Chapter 2
Money and the Monetary System

CHAPTER PREVIEW

The monetary system plays an important role in the operation and development of the financial system. This chapter describes the monetary system of the United States in detail. We begin with a discussion of the process of moving savings into investments and follow with an overview of the monetary system. We then cover the three major functions of money and how money developed in the U.S. over time. Next, we cover money market securities and follow with measures of the U.S. money supply. This is followed by a brief presentation of the views of monetarists and Keynesians concerning the relationship between the money supply and economic activity. The chapter concludes with a brief coverage of the international monetary system.

LEARNING OBJECTIVES

- *Describe the three ways that money is transferred from savers to investors.*
- *Identify the major components of the monetary system.*
- *Describe the functions of money.*
- *Give a brief review of the development of money in the U.S.*
- *Describe major types of money market securities.*
- *Briefly explain the M1, M2, and M3 definitions of the money supply.*
- *Explain possible relationships between money supply and economic activity.*
- *Comment on developments in the international monetary system.*

CHAPTER OUTLINE

I. PROCESS OF MOVING SAVINGS INTO INVESTMENTS

II. OVERVIEW OF THE MONETARY SYSTEM

III. IMPORTANCE AND FUNCTIONS OF MONEY

IV. DEVELOPMENT OF MONEY IN THE UNITED STATES
  A. Physical Money (Coin and Paper Currency)
    1. U.S. Coins
    2. Paper Currency
  B. Deposit Money

V. MONEY MARKET SECURITIES

VI. MEASURES OF THE U.S. MONEY SUPPLY
- A. M1 Money Supply
- B. M2 Money Supply
- C. M3 Money Supply
- D. Exclusions from the Money Supply

VII. MONEY SUPPLY AND ECONOMIC ACTIVITY

VIII. INTERNATIONAL MONETARY SYSTEM

IX. SUMMARY

LECTURE NOTES

I. PROCESS OF MOVING SAVINGS INTO INVESTMENTS

We begin with a discussion of the difference between a surplus economic unit and a deficit economic unit. We focus on the savings-investment process that involves the direct or indirect transfer of individual savings to business firms in exchange for their debt securities. Savers may invest directly in a business firm by exchanging their money for the firm's securities. Savers also may make indirect transfers by first placing their money either through an investment banking firm or a financial intermediary. When using an investment banking firm, money flows from savers through to the business firm and the business firm's securities flow back through to the savers. When using a financial intermediary, savers invest their money in a financial institution and receive the institution's securities. The financial institutions then invest money in the business firm and receive the firm's securities in exchange for their investment.

(Use Figure 2.1 and Discussion Questions 1 through 3 here.)

II. OVERVIEW OF THE MONETARY SYSTEM

The monetary system is responsible for carrying out the financial functions of creating and transferring money. Money is transferred from savers to investors either directly or indirectly. For example, if the investor is a business firm, a direct transfer takes place when savers purchase the securities (stocks or debt instruments) of the business firm by exchanging money for the firm's securities.

An indirect transfer between savers and a business firm can take place either through an investment banking firm or through a financial intermediary. Investment banking firms often first purchase the securities from the issuing firm and then sell the securities to the savers. However, no additional securities are created in this type of indirect transfer. When using a financial intermediary, savers deposit or invest money

with a financial intermediary such as a bank which issues its own securities to the saver. The bank, in turn, makes a loan to the business firm.

The major participants in the U.S. monetary system include a central bank and a banking system comprised of a number of individual banks. The Federal Reserve System is the central bank in the U.S. and it is responsible for defining and regulating the money supply, as well as facilitating the transferring of money through check processing and clearing. The banking system creates money and transfers money through check processing and clearing within the banking system.

(Use Figure 2.2 and Discussion Question 4 here.)

