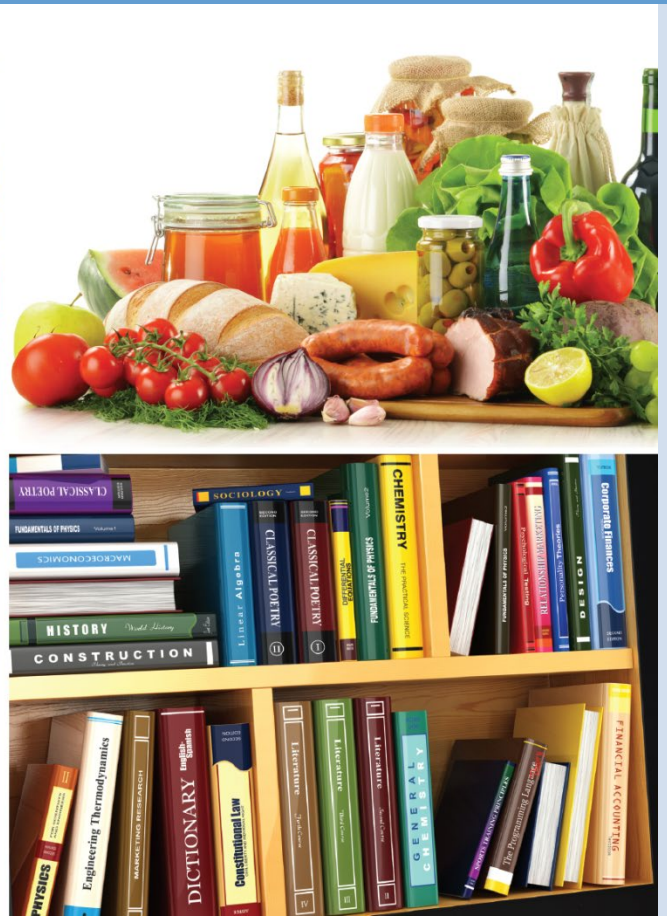
Chapter 3: Supply, Demand, and Elasticity



Introduction to Microeconomics, 6th Edition

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Learning Objectives

- What economists mean by elasticity
- The relationship of demand to revenue
- How economists apply the concept of elasticity to changes in market conditions
- How elasticity helps in understanding issues of public policy

Chapter Outline (Slide 1 of 2)

- Elasticity
  - Price Elasticity of Demand
  - Calculating Elasticity of Demand
    - The Midpoint Formula for Elasticity
    - Elasticity Numbers and Terminology
  - Varying- and Constant-Elasticity Demand Curves
  - Determinants of Elasticity of Demand
    - Substitute, Complements, and Elasticity
    - Price versus Opportunity Cost
    - Time Horizon and Elasticity

Chapter Outline (Slide 2 of 2)

- Income Elasticity of Demand
- Cross Elasticity of Demand
- Price Elasticity of Supply
- Applications of Elasticity
  - Gas Tax or Mileage Standards
  - Elasticity and Prohibition

Elasticity (Slide 1 of 2)

- **Elasticity:** a measure of the ratio of a change in one variable to a change in another, expressed as a percentage
- **Price elasticity of demand:** the ratio of the percentage change in the quantity of a good demanded to a given percentage change in its price, other things being equal
  - Effects the way a change in price affects the **revenue** (price multiplied by quantity sold) that sellers earn from the good in question

Elasticity (Slide 2 of 2)

- **Elastic demand:** a situation in which quantity demanded changes by a larger percentage than price, so that total revenue increases as price decreases
- **Inelastic demand:** a situation in which quantity demanded changes by a smaller percentage than price, so that total revenue decreases as price decreases
- **Unit elastic demand:** a situation in which price and quantity demanded change by the same percentage, so that total revenue remains unchanged as price changes
- **Perfectly elastic demand:** a situation in which the demand curve is a horizontal line

