medium of exchange, *or* means of payment, *p. 190*
money multiplier, *p. 198*
moral suasion, *p. 205*
near monies, *p. 193*
Open Market Desk, *p. 200*
open market operations, *p. 205*
required reserve ratio, *p. 196*
reserves, *p. 195*
run on a bank, *p. 195*
store of value, *p. 190*
unit of account, *p. 190*

1. M1 ≡ currency held outside banks + demand deposits + traveler's checks + other checkable deposits
2. M2 ≡ M1 + savings accounts + money market accounts + other near monies
3. Assets ≡ Liabilities + Net Worth
4. Excess reserves ≡ actual reserves − required reserves
5. Money multiplier $\equiv \dfrac{1}{\text{required reserve ratio}}$

PROBLEMS

All problems are available on www.myeconlab.com

1. In the Republic of Ragu, the currency is the rag. During 2009, the Treasury of Ragu sold bonds to finance the Ragu budget deficit. In all, the Treasury sold 50,000 10-year bonds with a face value of 100 rags each. The total deficit was 5 million rags. Further, assume that the Ragu Central Bank reserve requirement was 20 percent and that in the same year, the bank bought 500,000 rags' worth of outstanding bonds on the open market. Finally, assume that all of the Ragu debt is held by either the private sector (the public) or the central bank.
   a. What is the combined effect of the Treasury sale and the central bank purchase on the total Ragu debt outstanding? on the debt held by the private sector?
   b. What is the effect of the Treasury sale on the money supply in Ragu?
   c. Assuming no leakage of reserves out of the banking system, what is the effect of the central bank purchase of bonds on the money supply?
2. In 2000, the federal debt was being paid down because the federal budget was in surplus. Recall that surplus means that tax collections (T) exceed government spending (G). The surplus ($T - G$) was used to buy back government bonds from the public, reducing the federal debt. As we discussed in this chapter, the main method by which the Fed increases the money supply is to buy government bonds by using open market operations. What is the impact on the money supply of using the fiscal surplus to buy back bonds? In terms of their impacts on the money supply, what is the difference between Fed open market purchases of bonds and Treasury purchases of bonds using tax revenues?
3. For each of the following, determine whether it is an asset or a liability on the accounting books of a bank. Explain why in each case.
   Cash in the vault
   Demand deposits
   Savings deposits
   Reserves
   Loans
   Deposits at the Federal Reserve
4. **[Related to the *Economics in Practice* on *p. 191*]** It is well known that cigarettes served as money for prisoners of war in World War II. Do a Google search using the keyword *cigarettes* and write a description of how this came to be and how it worked.
5. If the head of the Central Bank of Japan wanted to expand the supply of money in Japan in 2009, which of the following would do it? Explain your answer.
   Increase the required reserve ratio
   Decrease the required reserve ratio
   Increase the discount rate
   Decrease the discount rate
   Buy government securities in the open market
   Sell government securities in the open market
6. Suppose in the Republic of Madison that the regulation of banking rested with the Madison Congress, including the determination of the reserve ratio. The Central Bank of Madison is charged with regulating the money supply by using open market operations. In April 2011, the money supply was estimated to be 52 million hurls. At the same time, bank reserves were 6.24 million hurls and the reserve requirement was 12 percent. The banking industry, being "loaned up," lobbied the Congress to cut the reserve ratio. The Congress yielded and cut required reserves to 10 percent. What is the potential impact on the money supply? Suppose the central bank decided that the money supply should not be increased. What countermeasures could it take to prevent the Congress from expanding the money supply?
7. The U.S. money supply (M1) at the beginning of 2000 was $1,148 billion broken down as follows: $523 billion in currency, $8 billion in traveler's checks, and $616 billion in checking deposits. Suppose the Fed decided to reduce the money supply by increasing the reserve requirement from 10 percent to 11 percent. Assuming all banks were initially loaned up (had no excess reserves) and currency held outside of banks did not change, how large a change in the money supply would have resulted from the change in the reserve requirement?
8. As king of Medivalia, you are constantly strapped for funds to pay your army. Your chief economic wizard suggests the following plan: "When you collect your tax payments from your subjects, insist on being paid in gold coins. Take those gold coins, melt them down, and remint them with an extra 10 percent of brass thrown in. You will then have 10 percent more money than you started with." What do you think of the plan? Will it work?
9. Why is M2 sometimes a more stable measure of money than M1? Explain in your own words using the definitions of M1 and M2.
10. Do you agree or disagree with each of the following statements? Explain your answers.
    a. When the Treasury of the United States issues bonds and sells them to the public to finance the deficit, the money supply remains unchanged because every dollar of money taken in by the Treasury goes right back into circulation through government spending. This is not true when the Fed sells bonds to the public.
    b. The money multiplier depends on the marginal propensity to save.