III. IMPORTANCE AND FUNCTIONS OF MONEY

We begin with a discussion of the difference between real and financial assets. *Money* is anything generally accepted as a means of paying for goods and services and for paying off debts. The basic function of money is that of serving as a *medium of exchange.* A second function of money is that it can be held as a *store of value* (or purchasing power) and thus can be drawn upon at will. Money is perfectly liquid since it is a generally accepted medium of exchange. Money also serves as a *standard of value.* This third function refers to the fact that prices as well as contracts for deferred payments are expressed in terms of the monetary unit.

(Use Discussion Questions 5 through 7 here.)

IV. DEVELOPMENT OF MONEY IN THE UNITED STATES

The U.S. monetary system developed to meet the changing needs of the economy. As primitive economies began to develop, a *barter* system (based on tables of relative values) was developed to help facilitate the exchange of goods and services. Records in early economies show many items that were useful for food or clothing (i.e., commodities) were used as both a medium of exchange and as a unit for measuring value.

There was a gradual transition from the use of commodities for exchange to the use of precious metals. The advantages of precious metals eventually led to their general use. For example, the supply of gold and silver was limited enough so that these metals had great value, and they were also in great demand for ornamentation purposes. Coins with a certain weight of metal in them were developed to aid the process of exchanging goods and services.

Full-bodied money is used to refer to coins that have metal content worth the same as their face values. Coins with face values higher than the value of their metal content are called *token coins*. Paper money may be either representative full-bodied money or fiat money. *Representative full-bodied money* is paper money that is backed by an amount of precious metal equal in value to the face amount of the paper money. *Fiat money* is money that is not backed by precious metals but is decreed by the government to be "legal tender" for purposes of making payments and discharging debts.

The use of physical money (coin and currency) to complete transactions can be very costly and inefficient. As a result, along with confidence in the banking system, a special type of credit money called deposit money has grown in importance. *Credit money* is money backed by the "creditworthiness" of the issuer. Deposit money is backed by the creditworthiness of the depository institution that issued the deposit.

Automatic transfer service (ATS) accounts provide for direct deposits to, and payments from checkable deposit accounts. Employers can have their employees' wages deposited directly in their checking accounts. Individuals can have regular payments such as mortgage payments automatically deducted from their accounts. *Debit cards* provide for immediate direct transfer of deposit amounts such as when a debit card is used to purchase merchandise at a retailer's "point of sale" cash register. When the sale is recorded, the cardholder's bank transfers the designated amount from the purchaser's demand account to the retailer's account.

(Use Figures 2.3, 2.4, and 2.5 and Discussion Questions 8 through 13 here.)

V. MONEY MARKET SECURITIES

Money market securities are debt instruments or securities with maturities of one year or less that are created or trade in money markets. We identify six major money market securities: a) treasury bills, b) commercial paper, c) negotiable certificates of deposit (negotiable CDs), e) repurchase agreements, and f) federal funds.

(Use Figure 2.6 and Discussion Question 14 here.)

VI. U.S. MONEY SUPPLY TODAY

The M1 definition of the money supply includes only types of money that are acceptable as a medium of exchange. Included are currency, traveler's checks, demand deposits, and other checkable deposits. All four components are types of credit money. The coins are token money and the paper currency is fiat money in the form of Federal Reserve Notes.

M2 is a broader measure of the money supply than M1 because it emphasizes money as a store of value in addition to its function as a medium of exchange. M2 includes all of M1 plus savings deposits, money market deposit accounts (MMDAs), and small-denomination time deposits (under $100,000) at depository institutions plus balance in retail money market mutual funds (MMMFs) where initial investments are less than $50,000.

M3 takes an even broader view of money as a store of value. M3 includes all of M2 plus large time deposits (over $100,000), balances in institutional MMMFs (minimum initial investment of $50,000 or more), repurchase agreements (overnight and term) issued by depository institutions, and Eurodollars (overnight and term) held

by U.S. residents in the United Kingdom and Canada and at foreign branches of U.S. banks.

(Use Figure 2.7 and Discussion Questions 15 through 17 here.)

VII. MONEY SUPPLY AND ECONOMIC ACTIVITY

Economists generally believe that money supply "matters" when trying to "manage" economic activity. They have observed that economic activity, money supply, and the price levels of goods and services generally move together over time. However, economists disagree as to how these relationships are to be explained.