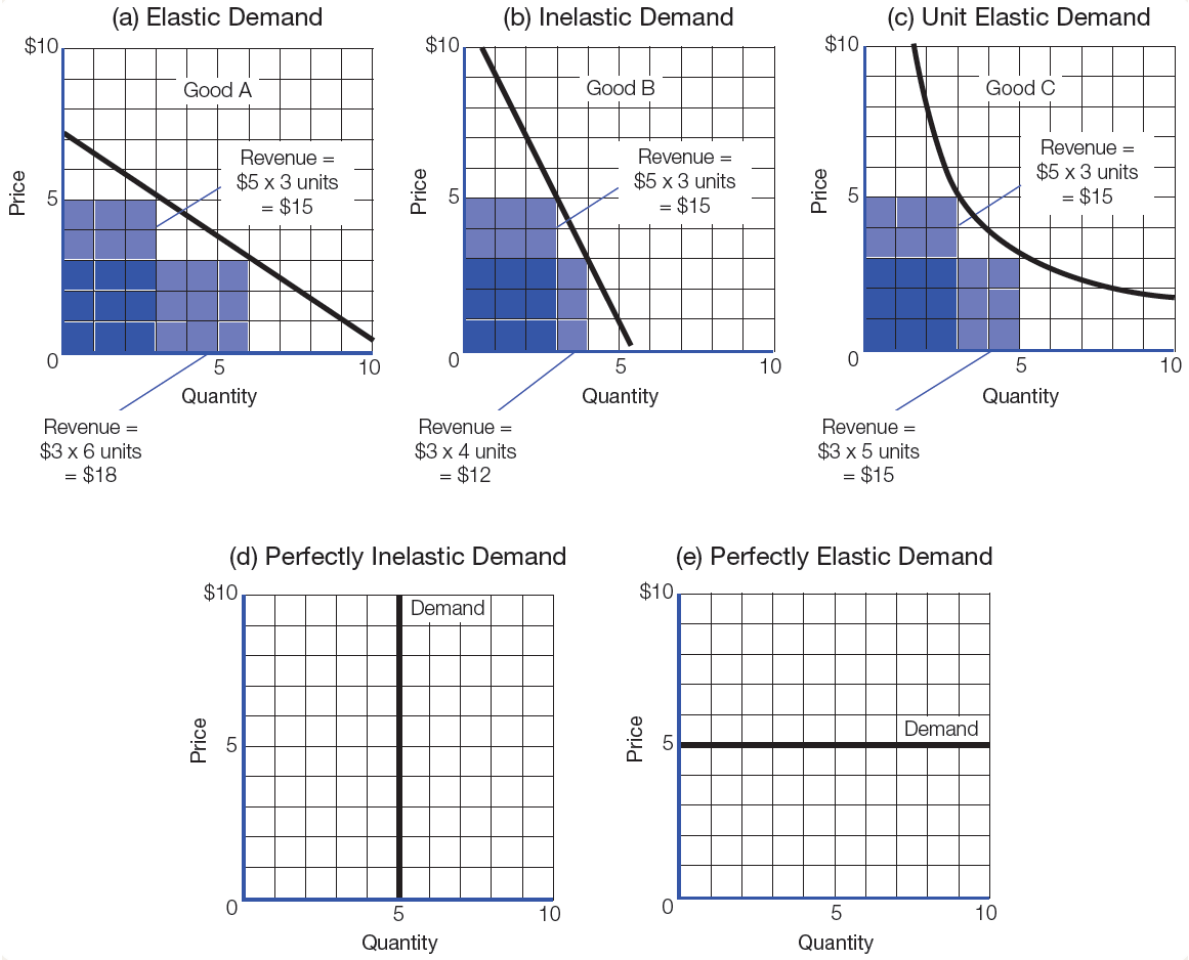

Figure 3-1: Price Elasticity of Demand

Calculating Elasticity of Demand (Slide 1 of 2)

- To turn the definition of elasticity into a formula:
  - Specify a way to measure percentage changes.
    - Initial value of variable as denominator and the change in the value as numerator
    - To avoid some percentage ambiguity, use the midpoint as the denominator.
    - Percentage change in quantity = $\frac{Q_2 - Q_1}{(Q_1 + Q_2)/2}$
    - Same approach can be used for price
    - Percentage change in price = $\frac{P_2 - P_1}{(P_1 + P_2)/2}$

