Elasticity

Rob Hayward

October 14, 2014

Introduction

Economics is all about relationships between variables. We will look at three main types. These all assess the change in demand. Remember, demand will fall as the price increases. Elasticity attempts to quantify that relationship.

- Price-elasticity of demand

Introduction

Economics is all about relationships between variables. We will look at three main types. These all assess the change in demand. Remember, demand will fall as the price increases. Elasticity attempts to quantify that relationship.

- Price-elasticity of demand
- Income elasticity of demand

Introduction

Economics is all about relationships between variables. We will look at three main types. These all assess the change in demand. Remember, demand will fall as the price increases. Elasticity attempts to quantify that relationship.

- Price-elasticity of demand
- Income elasticity of demand
- Cross-price elasticity of demand

Determinants of elasticity

Five factors determine elasticity.

- Availability of substitutes

Determinants of elasticity

Five factors determine elasticity.

- Availability of substitutes
- Necessities vs luxuries

Determinants of elasticity

Five factors determine elasticity.

- Availability of substitutes
- Necessities vs luxuries
- Definition of the market

Determinants of elasticity

Five factors determine elasticity.

- Availability of substitutes
- Necessities vs luxuries
- Definition of the market
- Proportion of income devoted to the product

Determinants of elasticity

Five factors determine elasticity.

- Availability of substitutes
- Necessities vs luxuries
- Definition of the market
- Proportion of income devoted to the product
- Time horizon

Price elasticity of demand

Elasticity is the percentage change in quantity demanded relative to the change in price.

$$ped = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}}$$

$$= \frac{\%\Delta Q_d}{\%\Delta P}$$

Example (ped)

- The price of coffee increases by 4%

Example (ped)

- The price of coffee increases by 4%
- The demand for coffee falls by 2%

Example (ped)

- The price of coffee increases by 4%
- The demand for coffee falls by 2%

Example (ped)

- The price of coffee increases by 4%
- The demand for coffee falls by 2%

$$\begin{aligned} ped &= \frac{-2}{4} \\ &= -0.5 \end{aligned}$$

Price elasticity of demand

- The price elasticity of demand is negative

Price elasticity of demand

- The price elasticity of demand is negative
- It can range from zero to minus infinity

Price elasticity of demand

- The price elasticity of demand is negative
- It can range from zero to minus infinity
- Between zero and minus one, usually say it is inelastic

Price elasticity of demand

- The price elasticity of demand is negative
- It can range from zero to minus infinity
- Between zero and minus one, usually say it is inelastic
- Above one, it is elastic

Price elasticity of demand

- The price elasticity of demand is negative
- It can range from zero to minus infinity
- Between zero and minus one, usually say it is inelastic
- Above one, it is elastic
- Usually speak in terms of relative elasticity

Measuring elasticity

There are two ways of measuring elasticity

- Mid-point or arc elasticity of demand

Measuring elasticity

There are two ways of measuring elasticity

- Mid-point or arc elasticity of demand
- Point elasticity of demand

Example

If there are two points

- Point A: $P = 4$, $Q = 120$

Example

If there are two points

- Point A: $P = 4$, $Q = 120$
- Point B: $P = 6$, $Q = 80$

Example

If there are two points

- Point A: $P = 4$, $Q = 120$
- Point B: $P = 6$, $Q = 80$

Example

If there are two points

- Point A: P $= 4$, Q $= 120$
- Point B: P $= 6$, Q $= 80$

$$ped(A - B) = \frac{-33}{+50} = 0.66$$

$$ped(B - A) = \frac{+50}{-33} = 1.5$$

Solution

Calculate the percentage from the mid-point rather than the starting point.

