Elasticity

From:

Book 1: Chapter 6

Price Elasticity of Demand

- Measures buyers' responsiveness to price changes

- Elastic demand
  - Sensitive to price changes
  - Large change in quantity

- Inelastic demand
  - Insensitive to price changes

Price Elasticity of Demand Formula

- Formula for price elasticity of demand

$$E_d = \frac{\text{Percentage Change in } \mathbf{Quantity\ Demanded} \text{ of Product X}}{\text{Percentage Change in } \mathbf{Price} \text{ of Product X}}$$

Price Elasticity of Demand Formula

- Use the midpoint formula

- Ensures consistent results

$$E_d = \frac{\text{Change in quantity}}{\text{Sum of quantities} / 2} \div \frac{\text{Change in price}}{\text{Sum of prices} / 2}$$

Price Elasticity of Demand Formula

- Use percentages
  - Unit free measure
  - Compare responsiveness across products
- Eliminate the minus sign
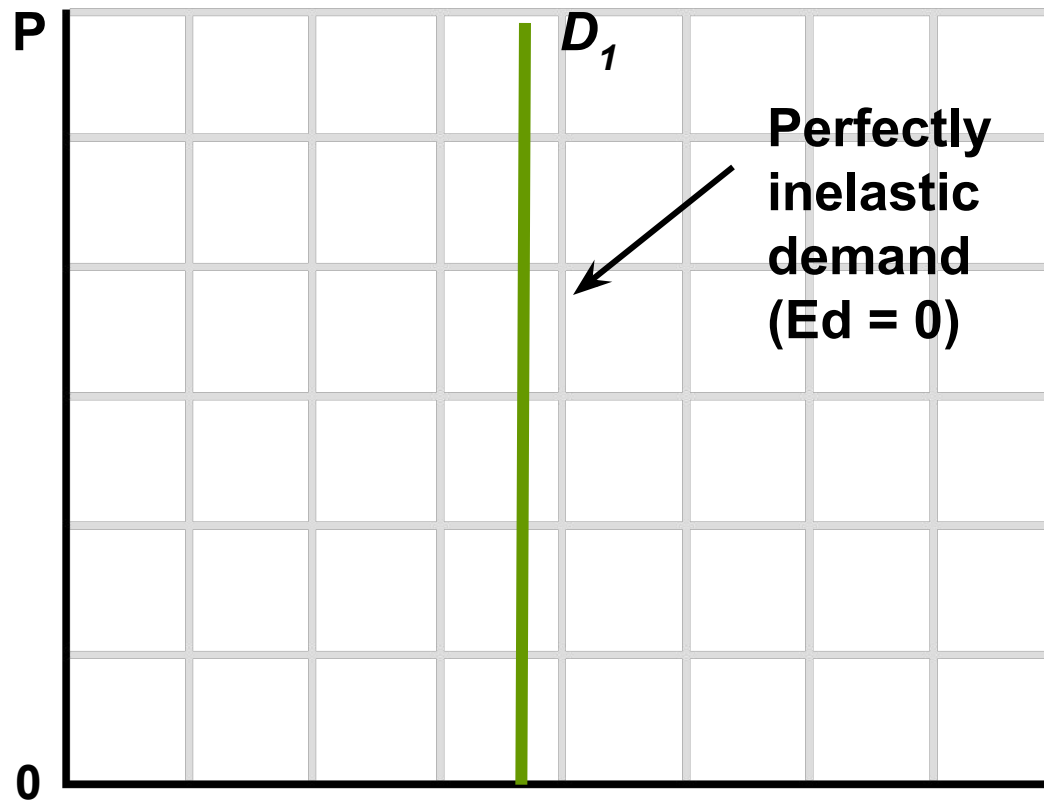 - Easier to compare elasticities