Calculating Elasticity of Demand (Slide 2 of 2)

- The Midpoint Formula for Elasticity

$$\text{Price elasticity of demand} = \frac{(Q_2 - Q_1/(Q_1 + Q_2)}{(P_2 - P_1)/(P_1 + P_2)} = \frac{Percentage\ change\ in\ quantity}{Percentace\ change\ in\ price}$$

- Elasticity Numbers and Terminology
  - Perfectly inelastic demand curve has a value of zero
  - Inelastic demand—values from zero up to, but not including, one
  - Elastic demand—any value for elasticity greater than one
  - Perfectly elastic demand—numerically undefined

Varying- and Constant-Elasticity Demand Curves

- The elasticity of demand for the same good may be the same or different, depending on the shape of the demand curve.
- General rule: Elasticity decreases as one moves down and to the right along a straight-line demand curve.
- Demand curves do not always have to be straight lines.

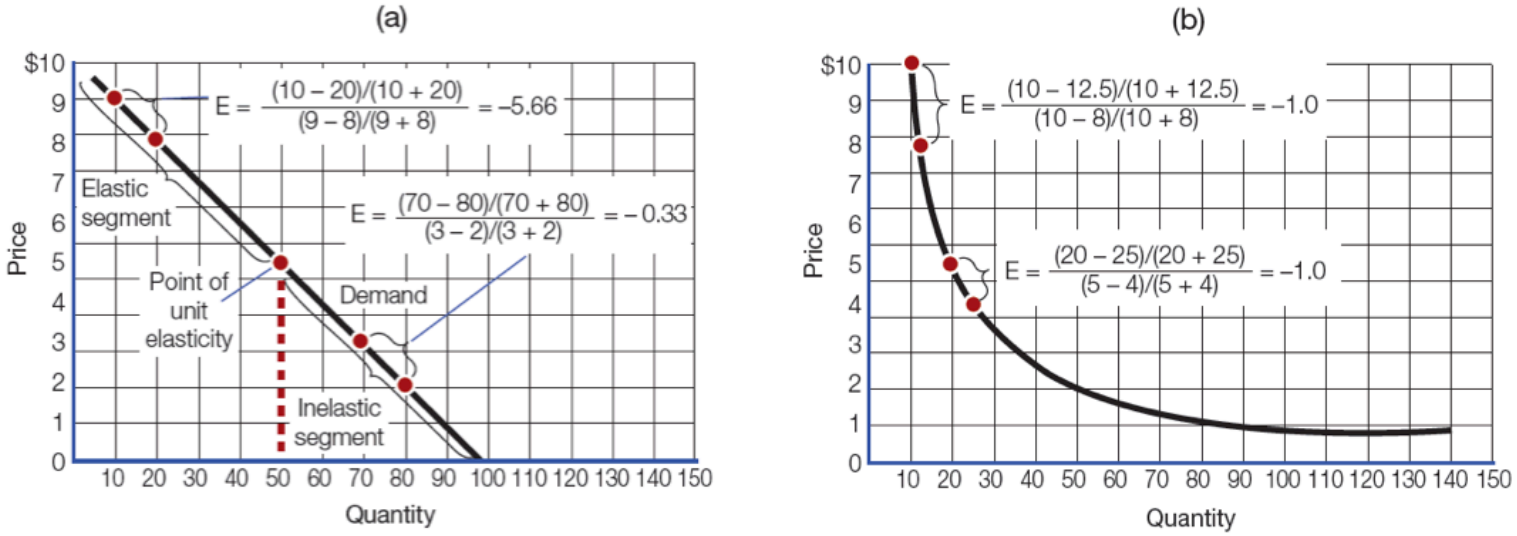

Figure 3-2: Elasticity at Various Points along a Demand Curve

Determinants of Elasticity of Demand

(Slide 1 of 2)

- Substitutes, Complements, and Elasticity
  - Demand tends to be more elastic when a good has close substitutes.
  - Demand for a good tends to be more elastic the narrower the definition of the good.
  - Substitution offers more elasticity.
- Price versus Opportunity Cost
  - Price is often a good indicator of opportunity cost.
  - Price can be separated from opportunity cost.