Monetarists believe that the amount of money in circulation determines the level of gross domestic product (GDP) or economic activity. If we divide GDP by the money supply (MS), we get the number of times the money supply "turns over" to produce GDP. This turnover of money is called the velocity of money and measures the rate of circulation of the money supply. Monetarists also believe that when the money supply exceeds the amount of money demanded, the public will spend more rapidly causing real economic activity or prices to rise. A too rapid rate of growth in the money supply will ultimately result in rising prices or inflation because excess money will be used to bid up the prices of existing goods.

Other economists, called *Keynesians*, believe that a change in the money supply has a less direct relationship with GDP. They argue that a change in money supply first causes a change in interest rate levels which, in turn, alters the demand for goods and services. Decreases in the money supply will likely cause interest rates to rise. As a result, GDP will grow more slowly or even decline depending on how the higher interest rates affect consumption and spending decisions.

(Use Discussion Questions 18 and 19 here.)

VIII. INTERNATIONAL MONETARY SYSTEM

Students should be made aware of the globalization of economic activity. The exchange of goods and services is no longer primarily within the borders of an individual country. Rather, a country's economic system is necessarily tied to the international exchange of goods and services. A well developed international monetary system is necessary for a successful global economy.

The international monetary system has been historically tied to the gold standard. For example, in 1944 many of the world's economic powers met and agreed to an international monetary system that was tied to the U.S. dollar or gold via fixed, or pegged, exchange rates. By early 1973, major currencies were allowed to "float" against each other, resulting in a flexible or floating exchange rate system. Today the

current international monetary system is a "managed" floating exchange rate system (because central monetary authorities sometimes intervene).

A *currency exchange rate* indicates the value of one currency relative to another. If demand for a particularly currency falls relative to its supply, the exchange rate falls and the international purchasing power of that nation's money supply drops. We discuss currency exchange rates in detail in Chapter 6.

(Use Discussion Question 20 here.)

DISCUSSION QUESTIONS AND ANSWERS

1. *How do surplus economic units and deficit economic units differ?*

   A *surplus economic unit* generates more money than it spends resulting in excess money to save or spend.

   A *deficit economic unit* spends more money than it brings in resulting in a need for additional money.

2. *Describe the three basic ways whereby money is transferred from savers to investors.*

   There can be a direct transfer of money between savers and investors. For example, savers can directly purchase the stocks or debt instruments of a business firm by exchanging money for the firm's securities. Money also can be transferred from savers to investors via indirect transfers. For example, if the investor is a business firm, savers can transfer money to the business firm either through the use of an investment banking firm or through a financial intermediary.

3. *Identify economic units in addition to business firms who might need funds from savers.*

   Government entities (U.S. government and state and local governments) spending more than their tax revenues may need funds from savers to balance their budgets. Some individuals and other units might seek funds from savers to finance home ownership or other real estate investments.

4. *Identify the major participants in the U.S. monetary system.*

   A central bank (i.e., the Federal Reserve System in the U.S.) is needed to define and regulate money supply and to facilitate the transferring of money through check processing and clearing. An efficient banking system also is needed to create money, transfer money, provide financial intermediation, and to process and clear checks.

5. *Indicate how real assets and financial assets differ.*

   Real assets include the direct ownership of land, buildings, homes, equipment, inventories, durable goods, and precious metals.

   Financial assets include money, debt instruments, equity securities, and other financial contracts backed by real assets and the earning abilities of issuers.

6. *Define money and indicate the basic functions of money.*

Money acts as: (a) a medium of exchange; (b) a store of value; and (c) a standard of value. Unless the value of money is relatively stable, it will not be held long enough to serve as a medium of exchange or as a store of value or purchasing power. It can serve as a standard of value only if its value is relatively stable, since it is all but impossible to use a varying standard for measuring values.

7. *Describe how an individual's net worth is determined.*

Individual net worth is the sum of an individual's money, real assets, and financial assets or claims against others less the individual's debt obligations.

