Course: Foundations of Economics
Lecture 3: Elasticity

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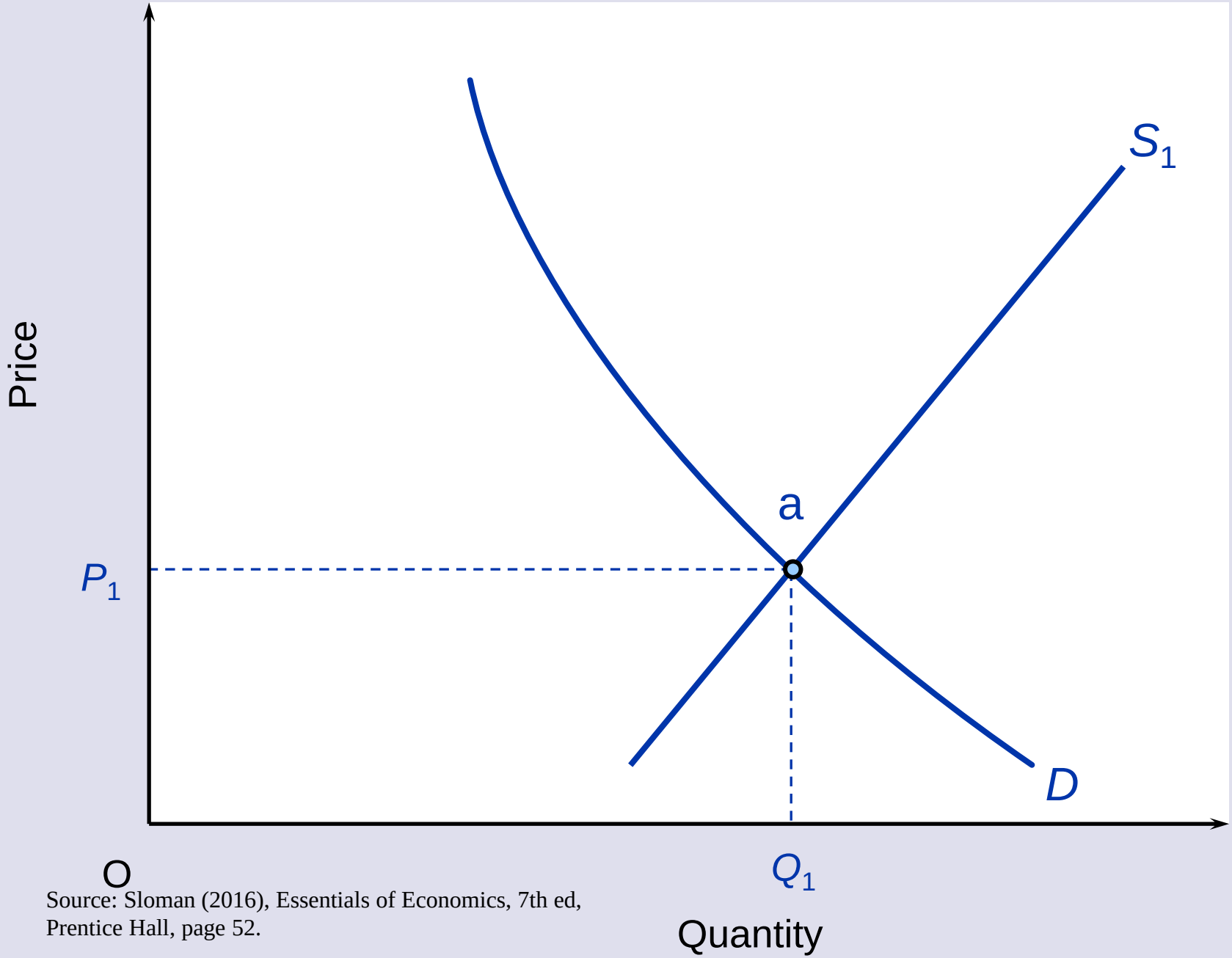
Learning outcomes

- Elasticity concept
- Price elasticity of demand and supply
- Other elasticities
- Measuring elasticities
- Application of elasticities

Elasticity

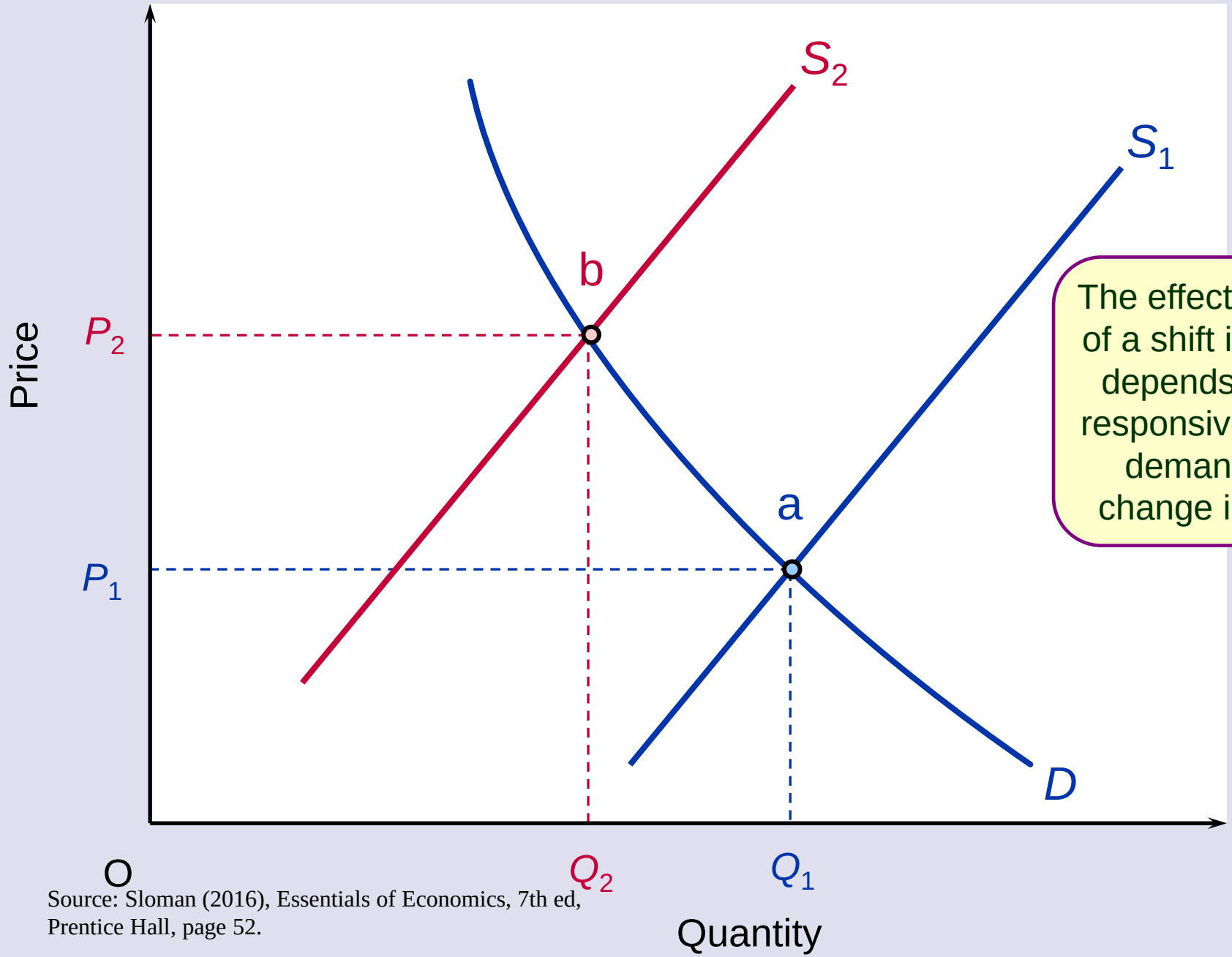
- Defining elasticity
  - the responsiveness of demand and supply
- Price elasticity of demand
  - the responsiveness of demand to a change in price

Market supply and demand



Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 52.

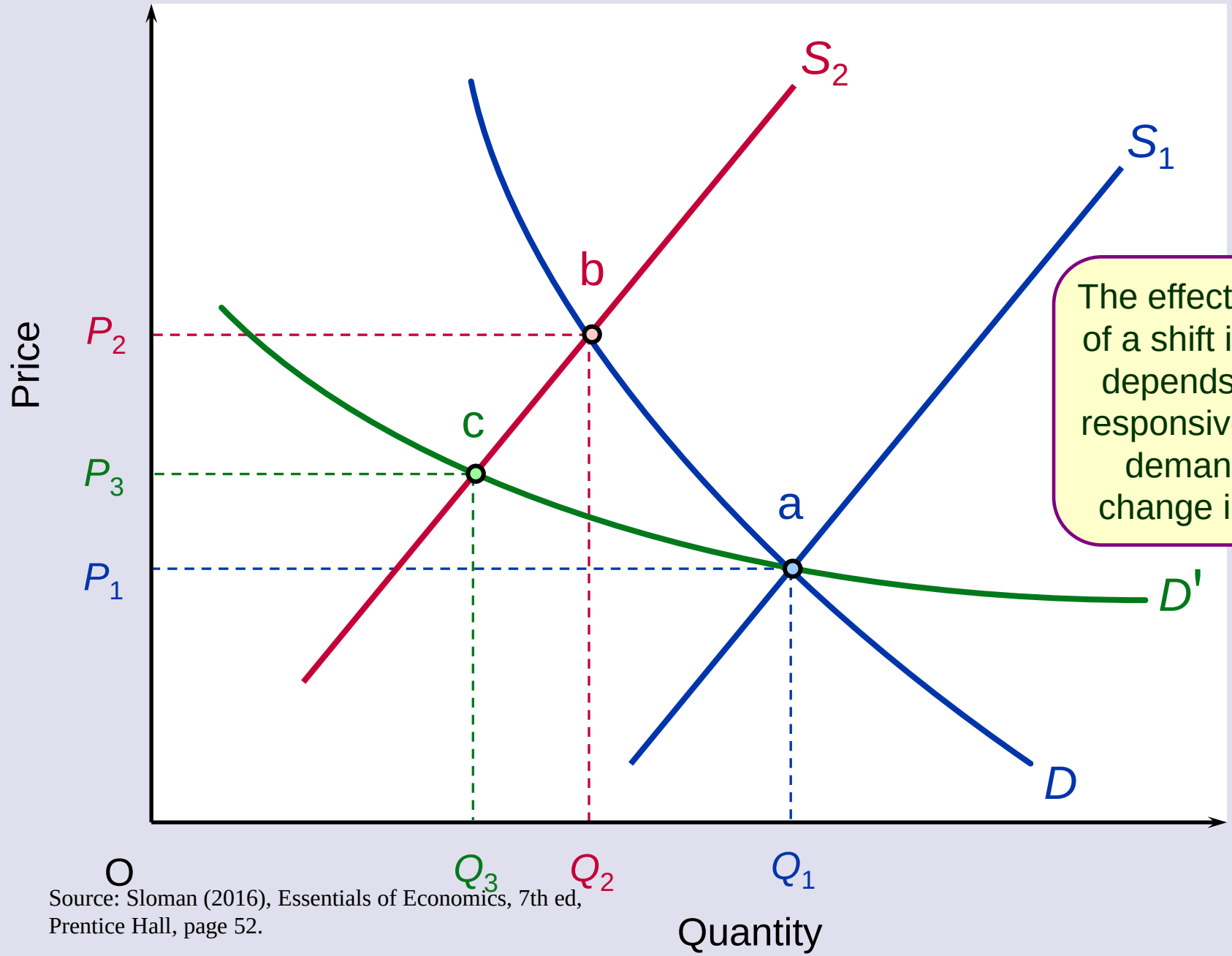
Market supply and demand



The effect on price of a shift in supply depends on the responsiveness of demand to a change in price.

Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 52.

Market supply and demand



The effect on price of a shift in supply depends on the responsiveness of demand to a change in price.

Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 52.

Elasticity

- Price elasticity of demand
  - measurement

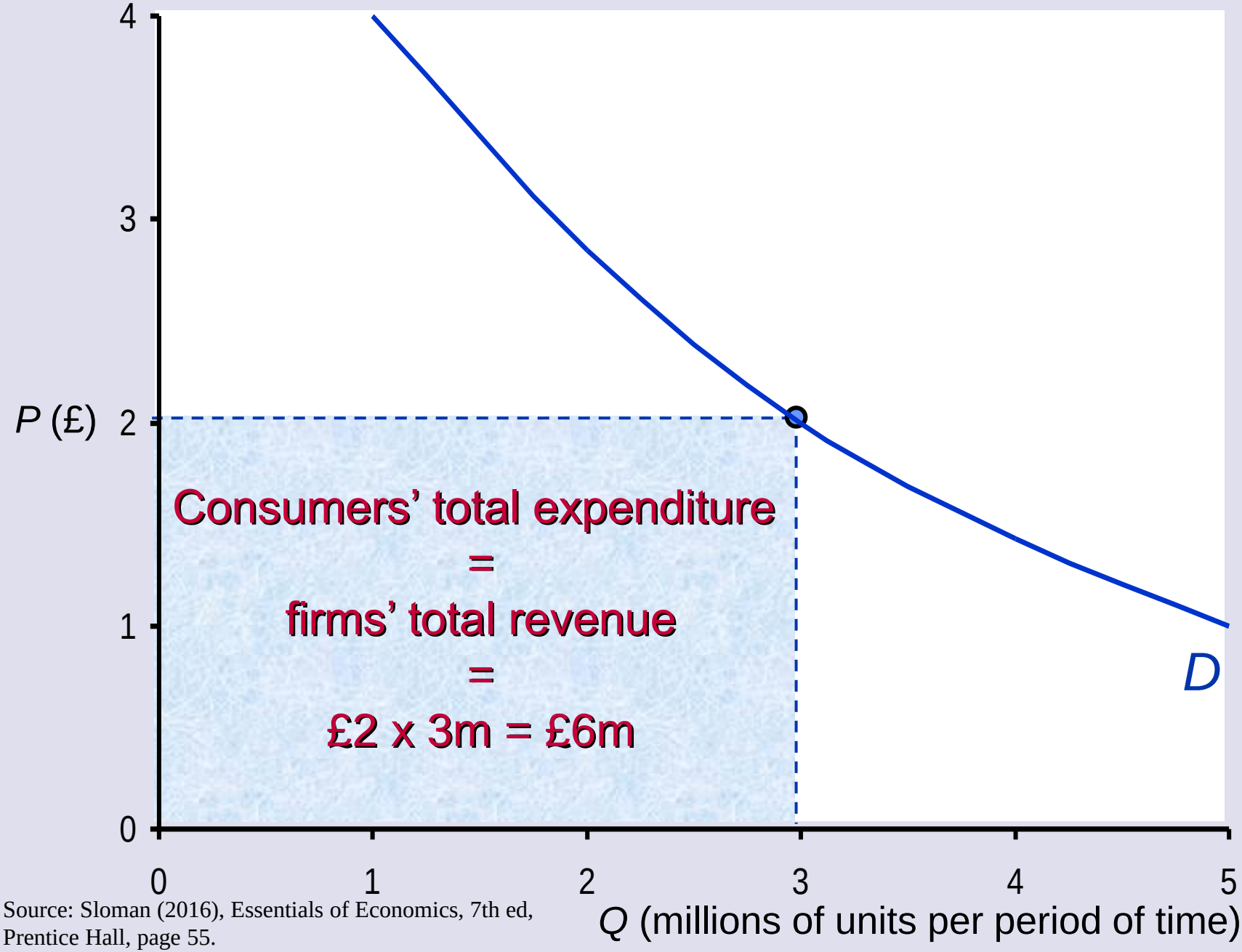
    proportionate (or %) ΔQ_d / proportionate (or %) ΔP

  - use of proportionate or percentage changes
  - the sign (positive or negative)
  - the value (greater or less than one)

Elasticity

- Determinants of price elasticity of demand ($P\varepsilon_D$)
  - number and closeness of substitute goods
  - the proportion of income spent on the good
  - time
- Price elasticity of demand and consumer expenditure ($P \times Q$)

Total expenditure

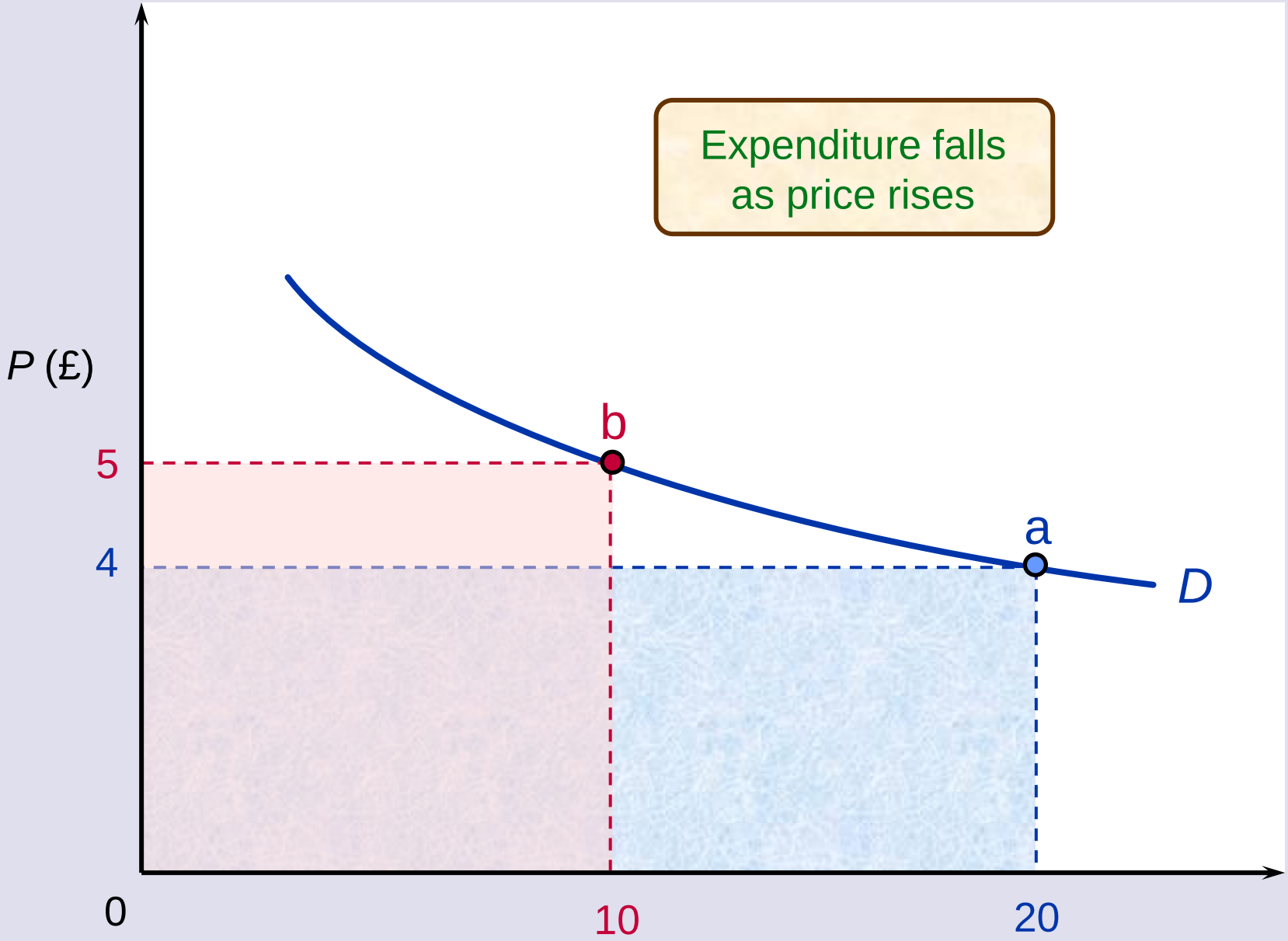


Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 55.

Elasticity

- Price elasticity of demand and consumer expenditure ($P \times Q$)
  - effects of a price change on expenditure: elastic demand

Elastic demand between two points



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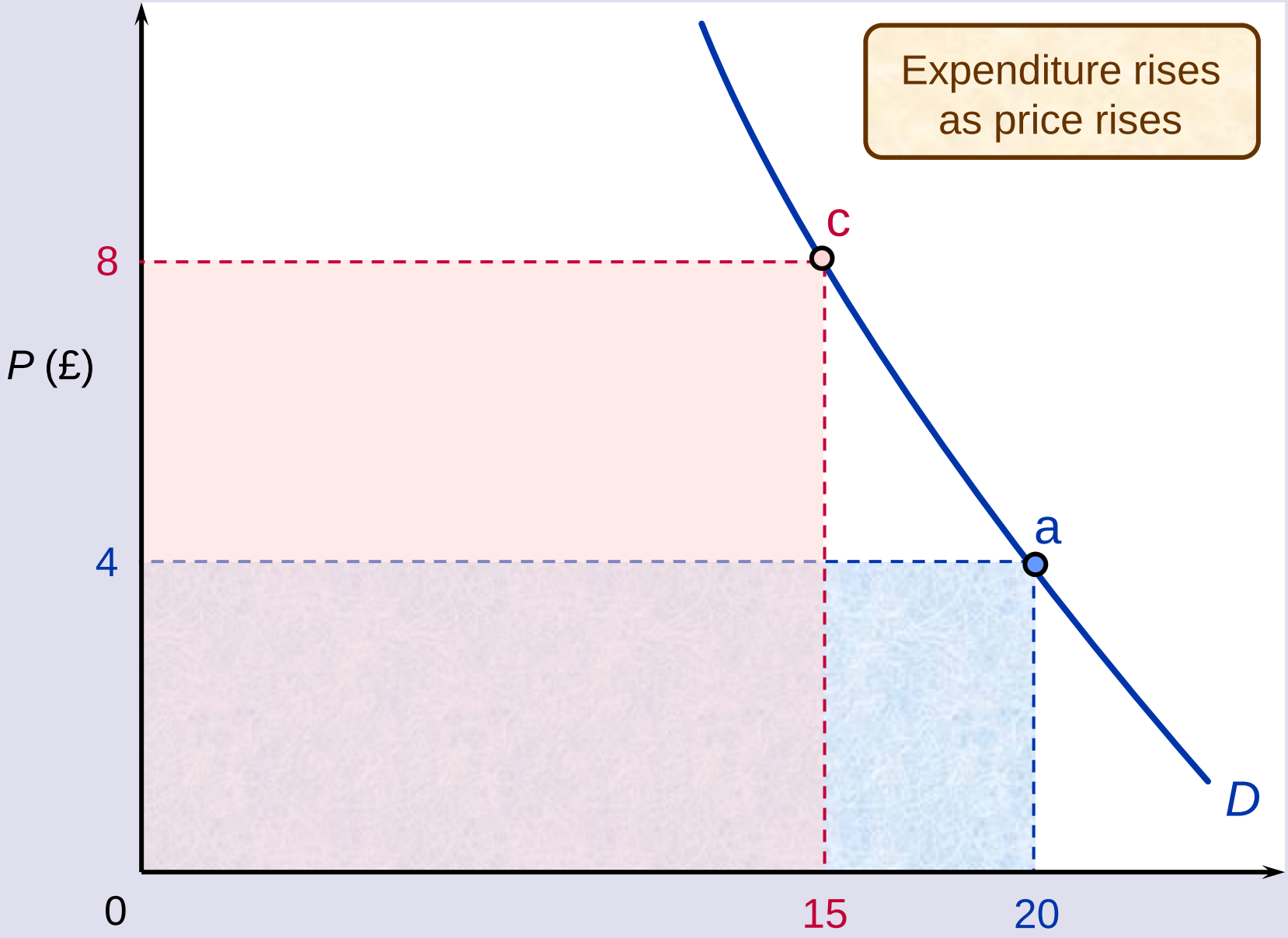
Elasticity

