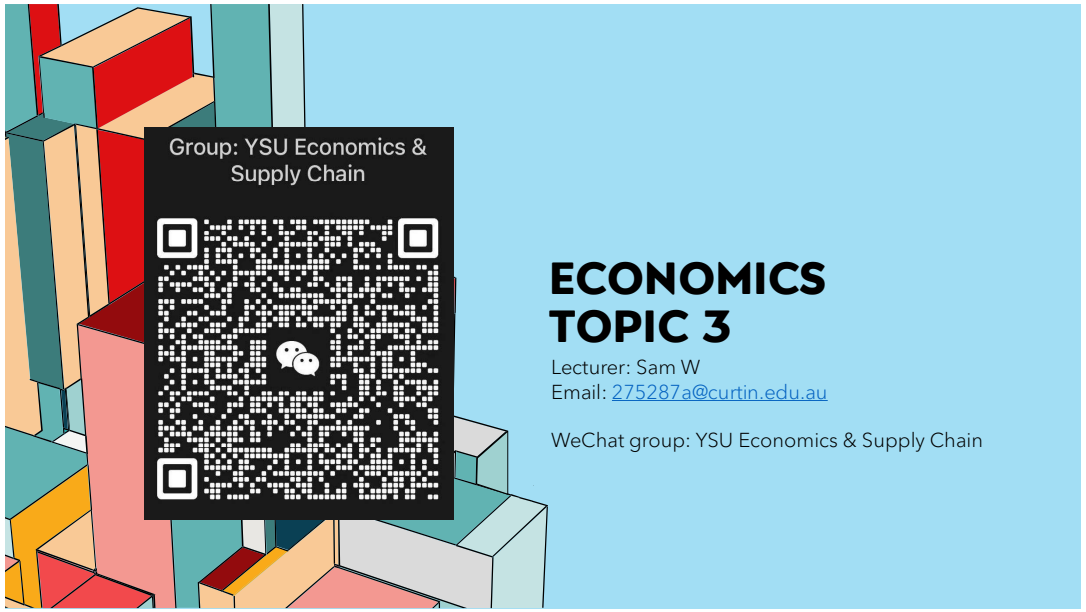

ECONOMICS TOPIC 3

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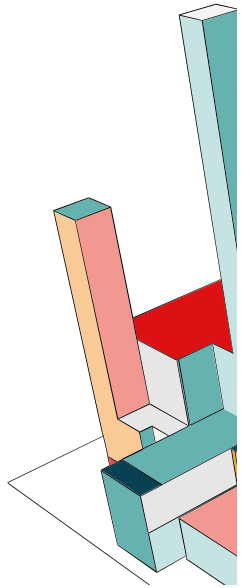
TOPIC 3: ELASTICITY



*elastic = responsive to change
**inelastic = unresponsive to change

0 INTRODUCTION

Elasticities measures the responsiveness or sensitivity of the quantity demanded or supplied to changes in market factors, e.g., price and other determinants.

Price *in*elastic** demand

Petrol
It will always in high demand due to its necessity.

Diamonds
As a luxury item, it has few exact alternatives.

Peak Rail Tickets
Commuters rely on trains.

Apple products
Strong brand loyalty.

Price elastic* demand

Fast Food
Increase in price leads to large fall in sales.

Airline Tickets
Passengers seek alternative airlines or travel options.

Clothing
Customers can switch to more affordable options.

Hotel Room
Travellers choose alternative accommodations or adjust travel plans.

1.1 PRICE ELASTICITY OF DEMAND (PED)

PED ($\boldsymbol{P\varepsilon_D}$) measures the sensitivity of quantity demanded to a change in price. It defined as:

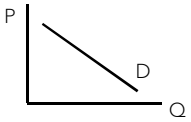
$$P\varepsilon_D = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in price}} = \frac{\%\Delta Q_d}{\%\Delta P}$$

Question: If the quantity demanded falls 20 kgs from the initial 200 kgs after the price rises $5 from an initial price of $100, calculate PED.

$$P\varepsilon_D = \frac{(180-200)/200}{(105-100)/100} = \frac{-10\%}{5\%} = -2$$

1.2 CLASSIFICATION

$$P\varepsilon_D = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in price}} = \frac{\%\Delta Q_d}{\%\Delta P}$$



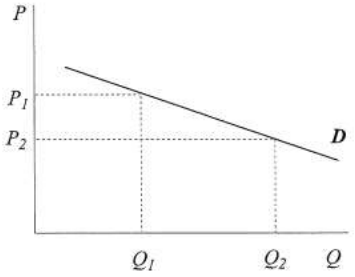
PED is typically negative as an increase (decrease) in price leads to a fall (rise) in quantity demanded, ie most demand curves slope downwards.

Therefore, economists often ignore the sign and refer to the PED in absolute value term.