Determinants of Elasticity of Demand

(Slide 2 of 2)

- Time Horizon and Elasticity
  - Demand is typically less elastic in the short run.
  - Elasticity tends to be greater in the long run.
    - Adjustment to change in price may require change in kind or quantity of goods too.
    - An increase in the price of a good encourages entrepreneurs to develop substitutes.
    - Slow adjustment in consumer tastes

Income Elasticity of Demand

- **Income elasticity of demand:** the ratio of the percentage change in the quantity of a good demanded to a given percentage to change in consumer incomes, other things being equal

$$\text{Income elasticity of demand} = \frac{(Q_2 - Q_1/(Q_1 + Q_2)}{(y_2 - y_1)/(y_1 + y_2)} = \frac{Percentage\ change\ in\ quantity}{Percentace\ change\ in\ income}$$

  - Whether a good is normal or inferior depends on how narrowly it is defined and on the availability of substitutes.

Cross Elasticity of Demand

- **Cross elasticity of demand:** the ratio of the percentage change in the quantity of a good demanded to a given percentage change in the price of some other good, other things being equal
  - Provides a new way of measuring the relationships of substitutes and complements

Price Elasticity of Supply

- **Price elasticity of supply:** the ratio of the percentage change in the quantity of a good supplied to a given percentage change in its price, other things being equal
  - Equation for calculating midpoint is similar to that of determining price elasticity of demand, but the *Qs* now refer to quantity supplied.
  - Several conditions can affect elasticity of supply.

