

# Chapter 2

## Money and the Payments System

### ■ Brief Chapter Summary and Learning Objectives

#### 2.1 Do We Need Money? (pages 24–26)

Analyze the inefficiencies of a barter system.

- Money reduces the transactions costs of exchange as well as other inefficiencies of the barter system.

#### 2.2 The Key Functions of Money (pages 26–29)

Discuss the four key functions of money.

- Money serves four key functions in the economy: It acts as a medium of exchange, a unit of account, and a store of value, and it offers a standard of deferred payment.

#### 2.3 The Payments System (pages 29–32)

Explain the role of the payments system.

- The efficiency of the payments system has increased over time as new instruments have reduced the cost of settling transactions.

#### 2.4 Measuring the Money Supply (pages 32–35)

Explain how the U.S. money supply is measured.

- There are currently two measures of the money supply in the United States, M1 and M2.
- M1 includes liquid assets that can directly be used as a medium of exchange, while M2 includes short-term assets that are less liquid but can readily be converted to currency and be used as a medium of exchange.

#### 2.5 The Quantity Theory of Money: A First Look at the Link Between Money and Prices (pages 36–43)

Use the quantity theory of money to analyze the relationship between money and prices in the long run.

- The quantity theory of money helps to explain the long-run relationship between the growth of the money supply and inflation.

### ■ Key Terms

**Barter** A system of exchange in which individuals trade goods and services directly for other goods and services.

**Checks** A promise to pay on demand money deposited with a bank or other financial institution.

**Commodity money** A good used as money that has value independent of its use as money.

**E-money** Digital cash people use to buy goods and services over the Internet; short for electronic money.

**Fiat money** Money, such as paper currency, which has no value apart from its use as money.

**Hyperinflation** A rate of inflation that exceeds 50% per month.

**Legal tender** The government designation that currency is accepted as payment of taxes and must be accepted by individuals and firms in payment of debts.

**M1** A narrower definition of the money supply: The sum of currency in circulation, checking account deposits, and holdings of traveler's checks.

**M2** A broader definition of the money supply: all the assets that are included in M1, as well as time deposits with a value of less than \$100,000, savings accounts, money market deposit accounts, and noninstitutional money market mutual fund shares.

**Medium of exchange** Something that is generally accepted as payment for goods and services; a function of money.

**Monetary aggregates** Measures of the quantity of money that are broader than currency; M1 and M2.

**Money** Anything that is generally accepted as payment for goods and services or in the settlement of debts.

**Quantity theory of money** A theory about the connection between money and prices that assumes that the velocity of money is constant.

**Specialization** A system in which individuals produce the goods or services for which they have relatively the best ability.

**Standard of deferred payment** The characteristic of money by which it facilitates exchange over time.

**Store of value** The accumulation of wealth by holding dollars or other assets that can be used to buy goods and services in the future; a function of money.

**Transactions costs** The costs in time or other resources that parties incur in the process of agreeing and carrying out an exchange of goods and services.

**Unit of account** A way of measuring value in an economy in terms of money; a function of money.

**Wealth** The sum of the value of a person's assets minus the value of the person's liabilities.

## ■ Chapter Outline

### *Who Hates the Federal Reserve?*

Inflation has averaged 2.5% since 1994. If it rose significantly above that rate, those who already have loans would benefit by paying back their debt with dollars that were losing value. But high rates of inflation typically cause problems for the economy. The Fed is often blamed for the high inflation of the 1970s. Since that time, the Fed has made keeping inflation low a top priority. Some economists and members of Congress took the view that the actions of the Fed during the financial crisis had the potential to significantly increase inflation. In addition, some of the Fed's actions during that period went beyond normal monetary policy. As a result, several bills were introduced in Congress to increase Congressional oversight of the Fed. Fed Chair Ben Bernanke argued that passing these bills would reduce the independence of the Fed, thereby increasing the risk of higher inflation. In the end, Congress did not pass any of the bills.

### Teaching Tips

For most students, Sections 2.1, 2.2, and 2.4 on the functions and definitions of money should be a review of material they learned in their principles class. It is possible to cover this material very briefly with well-prepared students. Section 2.3 discusses the payments system—a term that may be unfamiliar to many students—including electronic funds and electronic cash, which are topics not always covered in principles classes.