$$\%\Delta P = \frac{2}{5} = 0.4$$

$$\%\Delta Q = \frac{40}{100} = 0.4$$

$$ped = \frac{0.4}{0.4} = 1$$

Solution

Calculation

$$ped = \frac{(Q_2 - Q_1)/[(Q_2 + Q_1)/2]}{(P_2 - P_1)/[(P_2 + P_1)/2]}$$

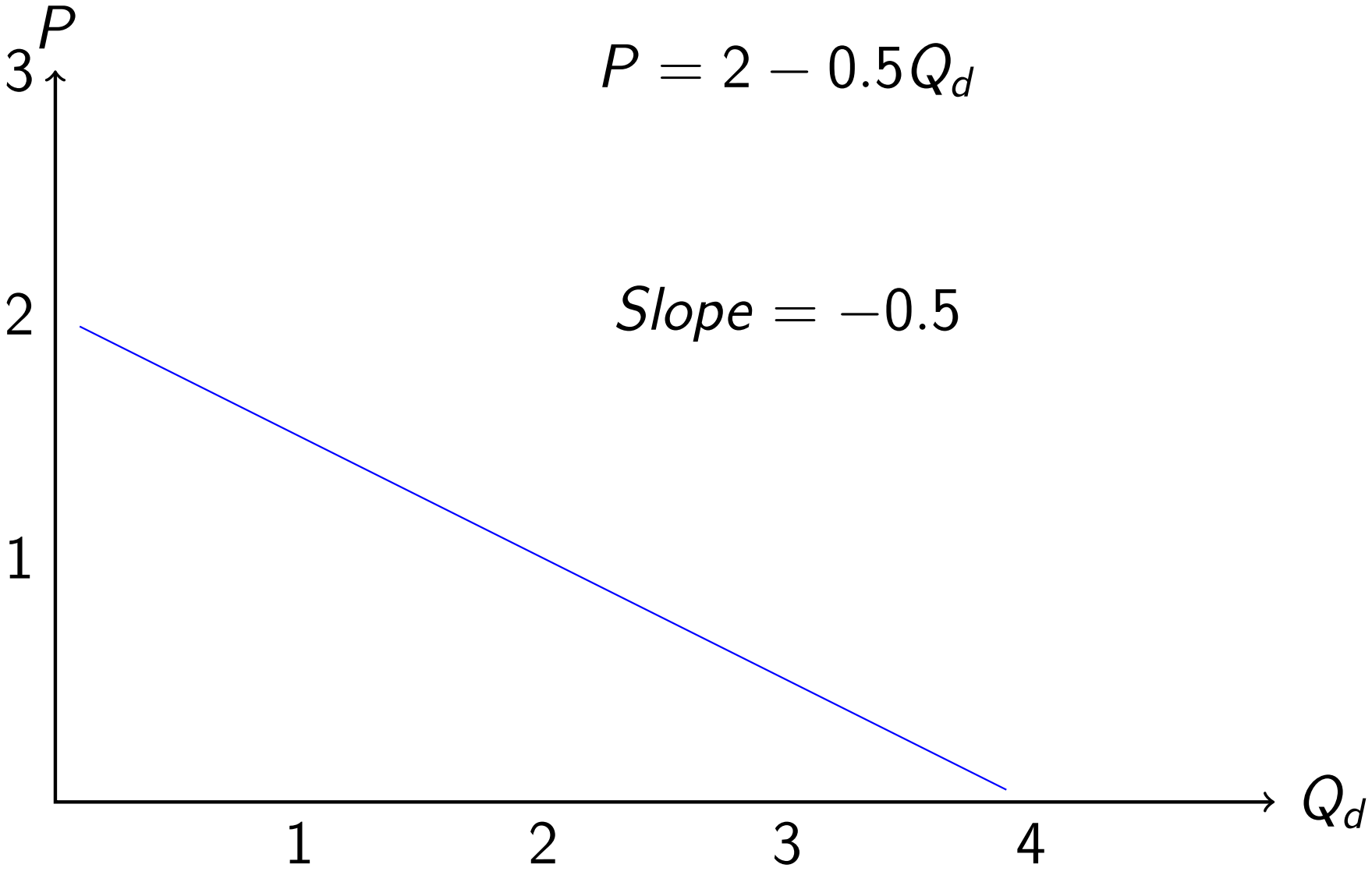
