

## Income (YED) & Cross-Price Elasticity (XED)



# Assessment Objectives

## Specific Expectations

AO4	Use the formula for income elasticity of demand (YED) and cross-price elasticity of demand (XED) to calculate elasticities.
AO4	Draw an Engel curve diagram to show income elastic, income inelastic, and inferior goods.
AO2	Distinguish between normal and inferior goods.
AO2	Distinguish between substitutes and complements.
AO2	Depending on the value of YED (less than one or greater than one), distinguish between necessities, services and luxury goods.

# Income elasticity of demand (YED)

- **Income elasticity of demand (YED)** is a measure of the responsiveness of demand to changes in income, and involves demand curve shifts.
  - ▶ It provides information on the direction of change of demand a change in income (increase or decrease) and the size of the change (size of demand curve shifts).

$$\text{Income elasticity of demand (YED)} = \frac{\% \Delta Q}{\% \Delta Y} = \frac{\Delta Q / Q}{\Delta Y / Y}$$

- ▶ Unlike, the price elasticity of demand, the income elasticity's sign is important.

# Normal goods & Inferior goods

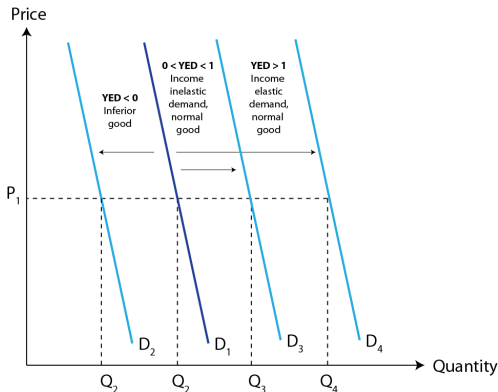
- **Normal good** a good the demand for which varies positively (or directly) with income. **Example:** Rolex watches, sports cars.
  - ▶ Demand for the good and income change in the same direction.
  - ▶ As income increases (decreases), the demand for the good increases (decreases).
  - ▶ Most goods are normal goods.
- **Inferior good** a good the demand for which varies negatively (or indirectly) with income. **Example:** Bus rides, used cars.
  - ▶ As income increases (decreases), the demand for the good decreases (increases).
  - ▶ Demand for the good and income move in opposite directions.
  - ▶ The demand for these goods falls as consumers switch to consumption of normal goods.

# The numerical value of income elasticity of demand

- **Necessities** are goods that are necessary or essential.
  - ▶ They have a price inelastic demand ( $PED < 1$ ) and income inelastic demand ( $YED < 1$ ).
  - ▶ **Income inelastic demand** means relatively low responsiveness of demand to changes in income.
    - A percentage increase in income produces a smaller percentage increase in quantity demanded.
- **Luxuries** are goods that are not necessary or essential.
  - ▶ They have a price elastic demand ( $PED > 1$ ) and income elastic demand ( $YED > 1$ ).
  - ▶ **Income elastic demand** means relatively high responsiveness to changes in income.
    - A percentage increase in income produces a larger percentage increase in quantity demanded.

# The numerical value of income elasticity of demand

- In the case of necessities, an increase in income will produce a relatively small rightward shift in the demand curve.
  - ▶ In the case of luxuries and services, the rightward shift will be larger.

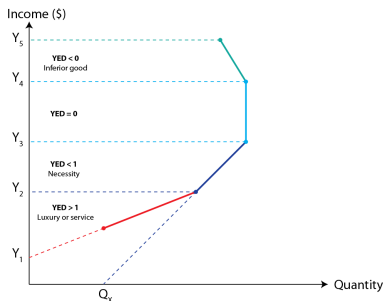


# The Engel curve

- **Engel curve** a curve that shows the relationship between consumer income and demand for a product; indicates whether a good is normal or inferior.
  - ▶ With income on the vertical axis and quantity on the horizontal axis of an Engel curve diagram, we can see the following:
    - $YED > 0$  in the upward sloping part of the curve showing quantity and income both increasing, which indicates the good is normal.
    - $YED < 0$  in the downward sloping part showing quantity decreasing as income increases, which indicates the good is inferior.
  - ▶ The Engel curve is a continuum.
    - At very low incomes a good may be a luxury.
    - As income increases it becomes a necessity and finally at high income levels it becomes inferior.

# The Engel curve

- Imagine each segment of the Engel curve extending backward to touch either the vertical axis or horizontal axis, as shown by the dotted lines:
  - $YED > 1$  if the line touches the vertical axis, as with the line AB, so that it is a luxury or service.
  - $YED < 1$  if the line touches the horizontal axis, as with BC, so that it is a necessity.





# Applications of income elasticity of demand

- Over time, as countries experience economic growth, society's income increases.
  - ▶ Increasing income means a growing demand for goods and services.
    - The higher the YED for a good or service, the greater the expansion of the of its market is likely to be in the future.
    - The lower the YED, the smaller the expansion.
    - Producers interested in producing in an expanding market may therefore want to know YEDs of various goods and services.
  - ▶ During an economic recession there is falling output and incomes.
    - Good and services with higher YED ( $YED > 1$ ) are the hardest hit, experiencing the largest decline in sales.
    - Producers with low YED ( $YED < 1$ ) can avoid large falls in sales, while inferior goods ( $YED < 0$ ) can even experience increase in sales.

