

ELASTICITIES OF DEMAND AND SUPPLY

Elasticity measures the responsiveness of one variable to a change in another.

Price Elasticity of Demand

Price Elasticity of Demand (PED) measures the responsiveness of the quantity demanded to a change in price.

$$\text{PED} = \frac{\% \text{ change in quantity demanded}}{\% \text{ change in price}}$$

An alternative formula which is very useful is

$$\text{PED} = \frac{\Delta Q/Q}{\Delta P/P}$$

where ΔQ is the change in quantity demanded, Q is the original quantity, ΔP is the change in price, and P is the original price.

The calculation of PED results in a coefficient, or real number, and this tells us two major things about the responsiveness of the quantity demanded to a change in price.

Sign (positive or negative) gives information about the direction of the relationship. For all **Normal goods**, PED will be negative, as there is a negative relationship between price and quantity on a downward-sloping demand curve. We always ignore this negative sign. If PED is positive, then we have a perverse demand curve.

Magnitude. The size of the number resulting from the elasticity calculation tells us about the degree of response. The bigger the number, the bigger the response, and vice versa.

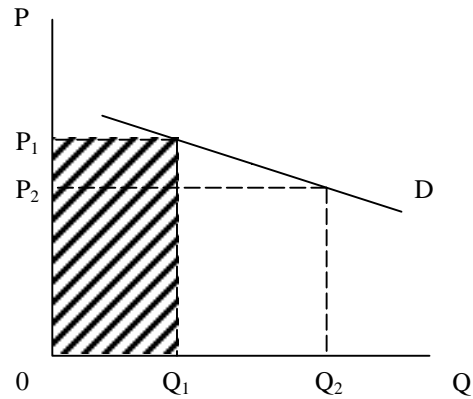
- PED > 1 means the good is price elastic
- PED < 1 means the good is price inelastic
- PED = 1 means the good has unit elasticity
- PED = 0 means the good is perfectly price inelastic
- PED = ∞ means the good is perfectly price elastic

Price elastic means that *the quantity demanded is highly responsive to a change in price*. In the diagram below a change in price from P_1 to P_2 results in a large response in the quantity demanded from Q_1 to Q_2 :

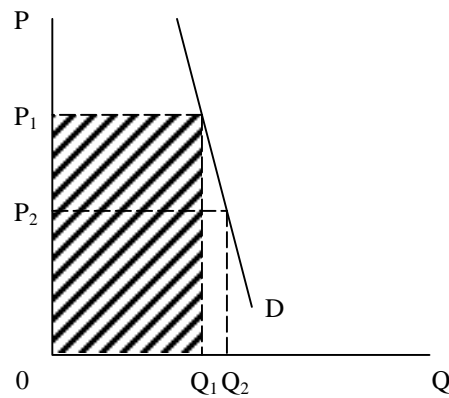
Whilst the topic of elasticity in the IB syllabus is strictly a part of the Business Economics section, I feel that it is much more helpful to have an understanding of the concept of elasticity before government intervention in the market is studied in detail.

Many students have major problems with the topic of elasticity. They frequently see it as an isolated topic and an excuse for examiners to ask questions which involve numbers. The concept of elasticity is immensely important for economists, as it enables us more accurately to picture, analyse and evaluate what goes on in the real world. Without PED and PES our demand and supply analysis would not be half as effective.

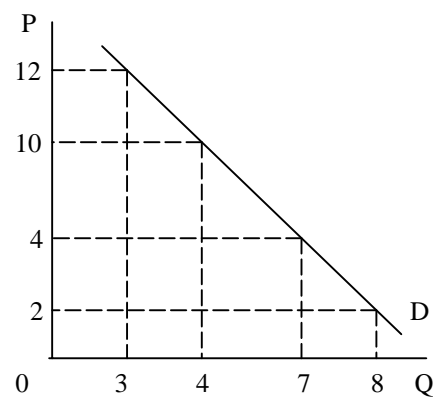
Students should always look to comment on elasticity wherever they can, and if they are required or feel it necessary to draw a market, they should carefully consider whether they can use their knowledge of PED and PES to draw demand and supply curves which accurately reflect the market situation. For example, diagrams to illustrate agricultural markets should always have price inelastic demand and supply curves.



Price inelastic means that *the quantity demanded is highly unresponsive to a change in price*. In the diagram below a change in price from P_1 to P_2 results in a small response in the quantity demanded from Q_1 to Q_2 :



PED varies at every point along a straight line demand curve.
 PED is not the same as the gradient.
 At high prices, PED tends towards infinity.
 At low prices, PED tends towards zero.
 At the mid-point PED = 1:



As price increases from 10 to 12:

$$\frac{-1/4}{+2/10} = (-) 1.25$$

As price increases from 2 to 4:

$$\frac{-1/8}{+2/2} = (-) 0.125$$

● Determinants of PED

Closeness of substitutes. PED will be more price elastic if there are close substitutes available.

Luxury or necessity. Luxury goods tend to be price elastic, and necessities tend to be price inelastic.

Percentage of income spent on the good. The smaller the percentage of income spent on a good, the more price inelastic demand will be.

Time period. In the long run, demand tends to be more price elastic, as it takes time for consumers to react to price changes.

● PED and Total Revenue (TR)

$$TR = P \times Q.$$

Total revenue is a useful way to check the PED of a demand curve. If a rise in price causes total revenue to increase, then PED is inelastic. If an increase in price causes total revenue to decrease, then the demand curve is price elastic. If an increase in price causes total revenue to increase then the demand curve is price inelastic. If a change in price does not change total revenue, the PED is unitary (= 1).

In the diagrams on the previous page TR at $P_2 = OP_2 \times OQ_2$. After an increase in price, TR at $P_1 = OP_1 \times OQ_1$ (shaded area).

Cross Elasticity of Demand

Cross Elasticity of Demand (XED) measures *the responsiveness of the quantity demanded of one good to a change in price of another*.

$$XED = \frac{\% \text{ change in quantity demanded good A}}{\% \text{ change in price good B}}$$

An alternative formula which is very useful is

$$XED = \frac{\Delta QA/QA}{\Delta PB/PB}$$

where ΔQA is the change in quantity demanded of good A, QA is the original quantity of good A, ΔPB is the change in price of good B, and PB is the original price of good B.

Sign (positive or negative). **Substitutes** (goods in competitive demand) will have a positive XED.

PED will appear again when we look at price discrimination, and the effects of a depreciation in the exchange rate on the balance of payments.

You should see the link between XED and the price of other goods, which was complements and substitutes as determinants of demand (see p. 8). A fall in the price of a complement will cause an increase in demand (a shift of the demand curve to the right) for the good that is in joint demand. A fall in the price of a substitute will cause a decrease in demand (a shift of the demand curve to the left) for the good that is in competitive demand.