

Cambridge AS & A Level · Economics 9708 · Notes

Price elasticity of supply AS

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Read first: [Demand and supply curves](#)

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What you need to know

By the end of this topic you should be able to:

1. **Define price elasticity of supply (PES):** how strongly the quantity supplied of a good responds to a change in **its own price**.
2. **Write the formula and calculate PES** from percentage changes, and rearrange it to find a missing percentage change or a new quantity supplied.
3. **Explain what the size and sign of PES tell you:** whether quantity supplied changes by a bigger or smaller percentage than price, why PES is normally positive, and the names for its values (perfectly inelastic, inelastic, unit elastic, elastic, perfectly elastic). This includes reading PES from the shape of a supply curve.
4. **Explain the factors that affect PES:** time, spare capacity, stocks and how easily the good can be stored, how long production takes, and how easily firms can get or move the factors of production they need.
5. **Explain what PES means for how quickly and easily firms can react** when market conditions change, such as a rise or fall in demand.

This topic builds on supply curves from the topic Demand and supply curves. Price elasticity of **demand** is a separate measure: don't mix them up.

Understand it

What PES measures

A supply curve tells you that a higher price brings out a bigger quantity supplied. PES answers the next question: **how much** bigger? Like every elasticity, it compares **percentage** changes, so the units don't matter.

$$\text{PES} = \frac{\% \Delta \text{ quantity supplied of the good}}{\% \Delta \text{ price of the good}}$$

A percentage change is always worked out from the **original** value: $\frac{\text{new} - \text{old}}{\text{old}} \times 100$.

A bakery sells bread at \$2.00 a loaf and bakes 400 loaves a day. The price rises to \$2.50 (+25%) and it bakes 450 loaves (+12.5%). So $PES = \frac{12.5}{25} = 0.5$.

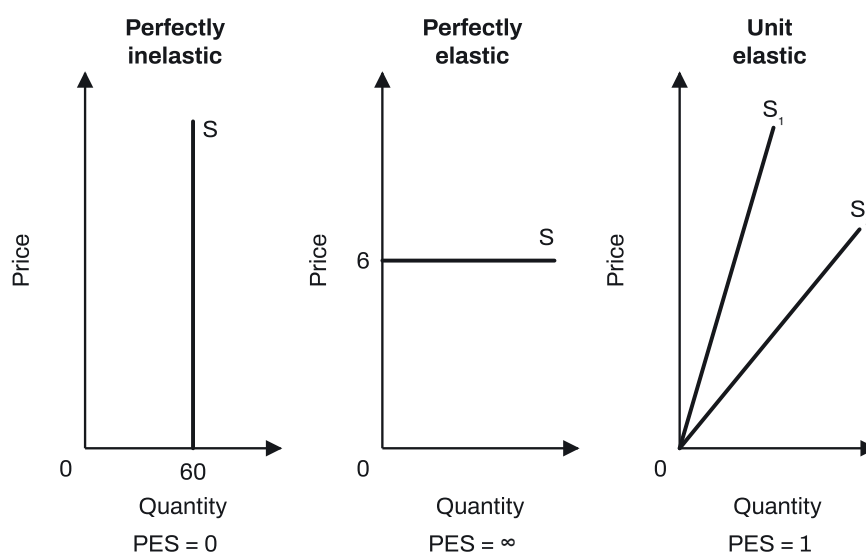
The sign. A higher price makes each unit more profitable and covers the higher cost of producing extra units, so firms supply more. Price and quantity supplied move in the **same** direction, so PES is **positive** (unlike PED, which is negative). A value is often written with its sign, such as +1.5.

