# Other Elasticities

Problem Set

1. **For which of the following is the cross-price elasticity of demand most likely a large positive number?**
   a. hockey pucks and hockey sticks
   b. DVDs and milk
   c. **french fries and onion rings**
   d. carrots and cabbage
   e. gasoline and cell phones

2. **Suppose the cross-price elasticity of demand for butter and margarine is equal to 0.96 while the cross-price elasticity of demand for water and lemon is –0.13. This means that butter and margarine are _____ while water and lemon are _____.**
   a. complements; substitutes
   b. **substitutes; complements**
   c. inelastic goods; elastic goods
   d. elastic goods; complements
   e. luxury goods; necessity goods

3. **Suppose the price of cereal rose by 25% and the quantity of milk sold decreased by 50%. Then we know that the:**
   a. **cross-price elasticity between cereal and milk is –2.**
   b. cross-price elasticity between cereal and milk is –0.5.
   c. price elasticity of demand for milk is 2.
   d. cross-price elasticity of demand for milk is 2.
   e. price elasticity of demand for cereal is 0.5.

4. **When Joe's income is $100 per week, he spends $20 per week on pizza. When his income rises to $110 per week, he spends $25 per week on pizza. If the price of pizza remains constant, this information implies that for Joe:**
   a. **pizza is a normal good and a luxury.**
   b. pizza is a normal good and a necessity.
   c. pizza is an inferior good.
   d. demand for pizza is price-elastic.
   e. demand for pizza is price-inelastic.

5. **The income elasticity of demand for eggs has been estimated to be 0.6. If income grows by 5% in a period, assuming all other things are unchanged, the quantity of eggs demanded will:**
   a. increase by more than 6%.
   b. increase by 6%.
   c. decrease by 3%.
   d. increase by 1.8%.
   e. **increase by 3%.**

6. **The cross-price elasticity of demand for Coke with respect to the price of Pepsi has been estimated to be 0.61. If the price of Pepsi falls by 10% in a period, assuming all other things are unchanged, the quantity demanded for Coke will:**
   a. decrease by 0.61%.
   b. **decrease by 6.1%.**
   c. not change.
   d. rise by 6.1%.
   e. decrease by 61%.

7. **The price elasticity of supply for a good is 3 if a:**
   a. 1% increase in price leads to a 3% decrease in quantity supplied.
   b. **1% decrease in price leads to a 3% decrease in quantity supplied.**
   c. 9% decrease in price leads to a 3% decrease in quantity supplied.
   d. 9% increase in price leads to an 3% decrease in quantity supplied.
   e. 3% increase in price leads to a 1% increase in quantity supplied.

8. **If your purchases of shoes increase from 9 pairs per year to 11 pairs per year when the price of shirts increases from $8 to $12, then, for you, shoes and shirts are considered:**
   a. inferior goods.
   b. luxury goods.
   c. **substitute goods.**
   d. complementary goods.
   e. unrelated goods.

9. **If the income elasticity of demand for a good is positive, the good is said to be a(n):**
   a. inferior good.
   b. substitute good.
   c. **normal good.**
   d. positive good.
   e. unrelated good.

10. **To say that two goods are complements, their cross-price elasticities of demand should be:**
    a. **less than 0.**
    b. equal to 0.
    c. positive, but not greater than 1.
    d. greater than 0.
    e. positive and greater than 1.

11. **A perfectly elastic supply curve is:**
    a. **horizontal.**
    b. downward-sloping.
    c. upward-sloping.
    d. vertical.
    e. initially upward sloping at low prices, but downward sloping at high prices.

12. **A price floor will cause a larger surplus when demand is _____ and supply is _____.**
    a. elastic; inelastic
    b. inelastic; inelastic
    c. **elastic; elastic**
    d. perfectly inelastic; elastic
    e. elastic; perfectly inelastic

13. **If the price elasticity of supply is greater than 1, then:**
    a. supply is income-elastic.
    b. supply is price-inelastic.
    c. supply is price unit-elastic.
    d. quantity supplied is relatively unresponsive to price changes.
    e. **supply is price-elastic.**

14. **It is very difficult for Julia to find inexpensive and available inputs for her business. Because of this, we would predict that Julia's price elasticity of supply would be:**
    a. elastic.
    **b. inelastic.**
    c. unit-elastic.
    d. perfectly elastic.
    e. a value greater than 1.

15. **If the price of chocolate-covered peanuts increases and the demand for strawberry licorice twists increases, this indicates that these two goods are:**
    a. complementary goods.
    b. normal goods.
    c. inferior goods.
    **d. substitute goods.**
    e. unrelated goods.