- Price elasticity of demand and consumer expenditure ($P \times Q$)
  - effects of a price change on expenditure: elastic demand
  - effects of a price change on expenditure: inelastic demand

Inelastic demand between two points

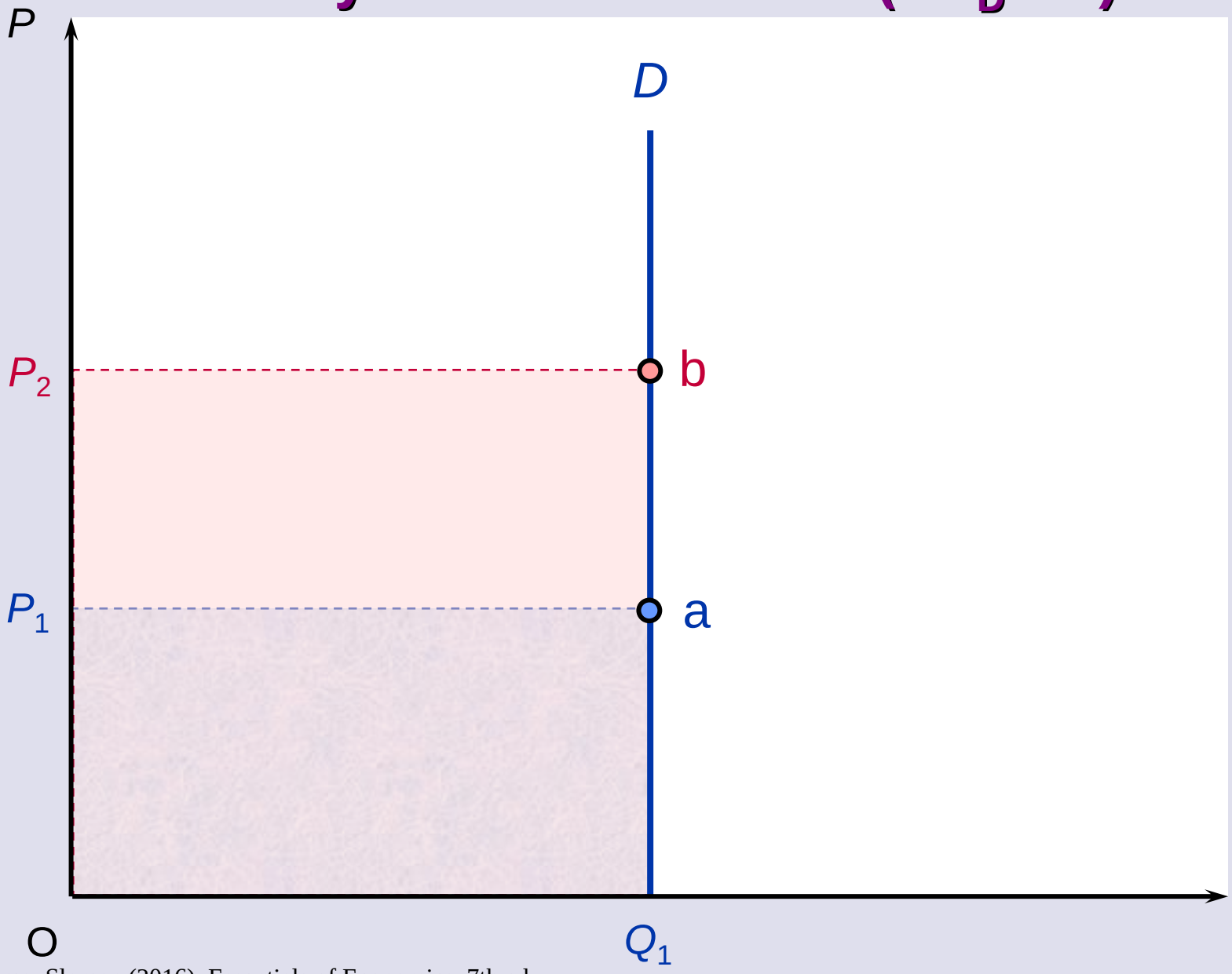


Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 55.

Elasticity

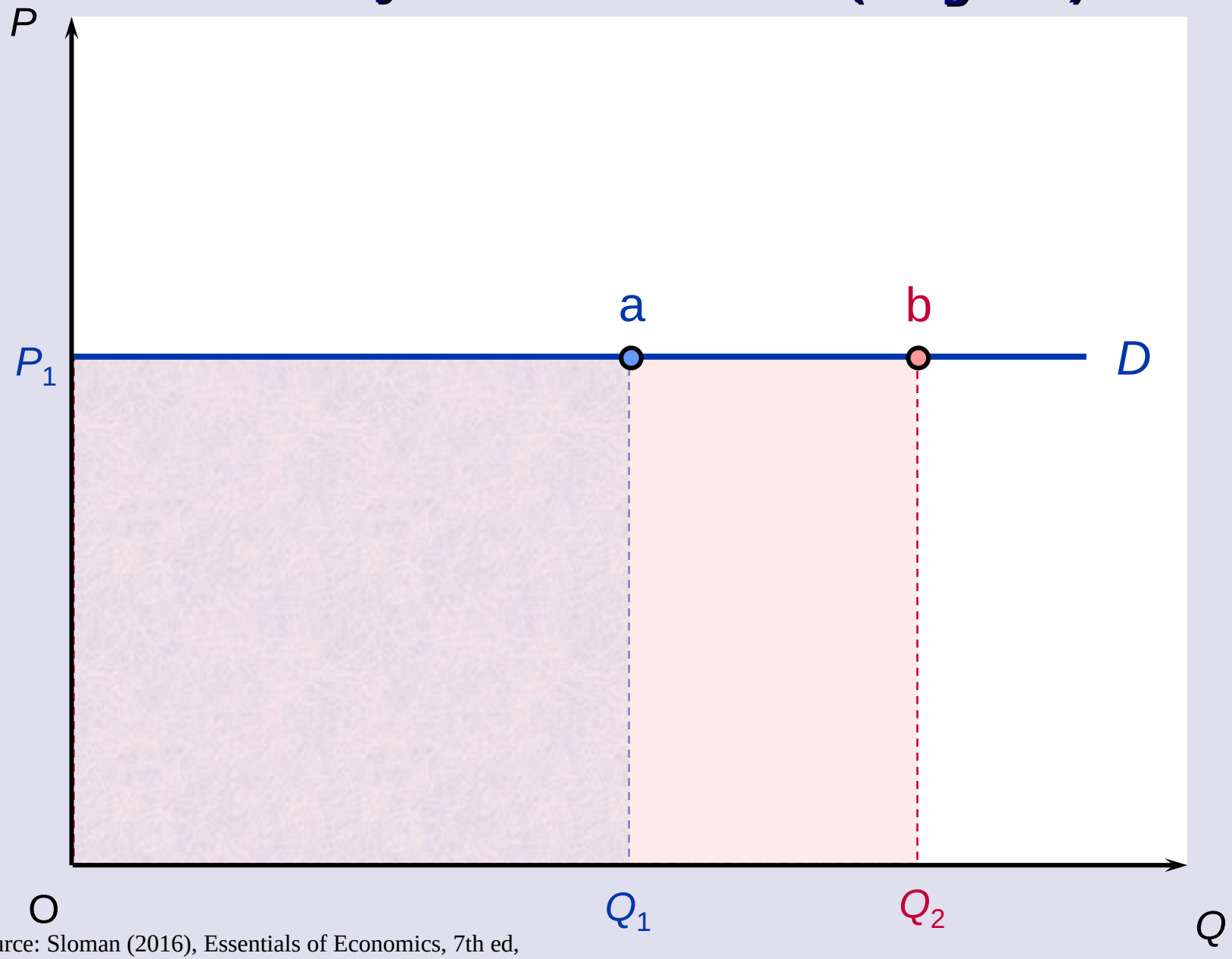
- Price elasticity of demand and consumer expenditure ($P \times Q$)
  - effects of a price change on expenditure: elastic demand
  - effects of a price change on expenditure: inelastic demand
  - special cases
    - totally inelastic demand: $P\varepsilon_D = 0$
    - infinitely elastic demand: $P\varepsilon_D = \infty$
    - unit elastic demand: $P\varepsilon_D = -1$

Totally inelastic demand ($P\in_D = 0$)



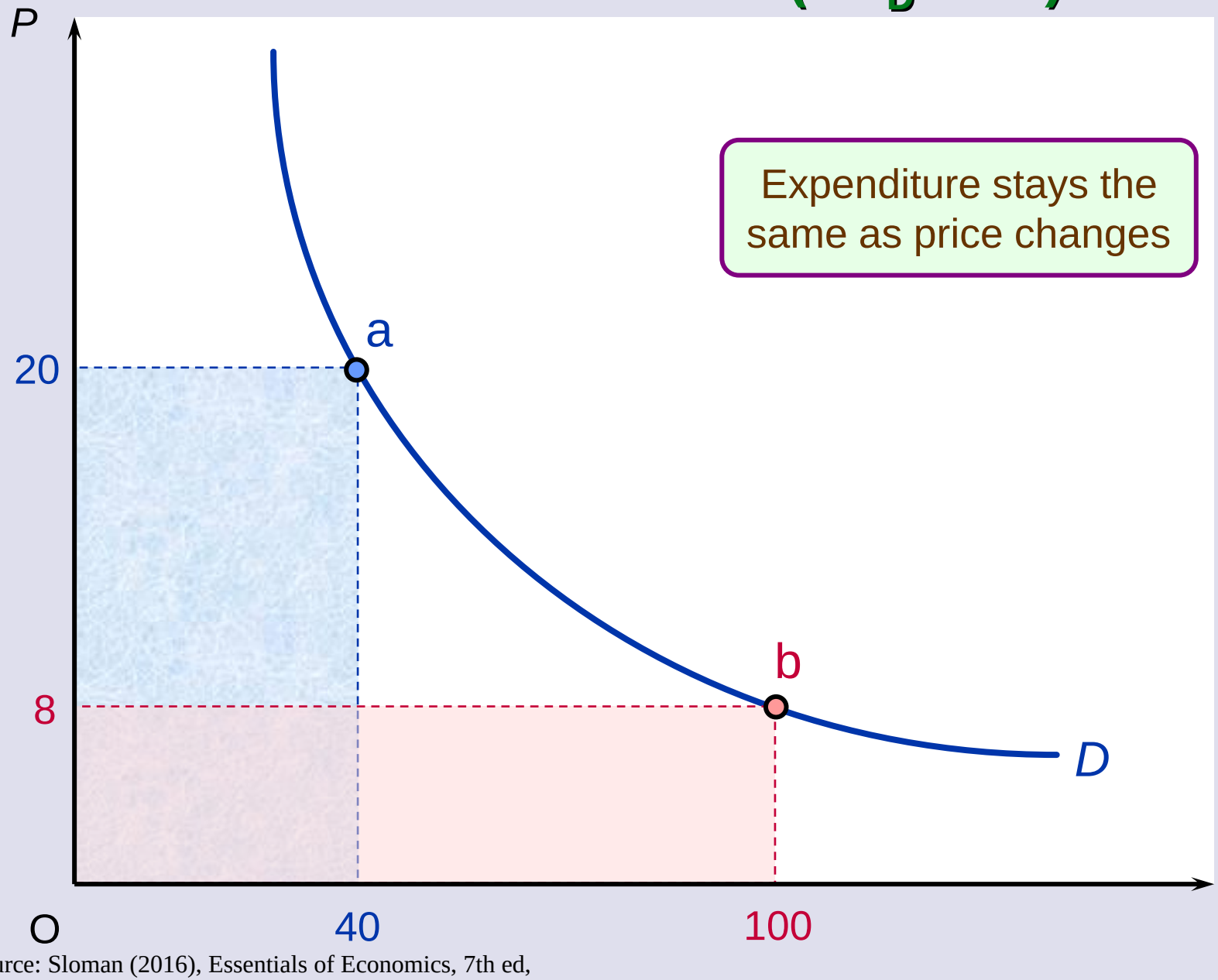
Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 55.

