Elasticity

AQA A-Level Economics

PED · YED · XED · PES · Determinants · Total Revenue · Tax Incidence

Price Elasticity of Demand (PED)

Definition:

Price elasticity of demand measures the responsiveness of quantity demanded to a change in the good's own price. It is almost always negative — price and quantity demanded move in opposite directions.

PED = % change in Qd ÷ % change in Price

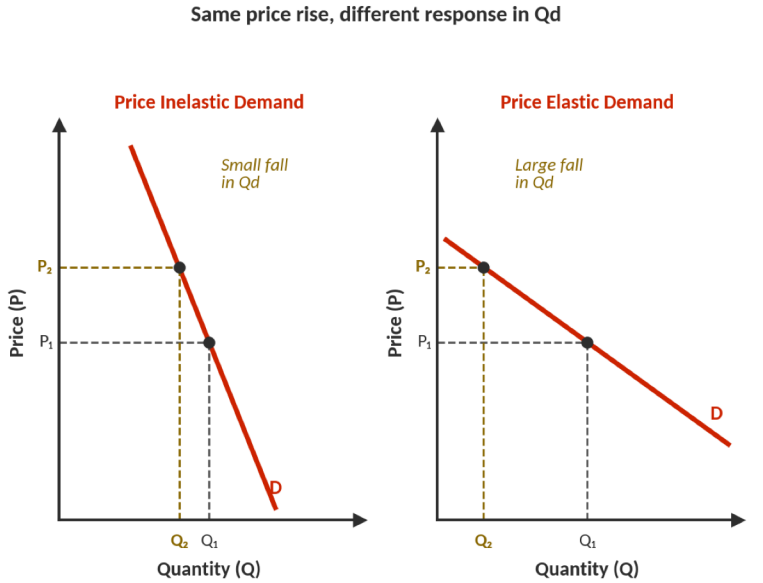
Interpreting the value:

The minus sign is usually ignored when comparing — it is the size that matters. A PED of −2 means a 10% price rise causes a 20% fall in quantity demanded.

Worked example:

A coffee rises from £3.00 to £3.30 (+10%). Sales fall from 500 to 400 cups a day (−20%). PED = −20 ÷ 10 = −2 → price elastic.

Slope is not the same as elasticity: along a straight-line demand curve PED changes at every point — elastic at high prices, inelastic at low prices.



Real-World Example

UK 2022: petrol demand is highly price inelastic (short-run PED estimated at around −0.1 to −0.3). When pump prices hit a record ~191p per litre in July 2022, fuel sales fell only slightly — drivers had few short-run alternatives.

Price Elastic vs Price Inelastic Demand

The dividing line is a PED of 1 (ignoring the sign) — compare the % change in quantity with the % change in price:

Price Elastic Demand (PED > 1)

Definition: a change in price causes a proportionately larger change in quantity demanded. Consumers are highly responsive.

Demand curve: relatively flat. At the extreme, perfectly elastic demand (PED = ∞) is horizontal — any price rise loses all sales.

Typical goods: those with many close substitutes, luxuries, and narrowly defined brands.

Pricing: a price cut raises total revenue; a price rise reduces it.

e.g. Individual brands of crisps or coffee shop chains — raise the price and customers simply switch to a rival.

Price Inelastic Demand (PED < 1)

Definition: a change in price causes a proportionately smaller change in quantity demanded. Consumers are relatively unresponsive.

Demand curve: relatively steep. At the extreme, perfectly inelastic demand (PED = 0) is vertical — Qd is unchanged whatever the price.

Typical goods: necessities, addictive goods, and goods with few substitutes or that take a small share of income.

Pricing: a price rise raises total revenue; a price cut reduces it.

e.g. Cigarettes (PED ≈ −0.4), petrol and household energy — demand falls only slightly even after large price rises.