*11. When the Fed adds new reserves to the system, some of these new reserves find their way out of the country into foreign banks or foreign investment funds. In addition, some portion of the new reserves ends up in people's pockets and mattresses instead of bank vaults. These "leakages" reduce the money multiplier and sometimes make it very difficult for the Fed to control the money supply precisely. Explain why this is true.

12. You are given this account for a bank:

ASSETS		LIABILITIES	
Reserves	$ 500	$3,500	Deposits
Loans	3,000		

The required reserve ratio is 10 percent.

a. How much is the bank required to hold as reserves given its deposits of $3,500?
b. How much are its excess reserves?
c. By how much can the bank increase its loans?
d. Suppose a depositor comes to the bank and withdraws $200 in cash. Show the bank's new balance sheet, assuming the bank obtains the cash by drawing down its reserves. Does the bank now hold excess reserves? Is it meeting the required reserve ratio? If not, what can it do?

13. After suffering two years of staggering hyperinflation, the African nation of Zimbabwe officially abandoned its currency, the Zimbabwean dollar, in April 2009 and made the U.S. dollar its official currency. Why would anyone in Zimbabwe be willing to accept U.S. dollars in exchange for goods and services?

14. The following is from an article in *USA TODAY*.

> A small but growing number of cash-strapped communities are printing their own money. Borrowing from a Depression-era idea, they are aiming to help consumers make ends meet and support struggling local businesses. The systems generally work like this: Businesses and individuals form a network to print currency. Shoppers buy it at a discount—say, 95 cents for $1 value—and spend the full value at stores that accept the currency. . . .
>
> *Source:* From *USA TODAY*, a division of Gannett Co., Inc. Reprinted with Permission.

These local currencies are being issued in communities as diverse as small towns in North Carolina and Massachusetts to cities as large as Detroit, Michigan. Do these local currencies qualify as money based on the description of what money is in the chapter?

15. Suppose on your 21st birthday, your eccentric grandmother invites you to her house, takes you into her library, removes a black velvet painting of Elvis Presley from the wall, opens a hidden safe where she removes 50 crisp $100 bills, and hands them to you as a present, claiming you are her favorite grandchild. After thanking your grandmother profusely (and helping her rehang the picture of Elvis), you proceed to your bank and deposit half of your gift in your checking account and half in your savings account. How will these transactions affect M1 and M2? How will these transactions change M1 and M2 in the short run? What about the long run?"

16. Suppose Fred deposits $8,000 in cash into his checking account at the Bank of Bonzo. The Bank of Bonzo has no excess reserves and is subject to a 5 percent required reserve ratio.

a. Show this transaction in a T-account for the Bank of Bonzo.
b. Assume the Bank of Bonzo makes the maximum loan possible from Fred's deposit to Clarice and show this transaction in a new T-account.
c. Clarice decides to use the money she borrowed to take a trip to Tahiti. She writes a check for the entire loan amount to the Tropical Paradise Travel Agency, which deposits the check in its bank, the Iceberg Bank of Barrow, Alaska. When the check clears, the Bonzo Bank transfers the funds to the Iceberg Bank. Show these transactions in a new T-account for the Bonzo Bank and in a T-account for the Iceberg Bank.
d. What is the maximum amount of deposits that can be created from Fred's initial deposit?
e. What is the maximum amount of loans that can be created from Fred's initial deposit?

17. What are the three tools the Fed can use to change the money supply? Briefly describe how the Fed can use each of these tools to either increase or decrease the money supply.

* Note: Problems marked with an asterisk are more challenging.

5. The Fed can affect the equilibrium interest rate by changing the supply of money using one of its three tools—the required reserve ratio, the discount rate, or open market operations.
6. An increase in either *P* or *Y*, which shifts the money demand curve to the right, increases the equilibrium interest rate. A decrease in either *P* or *Y* decreases the equilibrium interest rate.
7. *Tight monetary policy* refers to Fed policies that contract the money supply and thus raise interest rates in an effort to restrain the economy. *Easy monetary policy* refers to Fed policies that expand the money supply and thus lower interest rates in an effort to stimulate the economy. The Fed chooses between these two types of policies for different reasons at different times.