The size compares the two percentage changes:

Value of PES	Name	Meaning
0	Perfectly inelastic	Quantity supplied doesn't change at all when price changes
between 0 and 1	Inelastic	$\% \Delta Q_s$ is smaller than $\% \Delta P$
exactly 1	Unit (unitary) elastic	$\% \Delta Q_s$ equals $\% \Delta P$
greater than 1	Elastic	$\% \Delta Q_s$ is larger than $\% \Delta P$
infinite (∞)	Perfectly elastic	Firms will supply any quantity at the ruling price, and nothing at all below it

So PES of +2 means a 10% rise in price brings a 20% rise in quantity supplied: output is easy to raise. PES of +0.2 means the same price rise brings only 2% more: output is hard to raise. "Inelastic" does not mean "supply doesn't change"; it means it changes by a **smaller percentage** than price.

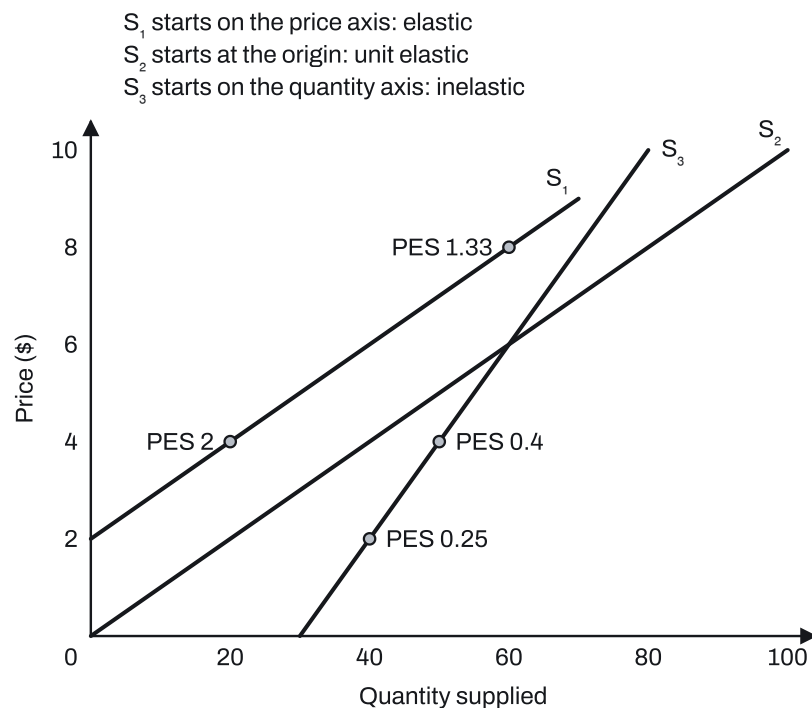
PES and the shape of the supply curve



- **Vertical: PES = 0.** The quantity is fixed whatever the price: the seats in a theatre for one performance, or paintings by an artist who has died.

- **Horizontal: PES infinite.** Firms will supply any amount at that price, and none below it.
- **Any straight line through the origin: PES = 1 at every point**, whatever its slope. On the line $Q = 10P$, a rise from \$4 to \$5 (+25%) raises quantity from 40 to 50 (+25%). A steeper or flatter line through the origin gives the same result, because price and quantity always change in the same proportion. It does **not** have to be a 45° line.

For other straight lines, what matters is **where the line starts**, not how steep it is:



Curve	Price rise	Quantity supplied	$\% \Delta P$	$\% \Delta Q_s$	PES
$S_1: Q = 10P - 20$	\$4 → \$5	20 → 30	+25%	+50%	2
S_1	\$8 → \$9	60 → 70	+12.5%	+16.7%	1.33
$S_2: Q = 10P$	any			same as $\% \Delta P$	1
$S_3: Q = 30 + 5P$	\$2 → \$3	40 → 45	+50%	+12.5%	0.25
S_3	\$4 → \$5	50 → 55	+25%	+10%	0.4

- A straight line that **starts on the price axis** (S_1) is **elastic** at every point. As price rises, PES **falls towards 1** (it is infinite right where the line meets the price axis, where quantity is zero).
- A straight line that **starts on the quantity axis** (S_3) is **inelastic** at every point. As price rises, PES **risks towards 1** (it is 0 where the line meets the quantity axis, at a price of zero).
- For a straight line, $PES = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$: the first part is fixed by the slope, but $\frac{P}{Q}$ changes as you move along it. That's why PES changes along S_1 and S_3 , and why it stays at 1 on S_2 , where $\frac{\Delta Q}{\Delta P}$ and $\frac{Q}{P}$ are always equal.