Section 2.5 contains material on the quantity theory that is likely to be less familiar to students. Given the debate over the likely outcome of Fed policies that have resulted in large increases in the money supply,

students are often interested in this material. For this reason, the authors cover it early in their classes. The material on hyperinflations is interesting to most students and may help to reinforce the discussion of the quantity theory. Nevertheless, if you are pressed for time, the material can be omitted. Similarly, the background on the quantity theory and hyperinflation helps motivate the last section on central bank independence, although discussion of this material can be postponed to later in the course.

## 2.1 Do We Need Money? (pages 24–26)

Learning Objective: Analyze the inefficiencies of a barter system.

### A. Barter

Barter is a system of exchange in which individuals trade goods and services directly for other goods and services. Sources of inefficiency for barter includes (1) the time and effort spent looking for trading partners; (2) each good having many prices (in terms of all other goods with which it can be exchanged); (3) a lack of standardization of the products being traded; and (4) difficulty in accumulating wealth (people need to store various products).

### B. The Invention of Money

Money reduces transactions costs as well as other inefficiencies of barter. Money allows for specialization, a system in which individuals produce the goods or services for which they have relatively the best ability.

## 2.2 The Key Functions of Money (pages 26–29)

Learning Objective: Discuss the four key functions of money.

### A. Medium of Exchange

Medium of exchange describes the role of money as a generally accepted payment for goods and services.

### B. Unit of Account

Unit of account is the function of money in which money can be used to measure value in an economy.

### C. Store of Value

Money is a store of value in that it allows for the accumulation of wealth by holding dollars or other assets that can be used to buy goods and services in the future.

### D. Standard of Deferred Payment

Money is considered a standard of deferred payment in that it facilitates exchange over time.

### E. Distinguishing Among Money, Income, and Wealth

Money, like other assets, is a component of wealth, which is the sum of the value of a person's assets minus the value of the person's liabilities. A person's income is equal to his or her earnings over a period of time.

### F. What Can Serve as Money?

An asset is suitable to use as money if it is (1) acceptable to (that is, usable by) most people; (2) standardized in terms of quality, so that any two units are identical; (3) durable, so that it does not quickly become too worn out to be usable; (4) valuable relative to its weight, so that amounts large enough to be useful in trade can be easily transported; and (5) divisible, because prices of goods and services vary.

### G. The Mystery of Fiat Money

Money, such as paper currency, that has no value apart from its use as money is called fiat money. The most important reason why paper currency circulates as a medium of exchange is the confidence of consumers and firms that if they accept paper currency they will be able to pass it along when they need to buy goods and services.

### 2.3 The Payments System (pages 29–32)

Learning Objective: Explain the role of the payments system.

#### A. The Transition from Commodity Money to Fiat Money

Centuries ago, people had difficulty transporting large numbers of gold coins to settle transactions and also ran the risk of having their gold robbed. To get around this problem, beginning around the year A.D. 1500 in Europe, governments and private firms—early banks—began to store gold coins in safe places and issue paper certificates. In modern economies, central banks issue fiat money.

#### B. The Importance of Checks

It can be expensive to transport paper money to settle large commercial or financial transactions. Checks are promises to pay on demand money deposited with a bank or other financial institution.

#### C. Electronic Funds and Electronic Cash

Breakthroughs in electronic telecommunication have improved the efficiency of the payments system, reducing the time needed for clearing checks and for transferring funds. Examples of computerized payment-clearing devices include debit cards, Automated Clearing House (ACH) transactions, automated teller machines (ATMs), and e-money.

### Teaching Tips

Ask students if they have bought items on eBay. Next, ask how many would have still bought the items if they could not have used PayPal. The discussion that follows should help them to understand how money evolves over time and how increased efficiency of the payments systems allows for more economic activity.

### 2.4 Measuring the Money Supply (pages 32-35)

Learning Objective: Explain how the U.S. money supply is measured.

#### A. Measuring Monetary Aggregates

M1 is a narrow definition of money that includes traditional mediums of exchange: currency, traveler's checks and checking deposits. M2 is a broader definition of money that includes short-term investments that can be easily converted to currency including time deposits valued under \$100,000, savings deposits, money market deposits held at banks, and noninstitutional money market shares.

