

Price elasticity of demand (PED)



Assessment Objectives

Specific Expectations

AO4	Use formula for price elasticity of demand (PED) to calculate PED, changes in price, changes in quantity and total revenue.
AO2	Identify the various degrees and range of values for PED.
AO2	Explain and illustrate in a diagram changing PED along a straight-line downward sloping demand curve.
AO2	Analyse the determinants of PED.
AO2	Explain the relationship between PED and total revenue.
AO4	Draw a diagram to show how total revenue changes in response to a price change depending on elastic or inelastic demand.
AO3	Apply PED to discuss the importance for firms and government decision-making.
AO2	Analyse the reasons why primary commodities generally have a lower PED than manufactured products.

Price elasticity of demand (PED)

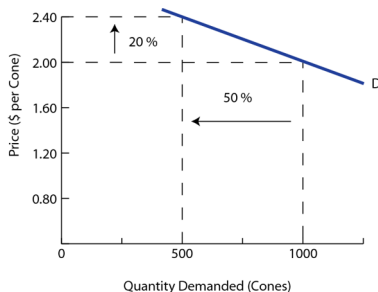
- **Price elasticity of demand (PED)** is a measure of the responsiveness of the quantity of a good demanded to changes in its price.
 - ▶ PED is calculated along a given demand curve.
 - ▶ In general, if quantity demanded is highly responsive to a change in price, demand is referred to as being **price elastic**.
 - ▶ If quantity demanded is not very responsive, demand is **price inelastic**.

$$\text{Price elasticity of demand (PED)} = \frac{\% \Delta Q}{\% \Delta P} = \frac{\Delta Q / Q}{\Delta P / P}$$

- ▶ PED is a unitless quantity and is always negative, but it is common practice to use the absolute value.

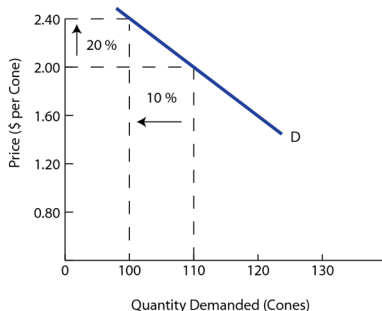
Elastic Demand

- **Price elastic** the percentage change in the quantity demanded is larger than the percentage change in price.
 - ▶ Quantity demanded is relatively responsive to price changes.
 - ▶ The value of PED is greater than one ($PED > 1$).



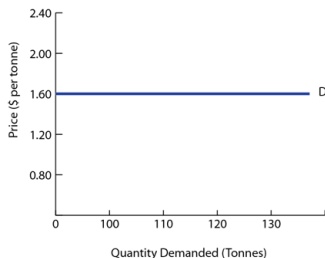
Inelastic Demand

- **Price inelastic** the percentage change in the quantity demanded is smaller than the percentage change in price.
 - ▶ Quantity demanded is relatively unresponsive to price changes.
 - ▶ The value of PED is less than one ($PED < 1$).



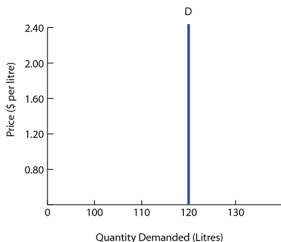
Perfectly elastic Demand

- **Perfectly elastic demand** occurs when a change in price results in an infinitely large change in quantity demanded.
 - ▶ At the price, consumers will buy any quantity that is available.
 - ▶ If price falls, buyers will buy all they can (an infinitely large response); if there is an increase in price, quantity demanded drops to zero.
 - ▶ The value of PED is equal to infinity ($PED = \infty$).



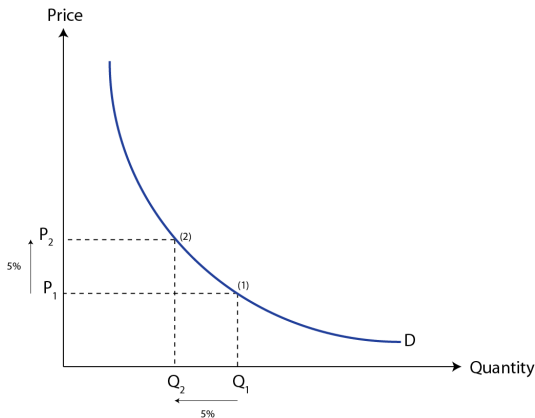
Perfectly inelastic Demand

- **Perfectly inelastic demand** occurs when the percentage change in quantity demanded is zero.
 - ▶ There is no change in quantity demanded, which remains constant no matter what happens to price.
 - ▶ The demand for a good is perfectly inelastic if the demand curve is a vertical line.
 - ▶ The value of PED is equal to zero ($PED = 0$).



