PART I

LEARNING OUTCOMES, SUMMARY OVERVIEW, AND PRACTICE PROBLEMS

CHAPTER 1

DEMAND AND SUPPLY ANALYSIS: INTRODUCTION

LEARNING OUTCOMES

After completing this chapter, you will be able to do the following:

- Distinguish among types of markets.
- Explain the principles of demand and supply.
- Describe causes of shifts in and movements along demand and supply curves.
- Describe the process of aggregating demand and supply curves, the concept of equilibrium, and mechanisms by which markets achieve equilibrium.
- Distinguish between stable and unstable equilibria and identify instances of such equilibria.
- Calculate and interpret individual and aggregate demand and inverse demand and supply functions, and interpret individual and aggregate demand and supply curves.
- Calculate and interpret the amount of excess demand or excess supply associated with a nonequilibrium price.
- Describe the types of auctions and calculate the winning price(s) of an auction.
- Calculate and interpret consumer surplus, producer surplus, and total surplus.
- Analyze the effects of government regulation and intervention on demand and supply.
- Forecast the effect of the introduction and the removal of a market interference (e.g., a price floor or ceiling) on price and quantity.
- Calculate and interpret price, income, and cross-price elasticities of demand, and describe factors that affect each measure.

SUMMARY OVERVIEW

- The basic model of markets is the demand and supply model. The demand function represents buyers' behavior and can be depicted (in its inverse demand form) as a negatively sloped demand curve. The supply function represents sellers' behavior and can be depicted (in its inverse supply form) as a positively sloped supply curve. The interaction of buyers and sellers in a market results in equilibrium. Equilibrium exists when the highest price willingly paid by buyers is just equal to the lowest price willingly accepted by sellers.

- Goods markets are the interactions of consumers as buyers and firms as sellers of goods and services produced by firms and bought by households. Factor markets are the interactions of firms as buyers and households as sellers of land, labor, capital, and entrepreneurial risk-taking ability. Capital markets are used by firms to sell debt or equity to raise long-term capital to finance the production of goods and services.
- Demand and supply curves are drawn on the assumption that everything *except* the price of the good itself is held constant (an assumption known as ceteris paribus or "holding all other things constant"). When something other than price changes, the demand curve or the supply curve will shift relative to the other curve. This shift is referred to as a change in demand or supply, as opposed to quantity demanded or quantity supplied. A new equilibrium generally will be obtained at a different price and a different quantity than before. The market mechanism is the ability of prices to adjust to eliminate any excess demand or supply resulting from a shift in one or the other curve.
- If, at a given price, the quantity demanded exceeds the quantity supplied, there is excess demand and the price will rise. If, at a given price, the quantity supplied exceeds the quantity demanded, there is excess supply and the price will fall.
- Sometimes auctions are used to seek equilibrium prices. Common value auctions sell items that have the same value to all bidders, but bidders can only estimate that value before the auction is completed. Overly optimistic bidders overestimate the true value and end up paying a price greater than that value. This result is known as the winner's curse. Private value auctions sell items that (generally) have a unique subjective value for each bidder. Ascending price auctions use an auctioneer to call out ever-increasing prices until the last, highest bidder ultimately pays his or her bid price and buys the item. Descending price, or Dutch, auctions begin at a very high price and then reduce that price until one bidder is willing to buy at that price. Second price sealed-bid auctions are sometimes used to induce bidders to reveal their true reservation prices in private value auctions. Treasury notes and some other financial instruments are sold using a form of Dutch auction (called a single price auction) in which competitive and noncompetitive bids are arrayed in descending price (increasing yield) order. The winning bidders all pay the same price, but marginal bidders might not be able to fill their entire order at the market-clearing price.
- Markets that work freely can optimize society's welfare, as measured by consumer surplus and producer surplus. Consumer surplus is the difference between the total value to buyers and the total expenditure necessary to purchase a given amount. Producer surplus is the difference between the total revenue received by sellers from selling a given amount and the total variable cost of production of that amount. When equilibrium price is reached, total surplus is maximized.
- Sometimes, government policies interfere with the free working of markets. Examples include price ceilings, price floors, and specific taxes. Whenever the imposition of such a policy alters the free market equilibrium quantity (the quantity that maximizes total surplus), there is a redistribution of surplus between buyers and sellers; but there is also a reduction of total surplus, called deadweight loss. Other influences can result in an imbalance between demand and supply. Search costs are impediments in the ability of willing buyers and willing sellers to meet in a transaction. Brokers can add value if they reduce search costs and match buyers and sellers. In general, anything that improves information about the willingness of buyers and sellers to engage will reduce search costs and add value.
- Economists use a quantitative measure of sensitivity called elasticity. In general, elasticity is the ratio of the percentage change in the dependent variable to the percentage change in the