Two lines can only be compared at the **same** point: there the flatter one is the more elastic. S_1 and S_3 above would meet at \$10 and 80 units, where S_1 (the flatter) has PES 1.25 and S_3 has PES 0.625.

Factors that affect PES

PES is about how easily **producers** can change their output. Every factor is on the supply side. The things that make **demand** elastic or inelastic (substitutes for consumers, share of income, necessity or luxury, advertising, inferior or normal) have **nothing** to do with PES.

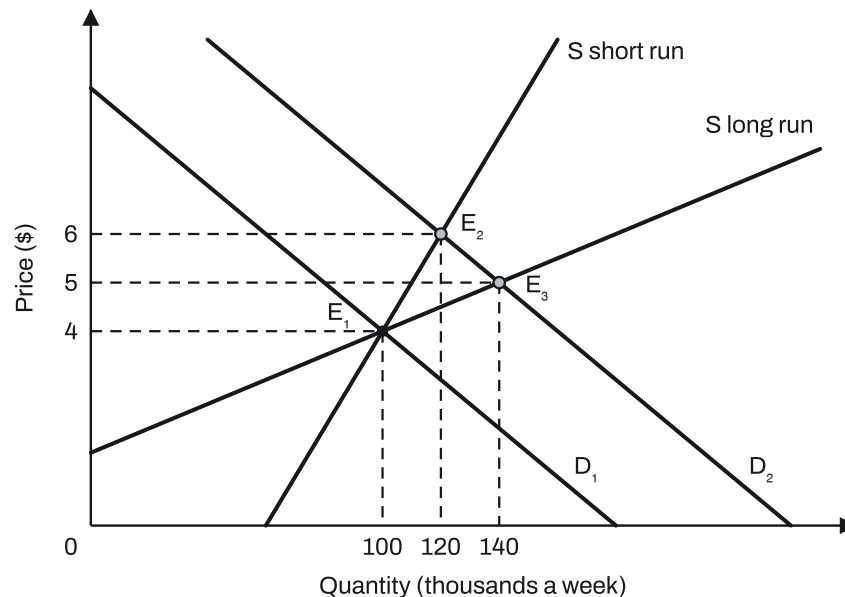
Supply is **more elastic** when:

- **The time period is longer.** This is the most important factor.
 - *Momentary (market) period:* what is already produced or on the shelves is all there is, so supply can be close to perfectly inelastic.
 - *Short run:* at least one factor, usually capital (machines, buildings, land), is fixed. Firms can only use existing machines more intensively, pay overtime or hire more workers, so supply is inelastic.
 - *Long run:* all factors can change. Firms build new capacity, and new firms enter the market, so supply becomes more elastic.
- **Firms have spare (excess) capacity.** Idle machines and workers mean output can be raised quickly without much extra cost. A firm working at full capacity can't raise output until it expands.
- **Firms hold stocks** (inventories) of finished goods or components, or the good is **easy to store** without losing value. Stocks can be released when the price rises and built up when it falls. Goods that are **perishable** (fresh fruit and flowers) or costly to store can't be held back, so their supply is inelastic.
- **Production is quick.** Printing more newspapers takes hours. Growing a crop takes a season; a new tree crop takes years; developing a new medicine, opening a mine or building a power station takes years. Long production processes make supply inelastic.
- **Factors of production are easy to get and to move** (factor mobility). If the extra labour needed is unskilled and there is unemployment, firms can hire quickly. If they need highly skilled workers who are scarce, or scarce raw materials, output can't rise fast. Supply is also more elastic when firms making related products can **switch** their machines and workers to this product, and when there are many producers or it is easy for new firms to enter.