Infinitely elastic demand ($P\in_D = \infty$)



Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 57.

Unit elastic demand ($P\epsilon_D = -1$)

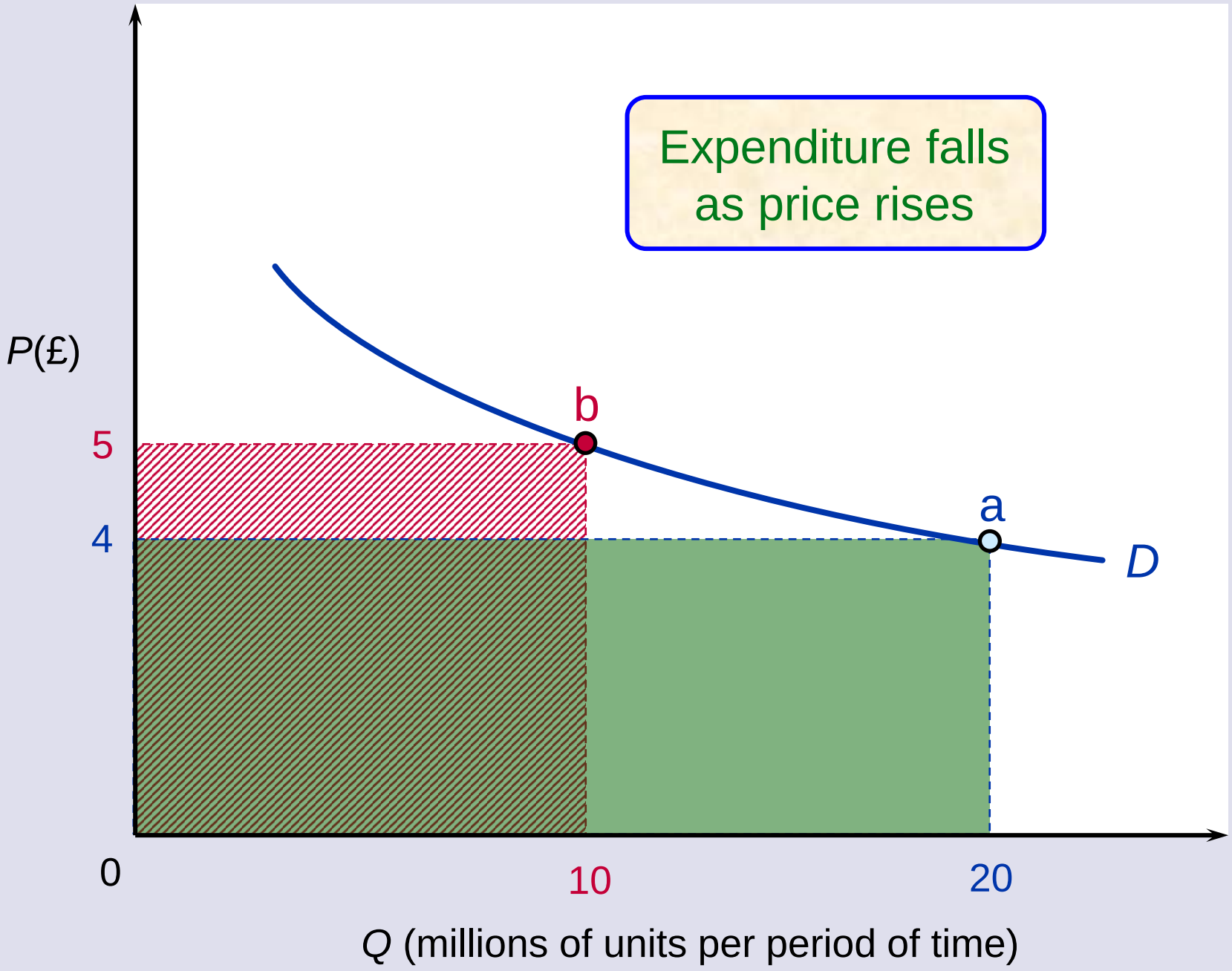


Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 57.

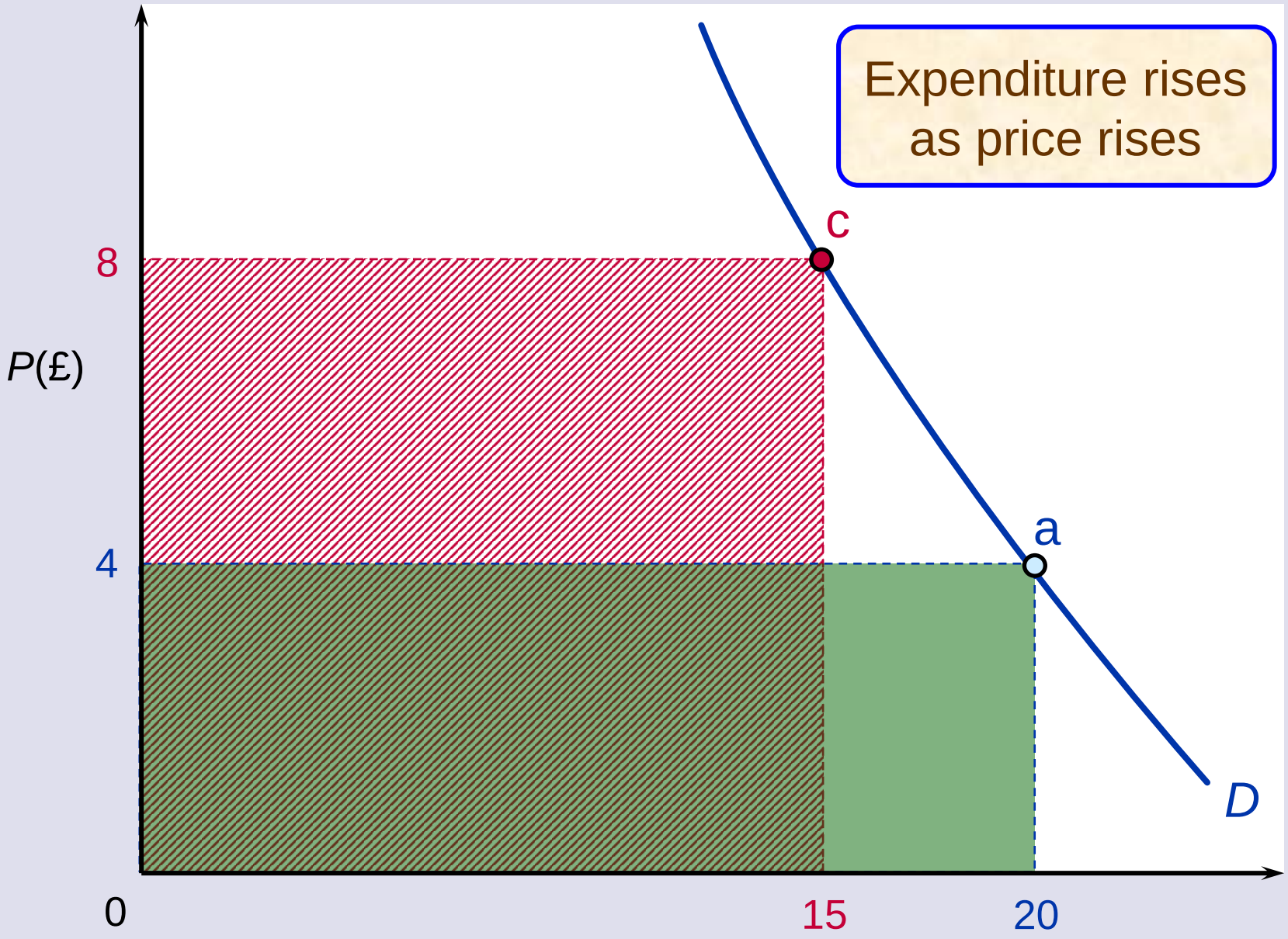
Elasticity

- Price elasticity of demand and consumer expenditure ($P \times Q$)
  - effects of a price change on expenditure: elastic demand
  - effects of a price change on expenditure: inelastic demand
  - special cases
  - applications to price decisions

Elastic demand between two points



Inelastic demand between two points



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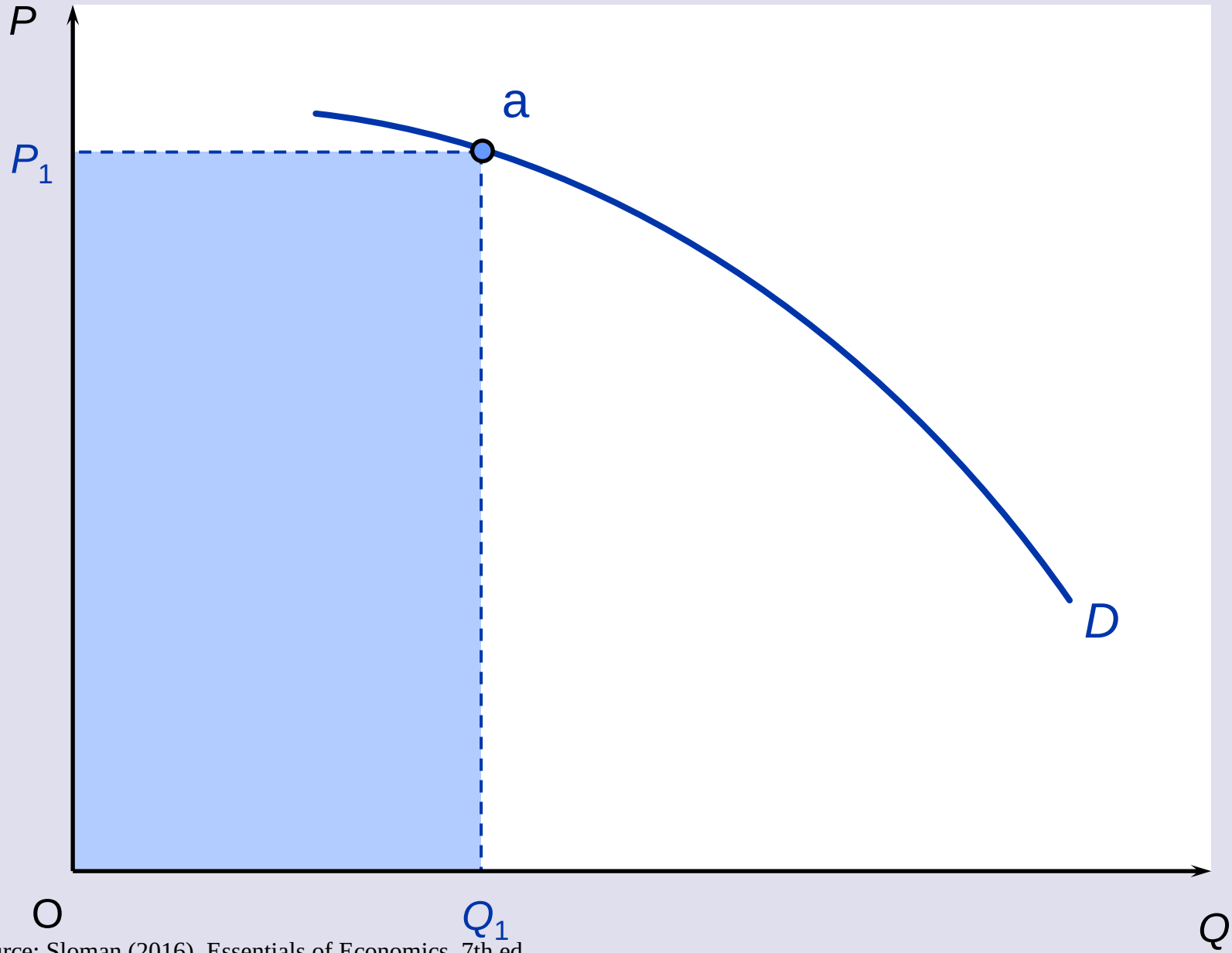
Elasticity