Unit elastic Demand

- **Unit elastic demand** occurs when the percentage change in quantity demanded is equal to the percentage change in price.
 - ▶ The value of the PED is equal to 1 ($PED = 1$)

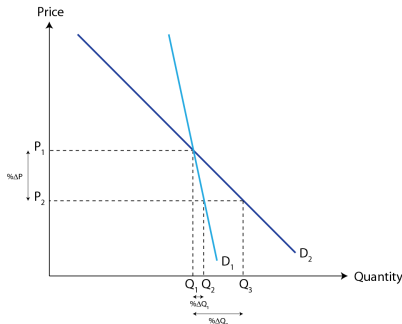


Price elasticity of demand (PED): Summary

Value of PED	Classification	Interpretation
$0 < PED < 1$	Price inelastic	Quantity demanded is relatively unresponsive to price.
$1 < PED < \infty$	Price elastic	Quantity demanded is relatively responsive to price.
$PED = 1$	Unit elastic	Percentage change in quantity demanded equals percentage change in price.
$PED = 0$	Perfectly inelastic	Quantity demanded is completely unresponsive to price.
$PED = \infty$	Perfectly elastic	Quantity demanded is infinitely responsive to price.

PED and the steepness of the demand curve

- We often use the relative steepness of the demand curves to be an indication of PED.
 - ▶ Comparing two demand curves, the one that is flatter is said to be more elastic which the one that is steeper is said to be more inelastic.
 - ▶ Demand curves drawn on different scales are not comparable.

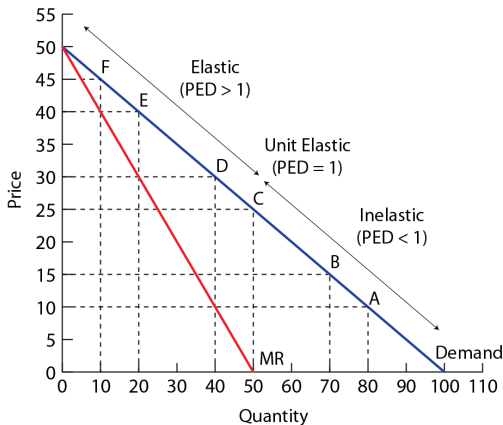


Changing PED and the straight-line demand curve

- Along any downward-sloping, straight-line demand curve, the PED varies (changes) as we move along the curve.
 - ▶ Demand is more elastic toward the upper left.
 - At high prices the average price is relatively large and the change in the average quantity demanded is relatively small.
 - ▶ Demand is more inelastic toward the lower right
 - At low prices the average price is relatively small and the average quantity demanded is relatively large.
 - ▶ At the midpoint of the demand curve, there is unit elastic demand.
 - ▶ The terms “elastic” and “inelastic” should not be used to refer to an entire demand curve (with the exception of the three special cases where PED is constant), but only to a portion of the demand curve corresponding to a particular price or price range.

Changing PED and the straight-line demand curve

$$\text{Price elasticity of demand (PED)} = \frac{\% \Delta Q}{\% \Delta P} = \frac{\Delta Q / Q}{\Delta P / P} = \frac{1}{\text{Slope}} \times \frac{P}{Q}$$



Determinants of price elasticity of demand

- There are four major factors that affect the price elasticity of demand.

1. Number and closeness of substitutes

- The more substitutes a good (or service) has, the more elastic its demand.
- If the price of a good with many substitutes increases, consumers can switch to other substitute products, therefore resulting in a relatively large drop (large responsiveness) in quantity demanded.
- If a good or service has few or no substitutes, then an increase in price will bring forth a relatively small drop in quantity demanded.
- Also important is the closeness of substitutes called the **degree of substitutability**.
- The closer two substitutes are to each other, the greater the responsiveness of quantity demanded to a change in the price of the substitute, because it is easier for the consumer to switch from one product to the other.

Determinants of price elasticity of demand

2. Necessities versus luxuries

- **Necessities** are goods or services we consider to be essential or necessary in our lives; we cannot do without them.
- **Luxuries** are not necessary or essential.
- The demand for necessities is less elastic than the demand for luxuries.
- In general, the more necessary a good, the less elastic the demand.
- A special case of necessity is a consumer's addiction to a good. The greater the degree of addiction to a substance, the more inelastic is the demand.