Agricultural goods versus manufactured goods is the classic comparison. Crops are usually **inelastic** in supply, especially in the short run: land is fixed for the season, there is a long gap between planting and harvest, many crops are perishable and hard to store, and output depends on the weather. Manufactured goods are usually **more elastic**: factories can run extra shifts, hold stocks of finished and part-finished goods, and switch production lines. But it depends: grain that stores well is more elastic than fresh vegetables; cold storage and greenhouses make farm supply more elastic; and a factory already at full capacity, or one needing scarce skilled labour, can have inelastic supply.

What PES means for how firms react

PES tells you how **quickly and easily** producers can respond when the market changes.



In this market, demand rises from D_1 to D_2 :

- **In the short run** supply is inelastic (PES 0.4 at E_1). Firms can't raise output much, so the rise in demand mostly shows up as a **higher price**: \$4 → \$6 (+50%), with output up only 20% (100 → 120 thousand). There is a shortage at the old price, and firms with stock or spare capacity earn high profits.
- **In the long run** supply is more elastic (PES 1.6). Firms expand and new firms enter, so the same rise in demand shows up mostly as **more output**: 100 → 140 thousand (+40%), with the price up only 25%, to \$5.

The general rule: **the more elastic supply is, the more a change in demand changes quantity and the less it changes price**. With perfectly inelastic supply, a rise in demand changes only the price.

What this means for firms:

- A firm with **elastic supply** can take advantage of a rise in demand quickly: it sells more units, gains market share and earns more revenue before rivals catch up. It can also cut output quickly when demand falls, so it isn't left with unsold goods.
- A firm with **inelastic supply** can't respond in time. When demand rises, the price rises instead, and customers may turn to rivals or imports. When demand falls, it keeps producing what it has already planted or started, so the price falls sharply. This is why prices of crops and minerals swing so much, and why farmers' incomes are unstable.
- Firms can make supply **more elastic**: keep spare capacity, hold stocks, use flexible machinery and workers who can do several jobs, or store the product (a buffer stock scheme releases stored stock when demand rises, so supply rises instead of price). Each of these costs money: idle machines, storage and wastage.

Key facts and formulas

Economics has no formula list in the exam. "Learn it" means you must remember it.

Formula	Status
$PES = \frac{\% \Delta \text{ quantity supplied of the good}}{\% \Delta \text{ price of the good}}$	Learn it
$\text{Percentage change} = \frac{\text{new} - \text{old}}{\text{old}} \times 100$	Learn it
Rearranged: $\% \Delta Q_s = PES \times \% \Delta P$, and $\% \Delta P = \% \Delta Q_s \div PES$	Learn it
$\text{New quantity} = \text{old quantity} \times \left(1 + \frac{\% \Delta Q_s}{100} \right)$	Learn it
For a straight supply curve: $PES = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$	Learn it
PES is normally positive: 0 perfectly inelastic; 0–1 inelastic; 1 unit elastic; > 1 elastic; ∞ perfectly elastic	Learn it
Vertical supply curve: $PES = 0$; horizontal: $PES = \infty$; straight line through the origin: $PES = 1$ everywhere	Learn it
Straight line from the price axis: elastic, PES falls towards 1 as price rises; from the quantity axis: inelastic, PES rises towards 1	Learn it

How to do it

In the questions we have tagged for this topic (62 questions, 2021–2025), 48 are Paper 1 multiple choice and 14 are Paper 2 data response or essay questions, where we counted only the parts about this topic. One question (9708/23/O/N/23 Q2) mixes two types, so the counts add up to 63.