Interpretation of Elasticity of Demand

- $E_d > 1$ demand is elastic

- $E_d = 1$ demand is unit elastic

- $E_d < 1$ demand is inelastic

- Extreme cases
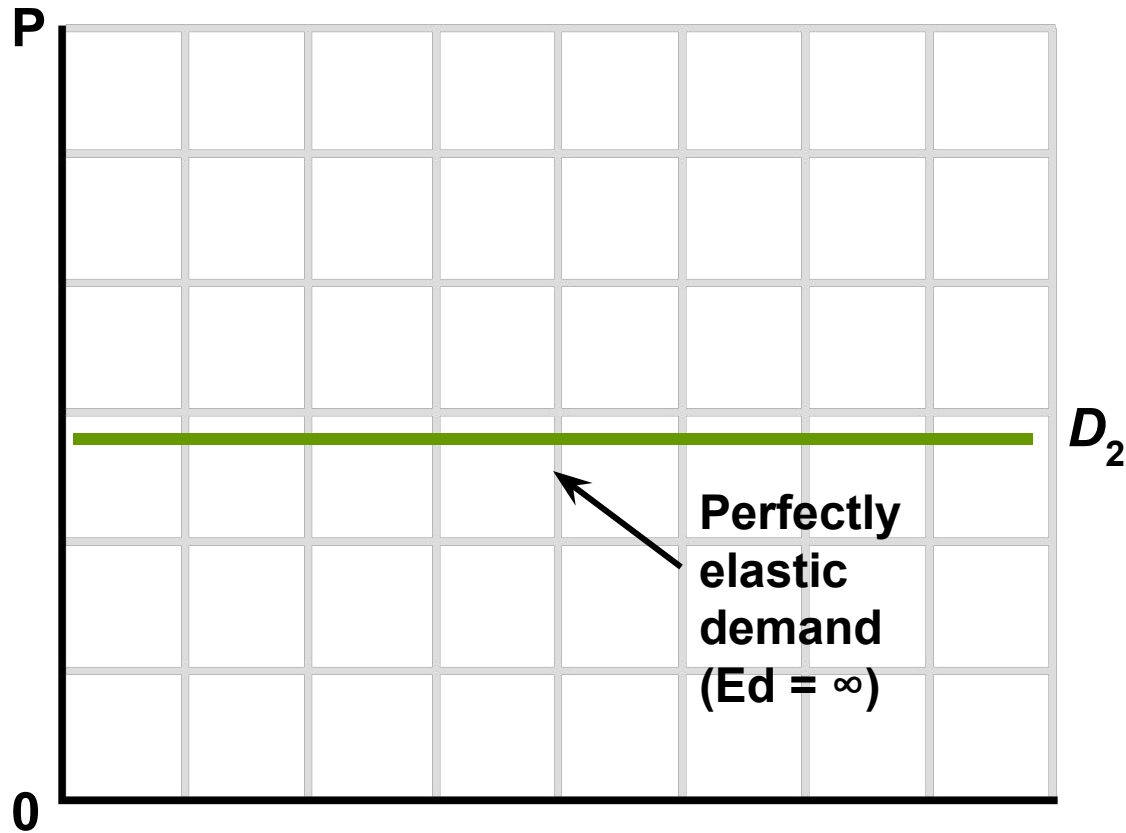 - Perfectly inelastic
  - Perfectly elastic

Extreme Cases

P

D_1

Perfectly inelastic demand (Ed = 0)