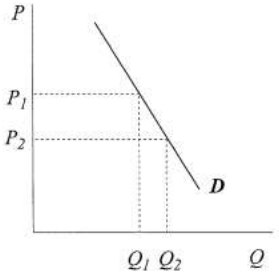
We can conclude that the demand is:

- elastic if | PED | > 1 quantity changes by a larger % than price
- inelastic if | PED | < 1 quantity changes by a smaller % than price
- Unit elasticity if | PED | = 1 quantity changes by the same % as price

1.2 ELASTIC AND INELASTIC DEMAND CURVES



Elastic demand curves looks flat
| PED | > 1



Inelastic demand looks steep
| PED | < 1

2 SIGNIFICANCE OF PED TO BUSINESS DECISION MAKING

One of the most important applications of price elasticity of demand concerns its relationship with a firm's sales revenue.

The total sales revenue earned from selling particular good at a particular price is:

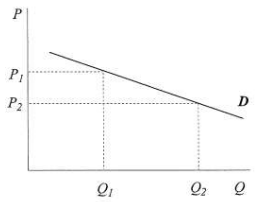
$$TR = P \times Q$$

Price Quantity

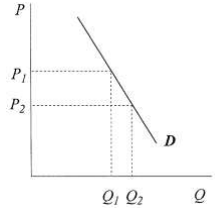
Example: 3000 units (Q) sold at $2 per unit (P) will earn 3000 x $2 = $6000 (TR).

Let us assume that a firm wants to increase its total revenue. What should it do? Should it raise its price or lower it? The answer depends on the price elasticity of demand.

2.1 ELASTICITY OF DEMAND AND SALES REVENUE



$$TR = P \times Q$$



If demand is elastic, | PED | > 1,

P rises; Q falls proportionately more; TR falls.

P falls; Q rises proportionately more; TR rises.

TR changes in the same direction as quantity.

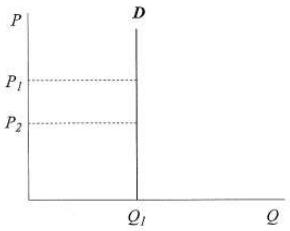
If demand is inelastic, | PED | < 1,

P rises; Q falls proportionately less; TR rises.

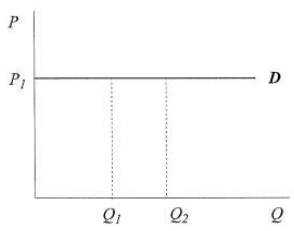
P falls; Q rises proportionately less; TR falls

TR changes in the same direction as price.

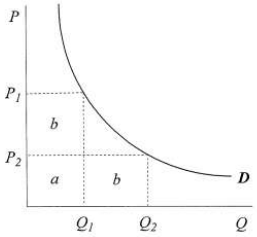
2.2 SPECIAL CASES



Total inelastic demand
PED = 0
Quantity demanded doesn't change with price.
E.g. life-saving medications like insulin shots for people with diabetes



Infinitely elastic demand
PED = ∞
Quantity demanded will increase without limit with small reduction in price, but the firm will lose all its sales if it tries to raise its price.



Unit elasticity of demand
PED = 1
Price and quantity change in the same proportion.
It exhibits a *rectangular hyperbolic* shape.

3.1 INCOME ELASTICITY OF DEMAND (YED)

The sensitivity of quantity demanded to a change in consumer incomes.

$$Y\varepsilon_D = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in income}}$$

$$Y\varepsilon_D = \frac{\%\Delta Q_d}{\%\Delta Y}$$

Example: If a 2% rise in consumer incomes causes an 8% rise in a product's demand, then its income elasticity of demand will be

YED = 8% / 2% = 4

For ***normal goods***, YED > 0, quantity demanded (Q) rises with income (Y).
For ***inferior goods***, YED < 0, quantity demanded (Q) falls with income (Y).
For *luxury goods*, we expect a high YED.

3.2 CROSS-PRICE ELASTICITY OF DEMAND (CPED)

The sensitivity of quantity demanded of one good to a change in price of another good (either a substitute or a complement).

$$C\varepsilon_{AB} = \frac{\%\text{ change in demand for good A}}{\%\text{ change in price for good B}}$$

$$C\varepsilon_{AB} = \frac{\%\Delta Q_A}{\%\Delta P_B}$$

Example: If a 5% rise in price for Pepsi causes an 7% increase in Coca-Cola demand, then the cross-price elasticity of demand for Coca-Cola with respect to the price of Pepsi will be:

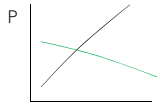
CPED = 7% / 5% = 1.4

For ***complementary goods***, CPED < 0, Q_A falls as P_B rises.
For ***substitute goods***, CPED > 0, Q_A rises as P_B rises.

PRACTICE QUESTION

Consider a market for electric vehicles (EVs). Assume that there is a technological breakthrough that significantly reduces the cost of producing batteries used in EVs.

a) Illustrate with a diagram how this technological breakthrough affects the supply curve for electric vehicles. Explain your diagram.



b) Describe the likely impact of this change on the equilibrium price and quantity of electric vehicles.

Equilibrium price _____, while

equilibrium quantity _____.

c) Assuming demand for electric vehicles is elastic, what effect would you expect this change in supply to have on total revenue for EV manufacturers? Explain your reasoning.

$$P\varepsilon_D = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in price}} = \frac{\%\Delta Q_d}{\%\Delta P}$$

$$TR = P \times Q$$