Determinants of PED

How responsive consumers are to a price change depends on several factors — remember them with SPLAT:

Substitutes (Availability & Closeness)

The more close substitutes a good has, the more price elastic its demand. Consumers switch easily when its price rises.

e.g. One brand of bottled water has very elastic demand; water as a whole has very inelastic demand.

Proportion of Income

Goods taking a large share of income (cars, holidays) have more elastic demand than cheap items where price rises go unnoticed.

e.g. A 10% rise in the price of salt barely registers; a 10% rise in the price of a new car costs thousands.

Luxury or Necessity

Necessities have inelastic demand — they must be bought. Luxuries are more elastic as purchases can be delayed.

e.g. Household energy and basic food are necessities; designer clothing and meals out are luxuries.

Addiction and Habit

Addictive or habit-forming goods have very inelastic demand — consumers keep buying even after large price rises.

e.g. Cigarettes, alcohol and coffee. This is why governments can raise large sums from 'sin taxes'.

Time Period

Demand becomes more elastic over time as consumers find substitutes and change habits.

e.g. After the 2022 energy price rises, households gradually insulated homes and fitted heat pumps.

Breadth of Definition of the Market

The more narrowly a good is defined, the more substitutes it has and the more elastic its demand.

e.g. Demand for 'food' is inelastic; demand for 'Heinz baked beans' is much more elastic.

PED and Total Revenue

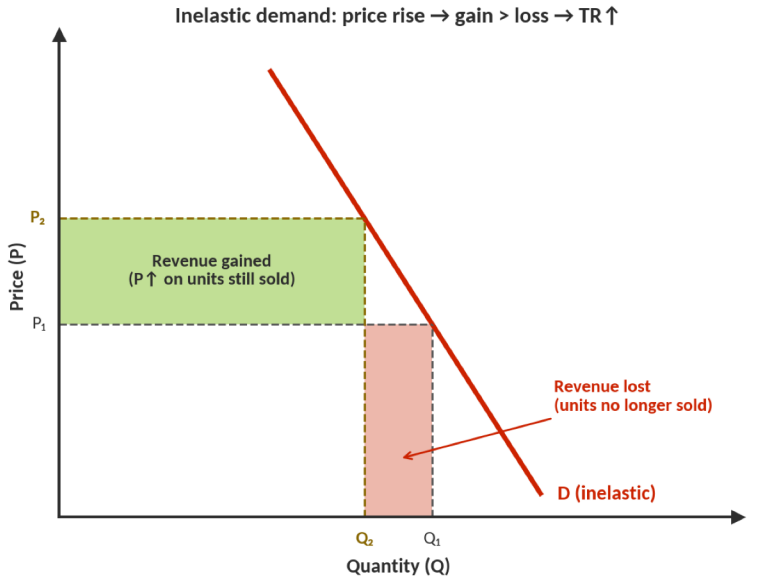
Total revenue:
TR = Price × Quantity sold. What happens to TR when a firm changes its price depends on PED — this is why elasticity matters so much to firms.

If demand is price inelastic (PED < 1):
Raise price → TR rises, as the % fall in Qd is smaller than the % rise in price. Cut price → TR falls.

If demand is price elastic (PED > 1):
Cut price → TR rises, as the % rise in Qd is larger than the % fall in price. Raise price → TR falls.

If demand is unitary elastic (PED = 1):
Any price change leaves TR unchanged. On a straight-line demand curve, TR is maximised where PED = 1.

Key point: firms with inelastic demand have pricing power — which is why they try to reduce PED through branding, advertising and loyalty schemes.



Real-World Example

Netflix 2023–24: raised UK prices and cracked down on password sharing — yet subscribers and revenue kept growing. Demand was price inelastic, so TR rose.