Point Elasticity of Demand

Elasticity is

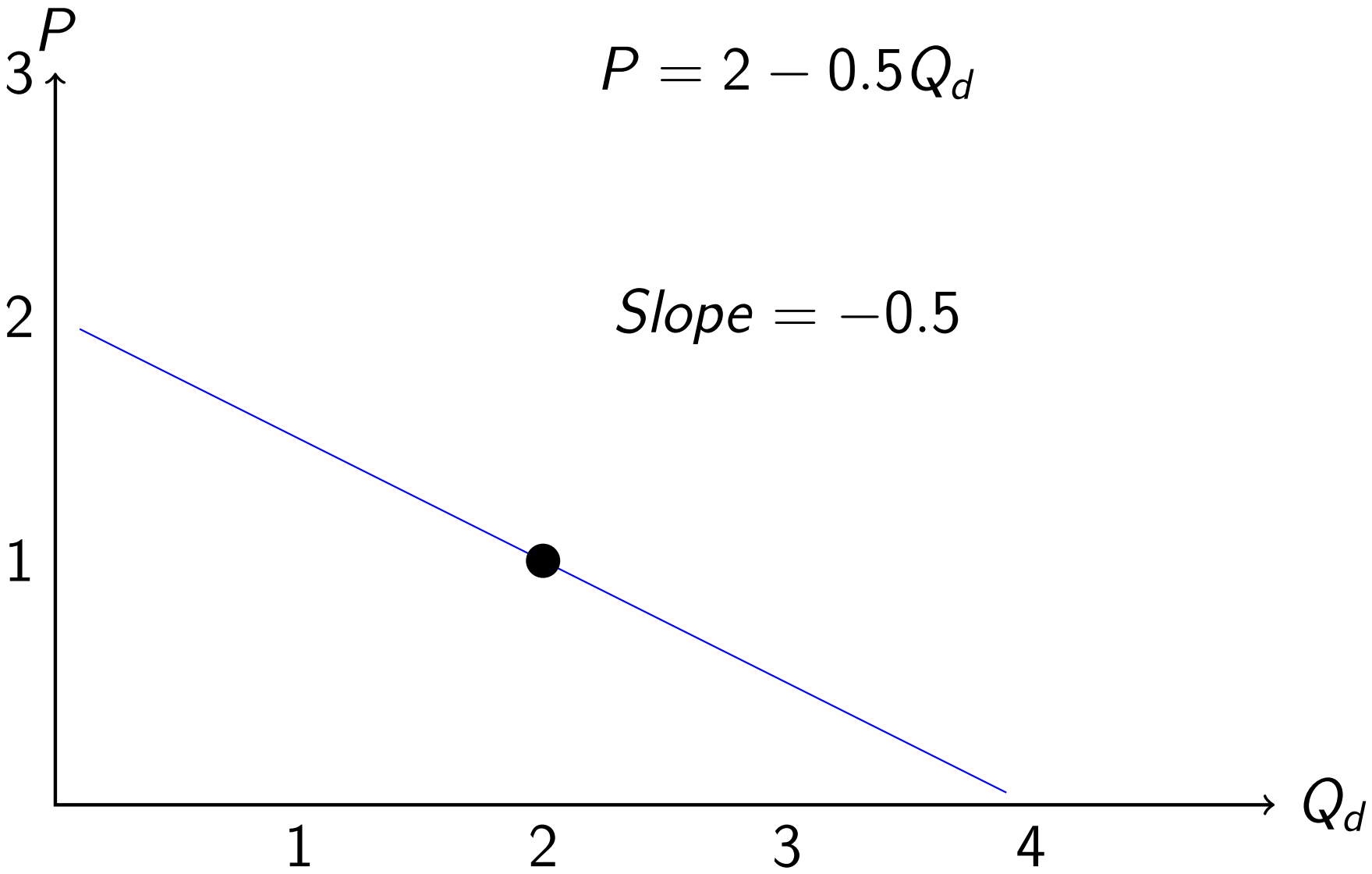
$$\begin{aligned} ped &= \frac{\%\Delta Q_d}{\%\Delta P} \\ &= \frac{\Delta Q_d}{Q_d} \Big/ \frac{\Delta P}{P} \\ &= \frac{\Delta Q}{\Delta P} \times \frac{P}{Q_d} \end{aligned}$$