# Cross-price elasticity of demand (XED)

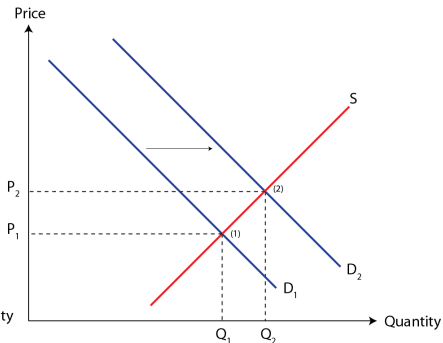
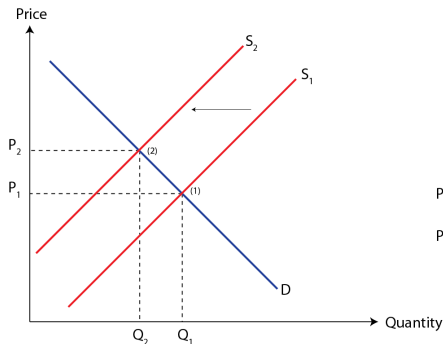
- **Cross-price elasticity of demand (XED)** is a measure of the responsiveness of demand for one good to a change in the price of another good, and involves demand curve shifts.
  - ▶ It provides us with information on whether demand increases or decreases, and on the size of demand curve shifts.

$$\text{Cross-price elasticity of demand (XED)} = \frac{\% \Delta Q_x}{\% \Delta P_y} = \frac{\Delta Q_x / Q_x}{\Delta P_y / P_y}$$

- **Substitute goods** two or more goods that satisfy a similar need, so that one good can be used in place of another.
  - ▶ Cross-price elasticity of demand for two goods is positive ( $\text{XED} > 0$ ) and the demand for one good and the price of the other good change in the same direction.

# Cross-price elasticity of demand (XED): Substitutes

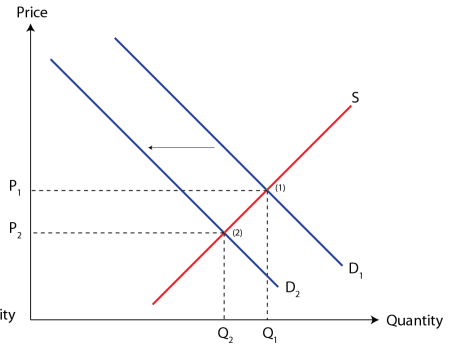
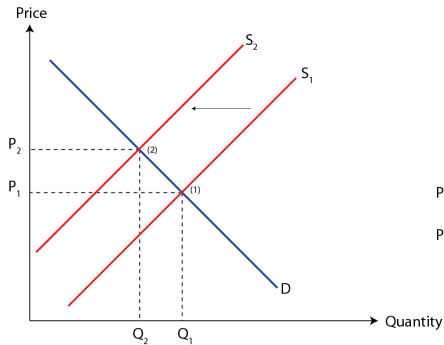
- ▶ Given two pairs of substitute goods, the larger the value of cross-price elasticity of demand (XED), the greater the substitutability between two goods, and the larger the demand curve shift in the event of a price change.



# Cross-price elasticity of demand (XED)

- **Complementary goods** two or more goods that tend to be used together.
  - ▶ Cross-price elasticity of demand for two goods is negative ( $XED < 0$ ) when the demand for one good and the price of the other good change in opposite directions.
  - ▶ When the price of one good increases (decreases), the demand for the other falls (rises).
  - ▶ The larger the absolute value of the negative cross-price elasticity of demand, the greater is the complementarity between two goods, and the larger is the demand curve shift in the event of a price change.

# Cross-price elasticity of demand (XED): Complements



# Applications of cross-price elasticity of demand (XED)

- There are some situations where businesses would be interested in knowing cross-price elasticities of demand for various products.

## 1. Substitute products by a single business

- When a business produces lines of products that are similar to each other, it must consider the XED for these products when making decisions about prices.

## 2. Substitutes produced by rival businesses

- A business is also interested in knowing the XED of substitutes when they are produced by rival businesses.

## 3. Substitutes and mergers between firms

- A **merger** takes place when two firms unite to form a single firm.
- Businesses producing close substitutes with a high positive XED, might be interested in merging because that way they would eliminate the competition between them (although this is usually illegal).

# Applications of cross-price elasticity of demand (XED)

## 4. Complementary goods

- Products that have a low absolute value (negative) XED are weakly complementary and will not be of much interest.
- High absolute value of a (negative) XED means that lowering the price of one good can result in a large increase in demand and sales for the other.
- Businesses producing strongly complementary goods often collaborate.  
**Example:** charter flights and holiday hotels.