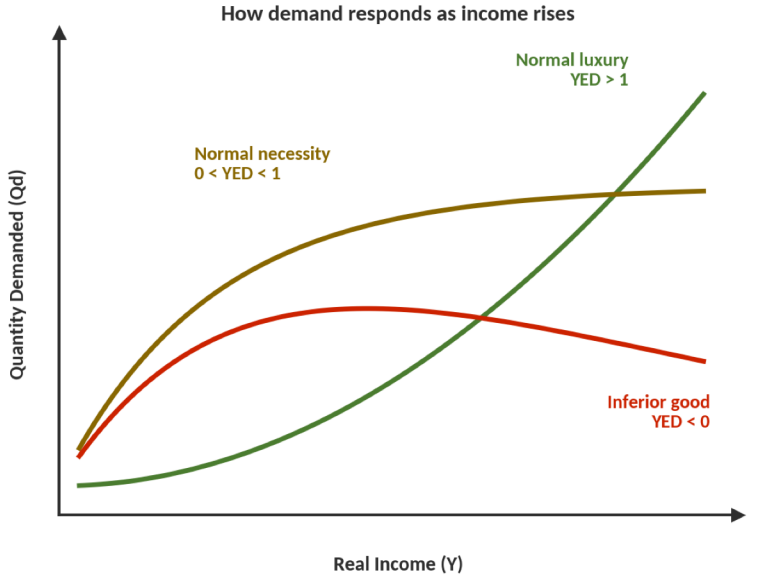
Income Elasticity of Demand (YED)

Definition:
Income elasticity of demand measures the responsiveness of quantity demanded to a change in real income. Here the sign matters.

YED = % change in Qd ÷ % change in Income

Three categories of good:
Normal necessity (0 < YED < 1): demand rises with income, but less than proportionately — e.g. bread, toothpaste, utilities.
Normal luxury (YED > 1): demand rises more than proportionately — e.g. foreign holidays, sports cars, fine dining.
Inferior good (YED < 0): demand falls as income rises, as consumers trade up — e.g. value ranges, bus travel.

Why it matters:
Firms use YED to forecast sales over the economic cycle. Sellers of luxuries are hit hardest in recessions; sellers of inferior goods may gain.



Real-World Example

UK cost-of-living crisis 2022–23: real incomes fell and shoppers traded down — Aldi and Lidl hit a record ~18% combined market share, while restaurants and luxury retailers struggled.

Cross Elasticity of Demand (XED)

Definition:

Measures the responsiveness of quantity demanded of good A to a change in the price of a related good B.

XED = % change in Qd of good A ÷ % change in Price of good B

The sign tells you the relationship between the goods:

Substitutes (XED > 0)

Goods used in place of each other. A rise in the price of B increases demand for A — a positive XED. The closer the substitutes, the higher the XED.

e.g. Coca-Cola and Pepsi; Uber and Bolt; Netflix and Disney+. If Netflix raises its price, demand for Disney+ rises.

Complements (XED < 0)

Goods consumed together (joint demand). A rise in the price of B reduces demand for A — a negative XED. Strong complements have a large negative XED.

e.g. Printers and ink cartridges; games consoles and games; cars and petrol. Firms often sell one cheaply to profit from the other.

Unrelated Goods (XED = 0)

Goods with no relationship — a change in the price of one has no effect on demand for the other. XED is zero or very close to zero.

e.g. Toothpaste and car tyres. XED helps firms identify genuine rivals, and helps the CMA define a market in competition cases.

Price Elasticity of Supply (PES)

Definition:

Price elasticity of supply measures the responsiveness of quantity supplied to a change in the good's own price. PES is positive, as supply curves slope upwards.