#### B. Does it Matter which Definition of the Money Supply We Use?

M2 has grown more over time as people increase their holdings of money market mutual fund shares and CDs. M1 has been more volatile, soaring during the recession years of 1990–1991, 2001, and 2007–2009 as investors desired the safety of liquid assets. The strengths and weaknesses of each measure will be discussed in future chapters.

### Teaching Tips

There has been much discussion about how the Fed “printed money” and more than doubled the size of the money supply during the financial crisis. As a result, some commentators have predicted that the United States will experience hyperinflation. Have students look at Figure 2.2 on page 35 (both panel (a) and panel (b)) to see how much the money supply has really grown since the start of the crisis in fall 2008 (pay particular attention to M2). You can use this figure to reinforce the meaning of the money supply and the limits to the Fed's ability to increase it (though you should save the discussion of the difference between the monetary base and the money supply for a future chapter). Though M1 displays a couple of bursts of growth, neither was sustained. The growth of M2 does not differ much from its historical behavior.

## 2.5 The Quantity Theory of Money: A First Look at the Link between Money and Prices (pages 36–43)

Learning Objective: Use the quantity theory of money to analyze the relationship between money and prices in the long run.

### A. Irving Fisher and the Equation of Exchange

The velocity of money is defined as the number of times a dollar is used to purchase a good or service in GDP or  $V = PY/M$ , where  $V$  is the velocity of money;  $Y$  is real GDP,  $P$  is the price level (so  $P \times Y$  is nominal GDP), and  $M$  is the money supply. Rearranging terms, we obtain the equation of exchange,  $M \times V = P \times Y$  (which is true by definition). Irving Fisher assumed that the velocity of money is constant to develop the quantity theory of money. Therefore, if the money supply ( $M$ ) increases more quickly than real GDP ( $Y$ ), the difference is inflation ( $P$ ).

### B. The Quantity Theory Explanation of Inflation

We can rewrite the equation of exchange in percentage terms as: the percentage change in  $M$  plus the percentage change in  $V$  equals the percentage change in  $P$  plus the percentage change in  $Y$ . Because  $V$  is assumed to be constant, the percentage change in  $V$  is 0. Therefore, if the money supply ( $M$ ) increases more quickly than real GDP ( $Y$ ), the difference is inflation ( $P$ ).

### C. How Accurate Are Forecasts of Inflation Based on the Quantity Theory?

Because velocity can move erratically in the short run, we would not expect the quantity equation to provide good forecasts of inflation in the short run. Over the long run, however, there is a strong link between changes in the money supply and inflation.

### D. The Hazards of Hyperinflation

When there is hyperinflation, prices rise so rapidly that a given amount of money can purchase fewer and fewer goods and services each day. Households and firms may refuse to accept money at all, in which case money no longer functions as a medium of exchange. When economies do not use money, the degree of specialization necessary to maintain high rates of productivity breaks down.

### E. What Causes Hyperinflation?

The quantity theory indicates that hyperinflation is caused by the money supply increasing far more rapidly than real output of goods and services. The ultimate cause of hyperinflation is usually governments spending more than they collect in taxes, which results in government budget deficits. If private investors are not willing to purchase the government bonds and the government controls the central bank, the government sells the bonds to the central bank. The central bank increases the money supply to buy the bonds, resulting in monetizing the debt.

### F. Should Central Banks Be Independent?

Research has shown that countries with highly independent central banks have lower inflation rates than countries whose central banks have little independence. The more independent a central bank is of the rest of the government, the more it can resist political pressures to increase the money supply, and the lower the country's inflation rate is likely to be. Policymakers continue to debate whether Congress and the president should change the law to reduce the Fed's independence, although, historically, curtailing the independence of a central bank has resulted in higher inflation rates.

## Teaching Tips

Have students consider the implications of Figure 2.4 on page 42 regarding the independence of the Federal Reserve. Discussion can involve what would likely happen to inflation in the United States if Congress reduced the independence of the Fed.

## ■ Solutions to the End-of-Chapter Questions, Problems, and Data Exercises

### 2.1 Do We Need Money?

Learning objectives: Analyze the inefficiencies of a barter system.