Or (reciprocal) of the slope multiplied by point

Point elasticity calculation



Point elasticity calculation



Calculation of point elasticity at $(2, 1)$

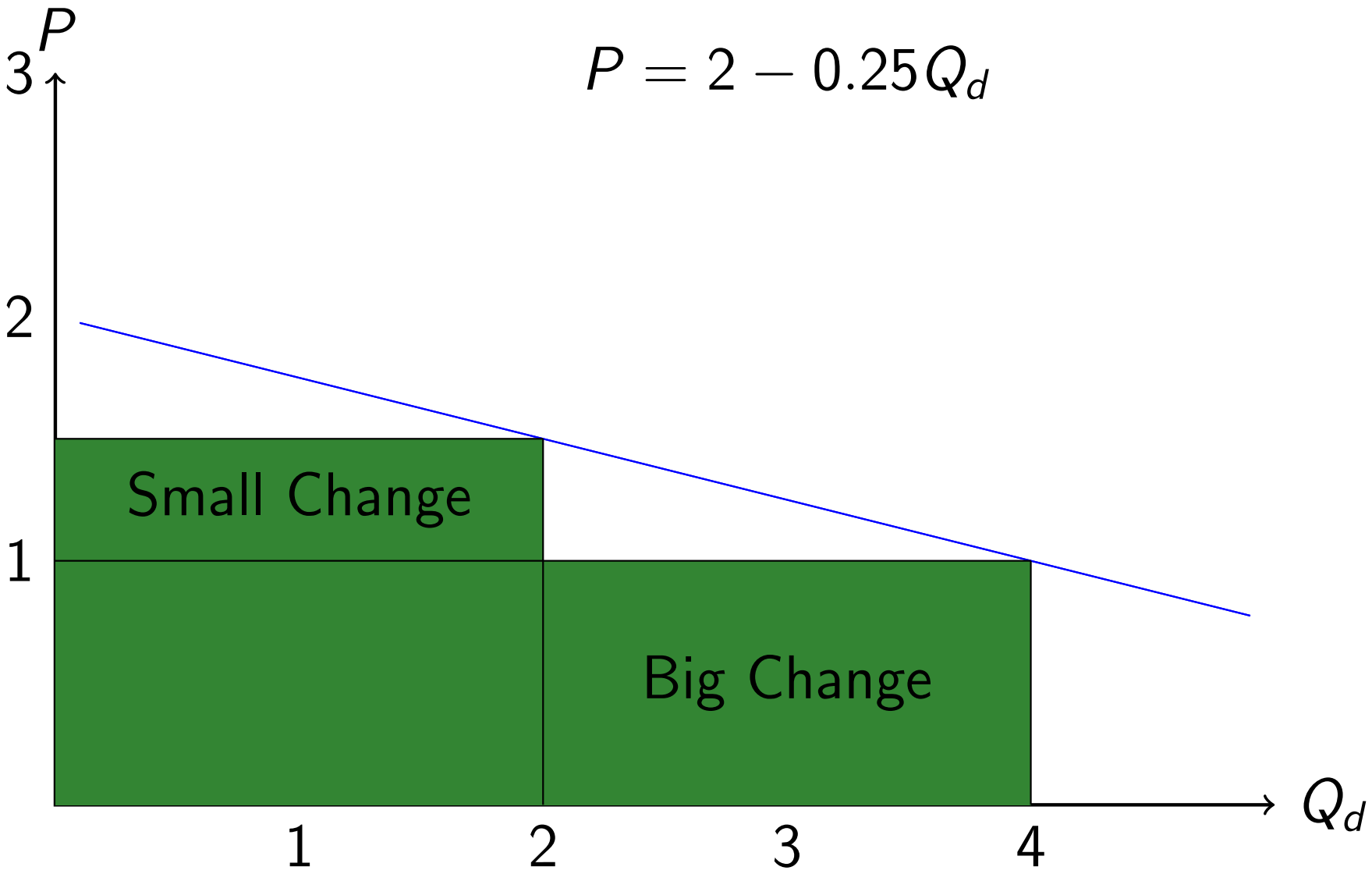
The equation for point elasticity is