independent variable of interest. Important specific elasticities include own-price elasticity of demand, income elasticity of demand, and cross-price elasticity of demand.

- Based on algebraic sign and magnitude of the various elasticities, goods can be classified into groups. If own-price elasticity of demand is less than 1 in absolute value, demand is called "inelastic"; it is called "elastic" if own-price elasticity of demand is greater than 1 in absolute value. Goods with positive income elasticity of demand are called normal goods, and those with negative income elasticity of demand are called inferior goods. Two goods with negative cross-price elasticity of demand—a drop in the price of one good causes an increase in demand for the other good—are called complements. Goods with positive cross-price elasticity of demand—a drop in the price of one good causes a decrease in demand for the other—are called substitutes.
- The relationship among own-price elasticity of demand, changes in price, and changes in total expenditure is as follows: If demand is elastic, a reduction in price results in an increase in total expenditure; if demand is inelastic, a reduction in price results in a decrease in total expenditure; if demand is unitary elastic, a change in price leaves total expenditure unchanged.

PRACTICE PROBLEMS[1]

1. Which of the following markets is *most* accurately characterized as a goods market? The market for:
   A. coats.
   B. sales clerks.
   C. cotton farmland.

2. The observation "As a price of a good falls, buyers buy more of it" is *best* known as:
   A. consumer surplus.
   B. the law of demand.
   C. the market mechanism.

3. Two-dimensional demand and supply curves are drawn under which of the following assumptions?
   A. Own price is held constant.
   B. All variables but quantity are held constant.
   C. All variables but own price and quantity are held constant.

4. The slope of a supply curve is *most* often:
   A. zero.
   B. positive.
   C. negative.

5. Assume the following equation:

$$Q_x^s = -4 + \tfrac{1}{2}P_x - 2W$$

[1]These practice problems were written by William Akmentins, CFA (Dallas, Texas, USA).

where Q_x^s is the quantity of good X supplied, P_x is the price of good X, and W is the wage rate paid to laborers. If the wage rate is 11, the vertical intercept on a graph depicting the supply curve is *closest* to:
A. -26.
B. -4.
C. 52.

6. Movement along the demand curve for good X occurs due to a change in:
A. income.
B. the price of good X.
C. the price of a substitute for good X.

The following information relates to Questions 7 through 9.

A producer's supply function is given by the equation:

$$Q_s^s = -55 + 26P_s + 1.3P_a$$

where Q_s^s is the quantity of steel supplied by the market, P_s is the per-unit price of steel, and P_a is the per-unit price of aluminum.

7. If the price of aluminum rises, what happens to the steel producer's supply curve? The supply curve:
A. shifts to the left.
B. shifts to the right.
C. remains unchanged.

8. If the unit price of aluminum is 10, the slope of the supply curve is *closest* to:
A. 0.04.
B. 1.30.
C. 26.00.

9. Assume the supply side of the market consists of exactly five identical sellers. If the unit price of aluminum is 20, which equation is *closest* to the expression for the market inverse supply function?
A. $P_s = 9.6 + 0.04Q_s^s$
B. $P_s = 1.1 + 0.008Q_s^s$
C. $Q_s^s = -145 + 130P_s$

10. Which of the following statements about market equilibrium is *most* accurate?
A. The difference between quantity demanded and quantity supplied is zero.
B. The demand curve is negatively sloped and the supply curve is positively sloped.
C. For any given pair of market demand and supply curves, only one equilibrium point can exist.