#### Review Questions

- 1.1 Barter is a system of exchange in which individuals trade goods and services directly for other goods and services. The costs of a barter system include the transactions cost of searching for trading partners (as a result of the need for a double coincidence of wants), the many prices for each good in terms of every other good it might be exchanged for, a lack of standardization of goods being exchanged, and the difficulty of accumulating wealth by storing goods.
- 1.2 Commodity money is a good used as money that has value independent of its use as money. Cigarettes and gold are two examples of commodity money.
- 1.3 Specialization is a system in which individuals produce the goods or services for which they have relatively the best ability. Specialization increases productivity. By specializing, people as a whole are far more productive than they would be if they tried to produce all the goods and services they consume themselves.

#### Problems and Applications

- 1.4 From the point of view of an individual, a \$20 Federal Reserve Note is more convenient than a \$20 gold coin because it has a higher value relative to its weight. From the point of view of the government, a \$20 Federal Reserve Note is more desirable because it has a lower cost to produce relative to its face value.
- 1.5 The primary difference would be that using a deerskin as money incurs a much larger transaction cost because it is bigger/heavier than paper money. In addition, deerskins are not of uniform quality, which is a drawback of using them as money.
- 1.6 The packs of cigarettes should be considered money because they had displaced the official currency (rubles) as the money used by Moscow taxi drivers and possibly other merchants.
- 1.7 Cigarettes must have been acceptable to most people (because so many people smoked cigarettes in the World War II period), they have a fairly standard quality (although there would have been some differences across brands), they are relatively durable, they are light (although compared to money bulky), and they are divisible by individual cigarette. Until people put their faith into the new currency, commodity goods with universal value (cigarettes) are a logical replacement as money.

### 2.2 The Key Functions of Money

Learning objective: Discuss the four key functions of money.

#### Review Questions

- 2.1 To serve as money, dollar bills and personal checks must generally be accepted as means of payment. Various circumstances might cause you or a business to be reluctant to accept a dollar bill as money such as the example of Apple attempting to keep track of anyone

- attempting to buy more than the limit of two iPads per customer or a convenience store not willing to receive large denomination bills to lessen the risk of robbery. You or a business may not want to accept personal checks if you do not want to bear the cost of bad checks.
- 2.2 The four main functions of money are to serve as a medium of exchange (generally accepted means of payment), unit of account (all prices expressed in monetary terms), store of value (transferring purchasing power over time), and standard of deferred payment (unit of account for exchange over time).
- 2.3 No, the store-of-value function is not unique to money. Houses, bonds, and stocks are other examples of stores of value. Money must be a store of value to function as a medium of exchange. People will not accept money unless they can use it to store value.
- 2.4 Commodity money has value beyond its use as currency; fiat money has no intrinsic value.

### Problems and Applications

- 2.5 a. It is difficult to carry milk around, the bottles could break, and the milk can go bad if not properly refrigerated.
- b. Each good could be listed in terms of the amount of milk required to exchange for the particular good. However, the value of milk goes up and down depending on the supply and demand for milk. These fluctuations can make stable prices in terms of milk difficult.
- c. Storing milk is difficult, and it may go sour. It is a poor store of value because of this.
- d. Future milk can be promised for present goods. However, changes in the value of milk due to changing supply and demand for milk means that the value of milk in the future when the payments are due could be substantially different than the value of milk today.
- 2.6 a. North Korean citizens with large holdings of the old currency could only exchange a limited amount of the old currency for the new currency, thereby wiping out their savings.
- b. The people of North Korea could switch to using other currencies, such as the Chinese yuan, the U.S. dollar, or the euro.
- 2.7 a. Wealth increases
- b. Income increases
- c. The value of your money falls once you have spent the cash. The form you are holding your wealth in changes from cash to an iPad, but the value of your wealth does not change.
- 2.8. People who hold a lot of cash would gain, as well as those who wanted to be anonymous when they buy something. Apple would lose in this situation, as they would not be able to keep track of who bought iPads, making it possible for these buyers to resell them at a higher price when there is a shortage. Other firms that have reasons not to want to have to accept paper currency as payment—for instance, automobile dealers—would also lose because their cost of carrying out transactions would rise.
- 2.9. As long as many German stores continued to accept the deutsche mark, it could serve as money. As the example of the Russian taxi drivers using Marlboro cigarettes as money showed, anything that is generally accepted as a mean of payment can serve as money.