3. Length of time

- The longer the time period in which a consumer makes a purchasing decision, the more elastic demand.
- As time goes by, consumers have the opportunity to consider whether they really want the good, and to get information on the availability of alternatives to the good in question.

Determinants of price elasticity of demand

4. Portion of income spent on a good

- The larger the proportion of one's income needed to buy a good, the more elastic the demand.

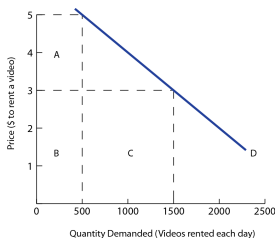
S	Substitutes	The number of substitutes available. The more substitutes, more elastic demand, as consumers can replace a good whose price has gone up with one of its now relatively cheaper substitutes.
P	Proportion of income	The proportion of income the purchase of a good represents. If a good represent a higher proportion of a consumer's income, his demand tends to be more elastic.
L	Luxury or necessity?	Luxury or necessity? If a good is a necessity, changes in price tend not to affect quantity demand, i.e. demand is inelastic. If it's a luxury that a consumer can go without, consumers tend to be more responsive.
A	Addictive?	If a product is addictive or habit forming, demand tends to be inelastic.
T	Time	The amount of time a consumer has to respond to the price change. If prices remain high over a longer period of time, consumers can find substitutes or learn to live without, so demand is more elastic over time.

Total revenue and price elasticity of demand

- **Total Revenue (TR)** is the amount of money received by firms when they sell a good (or service), and is equal to the price (P) of the good times the quantity (Q) of the goods sold.

1. Elastic Demand ($PED > 1$)

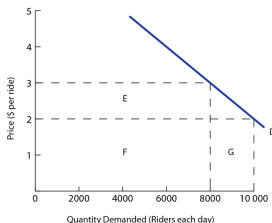
- When demand is elastic, an increase in price causes a fall in total revenue, while a decrease in price causes a rise in total revenue.
- Price and total revenue change in opposite directions.



Total revenue and price elasticity of demand

2. Inelastic Demand ($PED < 1$)

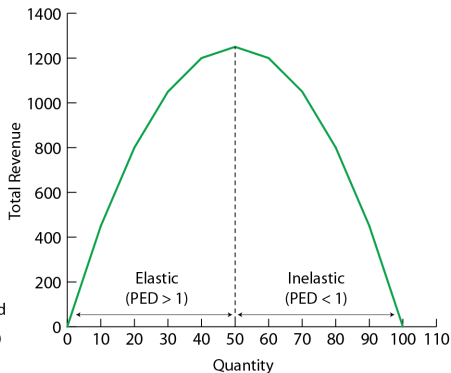
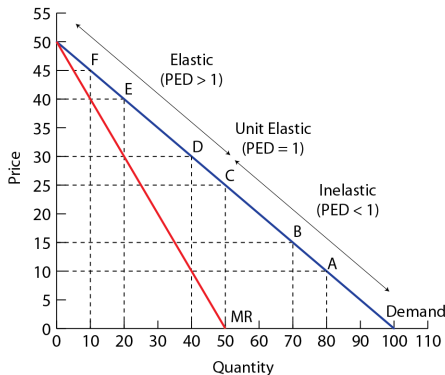
- When demand is inelastic, an increase in price causes an increase in total revenue, while a decrease in price causes a fall in revenue.
- Price and total revenue move in the same direction.



3. Unit Elastic Demand ($PED = 1$)

- when demand is unit elastic, a change in price does not cause any change in total revenue.

Total revenue and price elasticity of demand



PED in relation to commodities & manufactured products

- **Primary commodities** are goods arising directly from the use of natural resources, or the factor of production “land”.
 - ▶ Primary commodities therefore include agricultural, fishing, and forestry products, as well as products of extractive industries (oil, coal, minerals, and so on).
 - ▶ Many primary commodities have a relatively low PED (price inelastic demand) because they are necessities and have no close substitutes (for example, food and oil).
 - ▶ Prices fluctuations are larger for primary commodities because of low PED.
 - ▶ As primary commodities prices fluctuate widely, so do producers' incomes, which depend on the revenues producers receive from selling their output.

PED in relation to commodities & manufactured products

- **Manufactured products** are goods produced by labour usually working together with capital as well as raw materials.
 - ▶ The PED of manufactured products is relatively high (price elastic demand) because they usually have substitutes.