11. Which of the following statements *best* characterizes the market mechanism for attaining equilibrium?
    A. Excess supply causes prices to fall.
    B. Excess demand causes prices to fall.
    C. The demand and supply curves shift to reach equilibrium.

12. An auction in which the auctioneer starts at a high price and then lowers the price in increments until there is a willing buyer is *best* called a:
    A. Dutch auction.
    B. Vickery auction.
    C. private value auction.

13. Which statement is *most likely* to be true in a single price U.S. Treasury bill auction?
    A. Only some noncompetitive bids would be filled.
    B. Bidders at the highest winning yield may get only a portion of their orders filled.
    C. All bidders at a yield higher than the winning bid would get their entire orders filled.

14. The winner's curse in common value auctions is *best* described as the winning bidder paying:
    A. more than the value of the asset.
    B. a price not equal to one's own bid.
    C. more than intended prior to bidding.

15. A wireless phone manufacturer introduced a next-generation phone that received a high level of positive publicity. Despite running several high-speed production assembly lines, the manufacturer is still falling short in meeting demand for the phone nine months after introduction. Which of the following statements is the *most* plausible explanation for the demand/supply imbalance?
    A. The phone price is low relative to the equilibrium price.
    B. Competitors introduced next-generation phones at a similar price.
    C. Consumer incomes grew faster than the manufacturer anticipated.

16. A per-unit tax on items sold that is paid by the seller will *most likely* result in the:
    A. supply curve shifting vertically upward.
    B. demand curve shifting vertically upward.
    C. demand curve shifting vertically downward.

17. Which of the following *most* accurately and completely describes a deadweight loss?
    A. A transfer of surplus from one party to another
    B. A reduction in either the buyer's or the seller's surplus
    C. A reduction in total surplus resulting from market interference

18. If an excise tax is paid by the buyer instead of the seller, which of the following statements is *most likely* to be true?
    A. The price paid will be higher than if the seller had paid the tax.
    B. The price received will be lower than if the seller had paid the tax.
    C. The price received will be the same as if the seller had paid the tax.

19. A quota on an imported good below the market-clearing quantity will *most likely* lead to which of the following effects?
    A. The supply curve shifts upward.
    B. The demand curve shifts upward.
    C. Some of the buyer's surplus transfers to the seller.

20. Assume a market demand function is given by the equation:

$$Q^d = 50 - 0.75P$$

    where Q^d is the quantity demanded and P is the price. If P equals 10, the value of the consumer surplus is *closest* to:
    A. 67.
    B. 1,205.
    C. 1,667.

21. Which of the following *best* describes producer surplus?
    A. Revenue minus variable costs
    B. Revenue minus variable plus fixed costs
    C. The area above the supply curve and beneath the demand curve and to the left of the equilibrium point

22. Assume a market supply function is given by the equation

$$Q_s = -7 + 0.6P$$

    where Q_s is the quantity supplied and P is the price. If P equals 15, the value of the producer surplus is *closest* to:
    A. 3.3.
    B. 41.0.
    C. 67.5.

The following information relates to Questions 23 through 25.

The market demand function for four-year private universities is given by the equation:

$$Q_{pr}^d = 84 - 3.1P_{pr} + 0.8I + 0.9P_{pu}$$

where Q_{pr}^d is the number of applicants to private universities per year in thousands, P_{pr} is the average price of private universities (in thousands of USD), I is the household monthly income (in thousands of USD), and P_{pu} is the average price of public (government-supported) universities (in thousands of USD). Assume that P_{pr} is equal to 38, I is equal to 100, and P_{pu} is equal to 18.

23. The price elasticity of demand for private universities is *closest* to:
    A. −3.1.
    B. −1.9.
    C. 0.6.

24. The income elasticity of demand for private universities is *closest* to:
    A. 0.5.
    B. 0.8.
    C. 1.3.

25. The cross-price elasticity of demand for private universities with respect to the average price of public universities is *closest* to:
    A. 0.3.
    B. 3.1.
    C. 3.9.

26. If the cross-price elasticity between two goods is negative, the two goods are classified as:
    A. normal.
    B. substitutes.
    C. complements.