$$ped = \frac{\Delta Q_d}{\Delta P} \times \frac{P}{Q_d}$$

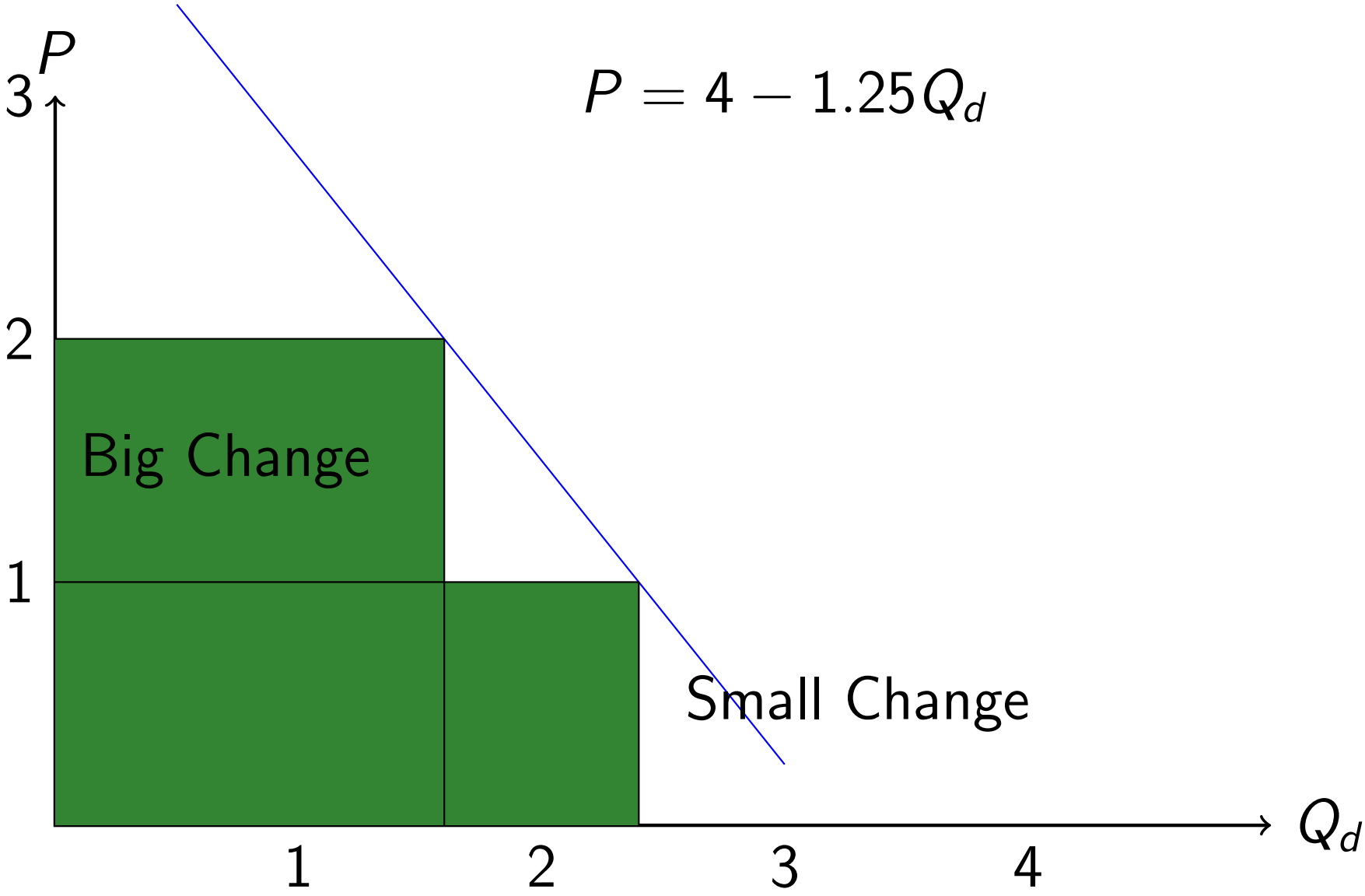
Therefore,

$$\begin{aligned} ped &= \frac{1}{0.5} \times \frac{1}{2} \\ &= \frac{2}{2} = 1 \end{aligned}$$