PES = % change in Qs ÷ % change in Price

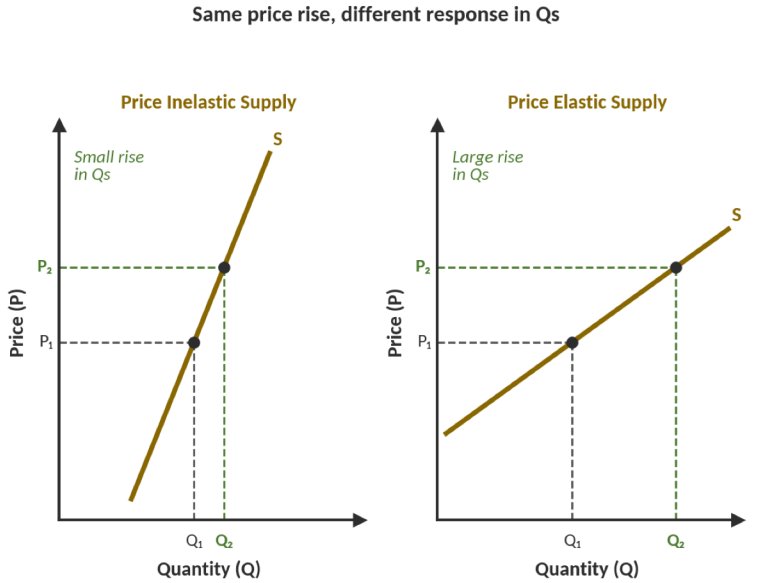
Interpreting PES:

PES > 1: elastic — producers respond strongly to price. PES < 1: inelastic — output is hard to change. PES = 0: perfectly inelastic, a vertical supply curve (e.g. seats at a sold-out concert). PES = ∞: perfectly elastic, a horizontal supply curve.

Short run vs long run:

Supply is more elastic in the long run, as firms can expand capacity and new firms can enter. In the very short run, supply may be fixed.

Any straight-line supply curve starting from the origin has PES = 1, whatever its slope.



Real-World Example

UK housing: supply is highly price inelastic — planning rules, land shortages and long build times mean higher prices bring only a slow rise in new homes, keeping prices high.

Determinants of PES

Supply is more elastic when firms can raise output quickly and cheaply in response to a higher price:

Time Period

The longer the time period, the more elastic supply. In the short run at least one factor is fixed; in the long run firms can build new capacity and new firms can enter the market.

Spare Capacity

Firms with unused machinery and workers can raise output quickly, so supply is elastic. Near full capacity, supply becomes inelastic — output cannot easily rise further.

Stocks and Perishability

Firms holding large stocks of finished goods can release them onto the market quickly — supply is elastic. Perishable goods (fresh fruit, flowers) cannot be stored, making supply less elastic.

Factor Mobility and Production Lags

If labour and capital can switch easily between uses, supply is more elastic. Long production lags (crops, housing, new drugs) make supply inelastic in the short run.

Key point for commodities: Agricultural supply is very inelastic in the short run — so demand or weather shocks cause large price swings, which is why governments may intervene with buffer stocks.

Why Elasticity Matters: Firms and Government

Elasticity estimates guide pricing, taxation and trade policy — but they are only estimates based on past behaviour:

Pricing Decisions (Firms)

Firms with inelastic demand can raise prices to boost revenue; firms with elastic demand may cut prices to gain sales.

Eval: PED estimates come from past data and change over time. Rivals may respond, altering PED.

Price Discrimination

Higher prices for groups with inelastic demand (peak commuters), lower prices for elastic groups (students, off-peak).

Eval: Only works if markets can be separated so resale is impossible — e.g. railcards and ID checks.

Indirect Taxation (Government)

Taxing goods with inelastic demand (fuel, tobacco, alcohol) raises large, predictable revenue, as quantity falls only slightly.

Eval: Such taxes are regressive and barely cut consumption — raising revenue conflicts with changing behaviour.

Minimum Pricing and Subsidies

Minimum unit pricing targets heavy drinkers with inelastic demand. Subsidies raise output most where supply is price elastic.

e.g. Scotland's minimum unit pricing (2018) was linked to a ~13% fall in alcohol-related deaths.

Exchange Rates and Trade

A depreciation only improves the current account if export and import demand is elastic enough (Marshall-Lerner condition).

Eval: In the short run trade is inelastic, so the current account may first worsen — the J-curve effect.