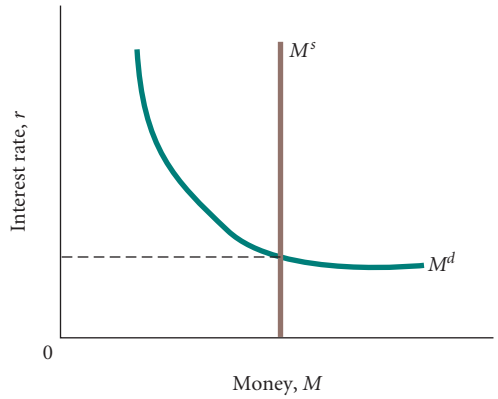
REVIEW TERMS AND CONCEPTS

easy monetary policy, *p. 223*
interest, *p. 213*
nonsynchronization of income and spending, *p. 215*
speculation motive, *p. 218*
tight monetary policy, *p. 223*
transaction motive, *p. 215*

PROBLEMS

All problems are available on www.myeconlab.com

1. State whether you agree or disagree with the following statements and explain why.
   a. When the real economy expands (*Y* rises), the demand for money expands. As a result, households hold more cash and the supply of money expands.
   b. Inflation, a rise in the price level, causes the demand for money to decline. Because inflation causes money to be worth less, households want to hold less of it.
   c. If the Fed buys bonds in the open market and at the same time we experience a recession, interest rates will no doubt rise.
2. During 2003, we began to stop worrying that inflation was a problem. Instead, we began to worry about deflation, a decline in the price level. Assume that the Fed decided to hold the money supply constant. What impact would deflation have on interest rates?
3. **[Related to *Economics in Practice* on *p. 219*]** How many times a week do you use an ATM? If ATMs were not available, would you carry more cash? Would you keep more money in your checking account? How many times a day do you use cash?
4. What if, at a low level of interest rates, the money demand curve became nearly horizontal, as in the following graph. That is, with interest rates so low, the public would not find it attractive to hold bonds; thus, money demand would be very high. Many argue that this was the position of the U.S. economy in 2003. If the Fed decided to expand the money supply in the graph, what would be the impact on interest rates?



5. During the fourth quarter of 1993, real GDP in the United States grew at an annual rate of over 7 percent. During 1994, the economy continued to expand with modest inflation. (*Y* rose at a rate of 4 percent and *P* increased about 3 percent.) At the beginning of 1994, the prime interest rate (the interest rate that banks offer their best, least risky customers) stood at 6 percent, where it remained for over a year. By the beginning of 1995, the prime rate had increased to over 8.5 percent.
   a. By using money supply and money demand curves, show the effects of the increase in *Y* and *P* on interest rates, assuming *no change* in the money supply.
   b. On a separate graph, show that the interest rate can rise even if the Federal Reserve expands the money supply as long as it does so more slowly than money demand is increasing.
6. Illustrate the following situations using supply and demand curves for money:
   a. The Fed buys bonds in the open market during a recession.
   b. During a period of rapid inflation, the Fed increases the reserve requirement.
   c. The Fed acts to hold interest rates constant during a period of high inflation.
   d. During a period of no growth in GDP and zero inflation, the Fed lowers the discount rate.
   e. During a period of rapid real growth of GDP, the Fed acts to increase the reserve requirement.
7. During a recession, interest rates may fall even if the Fed takes no action to expand the money supply. Why? Use a graph to explain.
8. During the summer of 1997, Congress and the president agreed on a budget package to balance the federal budget. The "deal," signed into law by President Clinton in August as the Taxpayer Relief Act of 1997, contained substantial tax cuts and expenditure reductions. The tax reductions were scheduled to take effect immediately, however, while the expenditure cuts would come mostly in 1999 to 2002. Thus, in 1998, the package was seen by economists to be mildly expansionary. If the result is an increase in the growth of real

output/income, what would you expect to happen to interest rates if the Fed holds the money supply (or the rate of growth of the money supply) constant? What would the Fed do if it wanted to raise interest rates? What if it wanted to lower interest rates? Illustrate with graphs.