- Price elasticity of demand and consumer expenditure ($P \times Q$)
  - effects of a price change on expenditure: elastic demand
  - effects of a price change on expenditure: inelastic demand
  - special cases
  - applications to price decisions
  - different elasticities along a demand curve

Different elasticities along different portions of a demand curve



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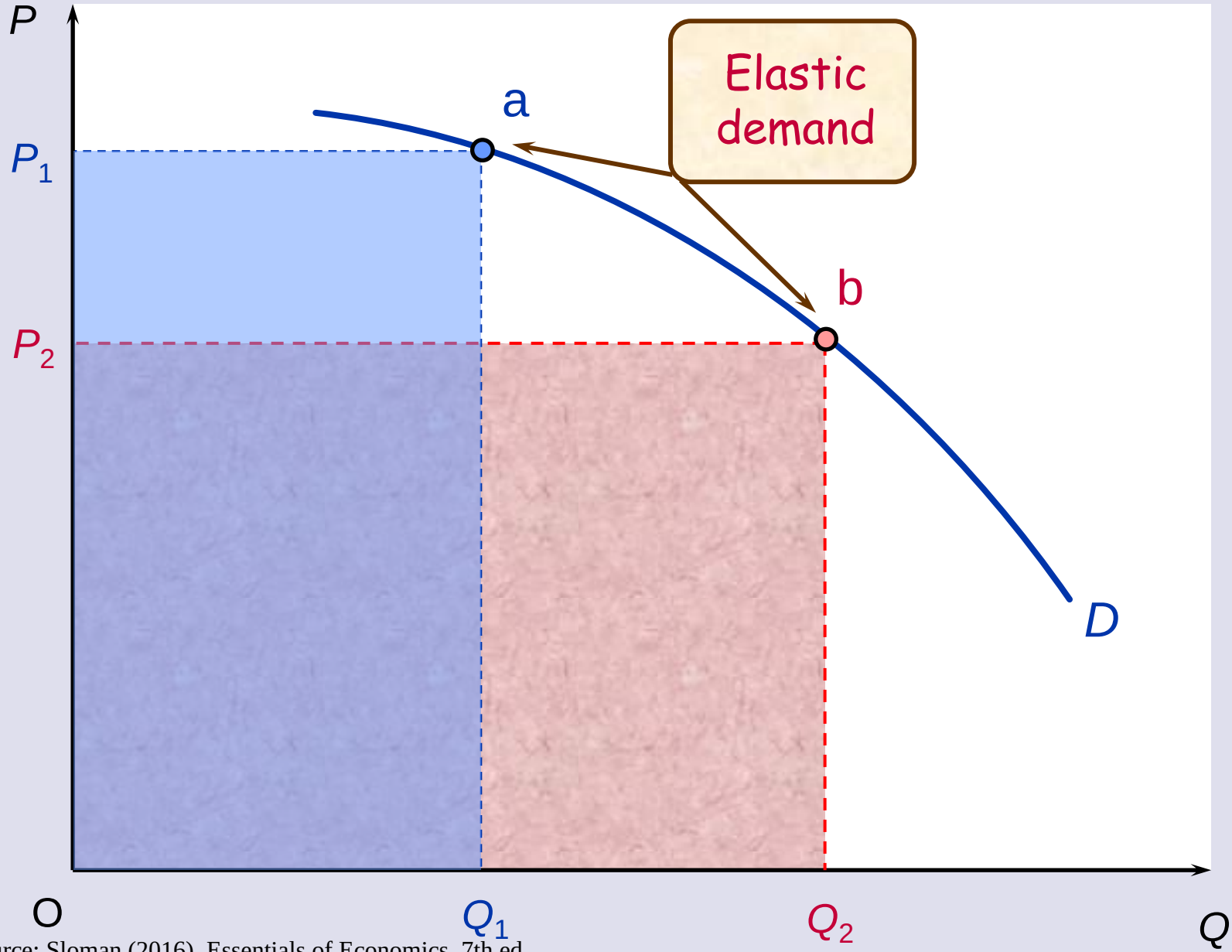
Different elasticities along different portions of a demand curve



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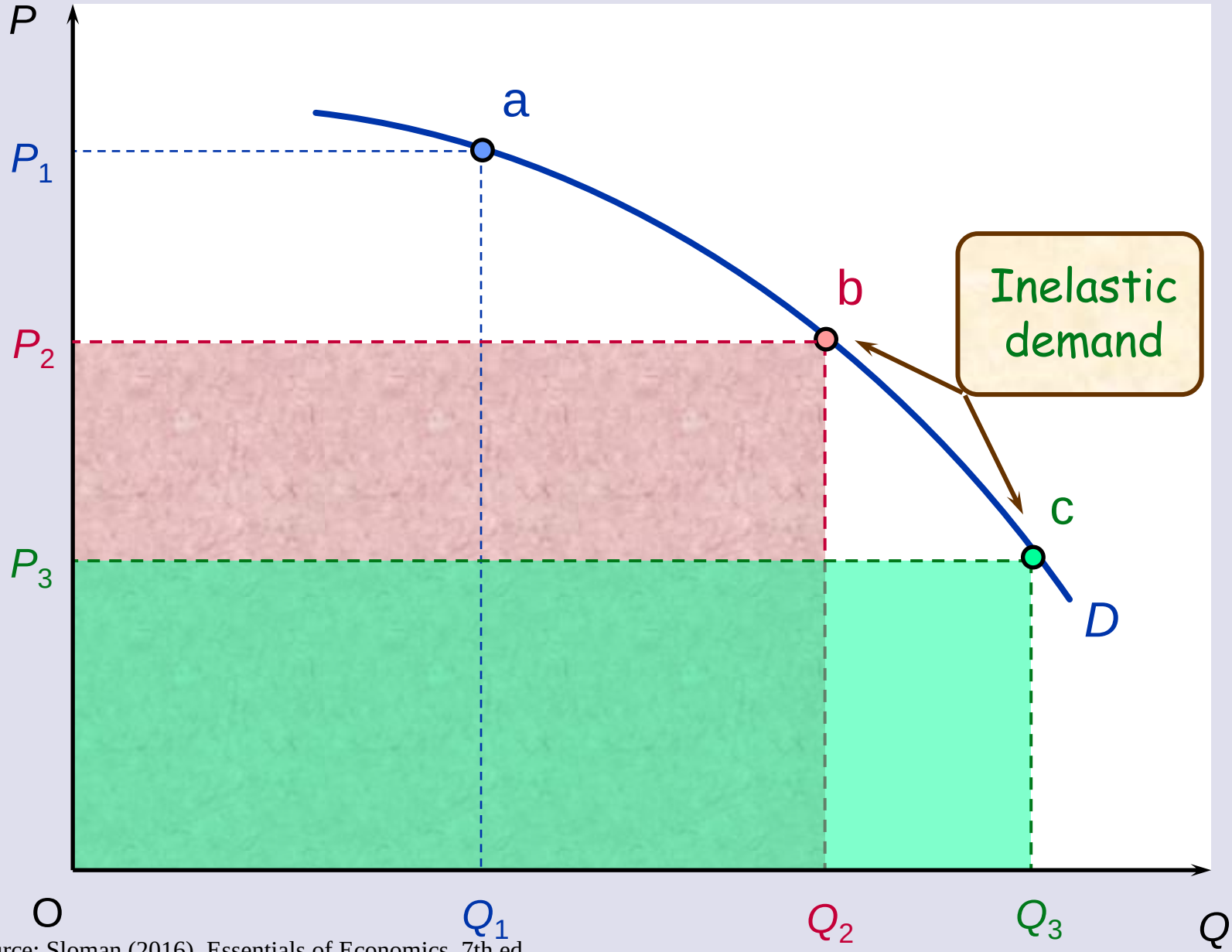
Different elasticities along different portions of a demand curve



Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 56.

