Elasticity of Demand and Supply

Matthew Williams • Economics • May 17, 2026

Elasticity of Demand and Supply

Elasticity measures how responsive one variable is to a change in another. Knowing whether demand or supply is elastic or inelastic tells you what actually happens to price, quantity, and revenue when conditions change.

Price Elasticity of Demand (PED)

Price elasticity of demand measures how responsive the quantity demanded of a good is to a change in its own price, holding all other factors constant.

$$\text{PED} = \frac{\%\Delta Q_D}{\%\Delta P}$$

The coefficient is always negative (price and quantity move in opposite directions), but the negative sign is conventionally dropped and the absolute value is used.

Types of PED

Value	Name	Meaning
PED > 1	Elastic	Quantity demanded changes by a larger percentage than price
PED = 1	Unitary elastic	Quantity demanded changes by the same percentage as price
PED < 1	Inelastic	Quantity demanded changes by a smaller percentage than price
PED = 0	Perfectly inelastic	Quantity demanded does not change at all when price changes
PED =	Perfectly elastic	Any price rise causes quantity demanded to fall to zero

📋 **Example**

The price of phone cards rises from $120 to$ 130 and quantity demanded falls from 10 to 8 units.

Step 1: % change in Qd

$$\frac{8-10}{10} \times 100 = -20\%$$

Step 2: % change in P

$$\frac{130-120}{120} \times 100 = 8.33\%$$

Step 3: PED

$$\text{PED} = \frac{-20\%}{8.33\%} = -2.4 \quad \Rightarrow \quad |\text{PED}| = 2.4$$

Since 2.4 > 1, demand is **elastic**. A 1% price rise causes a 2.4% fall in quantity demanded.

📝 **Exam Tip**

Always show the three steps: calculate % change in Qd, % change in P, then divide. Do not round intermediate values. State your interpretation (elastic, inelastic, or unitary) and confirm whether the value is above or below 1.

Determinants of PED

Factor	More elastic when...	More inelastic when...
Availability of substitutes	Many close substitutes exist	Few or no substitutes available
Necessity vs luxury	It is a luxury (can go without)	It is a necessity (must have)
Proportion of income spent	Large share of income (price matters more)	Small share of income (price is not noticed)
Time period	Given more time, consumers find alternatives	In the short run, habits are hard to change
Definition of market	Narrowly defined (e.g. "Pepsi")	Broadly defined (e.g. "drinks")

PED and Total Revenue

Demand type	Price rises	Price falls
Elastic (PED > 1)	Total revenue falls	Total revenue rises
Inelastic (PED < 1)	Total revenue rises	Total revenue falls
Unitary elastic (PED = 1)	Total revenue unchanged	Total revenue unchanged

This relationship matters for pricing decisions. A firm selling an inelastic product (like fuel or medicine) can raise prices without losing much revenue. A firm selling an elastic product risks large revenue losses if it raises prices.

Income Elasticity of Demand (YED)

Income elasticity of demand measures how responsive the quantity demanded of a good is to a change in consumer income.

$$\text{YED} = \frac{\%\Delta Q_D}{\%\Delta Y}$$

where Y denotes income.

Interpreting YED

YED value	Interpretation
YED > 0	Normal good — demand rises as income rises
YED > 1	Luxury good — demand rises proportionally more than income
0 < YED < 1	Necessity — demand rises but less than proportionally
YED < 0	Inferior good — demand falls as income rises

📋 **Example**

When income rises by 10%, the demand for restaurant meals rises by 15%.

$$\text{YED} = \frac{15\%}{10\%} = 1.5$$

YED = 1.5 > 1 ’restaurant meals are a **luxury** good.

When income rises by 10%, demand for a cheap instant noodle brand falls by 5%.

$$\text{YED} = \frac{-5\%}{10\%} = -0.5$$

YED = −0.5 < 0 ’the noodle brand is an **inferior** good.

Cross-Price Elasticity of Demand (XED)

Cross-price elasticity of demand measures how responsive the quantity demanded of good A is to a change in the price of good B.

$$\text{XED} = \frac{\%\Delta Q_{D_A}}{\%\Delta P_B}$$

Interpreting XED

XED value	Interpretation
XED > 0 (positive)	Substitutes — goods that can replace each other
XED < 0 (negative)	Complements — goods used together
XED = 0	Unrelated goods

📋 **Example**

The price of Pepsi rises by 10% and the quantity demanded of Coca-Cola rises by 6%.

$$\text{XED} = \frac{6\%}{10\%} = 0.6$$

XED = +0.6 ’Pepsi and Coca-Cola are **substitutes**.

The price of cars rises by 20% and the quantity demanded of car insurance falls by 12%.

$$\text{XED} = \frac{-12\%}{20\%} = -0.6$$

XED = −0.6 ’cars and car insurance are **complements**.

Price Elasticity of Supply (PES)

Price elasticity of supply measures how responsive the quantity supplied of a good is to a change in its own price.

$$\text{PES} = \frac{\%\Delta Q_S}{\%\Delta P}$$

PES is always positive because price and quantity supplied move in the same direction (law of supply).

Types of PES

Value	Name	Meaning
PES > 1	Elastic supply	Quantity supplied changes by a larger percentage than price
PES < 1	Inelastic supply	Quantity supplied changes by a smaller percentage than price
PES = 1	Unitary elastic supply	Equal percentage changes
PES = 0	Perfectly inelastic supply	Quantity supplied is fixed regardless of price
PES =	Perfectly elastic supply	Producers supply any amount at the current price

Determinants of PES

Factor	More elastic supply when...	More inelastic supply when...
Time available	Long run — firms can expand capacity	Short run — fixed factors constrain output
Mobility of factors	Factors move easily between uses	Factors are specialised and immobile
Spare capacity	Firms have idle resources ready to use	All capacity is already used
Perishability	Goods can be stored and released	Goods are perishable — production timing is rigid
Production period	Short production cycle	Long growing or production season

🧠 **Remember**

Time is the most important determinant of price elasticity of supply. In the very short run (market period), supply is perfectly inelastic — the amount available is fixed regardless of price. In the short run, firms can produce more using existing capacity. In the long run, all inputs are variable and supply becomes more elastic as firms can build new factories or enter the industry.

📋 **Example**

The price of a good rises from $50 to$ 60 and quantity supplied rises from 200 to 260 units.

Step 1: % change in Qs

$$\frac{260 - 200}{200} \times 100 = 30\%$$

Step 2: % change in P

$$\frac{60 - 50}{50} \times 100 = 20\%$$

Step 3: PES

$$\text{PES} = \frac{30\%}{20\%} = 1.5$$

PES = 1.5 > 1 ’supply is **elastic**.