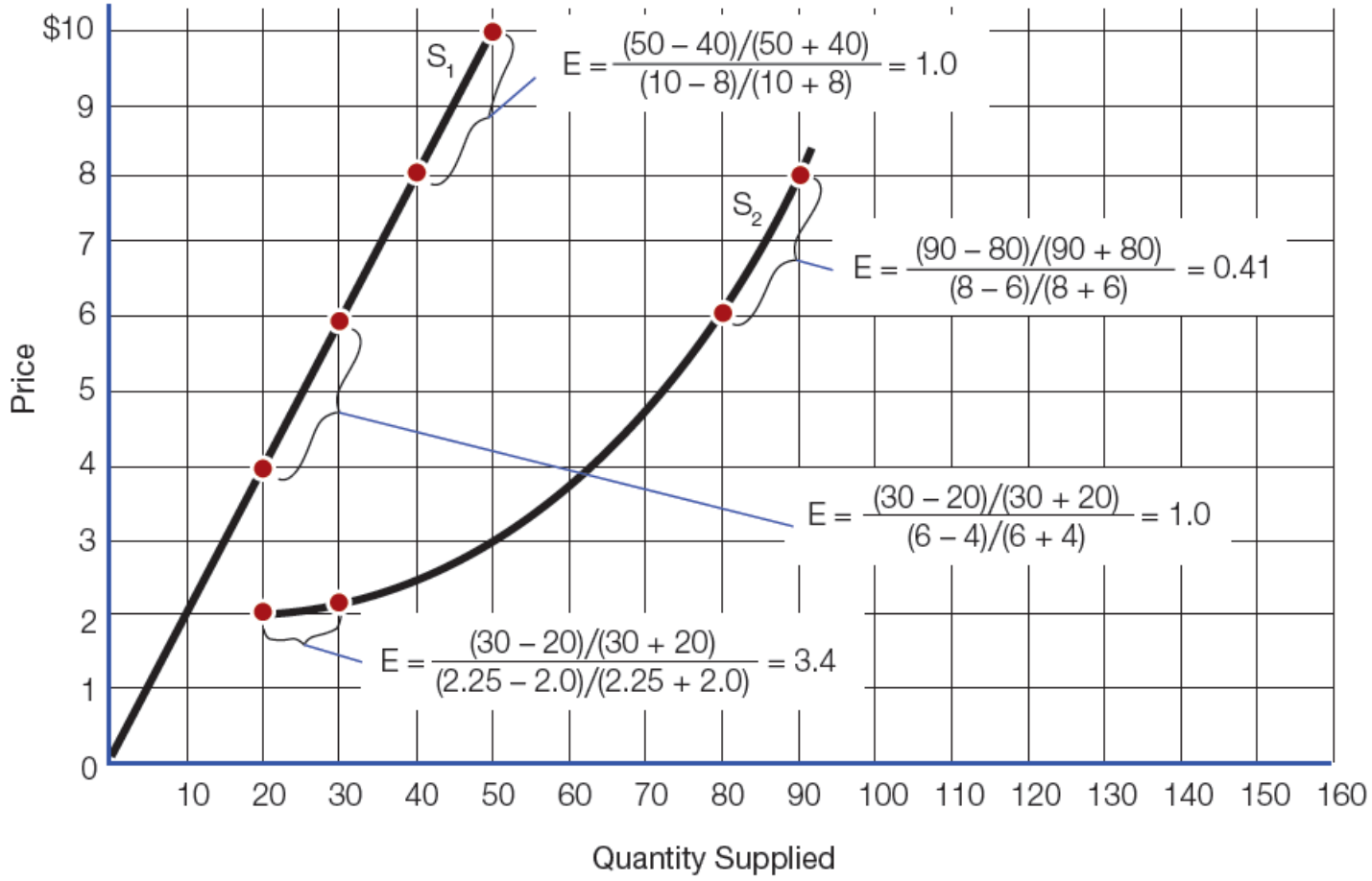

Figure 3-3: Calculating Price Elasticity of Supply

Applications of Elasticity

- Gas Tax or Mileage Standards?
  - Government continues to increase Corporate Average Fuel Economy standard (CAFE standard) for passenger cars
    - 27.5 mpg by 2025
    - Purchase more fuel-efficient vehicles
    - Relative merits of CAFE standards versus fuel taxes depend critically on the price elasticity of demand for fuel.

Elasticity and Prohibition (Slide 1 of 2)

- Ultimate goal of prohibition is to reduce quantity sold to zero.
- Similarities between prohibition and taxation
  - If price rises enough to supply prohibited good, lawbreakers will supply it—costs are an implicit tax.
    - Effect of prohibition is to shift a good's supply curve to the left.
    - Effects of prohibition depend on the elasticities of demand and supply.

Elasticity and Prohibition (Slide 2 of 2)

- Elasticity of demand is important in understanding the intended and unintended consequences of prohibition.
  - Intended: reduce or eliminate use of product
  - Where demand is inelastic, intended consequences are smaller and unintended consequences are greater.