Elasticity

- Measurement of elasticity:
  - the formula for price elasticity of demand

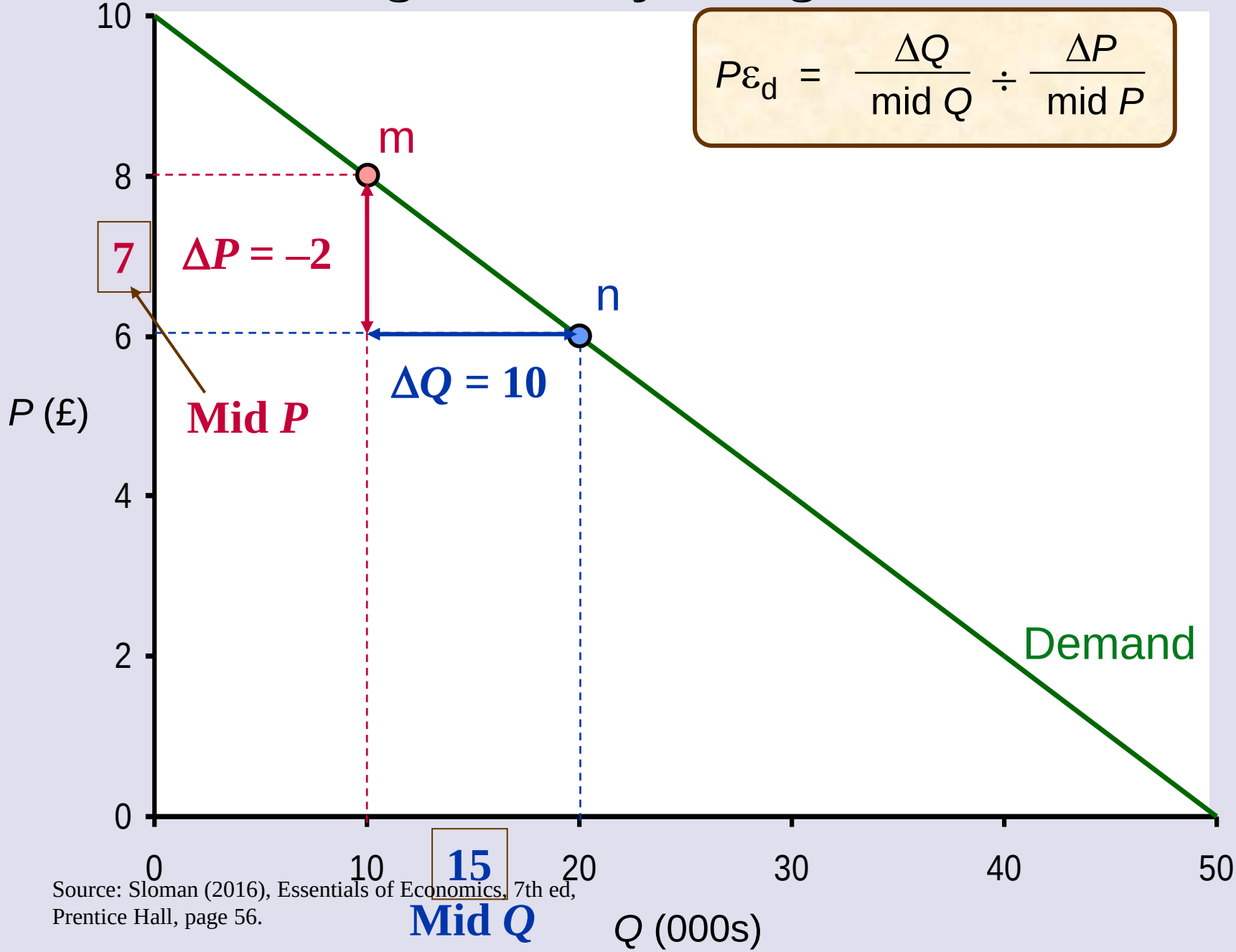
    $\Delta Q/Q \div \Delta P/P$

  - using the average (arc) or ‘mid-point’ method

    $\Delta Q/\text{mid } Q \div \Delta P/\text{mid } P$

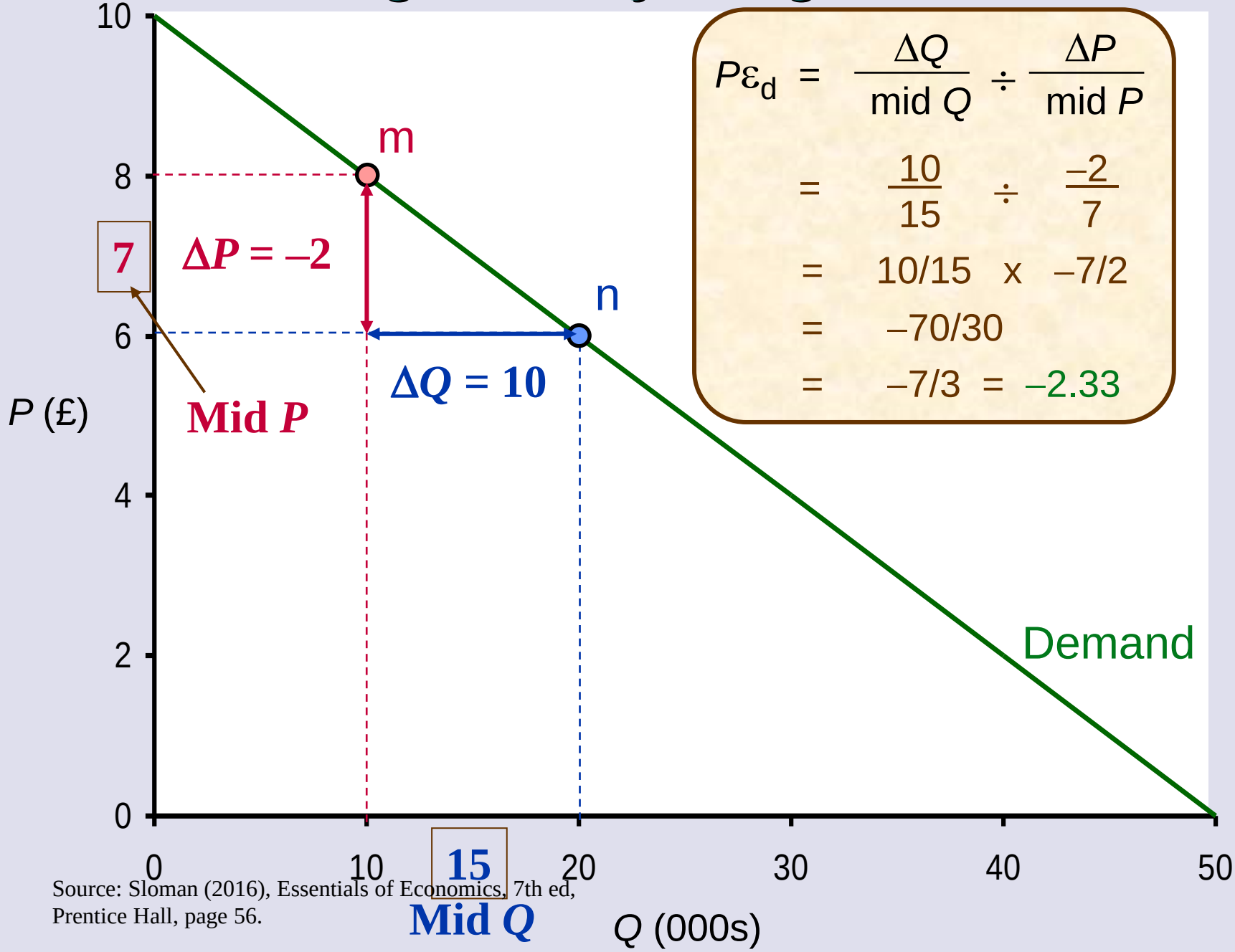
Measuring elasticity using the arc method

$$P\varepsilon_d = \frac{\Delta Q}{\text{mid } Q} \div \frac{\Delta P}{\text{mid } P}$$



Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 56.

Measuring elasticity using the arc method



$$P\varepsilon_d = \frac{\Delta Q}{\text{mid } Q} \div \frac{\Delta P}{\text{mid } P}$$

$$= \frac{10}{15} \div \frac{-2}{7}$$

$$= 10/15 \times -7/2$$

$$= -70/30$$

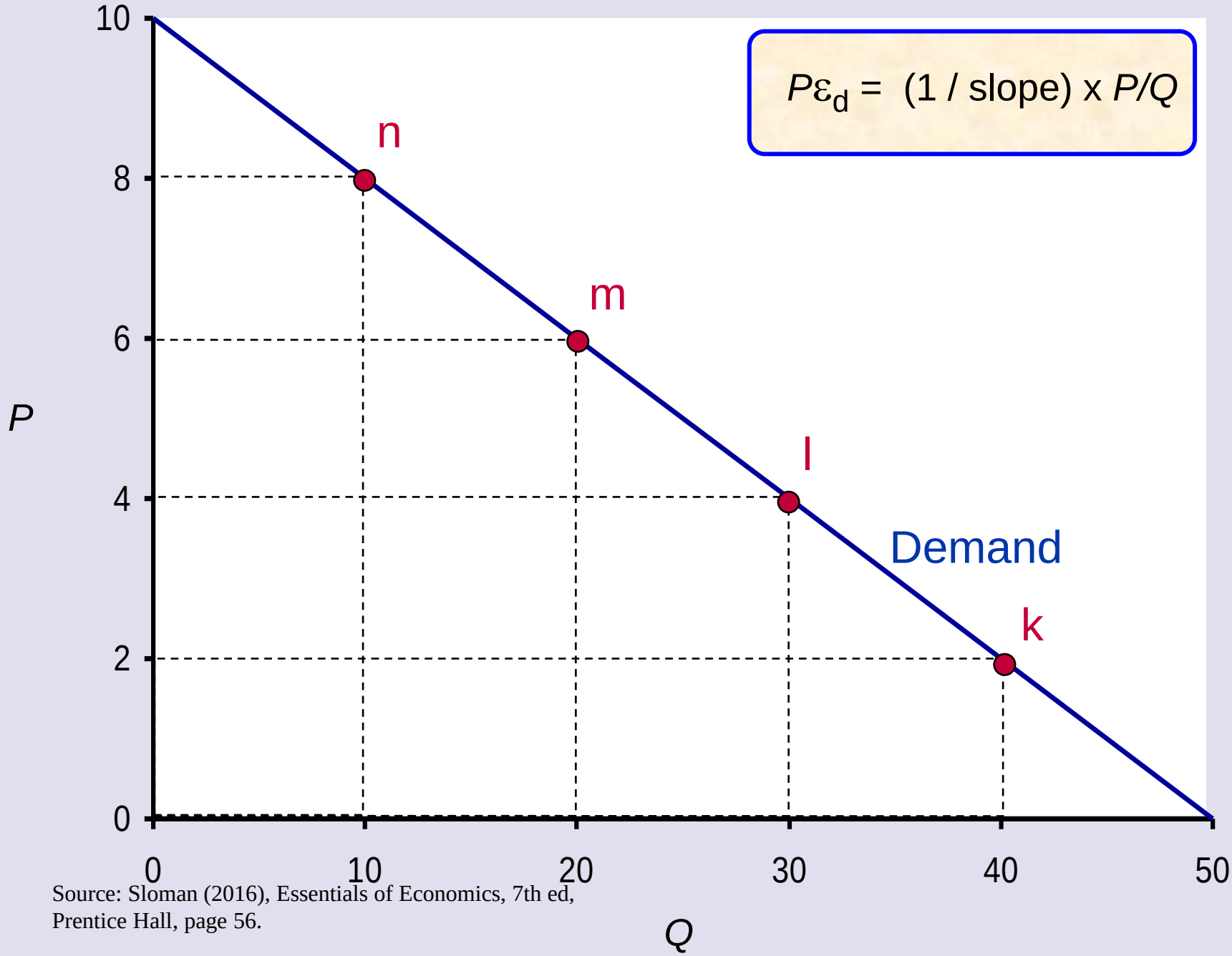
$$= -7/3 = -2.33$$

Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 56.

Elasticity

- Measurement of elasticity: point elasticity
  - the formula for price elasticity of demand
    - d*Q*/d*P* x *P*/*Q*
  - the elasticity of a straight-line demand ‘curve’ (constant d*Q*/d*P*)
  - the elasticity of a curved demand curve
    - d*Q*/d*P* is the tangent to the curve
  - different elasticities along a straight-line demand curve