Question type	Questions
Identify the factor that makes PES high or low	20
Read PES from the shape or position of a supply curve	12
Calculate PES, a percentage change in quantity supplied or a new output	11
Define PES and interpret the size and sign of the coefficient	5
Explain why supply is elastic or inelastic; agricultural against manufactured goods	5
Assess how useful PES is to a firm compared with another elasticity	5
Use PES to explain the size of a price change after a shift	3
Judge from case-study data whether supply is elastic or inelastic	2

Paper 2 parts are marked in two ways. **Part (a), 8 marks**, is point-based: up to **3** marks for knowledge (AO1), **3** for analysis (AO2) and **2** for evaluation (AO3, the second kept for a justified conclusion). **Part (b), 12 marks**, is levels-marked: Table A gives up to **8** for knowledge and analysis (Level 3 is 6–8, Level 2 is 3–5, Level 1 is 1–2) and Table B up to **4** for evaluation (Level 2 is 3–4 with a justified conclusion; Level 1 is 1–2). A one-sided answer gets **no** evaluation marks.

1. Identify the factor that makes PES high or low (20 questions)

All multiple choice.

1. **Throw out every demand-side option first:** share of income, substitutes for consumers, necessity or luxury, normal or inferior good, advertising, opportunity cost to consumers. None of them affects PES.
2. **Ask: can producers raise output quickly and cheaply?** If yes, supply is elastic; if no, inelastic.
3. **Match the option to a factor:** time period, spare capacity, stocks and storability, perishability, length of production, availability of labour and materials, ability to switch production.

Variations you will meet:

- **"Which factor affects PES?"** The answer is the supply-side one, such as the availability of stocks or the time period. Options such as "percentage of income spent", "price of substitutes" or "whether the good is a necessity" are PED factors.
- **Most elastic.** A labour-intensive firm's supply is most elastic when it uses **unskilled** labour and **unemployment is high**: it can hire extra workers at once. Scarce skilled labour, or full employment, makes supply inelastic. A car maker's supply is elastic when it has **large stocks**, not when it is near full capacity, short of labour or in the short run.
- **Least elastic, or slowest to react.** An oil exploration company (years to find and develop a field), a construction firm building a nuclear power station (it needs time to hire highly skilled labour), a new medicine (research and development take years; newspapers are elastic because presses have spare capacity).
- **Explain a given value.** PES of +0.1: something slows the response (scarce skilled labour, a long build). PES of +1.5: the firm has stocks or spare capacity it can use.
- **Crops.** Rice, wheat and fresh vegetables are **inelastic in the short run and more elastic in the long run**, because of the time between planting and harvest. Their PES is lower than that of manufactured goods for the same reason. Being "essential" is a demand idea, and land being fixed doesn't make supply inelastic forever: farmers switch land between crops over time.
- **What changes PES.** A longer production time **decreases** PES; being able to store the product for longer, or to swap machines for workers, increases it. PES **increases as the time period lengthens**.
- **Which event lets firms respond with more output rather than a higher price?** Anything that adds stock or capacity, such as a buffer stock scheme that releases stored goods. Less training, dearer machines or poor labour productivity all do the opposite.

2. Read PES from the shape or position of a supply curve (12 questions)

1. **Vertical:** $PES = 0$. **Horizontal:** PES infinite (any quantity at that price; none below it).
2. **Straight line:** find where it starts.
 - Through the **origin**: $PES = 1$ at every point, whatever the slope, even if two such lines have different slopes.
 - From the **price axis**: elastic (> 1), and PES **falls** as price rises.
 - From the **quantity axis**: inelastic (< 1), and PES **rises** as price rises (it is 0 at a price of zero).
3. **To compare two lines**, compare them at the same point; the flatter one is more elastic there.

Variations you will meet:

- **"Which curve has a constant PES?"** Only a line through the origin (PES always 1), or a vertical or horizontal line. A straight line that starts on an axis does **not** have a constant PES , even though its slope is constant.
- **An indirect tax shifts the curve up.** A specific tax of \$5 moves a supply curve through the origin up by \$5, so it now starts on the price axis: PES changes from **unitary to elastic** (> 1). A shift to the right that keeps the line through the origin leaves PES **unchanged** (still 1) and raises producer surplus at a given price.
- **Several curves through the origin with numbers** (for example, three lines through the origin and a price rise from \$5 to \$10): all are unit elastic, so each quantity doubles.