## 2.3 The Payments System

Learning objective: Explain the role of the payments system in the economy.

### Review Questions

- 3.1 A payments system is a mechanism for conducting transactions in the economy. If the payments system became less efficient, there would be an increase in the cost of trade and credit.
- 3.2 It was expensive to transport gold and silver coins. Paper currency lowered the cost of transactions.
- 3.3 It is likely that more transactions in the United States will be cashless in the future, but it is unlikely that cash will be eliminated. First, the infrastructure for an e-payments system is expensive to build, and second, many people want the option to use cash for privacy purposes. Finally, lower-income people may lack the means to carry out electronic transactions and may have to continue to use cash.

### Problems and Applications

- 3.4 When the stones are destroyed, the value of stones increases because there are fewer of them relative to goods and services. As a result, prices are likely to fall and the economy will experience deflation. When someone finds a new quantity of stones, the value of stones falls because there are more of them relative to goods and services. As a result, prices are likely to rise and the economy will experience inflation.
- 3.5
  - a. The coinage had greater amounts of less valuable metals mixed in with the gold and silver.
  - b. Money is only as good as the confidence a person has in its value. Citizens need to trust that the money the government is creating has value and will be accepted by others.
  - c. "In kind" means to pay for a service or good with another service or good. Paying in kind would increase the cost of trade and other economic activity, thereby and decrease specialization and the level of income in the empire.
- 3.6 Households would rely more on cash and personal checks to buy goods and services and to pay bills, and would need to make more stops at banks to deposit checks and withdraw cash. The transactions costs of shopping and buying goods would increase, which would result in lower incomes.
- 3.7 Competitors to PayPal would need to have enough merchants and households using their electronic payments system to make the system work and would need enough business to spread the overhead costs of setting up the competing electronic payments system. Economists use the phrase "network externalities" when referring to the lower costs that a firm like PayPal has relative to potential entrants to its market. The more merchants and households that use PayPal, the more desirable using the system becomes for other merchants and households, the lower PayPal's cost are, and the more difficult it becomes for new entrants to compete with it.

## 2.4 Measuring the Money Supply

Learning objective: Explain how the U.S. money supply is measured.

### Review Questions



- 4.1 The assets in M1 are more liquid. M1 is the narrow definition of the money supply and includes currency in circulation, traveler's checks, and checking account deposits, all assets that are highly liquid. M2 is a broad measure of the money supply and includes M1, time deposits with a value of less than \$100,000, savings accounts, money market deposit accounts, and non-institutional money market mutual fund shares.
- 4.2 M2 has grown more rapidly. Certificates of deposit, money market mutual fund shares, and other assets that are included only in M2 have grown faster than currency in circulation or checking accounts. The growth of M2 has been more stable than the growth of M1, although as Figure 2.2, panel (b) on page 35 shows, there have been substantial swings in the growth rates of both measures of the money supply.

### Problems and Applications

- 4.3 Liquidity indicates the ease with which an asset can be converted to money. Ranking from most to least liquid: dollar bill, checking account, savings account, money market mutual fund, corporate stock, gold bar, and house.
- 4.4
- Both M1 and M2
  - Only M2
  - Only M2
  - Both M1 and M2
- 4.5 M1 will decrease and M2 will stay the same. M2 includes both the checking account deposit (because M2 includes M1) and the certificate of deposit.
- 4.6 Credit is not a form of money, because it is a debt that is owed to the issuer of the card. A transaction using a credit card is completed only when the credit card debt is paid off—typically using a check.
- 4.7 Gold has had intrinsic value for thousands of years. It meets all the requirements for money except that it is difficult to transport. Some people do not trust fiat currency when the central bank is printing money or using open market operations to expand the money supply. Doing so has the potential to erode the value of fiat currency. Gold does not have this problem. Gold is not used as money in the United States, but it is used as a store of value. Davis was making the point that gold has intrinsic value, while fiat currency does not.
- 4.8 Some countries with less central bank discipline have inflation problems or currency crises. Holding U.S. dollars is a way for households and firms to avoid the losses cause by inflation reducing the purchasing power of the domestic currency. Also, many goods traded internationally are purchased in dollars, so it is convenient to hold dollars. The key advantage to foreign governments of households and firms using the U.S. dollar is that doing so avoids the loss of economic efficiency and income that would result from their economies reverting to barter. In addition, if the governments lack the political will to gain control over their money supplies, using U.S. dollars is a way of avoiding severe inflation. The disadvantages to the foreign governments include the inability to conduct monetary policy, which requires the central bank to be able to control the money supply.
- 4.9 This answer depends on what M1 is being used to measure. If M1 is being used to measure the money supply in the United States, this statement is correct. If M1 is being used as a measure of total currency in circulation, then the statement is incorrect. In any event, it would be difficult for the Federal Reserve to measure accurately the fraction of M1 that is inside the United States.