Different elasticities along a straight-line demand curve



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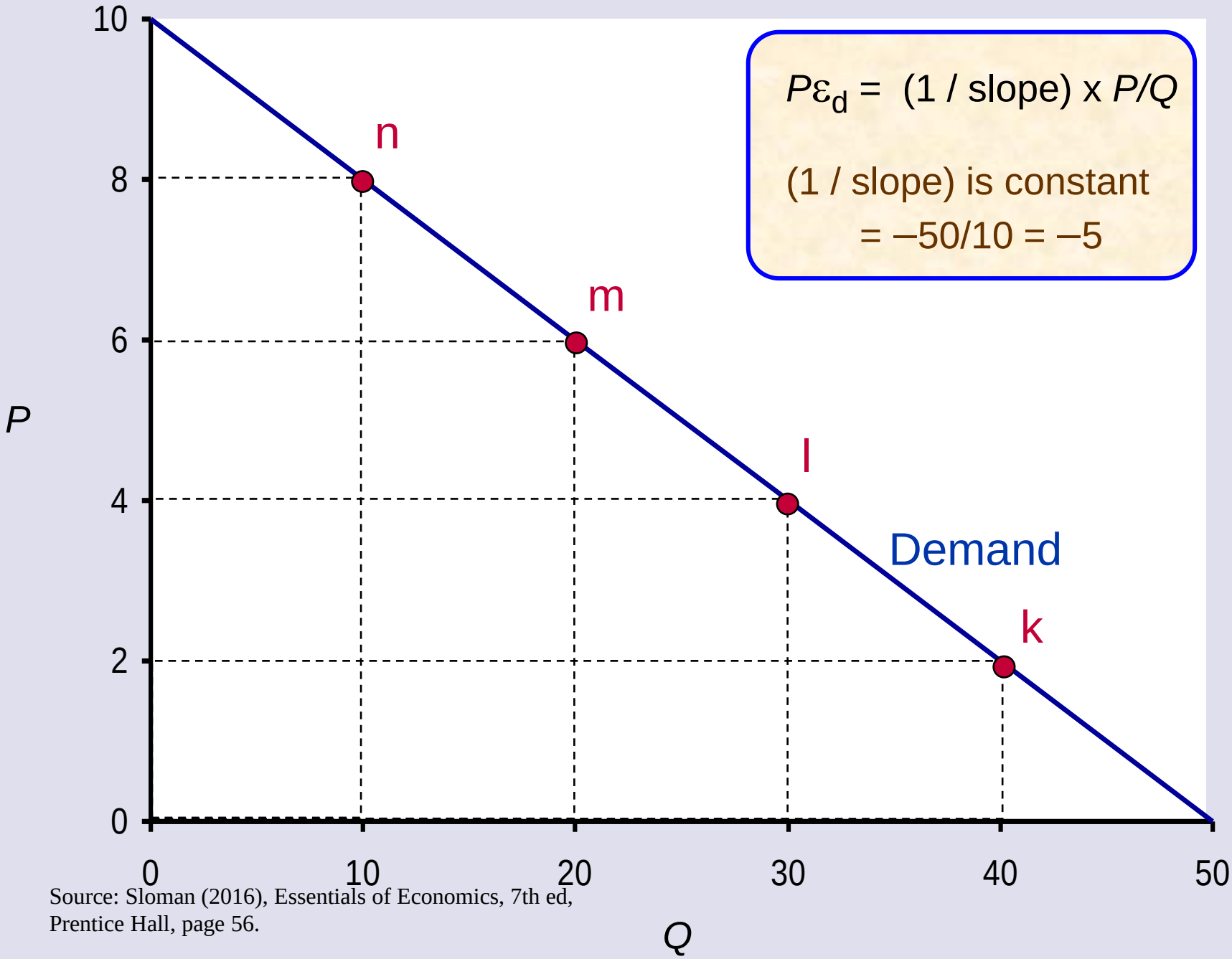
Different elasticities along a straight-line demand curve



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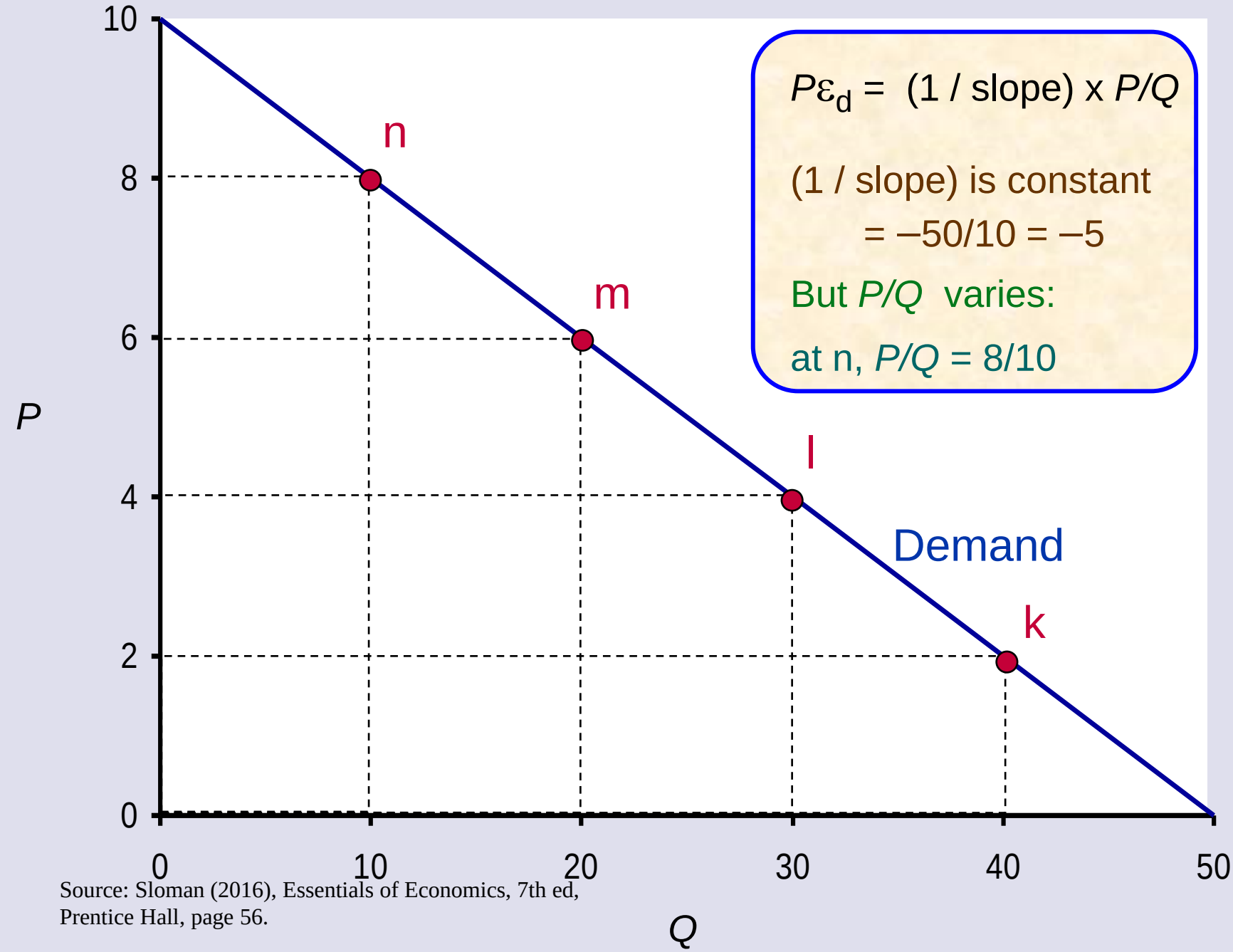
Different elasticities along a straight-line demand curve



$P\varepsilon_d$ = (1 / slope) x P/Q

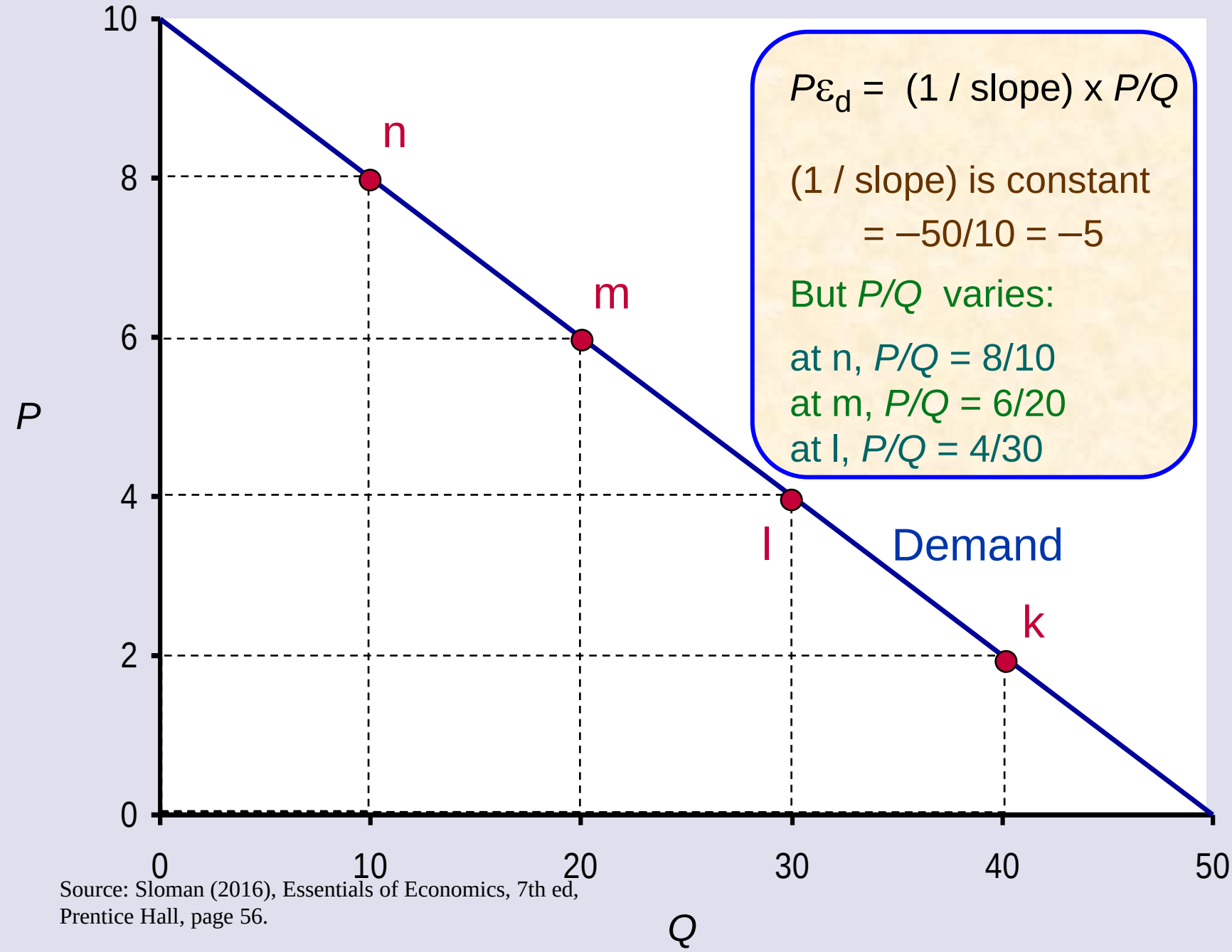
(1 / slope) is constant
= –50/10 = –5

But P/Q varies:

at n, P/Q = 8/10

Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 56.