0

Perfectly inelastic demand

P

D_2

Perfectly
elastic
demand
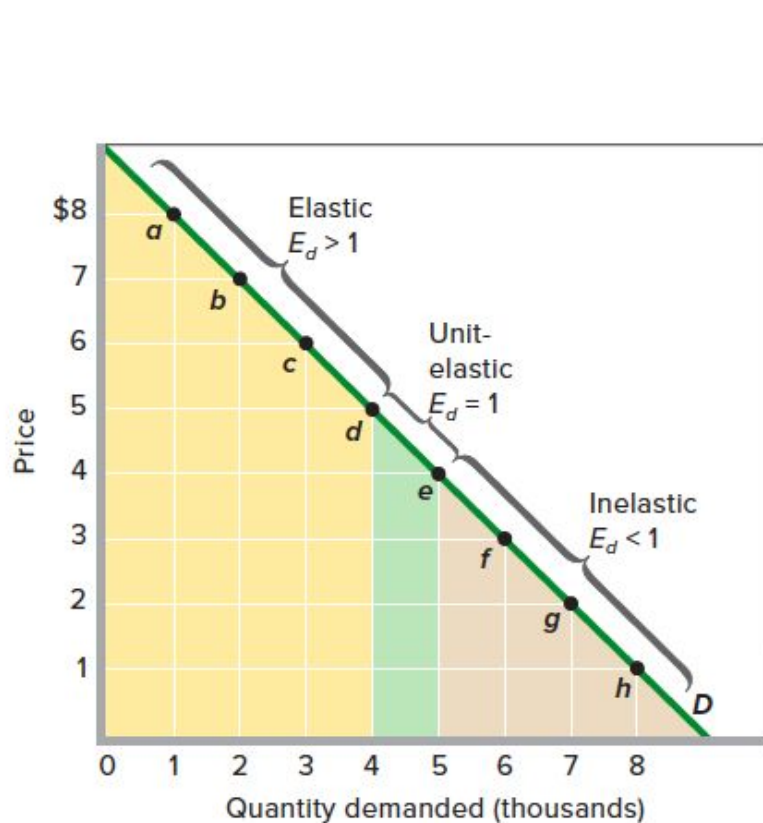$(Ed = \infty)$

0

Perfectly elastic demand
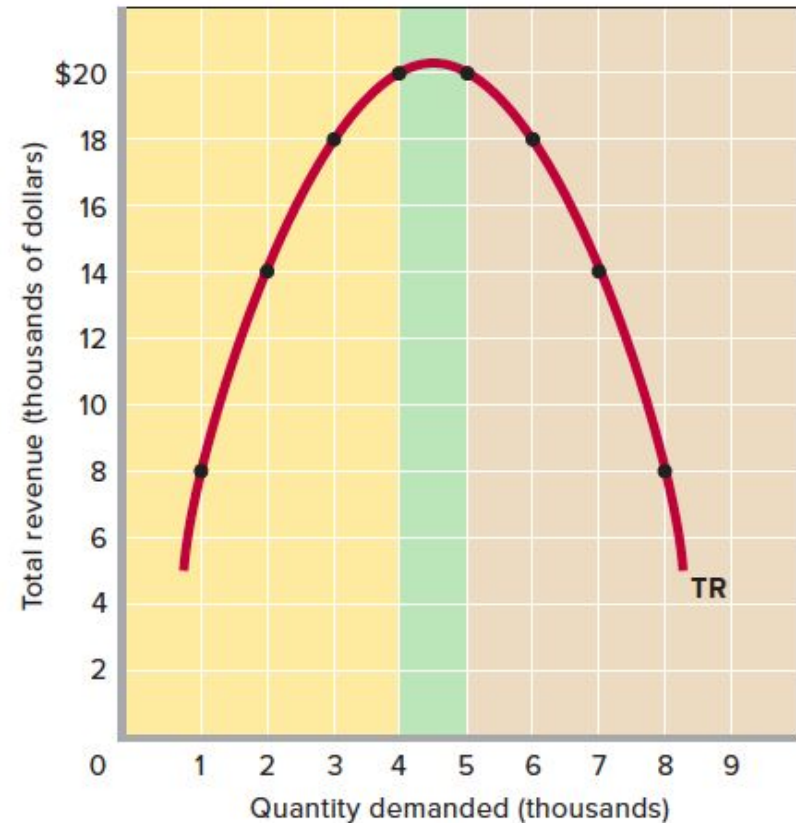
Total Revenue Test

- Total Revenue = Price x Quantity

- Inelastic demand
  - P and TR move in the same direction

- Elastic demand
  - P and TR move in opposite directions

The relation between price elasticity of demand and total revenue.

(a)
Demand curve

(b)
Total-revenue curve

Summary of Price Elasticity of Demand

Price Elasticity of Demand: A Summary

Absolute Value of Elasticity Coefficient	Demand Is	Description	Impact on Total Revenue of a:	
			Price Increase	Price Decrease
Greater than 1 ($E_d > 1$)	Elastic or relatively elastic	Q_d changes by a larger percentage than does price	Total revenue decreases	Total revenue increases
Equal to 1 ($E_d = 1$)	Unit or unitary elastic	Q_d changes by the same percentage as does price	Total revenue is unchanged	Total revenue is unchanged
Less than 1 ($E_d < 1$)	Inelastic or relatively inelastic	Q_d changes by a smaller percentage than does price	Total revenue increases	Total revenue decreases

Determinants of Elasticity of Demand

- Substitutability
  - More substitutes, demand is more elastic

- Proportion of Income
  - Higher proportion of income, demand is more elastic

- Luxuries vs. Necessities
  - Luxury goods, demand is more elastic

- Time
  - More time available, demand is more elastic

Cross Elasticity of Demand

- Measures responsiveness of sales to change in the price of another good

- Substitutes – positive sign

- Complements – negative sign

- Independent goods - zero

$$E_{x,y} = \frac{\text{Percentage change in quantity demanded of product X}}{\text{Percentage change in price of product Y}}$$

Income Elasticity of Demand

- Measures responsiveness of buyers to changes in income

- Normal goods – positive sign

- Inferior goods – negative sign

$$E_i = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$$

$E_{x,y}$ and E_i

Cross and Income Elasticities of Demand

Value of Coefficient	Description	Type of Good(s)
Cross elasticity: Positive ($E_{wz} > 0$)	Quantity demanded of W changes in same direction as change in price of Z	Substitutes
Negative ($E_{xy} < 0$)	Quantity demanded of X changes in opposite direction from change in price of Y	Complements
Income elasticity: Positive ($E_i > 0$)	Quantity demanded of the product changes in same direction as change in income	Normal or superior
Negative ($E_i < 0$)	Quantity demanded of the product changes in opposite direction from change in income	Inferior

Price Elasticity of Supply

- Measures sellers' responsiveness to price changes

  - Elastic supply, producers are responsive to price changes

  - Inelastic supply, producers are not responsive to price changes

Price Elasticity of Supply

■Formula to compute elasticity

■E_s > 1 supply is elastic

■E_s < 1 supply is inelastic

$$E_s = \frac{\text{Percentage Change in } \textbf{Quantity Supplied} \text{ of Product X}}{\text{Percentage Change in } \textbf{Price} \text{ of Product X}}$$

Impact of Time on Elasticity

- **The Immediate Market Period**
  - the length of time over which producers are unable to respond to a change in price with a change in quantity supplied.

- **The Short Run**
  - a period of time too short to change plant capacity but long enough to use the fixed-sized plant more or less intensively.

- **The Long Run**
  - a time period long enough for firms to adjust their plant sizes and for new firms to enter (or existing firms to leave) the industry.

Reading Assignment

"Elasticity and Pricing Power: Why Different Consumers Pay Different Prices"

Book 1 Page 134-135