## 2.5 The Quantity Theory of Money: A Look First at the Link Between Money and Prices

Learning objective: Use the quantity theory of money to analyze the relationship between money and prices in the long run.

### Review Questions

- 5.1 The equation of exchange relates the quantity of money,  $M$ , the velocity of money,  $V$ , the price level,  $P$ , and the level of real GDP,  $Y$  as  $M \times V = P \times Y$ . With the velocity of money defined as  $PY/M$ , the equation of exchange is an identity, not a theory. A theory is a statement about the world that might possibly be false.
- 5.2 The quantity theory of money is a theory about the relationship between money and prices that assumes that the velocity of money is constant. The theory is based on the equation of exchange identity:  $M \times V = P \times Y$ . Assuming that velocity ( $V$ ) is constant, increases in the money supply that exceed increases in real GDP lead to inflation.
- 5.3 Hyperinflation refers to a rate of inflation that exceeds 50% per month. Large increases in the money supply cause hyperinflation. As prices rise, the purchasing power of the currency falls, households and firms hold money for briefer and briefer periods as they try to avoid the losses in purchasing power. As a result, the velocity of money increase, which further increases the rapid increase in prices. The large increases in the money supply resulting in hyperinflation are ultimately caused by large government budget deficits, which are paid for by the central bank buying government bonds, thereby increasing the money supply.
- 5.4 Pros: The central bank will be independent from direct political influence. For example, in the United States, the independence of the Fed means that Congress has no direct control over monetary policy. Typically, inflation is lower when the central bank is independent. Cons: A central bank may have too much power without the checks and balances that come from being overseen by elected members of the government. In addition, the independence of the central bank may make it more difficult for the government to coordinate monetary and fiscal policy.

### Problems and Applications

- 5.5 Rearranging the equation from page 37:  $\% \Delta V = (\% \Delta P + \% \Delta Y) - \% \Delta M$  or  $1 = (2 + 3) - 4$ . The value of velocity in 2013 would have increased 1%.
- 5.6 This statement is not necessarily true because if velocity falls more than the money supply rises, the value of total production will fall.
- 5.7 The money supply falling, the velocity of money falling, or the money supply increasing more slowly than real GDP—with velocity remaining constant—can all cause a deflation. It is not necessary for the quantity of money to decline for a deflation to occur. Although there is a strong link between money supply and prices, prices can fall without the money supply falling. For example, if velocity is constant, while real GDP increases by 4%, then a 3% increase in the money supply would result in a 1% decline in the price level. During the late nineteenth century in the United States, the money supply increased most years, although the rate of increase was low.
- 5.8 Inflation reduces the value of money. Fewer transactions using money may occur if inflation is high. At very high rates of inflation, households and firms might return to barter because they fear that holding money even for brief periods will cause them to suffer losses as the purchasing power of the money rapidly declines.