9. The demand for money in a country is given by

$$M^d = 10{,}000 - 10{,}000r + P \cdot Y$$

where M^d is money demand in dollars, r is the interest rate (a 10 percent interest rate means $r = 0.1$), and $P \cdot Y$ is national income. Assume that $P \cdot Y$ is initially 5,000.

   a. Graph the amount of money demanded (on the horizontal axis) against the interest rate (on the vertical axis).
   b. Suppose the money supply (M^s) is set by the central bank at $10,000. On the same graph you drew for part a., add the money supply curve. What is the equilibrium rate of interest? Explain how you arrived at your answer.
   c. Suppose income rises from $P \cdot Y = 5{,}000$ to $P \cdot Y = 7{,}500$. What happens to the money demand curve you drew in part a.? Draw the new curve if there is one. What happens to the equilibrium interest rate if the central bank does not change the supply of money?
   d. If the central bank wants to keep the equilibrium interest rate at the same value as it was in part b., by how much should it increase or decrease the supply of money given the new level of national income?
   e. Suppose the shift in part c. has occurred and the money supply remains at $10,000 but there is no observed change in the interest rate. What might have happened that could explain this?

10. The United States entered a deep recession at the end of 2007. The Fed under Ben Bernanke used aggressive monetary policy to prevent the recession from becoming another Great Depression. The Fed Funds target rate was 5.25 percent in the fall of 2007; by mid-2008, it stood at 2 percent; and in January 2009, it went to a range of 0-0.25 percent, where it still stood through mid-2010. Lower interest rates reduce the cost of borrowing and encourage firms to borrow and invest. They also have an effect on the value of the bonds (private and government) outstanding in the economy. Explain briefly but clearly why the value of bonds changes when interest rates change. Go to federalreserve.gov, click on "Economic Research & Data," and click on "Flow of Funds." Look at the most recent release and find balance sheet table B.100. How big is the value of Credit Market Instruments held by households?

11. Normally, people in the United States and from around the world think of highly rated corporate or government bonds as a safe place to put their savings relative to common stocks. Because the stock market had performed so poorly during the recession and because many foreigners turned to the United States as a safe place to invest, bond sales boomed.

    If you were a holder of high-grade fixed rate bonds that you purchased a few years earlier when rates were much higher, you found yourself with big capital gains. That is, as rates went lower, the value of previously issued bonds increased. Many investment advisers in late 2010 were telling their clients to avoid bonds because inflation was going to come back.
   a. Suppose you bought a $10,000 ten-year fixed rate bond issued by the U.S. Treasury in July 2007 that paid 5% interest. In July 2010, new seven-year fixed rate bonds were being sold by the Treasury that paid 2.43%. Explain clearly what was likely to have happened to the value of your bond which still has 7 years to run paying 5%?
   b. Why would bond prices rise if people feared a recession was coming?
   c. Why would fear of inflation lead to losses for bondholders?
   d. Look back and see what happened in late 2010 into 2011? Did the Fed keep rates low? Did the recession end? Did we see the start of inflation? Explain.

12. Explain what will happen to holdings of bonds and money if there is an excess supply of money in the economy. What will happen if there is an excess demand for money in the economy? What will happen to interest rates in each of these cases?

13. The island nation of Macadamia recently experienced an 800 percent jump in tourism, increasing income throughout the island. Suppose the Macadamia money market was in equilibrium prior to the rise in tourism. What impact will the increase in income have on the equilibrium interest rate in Macadamia, assuming no change in the supply of money? What will the Macadamia Central Bank have to do to keep the increase in income from impacting the interest rate?

14. All else equal, what effect will an expansionary fiscal policy have on the money market, and how will this change impact the effectiveness of the fiscal policy? Draw a graph to illustrate your answer.

15. Explain the differences between the transaction motive for holding money and the speculation motive for holding money.

CHAPTER 11 APPENDIX A

The Various Interest Rates in the U.S. Economy

Although there are many different interest rates in the economy, they tend to move up or down with one another. Here we discuss some of their differences. We first look at the relationship between interest rates on securities with different *maturities*, or terms. We then briefly discuss some of the main interest rates in the U.S. economy.

The Term Structure of Interest Rates

The *term structure of interest rates* is the relationship among the interest rates offered on securities of different maturities. The key here is understanding issues such as these: How are these different rates related? Does a 2-year security (an IOU that promises to repay principal, plus interest, after 2 years) pay a lower annual rate than a 1-year security (an IOU to be repaid, with interest, after 1 year)? What happens to the rate of interest offered on 1-year securities if the rate of interest on 2-year securities increases?