8. *Briefly describe the development of money, from barter to the use of precious metals.*

Barter, or the exchange of goods for goods, developed as specialization of production and exchange of goods developed. Some items were generally desired and other goods were traded for them since they could always be used for further trading. The goods that were frequently traded also served as a yardstick for measuring the value of goods traded less frequently. However, barter was clumsy because items of food, clothing, and ornamentation were difficult to carry around; items were of different quality, so arguments could arise over their value.

Exchange was also clumsy since it had to take place in whole units, such as one or two furs, and the like. The use of gold and silver did not present these difficulties, and so they became more widely used. As time went on, these metals were made into coins with definite weights in metals of a certain purity, and they served even more effectively as a medium of exchange.

9. *What is the difference between full-bodied money and token coins?*

Full-bodied money is defined as coins that have metal content equal to their face values. Toke coins are coins with face values higher than the values of their metal content.

10. *Describe how representative full-bodied money and fiat money differ.*

Representative full-bodied money is paper money that is backed by an amount of precious metal equal in value to the face amount of the paper money. Fiat money is paper money without metal backing but where the government decrees the money to be "legal tender" for purposes of making payments and discharging public and private debts.

11. *What is deposit money and how is it "backed"?*

Credit money is money backed by the "creditworthiness" of the issuer. Deposit money is backed by the creditworthiness of the depository institution that issued the deposit.

12. *What are automatic transfer service (ATS) accounts?*

ATS accounts provide for direct deposits to, and payments from, checkable deposit accounts. For example, employers can have their employees' wages deposited directly in their checking accounts instead of issuing payroll checks.

13. *What are debit cards and how are they used?*

Debit cards provide for the immediate direct transfer of deposit amounts. For example, when a debit card is used to purchase merchandise at a retailer's "point of sale" cash register, the card holder's bank transfers the designated amount form the purchaser's demand account to the retailer's account.

14. Define money market securities and briefly describe the major types of these securities.

Money market securities are debt instruments or securities with maturities of one year or less. We identify six major money market securities:

Treasury bills short-term debt obligations issued by the U.S. federal government.

Negotiable certificates of deposit (negotiable CDs) are short-term debt instruments issued by depository institutions that can be traded in secondary money markets.

Commercial paper is short-term unsecured promissory notes issued by high credit-quality corporations.

Banker's Acceptances are promises of future payment issued by importing firms and guaranteed by banks.

Repurchase agreements are short-term debt securities where sellers agree to repurchase their securities at a specified price and date.

Federal funds are very short-term loans between depository institutions with excess funds and those with a need for funds.

15. Describe the M1 definition of the money supply and indicate the relative significance of the M1 components.

M1 includes: currency (coin and federal reserve notes), demand deposits at commercial banks and other checkable deposits at depository institutions (commercial banks, savings and loan associations, savings banks, and credit unions), and travelers checks. Currency and demand deposits are the two largest components of M1 and together account for over three-fourths of M1. Traveler's checks represent less than one percent of M1.

M1 measures transaction balances which are sums of money that can be spent without first converting them to some other asset, and which are held for anticipated or unanticipated purchases or payments in the immediate future. Essentially, only those amounts that represent the purchasing power of units in our economy other than the federal government are counted.

16. How does M2 differ from M1? What are money market mutual funds?

M2 is a broader measure of the money supply than M1 because it emphasizes money as a store of value in addition to its function as a medium of exchange. M2 includes all of M1 plus savings deposits, money market deposit accounts (MMDAs), and small-denomination time deposits (under $100,000) at depository institutions plus balance in retail money market mutual funds (MMMFs) where initial investments are less than $50,000.

Money market mutual funds (MMMFs) issue "shares" to customers and invest the proceeds in highly liquid, very short maturity, interest-bearing debt instruments called "money market investments." Thus, MMMFs get their name from the type of investments they make.