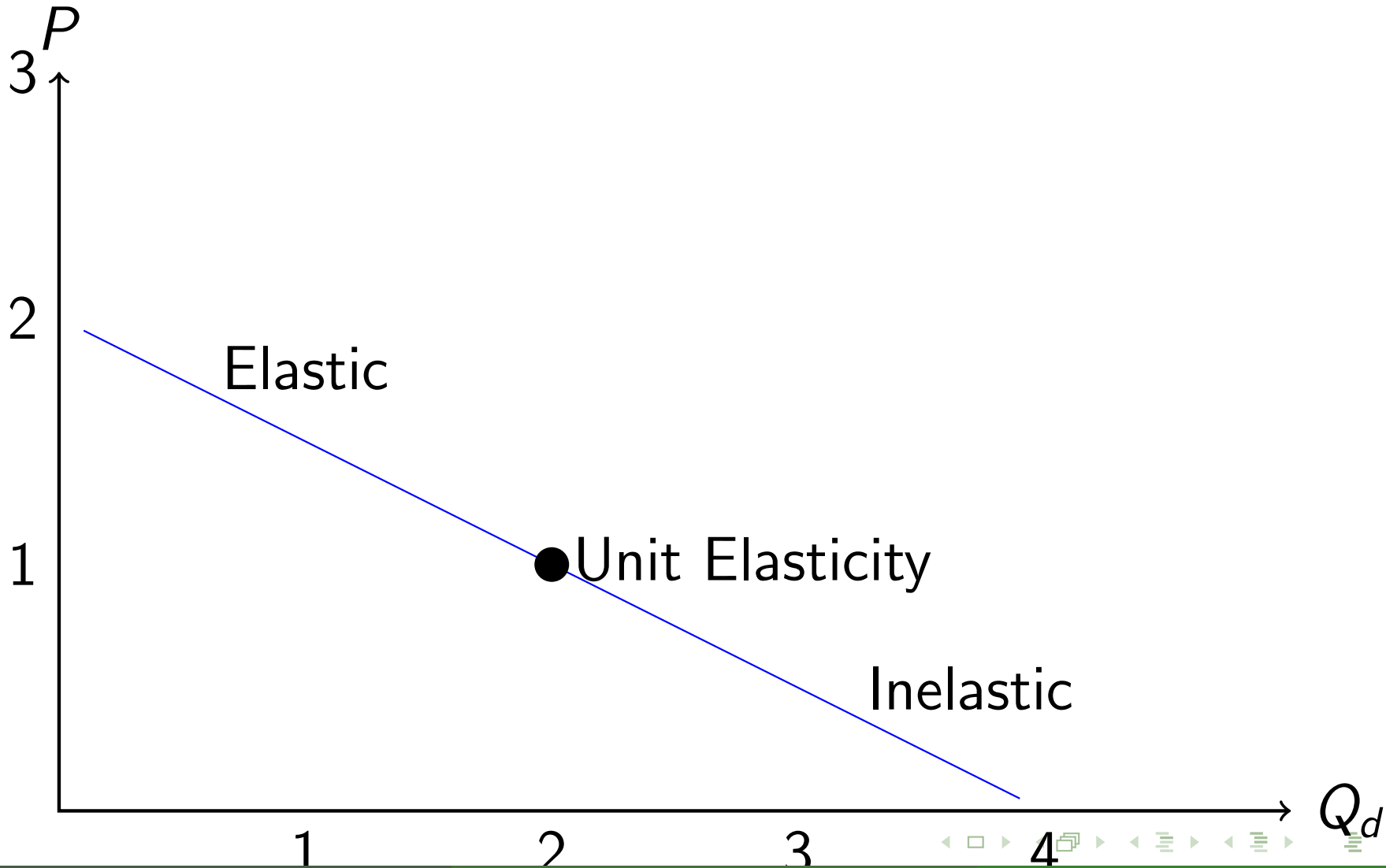
Elasticities: Relatively elastic



Elasticities: relatively in-elastic



Elasticity changes through the demand curve



Income elasticity of demand

Income elasticity of demand is the percentage change in quantity demanded relative to the change in income.

$$ied = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in income}}$$
$$= \frac{\%\Delta Q_d}{\%\Delta Y}$$

Normal good have a positive relationship, luxury is above 1 and *inferior* is a negative relationship.

Cross-price elasticity of demand

Elasticity is the percentage change in quantity demanded relative to the change in price.

$$xped = \frac{\text{percentage change in quantity demanded good i}}{\text{percentage change in price of good j}}$$
$$= \frac{\%\Delta Q_{d,i}}{\%\Delta P_j}$$

Positive relationship for substitutes and negative for compliments.

Importance of elasticity

Why care about elasticity?

- Monopolist should raise prices while demand is inelastic and drop them when demand is elastic

Importance of elasticity

Why care about elasticity?

- Monopolist should raise prices while demand is inelastic and drop them when demand is elastic
- Indirect tax

Importance of elasticity

Why care about elasticity?

- Monopolist should raise prices while demand is inelastic and drop them when demand is elastic
- Indirect tax
- Luxury or normal or inferior goods

Importance of elasticity

Why care about elasticity?

- Monopolist should raise prices while demand is inelastic and drop them when demand is elastic
- Indirect tax
- Luxury or normal or inferior goods
- Importance of competitors' actions (oligopoly and monopolistic competition)

Importance of elasticity

Why care about elasticity?

- Monopolist should raise prices while demand is inelastic and drop them when demand is elastic
- Indirect tax
- Luxury or normal or inferior goods
- Importance of competitors' actions (oligopoly and monopolistic competition)
- Price discrimination

Price Discrimination

