Key Terms

constant unitary elasticity when a given percent price change in price leads to an equal percentage change in quantity demanded or supplied

cross-price elasticity of demand the percentage change in the quantity of good A that is demanded as a result of a percentage change in the price of good B

elastic demand when the elasticity of demand is greater than one, indicating a high responsiveness of quantity demanded or supplied to changes in price

elastic supply when the elasticity of either supply is greater than one, indicating a high responsiveness of quantity demanded or supplied to changes in price

elasticity an economics concept that measures responsiveness of one variable to changes in another variable

elasticity of savings the percentage change in the quantity of savings divided by the percentage change in interest rates

inelastic demand when the elasticity of demand is less than one, indicating that a 1 percent increase in price paid by the consumer leads to less than a 1 percent change in purchases (and vice versa); this indicates a low responsiveness by consumers to price changes

inelastic supply when the elasticity of supply is less than one, indicating that a 1 percent increase in price paid to the firm will result in a less than 1 percent increase in production by the firm; this indicates a low responsiveness of the firm to price increases (and vice versa if prices drop)

infinite elasticity the extremely elastic situation of demand or supply where quantity changes by an infinite amount in response to any change in price; horizontal in appearance

perfect elasticity see infinite elasticity

perfect inelasticity see zero elasticity

price elasticity the relationship between the percent change in price resulting in a corresponding percentage change in the quantity demanded or supplied

price elasticity of demand percentage change in the quantity *demanded* of a good or service divided the percentage change in price

price elasticity of supply percentage change in the quantity *supplied* divided by the percentage change in price

tax incidence manner in which the tax burden is divided between buyers and sellers

unitary elasticity when the calculated elasticity is equal to one indicating that a change in the price of the good or service results in a proportional change in the quantity demanded or supplied

wage elasticity of labor supply the percentage change in hours worked divided by the percentage change in wages

zero inelasticity the highly inelastic case of demand or supply in which a percentage change in price, no matter how large, results in zero change in the quantity; vertical in appearance

Key Concepts and Summary

5.1 Price Elasticity of Demand and Price Elasticity of Supply

Price elasticity measures the responsiveness of the quantity demanded or supplied of a good to a change in its price. We compute it as the percentage change in quantity demanded (or supplied) divided by the percentage change in price. We can describe elasticity as elastic (or very responsive), unit elastic, or inelastic (not very responsive). Elastic demand or supply curves indicate that quantity demanded or supplied respond to price changes in a greater than proportional manner. An inelastic demand or supply curve is one where a given percentage change in price will cause a smaller percentage change in quantity demanded or supplied. A unitary elasticity means that a given percentage change in price leads to an equal percentage change in quantity demanded or supplied.

5.2 Polar Cases of Elasticity and Constant Elasticity

Infinite or perfect elasticity refers to the extreme case where either the quantity demanded or supplied changes by an infinite amount in response to any change in price at all. Zero elasticity refers to the extreme case in which a percentage change in price, no matter how large, results in zero change in quantity. Constant unitary elasticity in either a supply or demand curve refers to a situation where a price change of one percent results in a quantity change of one percent.

5.3 Elasticity and Pricing

In the market for goods and services, quantity supplied and quantity demanded are often relatively slow to react to changes in price in the short run, but react more substantially in the long run. As a result, demand and supply often (but not always) tend to be relatively inelastic in the short run and relatively elastic in the long run. A tax incidence depends on the relative price elasticity of supply and demand. When supply is more elastic than demand, buyers bear most of the tax burden, and when demand is more elastic than supply, producers bear most of the cost of the tax. Tax revenue is larger the more inelastic the demand and supply are.

5.4 Elasticity in Areas Other Than Price

Elasticity is a general term, that reflects responsiveness. It refers to the change of one variable divided by the percentage change of a related variable that we can apply to many economic connections. For instance, the income elasticity of demand is the percentage change in quantity demanded divided by the percentage change in income. The cross-price elasticity of demand is the percentage change in the quantity demanded of a good divided by the percentage change in the price of another good. Elasticity applies in labor markets and financial capital markets just as it does in markets for goods and services. The wage elasticity of labor supply is the percentage change in the quantity of hours supplied divided by the percentage change in the wage. The elasticity of savings with respect to interest rates is the percentage change in the quantity of savings divided by the percentage change in interest rates.

Self-Check Questions

1. From the data in Table 5.5 about demand for smart phones, calculate the price elasticity of demand from: point B to point C, point D to point E, and point G to point H. Classify the elasticity at each point as elastic, inelastic, or unit elastic.

Points	P	Q
A	60	3,000
B	70	2,800
C	80	2,600
D	90	2,400
E	100	2,200
F	110	2,000
G	120	1,800
H	130	1,600

TABLE 5.5

2. From the data in Table 5.6 about supply of alarm clocks, calculate the price elasticity of supply from: point J to point K, point L to point M, and point N to point P. Classify the elasticity at each point as elastic, inelastic, or unit elastic.