3. Calculate PES, a percentage change in quantity supplied or a new output (11 questions)

1. **Work out each percentage change from the original value.**
2. **Quantity supplied goes on top**, price underneath.
3. **To find a missing change**, rearrange: $\% \Delta Q_s = PES \times \% \Delta P$. Then apply the percentage to the original quantity.

Examples:

- **% change in quantity.** $PES = +1.5$ and price rises by 20%: $\% \Delta Q_s = 1.5 \times 20 = 30\%$. $PES = +2.5$ and price rises by 10%: quantity supplied rises by 25% (not total revenue: PES is about quantity).
- **PES from a % change.** Price rises 5% and quantity supplied rises 2.5%: $PES = 2.5 \div 5 = 0.5$.
- **New output.** A firm makes 100 units at \$10, $PES = 0.5$, and price rises to \$12 (+20%): output rises 10%, to **110**.
- **From an equation.** $Q_s = 10 + 10P$ and price rises from \$1 to \$2: quantity goes from 20 to 30, so $PES = \frac{50\%}{100\%} = 0.5$. To find the price that **doubles** quantity on $Q_s = 10 + 5P$ from \$1: quantity must go from 15 to 30, so $5P = 20$ and the price must rise to \$4.
- **Short run against long run.** Price rises from \$2.00 to \$2.20 (+10%) with 100 000 supplied. With PES 0.8 in the short run, supply rises 8% (8000 units); with 1.4 in the long run, 14% (14 000). The **difference** between them is 6000 units.

- **From a diagram.** Read the prices and quantities off the axes, then use the formula for each curve (short run and long run separately).

The wrong options usually put price on top (giving $1 \div \text{PES}$), add the percentage as units, or talk about revenue instead of quantity.

4. Define PES and interpret the size and sign of the coefficient (5 questions)

1. **Definition:** "the responsiveness of the quantity supplied of a good to a change in its own price", measured as the percentage change in quantity supplied divided by the percentage change in price.
2. **Size:** greater than 1 elastic ($\% \Delta Q_s > \% \Delta P$), between 0 and 1 inelastic, 0 perfectly inelastic (fixed capacity, such as a theatre's tickets for one performance).
3. **Sign:** positive, because price and quantity supplied move the same way along a supply curve.

Multiple-choice definitions: the answer compares the **proportionate** change in quantity supplied with the proportionate change in **price**. Wrong options use the absolute change, the price responding to quantity, a change in costs, a change in demand, or another good's price. Product X with PES +2 and product Y with +0.2: after a price rise it is **harder to raise Y's output** than X's (options about substitutes or buyers are about demand).

Paper 2, 8 marks (for example, what short-run and long-run estimates of PES mean for producers and consumers, and why they differ): AO1: define PES with the formula (1), say what inelastic (below 1) and elastic (above 1) mean in percentage terms (1), and name a factor (1). AO2: in the short run producers can't raise output much, so consumers face a bigger price rise and possible shortages; in the long run capacity grows, so more is supplied and the price rises less (use the diagram above). Explain **why** they differ: time to build capacity, train workers, enter the market. AO3: whether the estimates are reliable (they are estimates, and conditions change), and a conclusion.

5. Explain why supply is elastic or inelastic; agricultural against manufactured goods (5 questions)

Usually part (a) [8], sometimes part (b) [12]: "explain what determines elastic and inelastic PES and consider how far agricultural and manufactured goods differ", or "explain two factors for a manufactured product".

Answer plan:

1. **Knowledge (AO1, 3 marks).** Define PES with the formula (1). Explain elastic and inelastic in terms of percentage responses (1). Explain at least one factor (time, stocks, spare capacity, perishability) (1).
2. **Analysis (AO2, 3 marks).** Take each type of good in turn, with a developed chain (up to 2 marks each):
 - **Agricultural:** fixed land in the season → long time from planting to harvest → can't raise output until next harvest; perishable and hard to store → can't hold back stock → **inelastic**, especially in the short run; weather makes output unpredictable.
 - **Manufactured:** spare capacity and extra shifts → output rises quickly; stocks of finished and part-finished goods can be released; machinery and workers can switch between products → **more elastic**.