Charging different prices for the same product

- There must be some element of market power

Price Discrimination

Charging different prices for the same product

- There must be some element of market power
- perfect price discrimination will change a unique price to each buyer

Price Discrimination

Charging different prices for the same product

- There must be some element of market power
- perfect price discrimination will change a unique price to each buyer
- Related to market segmentation

Price Discrimination

Charging different prices for the same product

- There must be some element of market power
- perfect price discrimination will change a unique price to each buyer
- Related to market segmentation
- Need to identify the elasticity of demand for groups of customers

Price Discrimination

Charging different prices for the same product

- There must be some element of market power
- perfect price discrimination will change a unique price to each buyer
- Related to market segmentation
- Need to identify the elasticity of demand for groups of customers
- Need to make sure that buyers cannot swap between markets

Price Discrimination

Perice elasticity of supply

Factors that affect the response of supply to a change in price

- The time period

Perice elasticity of supply

Factors that affect the response of supply to a change in price

- The time period
- Productive capacity

Perice elasticity of supply

Factors that affect the response of supply to a change in price

- The time period
- Productive capacity
- The size of the firm/industry

Perice elasticity of supply

Factors that affect the response of supply to a change in price

- The time period
- Productive capacity
- The size of the firm/industry
- The mobility of factors of production

Perice elasticity of supply

Factors that affect the response of supply to a change in price

- The time period
- Productive capacity
- The size of the firm/industry
- The mobility of factors of production
- Ease/cost of storing inventory