Point	Price	Quantity Supplied
J	$8	50
K	$9	70
L	$10	80
M	$11	88
N	$12	95
P	$13	100

TABLE 5.6

3. Why is the demand curve with constant unitary elasticity concave?
4. Why is the supply curve with constant unitary elasticity a straight line?
5. The federal government decides to require that automobile manufacturers install new anti-pollution equipment that costs $2,000 per car. Under what conditions can carmakers pass almost all of this cost along to car buyers? Under what conditions can carmakers pass very little of this cost along to car buyers?
6. Suppose you are in charge of sales at a pharmaceutical company, and your firm has a new drug that causes bald men to grow hair. Assume that the company wants to earn as much revenue as possible from this drug. If the elasticity of demand for your company's product at the current price is 1.4, would you advise the company to raise the price, lower the price, or to keep the price the same? What if the elasticity were 0.6? What if it were 1? Explain your answer.
7. What would the gasoline price elasticity of supply mean to UPS or FedEx?
8. The average annual income rises from $25,000 to $38,000, and the quantity of bread consumed in a year by the average person falls from 30 loaves to 22 loaves. What is the income elasticity of bread consumption? Is bread a normal or an inferior good?
9. Suppose the cross-price elasticity of apples with respect to the price of oranges is 0.4, and the price of oranges falls by 3%. What will happen to the demand for apples?

Review Questions

10. What is the formula for calculating elasticity?
11. What is the price elasticity of demand? Can you explain it in your own words?
12. What is the price elasticity of supply? Can you explain it in your own words?
13. Describe the general appearance of a demand or a supply curve with zero elasticity.
14. Describe the general appearance of a demand or a supply curve with infinite elasticity.
15. If demand is elastic, will shifts in supply have a larger effect on equilibrium quantity or on price?
16. If demand is inelastic, will shifts in supply have a larger effect on equilibrium price or on quantity?

17. If supply is elastic, will shifts in demand have a larger effect on equilibrium quantity or on price?

18. If supply is inelastic, will shifts in demand have a larger effect on equilibrium price or on quantity?

19. Would you usually expect elasticity of demand or supply to be higher in the short run or in the long run? Why?

20. Under which circumstances does the tax burden fall entirely on consumers?

21. What is the formula for the income elasticity of demand?

22. What is the formula for the cross-price elasticity of demand?

23. What is the formula for the wage elasticity of labor supply?

24. What is the formula for elasticity of savings with respect to interest rates?

Critical Thinking Questions

25. Transatlantic air travel in business class has an estimated elasticity of demand of 0.62, while transatlantic air travel in economy class has an estimated price elasticity of 0.12. Why do you think this is the case?

26. What is the relationship between price elasticity and position on the demand curve? For example, as you move up the demand curve to higher prices and lower quantities, what happens to the measured elasticity? How would you explain that?

27. Can you think of an industry (or product) with near infinite elasticity of supply in the short term? That is, what is an industry that could increase Qs almost without limit in response to an increase in the price?

28. Would you expect supply to play a more significant role in determining the price of a basic necessity like food or a luxury like perfume? Explain. *Hint*: Think about how the price elasticity of demand will differ between necessities and luxuries.

29. A city has built a bridge over a river and it decides to charge a toll to everyone who crosses. For one year, the city charges a variety of different tolls and records information on how many drivers cross the bridge. The city thus gathers information about elasticity of demand. If the city wishes to raise as much revenue as possible from the tolls, where will the city decide to charge a toll: in the inelastic portion of the demand curve, the elastic portion of the demand curve, or the unit elastic portion? Explain.

30. In a market where the supply curve is perfectly inelastic, how does an excise tax affect the price paid by consumers and the quantity bought and sold?

31. Economists define normal goods as having a positive income elasticity. We can divide normal goods into two types: Those whose income elasticity is less than one and those whose income elasticity is greater than one. Think about products that would fall into each category. Can you come up with a name for each category?

32. Suppose you could buy shoes one at a time, rather than in pairs. What do you predict the cross-price elasticity for left shoes and right shoes would be?

Problems

33. The equation for a demand curve is $P = 48 – 3Q$. What is the elasticity in moving from a quantity of 5 to a quantity of 6?

34. The equation for a demand curve is $P = 2/Q$. What is the elasticity of demand as price falls from 5 to 4? What is the elasticity of demand as the price falls from 9 to 8? Would you expect these answers to be the same?

35. The equation for a supply curve is $4P = Q$. What is the elasticity of supply as price rises from 3 to 4? What is the elasticity of supply as the price rises from 7 to 8? Would you expect these answers to be the same?

36. The equation for a supply curve is $P = 3Q – 8$. What is the elasticity in moving from a price of 4 to a price of 7?

37. The supply of paintings by Leonardo Da Vinci, who painted the *Mona Lisa* and *The Last Supper* and died in 1519, is highly inelastic. Sketch a supply and demand diagram, paying attention to the appropriate elasticities, to illustrate that demand for these paintings will determine the price.

38. Say that a certain stadium for professional football has 70,000 seats. What is the shape of the supply curve for tickets to football games at that stadium? Explain.

39. When someone’s kidneys fail, the person needs to have medical treatment with a dialysis machine (unless or until they receive a kidney transplant) or they will die. Sketch a supply and demand diagram, paying attention to the appropriate elasticities, to illustrate that the supply of such dialysis machines will primarily determine the price.

40. Assume that the supply of low-skilled workers is fairly elastic, but the employers’ demand for such workers is fairly inelastic. If the policy goal is to expand employment for low-skilled workers, is it better to focus on policy tools to shift the supply of unskilled labor or on tools to shift the demand for unskilled labor? What if the policy goal is to raise wages for this group? Explain your answers with supply and demand diagrams.