17. Describe the M3 measure of the money supply.

M3 takes an even broader view of money as a store of value. M3 includes all of M2 plus large time deposits (over $100,000), balances in institutional MMMFs (minimum initial investment of $50,000 or more), repurchase agreements (overnight and term) issued by depository institutions, and Eurodollars (overnight and term) held by U.S. residents in the United Kingdom and Canada and at foreign branches of U.S. banks.

18. Briefly describe the monetarists' view of the relationship between money supply and economic activity.

Monetarists believe that the amount of money in circulation determines the level of GDP or economic activity. If we divide GDP by the money supply, we get the number of times the money supply turns over to produce GDP. This turnover of money is called the velocity of money. Monetarists also believe that when the money supply exceeds the amount of money demanded, the public will spend more rapidly causing real economic activity or prices to rise.

19. How do Keynesians view the relationship between money supply and economic activity?

Keynesians believe that a change in the money supply has a less direct relationship with GDP. They argue that a change in money supply first causes as change in interest rate levels which, in turn, alters the demand for goods and services. For example, an increase in the money supply might cause interest rates to fall (at least initially) because more money is being supplied relative to that being demanded.

20. Briefly describe the development of the international monetary system.

The international monetary system was historically tied to the gold standard. A breakdown in the gold standard occurred during World War I, and less formal exchange systems continued during the 1930s and during World War II. In 1944, many of the world's economic powers met and agreed to an international monetary system which was tied to the U.S. dollar or gold via fixed or pegged exchange rates. By early 1973, major currencies were allowed to "float" against each other resulting in a flexible or floating exchange rate system. The current international monetary system is a "managed" (because sometimes central monetary authorities attempt to intervene) floating exchange rate system.

EXERCISES AND ANSWERS

1. Match the following money market securities with their issuers.

Securities	***Issuers***
a. Treasury bills [# 2]	*1. depository institutions*
b. negotiable CDs [#1]	*2. U.S. government*
c. commercial paper [#4]	*3. banks*
d. banker's acceptances [#3]	*4. business firms and institutions*

2. *Match the following money market securities with the level of secondary market activity.*

a. Treasury bills [#4]	*1. no activity*
b. commercial paper [#3]	*2. low activity*
c. federal funds [#1]	*3. moderate activity*
d. negotiable CDs [#2]	*4. high activity*

3. *Go to the Website of the Federal Reserve Bank of St. Louis at http://www.stlouisfed.org. Go to "research and data" and access the Federal Reserve Economic Database (FRED). Compare the present size of M1 and M2 money stock measures with the data presented in Figure 2.7. Also find the current sizes of these M1 components: currency, travelers' checks, demand deposits, and other checkable deposits. Express each component as a percentage of M1 and compare your percentages with those presented in the Measures of the U.S. Money Supply section of this chapter.*

The instructor should specify a recent month and ask students to find M1 and M2 for that month and compare their findings with data in Figure 2.7. While it takes some effort, each of the four components of M1 also can be found for the specified month for comparison with data in Figure 2.7.

4. *Find several recent issues of Business Week. Identify articles relating to developments in the U.S. monetary system. Also search for possible developments occurring in foreign monetary systems.*

Note: The former *Business Week* is now *Bloomberg Businessweek.*

The instructor can either (1) allow students flexibility in identifying and discussing relevant articles, or (2) identify one or more specific articles for students to discuss from recent issues of *Bloomberg Businessweek.*

5. *We are faced with ethics decisions involving money almost every day. For example, we all probably have seen money in the form of coin or currency lying on the ground or floor somewhere. We also may have at some time discovered a lost wallet. Should it matter if the amount of money is small or large? Should it matter if no one else is around and/or there is no evidence of who lost the money? Sometimes we hear the*

finders-keepers argument being used to rationalize an individual's decision. How would you react to the following scenarios?

a. You are walking down a street and find a dollar bill lying on the ground. No one else is close by. You consider picking up the dollar, acknowledging your good luck, and putting it in your pocket. What would you do?