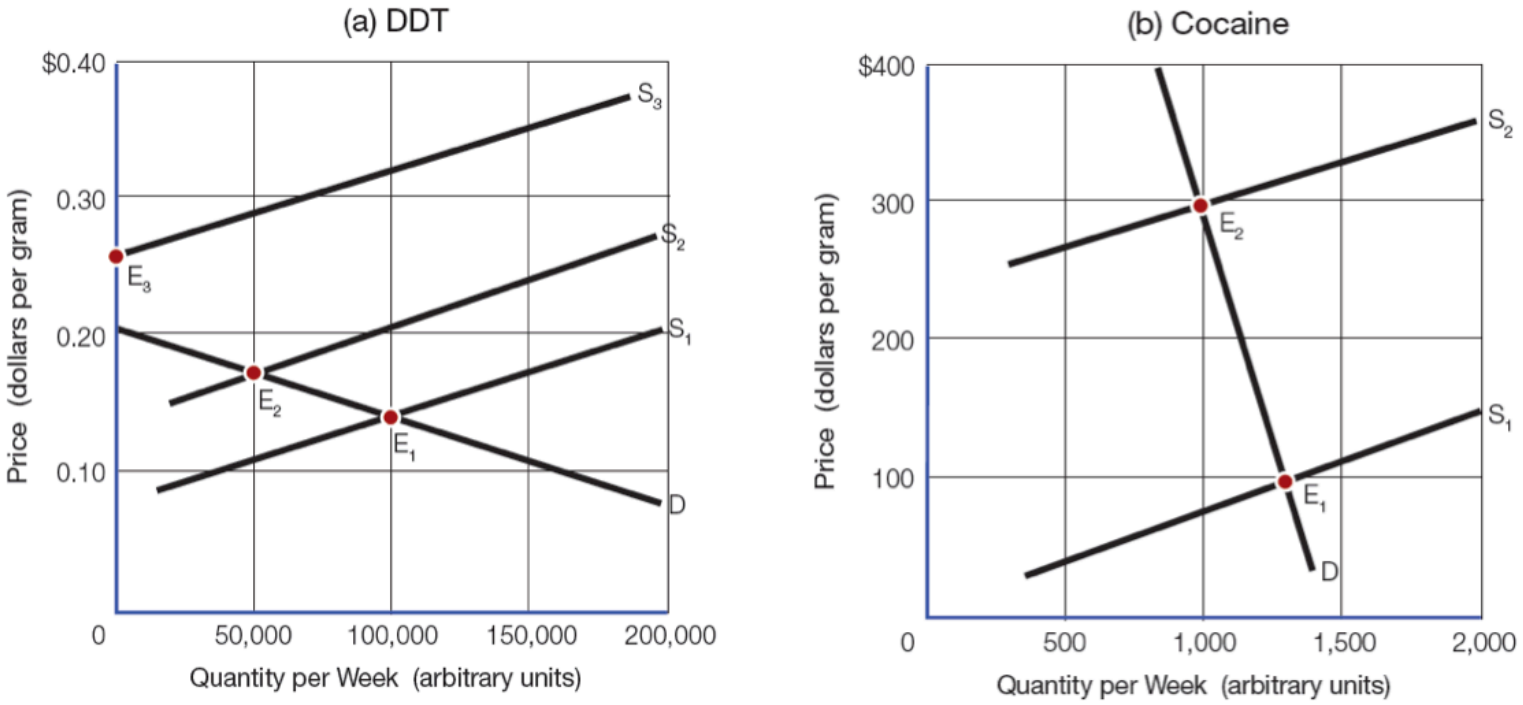

Figure 3-4: Elasticity and the Effects of Prohibition

Chapter Summary (Slide 1 of 4)

FINAL THOUGHTS

- What do economists mean by elasticity?
  - *Elasticity*: responsiveness of quantity demanded or supplied to changes in the price of a good, measured as a ratio of the percentage change in quantity to the percentage change in price
  - *Price elasticity of demand:* the percentage change in quantity demanded divided by the percentage change in the good's price

Chapter Summary (Slide 2 of 4)

FINAL THOUGHTS

- What is the relationship of demand to revenue?
  - If the demand for a good is elastic, a decrease in its price will increase total revenue.
  - If it is inelastic, an increase in its price will increase total revenue.
  - When it is unit elastic, revenue will remain constant as the price varies.

Chapter Summary (Slide 3 of 4)

FINAL THOUGHTS

- How do economists apply elasticity to changes in market conditions?
  - *Income elasticity of demand:* the ratio of the percentage change in quantity demanded to a given percentage change in income
  - *Cross elasticity of demand:* the ratio of the percentage change in the quantity of good A demanded to a given percentage change in the price of good B
  - *Price elasticity of supply:* the ratio of the percentage change in the quantity of a good supplied to a given change in its price

Chapter Summary (Slide 4 of 4)

FINAL THOUGHTS

- How does elasticity help in understanding changes in public policy?
  - Many issues of public policy depend on how responsive demand or supply is to changes in price.
  - Elasticity is important in prohibition.
    - Prohibition is more likely to have harmful unexpected consequences when demand is inelastic.