16. Nile.com, the online bookseller, wants to increase its total revenue. One strategy is to offer a 10% discount on every book it sells. Nile.com knows that its customers can be divided into two distinct groups according to their likely response to the discount. The accompanying table shows how the two groups respond to the discount.

| | Group A (sales per week) | Group B (sales per week) |
|---|---|---|
| Volume of sales before the 10% discount | 1.55 million | 1.50 million |
| Volume of sales after the 10% discount | 1.65 million | 1.70 million |

a. Using the midpoint method, calculate the price elasticities of demand for group A and group B.
**Using the midpoint method, the percent change in the quantity demanded by group A is:**

$\frac{1.65\ million - 1.55\ million}{(1.55\ million + 1.65\ million)/2}\ X\ 100 = \frac{0.1\ million}{1.6\ million}\ X\ 100 = 6.25\%$ **and since the change in price is 10%, the price elasticity of demand for group A is** $\frac{6.25\%}{10\%} = 0.625$.

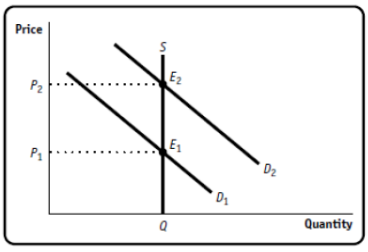
**Using the midpoint method, the percent change in the quantity demanded by group B is:**

$\frac{1.7\ million - 1.5\ million}{(1.5\ million + 1.7\ million)/2}\ X\ 100 = \frac{0.2\ million}{1.6\ million}\ X\ 100 = 12.5\%$ **and since the change in price is 10%, the price elasticity of demand for group B is** $\frac{12.5\%}{10\%} = 1.25$.

b. Explain how the discount will affect total revenue from each group.
**For group A, since the price elasticity of demand is 0.625 (demand is inelastic), total revenue will decrease as a result of the discount. For group B, since the price elasticity of demand is 1.25 (demand is elastic), total revenue will increase as a result of the discount.**

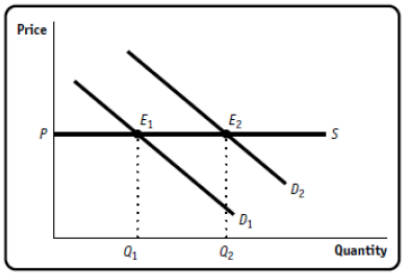
c. Suppose Nile.com knows which group each customer belongs to when he or she logs on and can choose whether or not to offer the 10% discount. If Nile.com wants to increase its total revenue, should discounts be offered to group A or to group B, to neither group, or to both groups.
**If Nile.com wants to increase total revenue, it should definitely not offer the discount to group A and it should definitely offer the discount to group B.**

17. In each of the following cases, do you think the price elasticity of supply is (i) perfectly elastic; (ii) perfectly inelastic; (iii) elastic, but not perfectly elastic; or (iv) inelastic, but not perfectly inelastic? Explain using a diagram.
    a. An increase in demand this summer for luxury cruises leads to a huge jump in the sales price of a cabin on the Queen Mary 2.
    **Supply is perfectly inelastic: the quantity of cabins on the Queen Mary 2 is fixed. As demand increases (a rightward shift in the demand curve), the price of a cabin on the Queen Mary 2 increases, without an increase in the quantity supplied. See the accompanying diagram.**



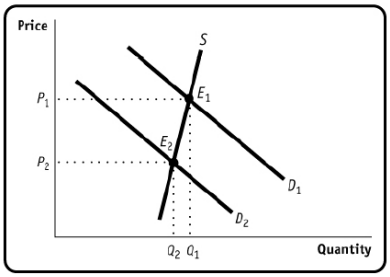
b. The price of a kilowatt of electricity is the same during periods of high electric demand as during periods of low electricity demand.

**Supply is perfectly elastic. As demand changes (for instance, as demand increases in times of high electricity demand), price does not change but the quantity supplied does change. See the accompanying diagram.**



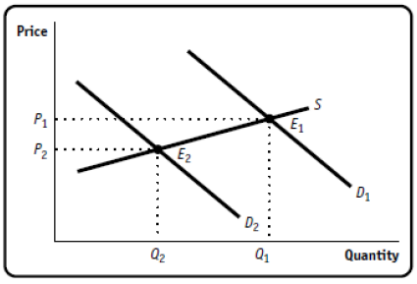

c. Fewer people want to fly during February than during any other month. The airlines cancel about 10% of their flights as ticket prices fall about 20% during this month.