Ethical behavior reflects how an individual treats others legally, fairly, and honestly. It is illegal to take another person's money without earning it or having it given to you by that person. Of course, in some instances it is not known to whom the money belongs. Furthermore, when the amount of money is in the form of a coin or dollar bill found on the street, many individuals employ the "finders-keepers" argument—possibly in part because the effort to find the owner is more than the amount found. This is not to say that the act is ethical but rather seems to represent "practice" for many individuals.

b. While you are shopping in a grocery store you see a wallet lying on the floor. You don't know who dropped the wallet. You consider holding on to the wallet until you get home and then search for the owner's identification so that you might contact the owner with information that you have the wallet. Alternatively, you could just give the wallet to the store manager. What would you do?

Probably every individual would like to be treated fairly and honestly by others. Surely, if you "lost" your wallet, you would hope that it is turned in as soon as possible. Protecting your identity and credit cards is probably at least important as getting back the currency in your wallet. Furthermore, once you discovered you lost your wallet, you likely would retrace your steps including asking the store manager whether your wallet had been turned in.

Turning in the wallet as soon as you found it also would eliminate any enticement to keep what is not yours if you wait until you returned home and then made an effort to identify the owner.

PROBLEMS AND ANSWERS

1. Determine the size of the M1 money supply using the following information.

Currency plus Traveler's checks	*$25 million*
Negotiable CDs	*$10 million*
Demand deposits	*$13 million*
Other checkable deposits	*$12 million*

The M1 money supply would be: $25 million (currency plus Traveler's checks)) + $13 million (demand deposits) + $12 million (other checkable deposits) = $50 million.

2. Determine the size of the M1 money supply using the following information.

Currency	*$700 billion*
Money market mutual funds	*$2,000 billion*
Demand deposits	*$300 billion*
Other checkable deposits	*$300 billion*
Traveler's checks	$10 billion

The M1 money supply would be: $700 billion (currency) + $300 billion (demand deposits) + $300 billion (other checkable deposits) + $10 billion (traveler's checks) = $1,310 billion.

3. Determine the size of the demand deposits component of the M1 money supply using the following information.

Currency	*$350 million*
Traveler's checks	*$10 million*
Other checkable deposits	*$200 million*
Small time deposits	*$100 million*
M1 money supply	*$800 million*

The demand deposits component would be: $800 million (M1 money supply) - $350 million (currency) - $10 million (traveler's checks) -$200 million (other checkable deposits) = $240 million.

4. Following are components of the M1 money supply at the end of last year. What will be the size of the M1 money supply at the end of next year if currency grows by 10 percent, demand deposits grow by 5 percent, other checkable deposits grow by 8 percent, and the amount of traveler's checks stays the same?

Currency	*$700 billion*
Demand deposits	*$300 billion*
Other checkable deposits	*$300 billion*
Traveler's checks	*$10 billion*

Next year's M1 would be: $700(1.10) billion + $300(1.05) billion + $300(1.08) billion + $10(1.00) billion = $770 billion + $315 billion + $324 billion + $10 billion = $1,419 billion.

5. The following information is available to you: travelers checks = $1 million; coin and paper currency = $30 million; repurchase agreements and Eurodollars = $15 million; demand deposits = $25 million; retail money market mutual funds = $60 million; savings accounts at depository institutions = $40 million; checkable deposits at depository institutions = $35 million; large-denomination time deposits = $50 million; institutional money market mutual funds = $65 million; and small-denomination time deposits = $45 million. Using Fed definitions, determine the dollar sizes of:

a. M1 money supply

Travelers checks	$1 million
Coin and currency	30
Demand deposits	25
Other checkable deposits	35
M1 money supply	$91 million

b. M2 money supply

M1 money supply	$91 million	
Retail money market mutual funds	60	
Savings accounts at depository institutions		40
Small denomination time deposits		45
M2 money supply		$236 million

c. M3 money supply

M2 money supply	$236 million
Repurchase agreements and Eurodollars	15
Large-denomination time deposits	50
Institutional money market mutual funds	65
M3 money supply	$366 million

6. A country's gross domestic product (GDP) is $20 billion and its money supply (MS) is $5 billion.

a. What is the country's velocity of money (VM)?