Different elasticities along a straight-line demand curve



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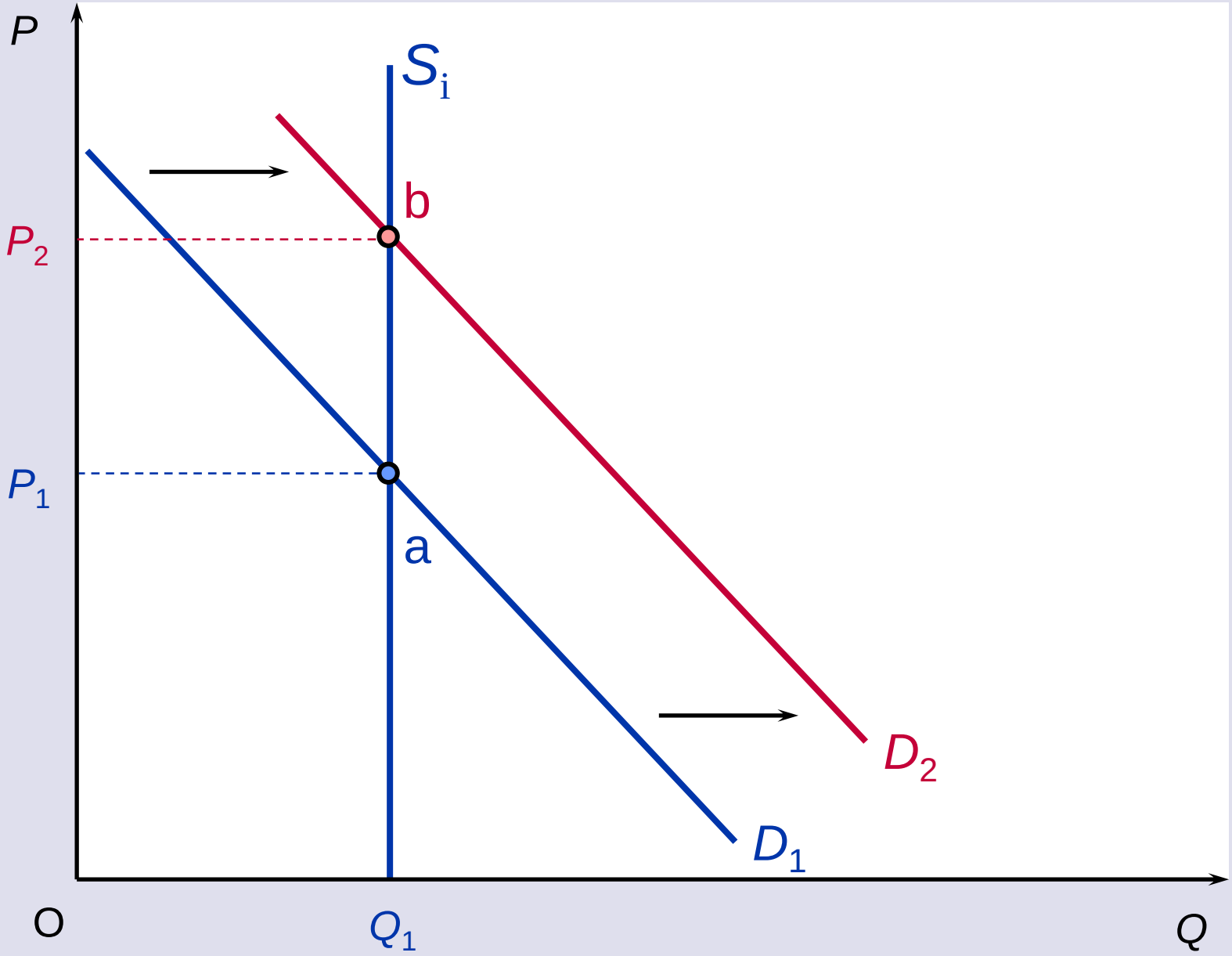
Elasticity

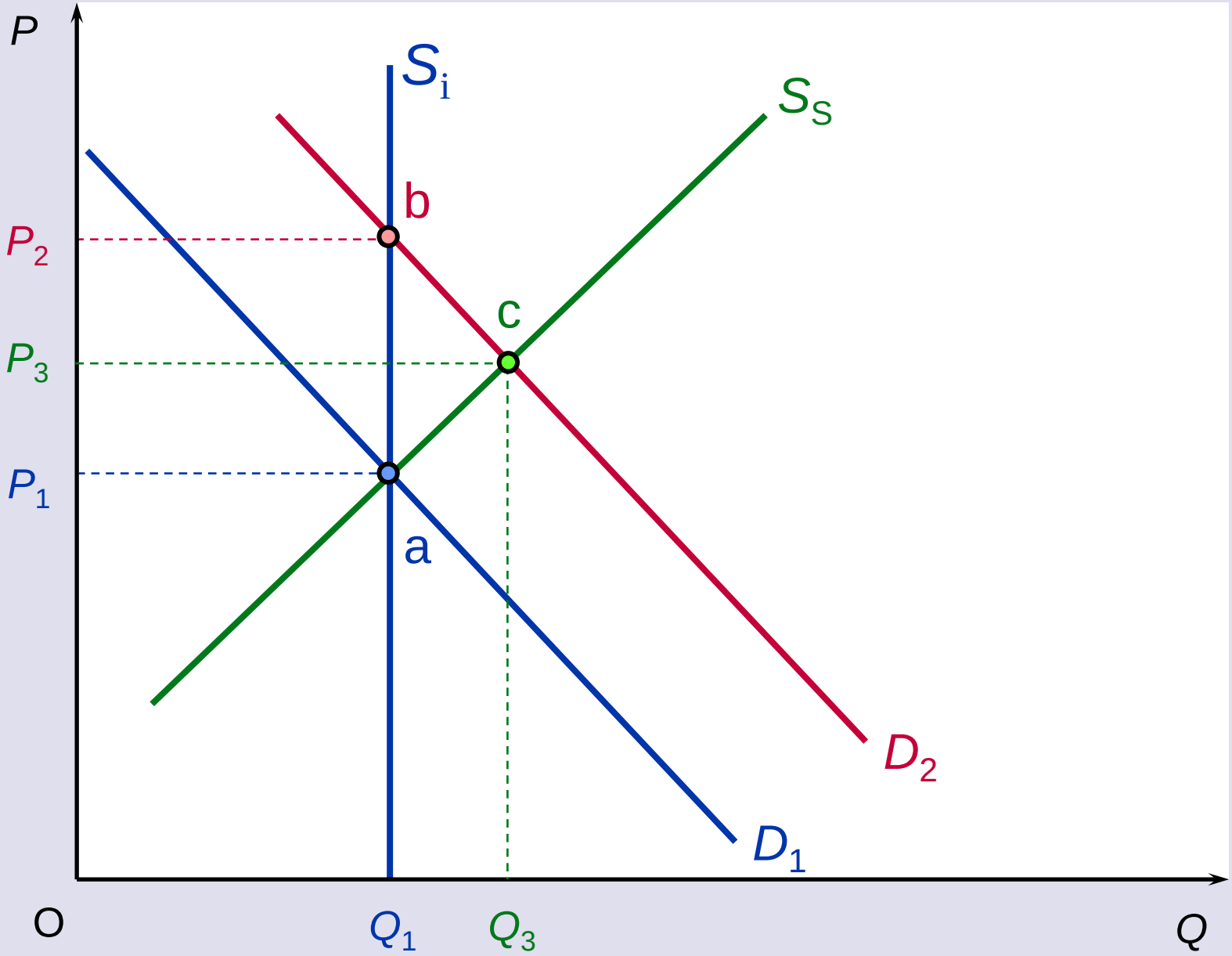
- Price elasticity of supply
  - measurement
    - $\Delta Q_S/Q_S \div \Delta P/P$
  - determinants
    - the amount that costs rise as output rises
    - time period

Supply in different time periods



Source: Sloman (2016), Essentials of Economics, 7th ed, Prentice Hall, page 59.

Supply in different time periods



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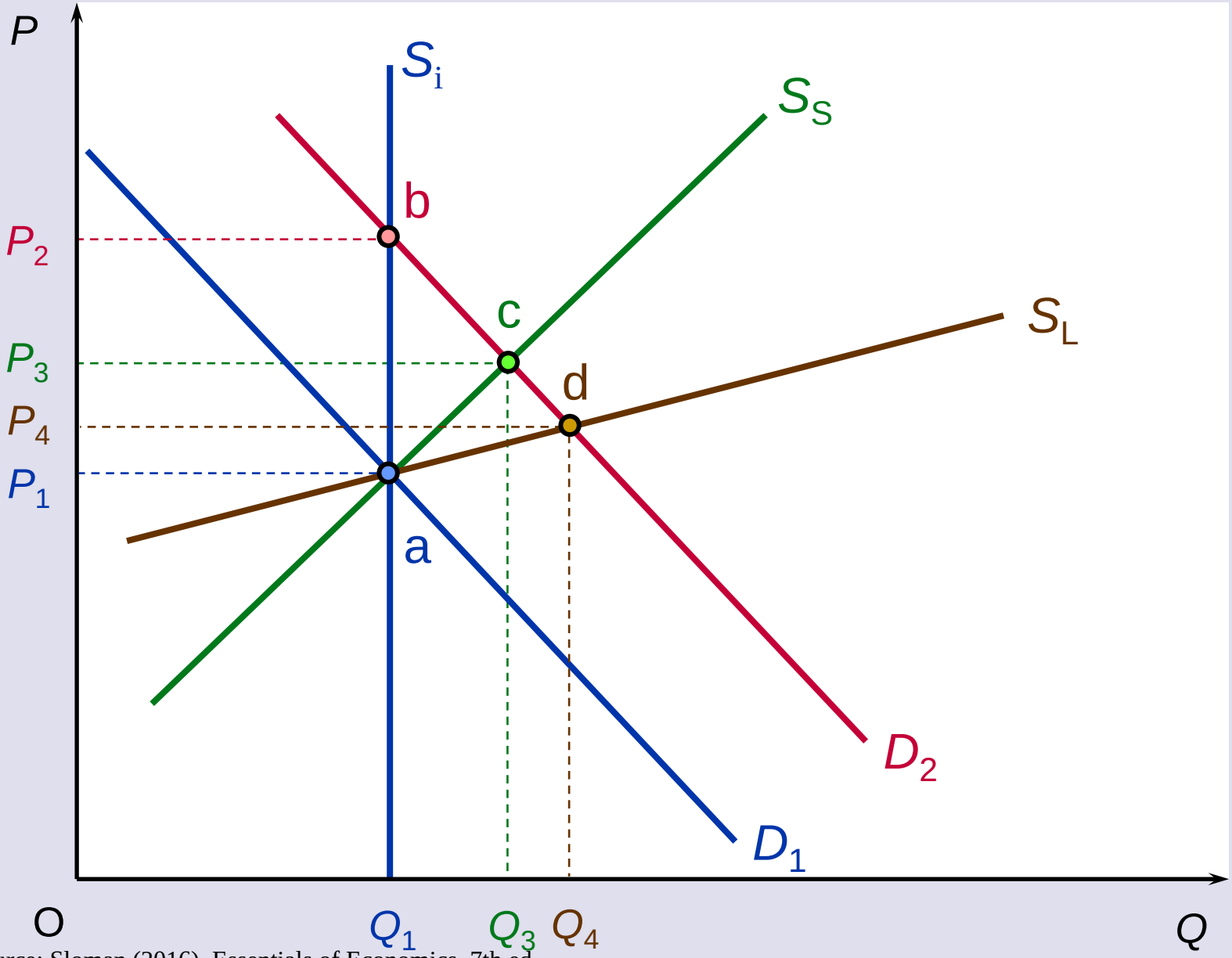
Supply in different time periods



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Elasticity

- Price elasticity of supply
  - measurement
    - $\Delta Q_S/Q_S \div \Delta P/P$
  - determinants
    - the amount that costs rise as output rises
    - time period
  - applications

Elasticity

- Income elasticity of demand
  - measurement
    - $\Delta Q_D/Q_D \div \Delta I/I$
  - determinants
    - degree of necessity
    - proportion of income spent on the good
  - applications
- Cross-price elasticity of demand
  - measurement
    - $\Delta Q_{Da}/Q_{Da} \div \Delta P_b/P_b$
  - determinants
    - closeness as substitutes or complements
  - applications

Closer Look at Cross-price elasticity of demand

Sign matters.

Substitute goods have a **positive** value.

Complementary goods have a **negative** value.

The cross-price elasticity will be *higher* the *closer* the two goods are as substitutes or complements.

Cross-price elasticity of demand cont.:

- 10% drop in price of orange juice causes 5% drop in quantity of grapefruit juice
  - Cross-price elasticity = -5%/-10% = 0.5
- 10% drop in price of peanut butter causes 8% rise in quantity of jelly
  - Cross-price elasticity = 8%/-10% = - 0.80

REFERENCES

- John Sloman, (2016), Essentials of Economics, 7th ed, Prentice Hall.
- Irvin B. Tucker, (2018), Survey of Economics, 10th ed, Cengage learning.
- Karl Case, Ray Fair, (2004), Principles of Economics, 7/e, Prentice Hall Business Publishing.