**Supply is inelastic. As price falls by 20%, the quantity supplied falls by 10%. This implies a price elasticity of $\frac{10\%}{20\%}$ = 0.5, which is inelastic. See the accompanying diagram.**




d. Owners of vacation homes in Main rent them out during the summer. Due to the soft economy this year, a 30% decline in the price of a vacation rental leads more than half of homeowners to occupy their vacation homes themselves during the summer.

**Supply is elastic. As price falls by 30%, the quantity supplied falls by more than 50%. This implies a price elasticity of supply greater than $\frac{50\%}{30\%}$, that is, a price elasticity of supply greater than 1.7. See the accompanying diagram.**




18. The accompanying table lists the cross-price elasticities of demand for several goods, where the percent quantity change is measured for the first good of the pair, and the percent price change is measured for the second good.

| Good | Cross-Price Elasticity of Demand |
|---|---|
| Air-conditioning units and kilowatts of electricity | -0.34 |
| Coke and Pepsi | +0.63 |
| High-fuel-consuming SUVs and gasoline | -0.28 |
| McDonald's burgers and Burger King burgers | +0.82 |
| Butter and margarine | +1.54 |

a. Explain the sign of each of the cross-price elasticities. What does it imply about the relationship between the two goods in question?

**A negative cross-price elasticity of demand implies that the two goods are complements. So air-conditioning units and kilowatts of electricity are complements, as are sport-utility vehicles and gasoline. A positive cross-price elasticity of demand implies that the two goods are substitutes. So Coke and Pepsi are substitutes, as are McDonald's and Burger King burgers as well as butter and margarine.**

b. Compare the absolute values of the cross-price elasticities and explain their magnitudes. For example, why is the cross-price elasticity of McDonald's burgers and Burger King burgers less than the cross-price elasticity of butter and margarine?

**The larger (and positive) the cross-price elasticity of demand is, the more closely the two goods are substitutes. Since the cross-price elasticity of butter and margarine is larger than the cross-price elasticity of McDonald's burgers and Burger King burgers, butter and margarine are closer substitutes than are McDonald's and Burger King burgers. Similarly, the greater (and negative) the cross-price elasticity of demand is, the more strongly the two goods are complements.**

c. Use the information in the table to calculate how a 5% increase in the price of Pepsi affects the quantity of Coke demanded.

**A cross-price elasticity of 0.63 implies that a 1% increase in the price of Pepsi would increase the quantity of Coke demanded by 0.63%. Therefore, a 5% increase in the price of Pepsi would increase the quantity of Coke demanded by five times as much, that is, by 5 × 0.63% = 3.15%.**

d. Use the information in the table to calculate how a 10% decrease in the price of gasoline affects the quantity of SUVs demanded.

**A cross-price elasticity of −0.28 implies that a 1% fall in the price of gasoline would increase the quantity of SUVs demanded by 0.28%. Therefore, a 10% fall in the price of gasoline would increase the quantity of SUVs demanded by 10 times as much, that is, by 10 × 0.28% = 2.8%.**

# Elasticity

Summary Sheet

| Elasticity | Formula | Measures the response of… | To a change in… | If Elasticity is… | It tells us that… |
|---|---|---|---|---|---|
| **Price elasticity of demand** | $E_d = \frac{\%\Delta Q_d}{\%\Delta P}$ | The quantity demanded of a good | The price of the good | < 1 | Demand is inelastic |
| | | | | > 1 | Demand is elastic |
| **Cross-price elasticity of demand** | $E_{xy} = \frac{\%\Delta Q_d^x}{\%\Delta P_y}$ | The quantity demanded of one good | The price of another good | > 0 | Goods are substitutes |
| | | | | < 0 | Goods are complements |
| **Income elasticity of demand** | $E_i = \frac{\%\Delta Q_d^x}{\%\Delta I}$ | The quantity demanded for one good | The consumer's income | $0 < E_i < 1$ | Normal, income-inelastic (necessity) |
| | | | | > 1 | Normal; income-elastic (luxury) |
| | | | | < 0 | Inferior good |
| **Price elasticity of supply** | $E_s = \frac{\%\Delta Q_s}{\%\Delta P}$ | The quantity supplied of a good | The price of the good | 0 | Perfectly inelastic supply |
| | | | | $0 < E_i < 1$ | Normal supply curve |
| | | | | $\infty$ | Perfectly elastic supply |