VM = $20 billion/$5 billion = 4.0

b. If the MS stays at the same level next year while the velocity of money "turns over" 4.5 times, what would be the level of GDP?

GDP = $5 billion x 4.5 = $22.5 billion

c. Assume that the VM will turn over 4 times next year. If the country wants a GDP of $22 billion at the end of next year, what will have to be the size of the money supply? What percentage increase in the MS will be necessary to achieve the target GDP?

MS = $22 billion/4 = $5.5 billion

% increase in MS = ($5.5 billion - $5 billion)/$5 billion = 10%

7. Assume that the real output (RO) for a country is expected to be 2.4 million products.

a. If the price level (PL) is $250 per product, what will be the amount of the gross national product (GDP)?

GDP = 2.4 million x $250 = $600 million

b. Now assume that the GDP is projected to be $8 million next year. What will the PL of the products need to be to reach the GDP target?

PL = $8 million/2.4 million = $3.33

Note: If GDP had been $800 million, PL = $800 million/2.4 million = $333million

c. Now assume that the RO of 2.4 million products is composed of equal amounts of two types of products. The first product sells for $100 each, and the second product sells for $500 each. What will be the size of the GDP?

GDP = 2.4 million x ($100 + $500)/2] = 2.4 million x $300 = $720 million

8. *Assume that a country estimates its M1 money supply at $20 million. A broader measure of the money supply, M2, is $50 million. The country's gross domestic product (GDP) is $100 million. Production or real output for the country is 500,000 units or products.*

   a. *Determine the velocity of money based on the M1 money supply.*

      VM1 = GDP/MS1 = $100 million/$20 million = 5.0 times

   b. *Determine the velocity of money based on the M2 money supply.*

      VM2 = GDP/MS2 = $100 million/$50 million = 2.0 times

   c. *Determine the average price for the real output.*

      Average Price = GDP/units = $100 million/500,000 = $200

9. *Using the data in Problem 8, along with the monetarists' view of the relationship between money supply and GDP, answer the following:*

   a. *If the M1 money supply increases by 10 percent and the M1 velocity of money does not change, what is the expected value of GDP next year?*

      [$20 million x 1.10] x 5.0 = $22 million x 5.0 = $110 million GDP

   b. *Based on the information from (a), if real output does not change next year, what is the expected average price for the products. What percentage change, if any, would take place in the price level?*

      $110 million/500,000 units = $220 price level
      ($220 - $200)/$200 = 10%

c. *If the M2 money supply decreases by 10 percent and the M2 velocity of money does not change, what is the expected value of GDP next year?*

$50 million x .90 = $45 million
$45 million x 2.0 = $90 million GDP

d. *Based on information from (c), if the price level does not change next year, what is the expected real output in units or products?*

$90 million/$200 = 450,000 units

10. *The following information was gathered for the XYZ economy: velocity of money = 3.8 times; average price level = $85; and real output = 10,000 units.*

a. *What is the nominal GDP for the XYZ economy?*

MS x VM = RO x PL
10,000 units x $85 = $850,000 GDP

b. *What is the size of the money supply for the XYZ economy?*

$850,000/3.8 = $223,684 MS

c. *If real output increases by 10 percent next year, but the price level and velocity of money do not change, what money supply amount will be needed to support this real growth in economic activity?*

RO = 10,000 units x 1.10 = 11,000 units
11,000 units x $85 = $935,000 GDP
$935,000/3.8 = $246,053

d. *What will be the money supply needed to support economic activity next year if real output increases to 12,000 units, the average price increases to $90, and velocity increases to 4 times?*

12,000 units x $90 = $1,080,000
$1,080,000/4.0 = $270,000 MS

11. *The One Product economy which produces and sells only personal computers (PCs), expects that it can sell 500 more or 12,500 PCs next year. Nominal GDP was $20,000,000 this year and the money supply was $7,000,000. The central bank for the One Product economy is planning to increase the money supply by 10 percent next year.*

a. What was the average selling price for the personal computers this year?

