. Hence the quantity supplied also must be \$300 billion.

b. In order to reduce the nominal interest rate to 4 percent, the Fed must increase the quantity of money supplied to \$500 billion. So the quantity of money must increase by \$200 billion.
6. a. Figure 8.4 shows the $100 billion increase in the quantity of money as the rightward shift from $MS_0$ to $MS_1$.

b. The initial nominal interest rate was 6 percent; after the increase in the quantity of money, the nominal interest rate fell, to 4 percent.

c. An increase in the quantity of money means that, at the initial nominal interest rate (6 percent), the quantity of money supplied is greater than the quantity of money demanded. Money holders want to reduce their money holdings and do so by buying financial assets, such as bonds. The increase in the demand for financial assets raises the price of financial assets and thereby lowers their interest rate. As the interest rate falls, the quantity of money demanded increases, which reduces the excess supply of money. This process continues until the interest rate has fallen sufficiently so that the quantity of money demanded is the same as the quantity of money supplied. The interest rate that sets the new quantity of money supplied equal to the quantity of money demanded is the (new) equilibrium interest rate.

7. a. Table 8.3 completes Table 8.2. All the answers were calculated with the equation of exchange, $MV = PY$. For the first row, to calculate $M$, the equation of exchange was rearranged as $M = PY/V$ so that $M$ equals $1,000$ billion ($1$ trillion). For the following rows, the equation of exchange was rearranged to show that $MV/Y = P$.

b. Going from the second to the third row, the quantity of money grows by 10 percent, and (with constant velocity and real GDP) the price level grows by 10 percent, that is, the inflation rate is 10 percent.

c. Moving from the third to the fourth row shows that another 10 percent increase in the quantity of money results in another 10 percent growth in the price level.

d. The last three rows illustrate the quantity theory of money conclusion: A 10 percent increase in the quantity of money raises the price level by 10 percent.

Mathematical Note

8. a. The money multiplier is $\frac{1 + C/D}{C/D + R/D}$, where $R/D$ is the desired reserve ratio and $C/D$ is the ratio of currency to deposits, the currency drain ratio. When $R/D$ is 0.05 and $C/D$ is 0.30, the money multiplier equals 1.30/0.35, or 3.71.

b. When $R/D$ is 0.10 and $C/D$ is 0.30, the money multiplier equals 1.30/0.40, or 3.25.

c. When $R/D$ is 0.10 and $C/D$ is 0.45, the money multiplier equals 1.45/0.55, or 2.64.

d. An increase in the desired reserve ratio decreases the money multiplier. An increase in the currency drain ratio also decreases the money multiplier.

You're the Teacher

1. “Look, don’t worry. It’s not illegal and you’ll get your money back! Here’s the deal: What you’re talking about is called ‘fractional reserve banking.’ Banks have been doing this for a long time. Seventy or so years ago, some risk was involved in this pro-
procedure, but today it’s safe because our deposits are insured by the FDIC. In fact, if it weren’t for fractional banking and the banks lending out part of your deposits, they wouldn’t be able to pay you interest on your account. Instead, they’d charge you for the cost of storing your money!”

“Anyway, you’re right that banks don’t set aside the $100 you deposit with them. They do keep a fraction of the $100 in reserves but, just as you said, the majority of the deposit is loaned to people who want to borrow. But this isn’t a problem for you when you want to get your cash back. On any day, banks have thousands of people who deposit cash and also thousands who want to withdraw it. And, on most days these amounts roughly balance. That is, the cash deposited will about equal the cash withdrawn. So, although you won’t get back the exact same $100 you deposited with your bank, you will get back $100 that other customers have deposited.”

“As I said, this process doesn’t give a problem today. But I remember from my U.S. history class about the bank runs during the Great Depression. In those days, bank deposits weren’t insured like they are today. Back then, if a bank failed, its depositors might lose all their deposits. So if depositors thought a bank was likely to fail, all the depositors would run to the bank to withdraw their money. When this sort of thing happened, the bank wouldn’t have enough cash on hand because the amount deposited that day was a lot less than the amount that people wanted to withdraw. And because the bank didn’t have the cash on hand, the bank would fail. Bank runs were a self-fulfilling prophecy: If people thought that a bank might fail, they would make a run on the bank, and the bank would fail. Today, the FDIC deposit insurance our book talks about prevents bank panics because depositors know that, even if their bank fails, they will get back their deposits. Today fractional reserve banking is safe, so you probably ought to worry more about your grade in our economics class than losing your money in the bank.”
Chapter Quiz

1. The most direct way that money replaces barter is through money’s use as a
   a. medium of exchange.
   b. store of value.
   c. unit of account.
   d. trade mechanism.

2. Juan takes $100 dollars from his checking account and transfers it to his saving account. As a result, M1 ____ and M2 ____.
   a. increases; increases
   b. decreases; does not change
   c. does not change; increases
   d. does not change; does not change

3. Juan takes $100 dollars from his wallet and deposits it in his checking account. As a result, M1 ____ and M2 ____.
   a. increases; increases
   b. increases; does not change
   c. does not change; increases
   d. does not change; does not change

4. Depository institutions create liquidity. Depository institutions pool risk.
   a. Both sentences are true.
   b. The first sentence is true and the second sentence is false.
   c. The first sentence is false and the second sentence is true.
   d. Both sentences are false.

5. The smaller the desired reserve ratio,
   a. the larger the money multiplier.
   b. the smaller the money multiplier.
   c. the smaller M1 is relative to M2.
   d. None of the above.

6. Reserve requirements are rules setting
   a. the minimum percentage of deposits that must be kept as reserves.
   b. the minimum amount of the owners’ wealth that must be invested in the depository institution.
   c. what sort of loans the depository institution can make.
   d. the types of assets a bank can purchase.

7. A bank’s reserves include the ____ and the ____.
   a. deposits it has accepted; cash it keeps in its vault
   b. liquid loans it has made; deposits it keeps at the Federal Reserve
   c. liquid securities it has purchased; liquid loans it has made
   d. deposits it keeps at the Federal Reserve; cash it keeps in its vault

8. The U.S. central bank is the
   b. Federal Open Market Committee.
   c. Federal Reserve System.
   d. U.S. Treasury.

9. Using data from different countries, it is apparent that a high growth rate of the quantity of money is associated with a
   a. high growth rate of real GDP.
   b. high inflation rate.
   c. low growth rate of velocity.
   d. low unemployment rates.

10. Velocity grows at 2 percent, the quantity of money grows at 6 percent and real GDP grows at 3 percent. Hence the inflation rate equals
    a. 11 percent.
    b. 7 percent.
    c. 5 percent.
    d. 3 percent.

The answers for this Chapter Quiz are on page 253