Forecasting with YED and XED

YED helps firms plan for booms and recessions; XED shows how rivals' prices or complementary goods will affect their sales.

Eval: Ceteris paribus rarely holds — income, prices and tastes all change at once, so estimates are unreliable.

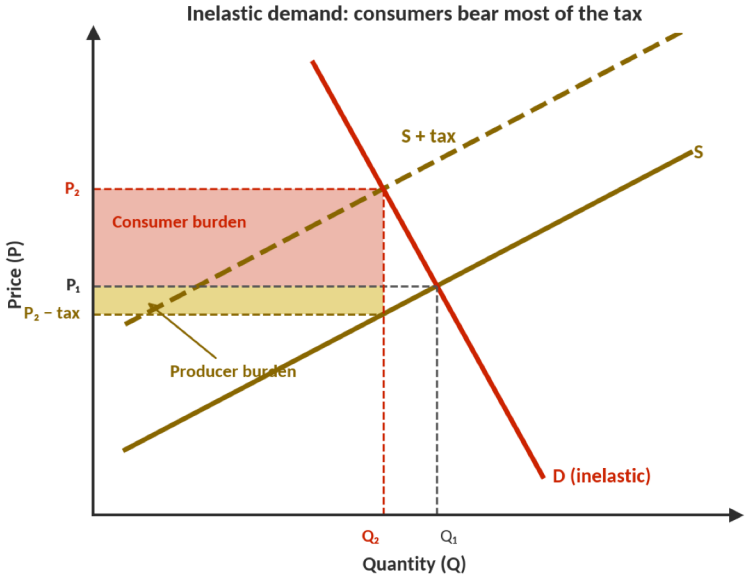
★ Bonus: Elasticity and the Incidence of Taxation

Tax incidence:
The incidence of an indirect tax is who actually bears the burden — consumers (through higher prices) or producers (through lower revenue per unit). It depends on relative elasticities.

Inelastic demand:
Consumers bear most of the tax. Price rises by nearly the full tax and quantity falls only slightly — e.g. fuel and tobacco duty.

Elastic demand:
Producers bear most of the tax. Firms cannot pass it on without losing many sales, so price rises only a little.

Evaluation:
Explains why governments favour taxes on inelastic goods — high revenue and a small deadweight loss. ✗ The burden falls hardest on low-income households — regressive. ✗ Elasticities change as substitutes appear (vapes, EVs).



Real-World Example

UK fuel duty: cut by 5p to 52.95p per litre in 2022. As fuel demand is price inelastic, most of the duty is passed on to motorists — raising around £25bn a year for the Treasury.

Summary: Key Terms & Relationships

Key Term	Meaning
PED	% change in Qd ÷ % change in price. Usually negative. Measures responsiveness to the good's own price.
Price elastic	PED > 1 (ignoring sign). Qd changes proportionately more than price. A price cut raises TR.
Price inelastic	PED < 1 (ignoring sign). Qd changes proportionately less than price. A price rise raises TR.
Unitary elasticity	PED = 1. Qd changes by the same % as price. Total revenue is unchanged.
Perfectly elastic / inelastic	PED = ∞ (horizontal demand curve) / PED = 0 (vertical demand curve).
Total revenue	Price × quantity sold. How it responds to a price change depends on PED.
YED	% change in Qd ÷ % change in income. Positive = normal good; negative = inferior good.
Normal luxury / necessity	Luxury: YED > 1. Necessity: 0 < YED < 1. Demand rises with income in both cases.
Inferior good	YED < 0 — demand falls as income rises as consumers trade up.
XED	% change in Qd of A ÷ % change in price of B. Positive = substitutes; negative = complements.
PES	% change in Qs ÷ % change in price. Positive. More elastic in the long run.
Tax incidence	Who bears the burden of a tax. Falls mainly on the more inelastic side of the market.
Price discrimination	Charging different prices to groups with different PEDs for the same good.