$20,000,000/12,000 units = $1,667 average price

b. What is the expected average selling price next year for personal computers if the velocity of money remains at this year's turnover rate? What percentage change in price level is expected to occur?

VM = GDP/MS = $20,000,000/$7,000,000 = 2.86 times
($7,000,000 x 1.10) x 2.86 = $7,700,000 x 2.86 = $22,022,000 GDP
$22,022,000/12,500 units = $1,762
($1,762 - $1,667)/$1,667 = $95/$1,667 = 5.7%

c. If the objective is to keep the price level the same next year (i.e., no inflation), what percentage increase in the money supply should the central bank plan for?

RO x PL = 12,500 units x $1,667 = $20,837,500 GDP
$20,837,500/2.86 = $7,285,839
($7,285,839 - $7,000,000)/$7,000,000 = 4.1%

d. How would your answer in Part c change if the velocity of money is expected to be three times next year?

$20,837,500/3.00 = $6,945,833
($6,945,833 - $7,000,000)/$7,000,000 = -.8%

12. ***Challenge Problem*** *The following problem requires a basic knowledge about probabilities and the calculation of expected values. In addition, the problem is more easily solved using Excel spreadsheet software.*

Scenario	**A**	**B**	**C**	**D**	**E**	**Metric**
Probability	.10	.20	.40	.20	.10	percent
Velocity of money	1.75	2.5	3.0	3.5	4.25	turnover
Real output	375	450	500	550	625	units (thousands)
Price level	75	90	100	110	125	dollars

a. Calculate the dollar amount of the money supply under each scenario or outcome.

MS x VM = RO x PL
MS = (RO x PL)/VM
Scenario A: (375,000 x $75)/1.75 = $28,125,000/1.75 = $16,071,429
Scenario B: (450,000 x $90)/2.5 = $40,500,000/2.5 = $16,200,000
Scenario C: (500,000 x $100)/3.0 = $50,000,000/3.0 = $16,666,667
Scenario D: (550,000 x $110)/3.5 = $60,500,000/3.5 = $17,285,714

Scenario E: (625,000 x $125)/4.25 = $78,125,000/4.25 = $18,382,353

b. Calculate the expected value of the money supply, taking into consideration each scenario and its probability of occurrence.

MS x probability

A:	$16,071,429 x .10 =	$1,607,143
B:	$16,200,000 x .20 =	3,240,000
C:	$16,666,667 x .40 =	6,666,667
D:	$17,285,714 x .20 =	3,457,143
E:	$18,382,353 x .10 =	1,838,235
MS expected value =		$16,809,188

c. Scenario C is the most likely scenario given that its probability of occurrence is 40 percent. Show how the amount of the money supply would change holding real output at 500,000 units and the price level at $100 for each of the velocity of money turnover rates (you have previously calculated the money supply under Scenario C for a turnover of 3.0 times).

MS = (500,000 x $100)/VM

A:	$28,571,429
B:	$20,000,000
C:	$16,666,667
D:	$14,285,714
E:	$11,764,706

d. Repeat the Scenario C exercise in (c) but now hold the velocity of money at 3.0 times and price level at $1000 and allow real output to change.

MS = (RO x $100)/3.0

A:	$12,500,000
B:	$15,000,000
C:	$16,666,667
D:	$18,333,333
E:	$20,833,333

e. Repeat the Scenario C exercise in (c) but now hold the velocity of money at 3.0 times and real output at 500,000 units and allow price level to change.

Note: money supply answers are the same as in (d).

SUGGESTED QUIZ

l. Identify the three functions of money.

2. Define or discuss briefly:
   a. Full-bodied money
   b. Representative full-bodied money
   c. Credit money
   d. Fiat money
3. Outline the various components of the U.S. money supply as it exists today.
4. Briefly describe basic differences in how monetarists and Keynesians view the relationship between money supply and economic activity.