- 5.9 a. A “commodity standard” refers to a commodity that the quantity of money is linked to. Prior to the 1930s, the United States and other countries tied their money to gold.
- b. The money supply, being tied to a commodity, could not grow unless the quantity or the value of the commodity grew. Unless the quantity of the commodity grew rapidly, as it did in the sixteenth century with huge quantities of gold being exported to Europe, inflation would be limited.
- 5.10 Ending the hyperinflation was better news for lenders to the extent that the hyperinflation was unanticipated and resulted in borrowers paying back their loans in money that had less purchasing power than anticipated. Because the hyperinflation had caused banks to sharply reduce the number of loans granted, however, the end of the hyperinflation was also good news to many borrowers.
- 5.11 The war reparations left Germany with unrealistic debt obligations. To meet these debt obligations, Germany printed money. Printing large amounts of money caused hyperinflation, which resulted in a collapse in the purchasing power of money and created economic turmoil. As we have seen in this chapter, when money is no longer used as a medium of exchange, an economy begins to revert to barter, with a resulting decline in specialization and income. In addition, people with savings accounts, bonds, and other financial assets payable in currency will have some, perhaps all, of their wealth wiped out. It is in the context of this economic turmoil and discontent that the Nazi party eventually gained power. Had there not been economic turmoil in post-WWI Germany, it could be argued there may not have been a Hitler.
- 5.12 a. Zimbabwe abandoned its own currency, the Zimbabwean dollar, because it was experiencing hyperinflation that had destroyed the purchasing power of the currency, leading to sharp declines in production and employment.
- b. Using the U.S. dollar as its currency gave Zimbabwe a stable currency, eliminating the ruinous effects of hyperinflation.
- c. Zimbabwe can no longer use monetary policy because it no longer has control over the currency households and firms are using.
- 5.13 Statistical evidence shows a strong relationship between the growth rate of the money supply and the inflation rate in the long run. The link is stronger in the long run than in the short run, because changes in the growth rates of velocity and real GDP are greater in the short run.
- 5.14 Reducing Fed independence would increase the influence of Congress on monetary policy decisions. Bernanke is referring to the political pressure that governments may bring to bear on central banks to take actions that may not be in the best long-run interests of the economy. For example, a government may pressure a central bank to buy large amounts of bonds that the government issued to finance a budget deficit even if the resulting increase in the money supply may increase the inflation rate. Politicians may also have short-term political motives to expand the money supply during an election year to increase production and employment even if the increase in the money supply may increase the inflation rate in the long run. Under current law, the Fed is able, in principle, to make its decisions in a disinterested, apolitical way. Figure 2.4 on page 42 provides evidence that countries with more independent central banks tend to have lower inflation rates.

## Data Exercises

D2.1 For December 31, 2012: M1 Money Stock = \$2,442.5 billion, Currency Component of M1 = \$1,091.7 billion, Total Checkable Deposits = \$1,346.9 billion, and Travelers Checks Outstanding = \$3.9 billion. Total Checkable Deposits are the largest component of M1 and Travelers Checks Outstanding are the smallest.

D2.2 a.

Date	M1	M2	M1/M2
2012-12	\$2,455.5 billion	\$10,408.0 billion	0.236
2007-12	\$1,375.2 billion	\$7,438.4 billion	0.185
2002-12	\$1,220.6 billion	\$5,737.4 billion	0.213

b. M1 as a proportion of M2 decreased from December 2002 to December 2007 and then increased from December 2007 to December 2012. The financial crisis in late 2007 through 2009 increased the demand for U.S. currency both in the United States and abroad, increasing the proportion of M1 to M2.

D2.3 a. In the third quarter of 2012, nominal GDP equaled \$15,811 billion, the velocity of M1 equaled 6.747, and the velocity of M2 equaled 1.572. In the third quarter of 1985, nominal GDP equaled \$4,258.3, the velocity of M1 equaled 7.142, and the velocity of M2 equaled 1.742. Using the equation of exchange ( $M \times V = P \times Y$ ),  $M = (P \times Y)/V$ .  $P \times Y$  equals nominal GDP. For the third quarter of 2012,  $M1 = \$15,811/6.747 = \$2,343$  billion and  $M2 = \$15,811/1.572 = \$10,058$  billion. For the third quarter of 1985,  $M1 = \$4,258.3/7.142 = \$596$  billion and  $M2 = \$4,258.3/1.742 = \$2,445$  billion.

b. Both the velocity of M1 and the velocity of M2 declined from 1985 to 2012.

D2.4 Note: In FRED, in the second line below the graph of M2, highlight “Levels” to change the units to compound annual rate of change. Similarly, below the graph of CPI, change the units to the percentage change from year ago. The compound annual rate of change and the percentage change in the CPI tend to move together, though not perfectly and with M2 being considerably more volatile.