3. **Evaluation (AO3, 2 marks)**. An "it depends" point: storage (grain, cold stores, greenhouses make farm supply more elastic), the time period (in the long run farmers plant more or switch crops), or a factory at full capacity or short of skilled labour (inelastic) (1). Then a justified conclusion, usually that farm supply is less elastic than manufactured supply, **mainly because of time and storage** (1).

If the question names only one kind of good (for example, "a manufactured product"), write only about that kind. Examiners report candidates losing time on both.

For the 12-mark version, the same content needs to be analysed in more depth (Table A Level 3 needs clear, accurate analysis for **both** kinds of good), and the judgement needs to weigh the factors against each other.

6. Assess how useful PES is to a firm compared with another elasticity (5 questions)

Part (b) [12]: "assess whether PES or PED (or XED, or YED) is more useful to a firm", often with a setting: a firm needing to **react quickly**, one wanting to **increase its total sales in a growing economy**.

Answer plan:

1. **Define both briefly** (AO1), with formulas. Examiners give no marks for long descriptions of each elasticity here: the marks are for using them.
2. **Uses of PES, tied to the setting** (AO2): it tells the firm how quickly it can raise output when demand or price rises, so it can plan spare capacity, how much stock to hold and when to hire. A firm that knows its supply is inelastic can invest to make it more elastic (flexible machinery, stocks) so it doesn't lose sales to rivals when demand rises.
3. **Limits of PES** (AO2/AO3): it is an estimate from past data and changes over time; it is of little use if production is slow or the good is perishable and can't be stored anyway; it says how output **can** respond, not whether demand will rise.
4. **Uses of the other measure** (AO2), from the previous topic: **PED** for pricing and revenue (raise the price when demand is inelastic); **XED** for how sales react to rivals' prices and to complements; **YED** for forecasting sales as incomes grow or fall (luxuries grow fastest in a boom; inferior goods sell more in a recession). Give its limits too.
5. **Judgement** (AO3), answering the exact words: "For a firm that must react **quickly**, PES is more useful, because knowing the other elasticities is no help if the firm can't change its output in time; but PES only matters once the firm knows demand will change, and YED or PED is what predicts that."

Answers not tied to the setting (reacting quickly, a growing economy, increasing total sales) are capped at mid-Level 2.

7. Use PES to explain the size of a price change after a shift (3 questions)

1. **Draw the shift** (usually demand to the right, or supply to the left) with a labelled new equilibrium.
2. **Link the size of the price change to PES**: a rise in demand with inelastic supply raises the price a lot and the quantity a little; with elastic supply, the reverse (the diagram above).
3. **Give the reason from the case**, such as a mine taking years to open, or a crop taking a season to grow.

Variations you will meet:

- **Supply that can't grow at all.** Paintings by artists who have died have perfectly inelastic supply, so price is set entirely by demand. Their prices keep rising because **demand** keeps rising (buyers see them as an asset whose value will grow); fixed supply alone would not make the price rise year after year.
- **Two shifts at once** (supply falls and demand rises), 8 marks: both push the price up, so the price rises for certain; the quantity could go either way. Evaluation: how far the price rises depends on the **relative sizes** of the shifts and on PED and PES; inelastic supply and demand make the rise larger.
- **With a policy** (such as a shortage of lithium for electric car batteries): inelastic supply means the price rises until new supply arrives; judge a policy that increases supply (a subsidy, faster permits) by how quickly it could work.

8. Judge from case-study data whether supply is elastic or inelastic (2 questions)

1. **Commit to one answer:** "inelastic" (1 mark on its own in a 2-mark part).
2. **Justify from the text** (1): name the evidence (drought, frost, storms, time to grow, hard to store) and link it to the **responsiveness** of supply: producers can't raise output when the price rises.
3. **Short run against long run** (4 marks): inelastic in the short run (time to grow, crops can't be stored); more elastic in the long run (new producers enter, farmers switch land to the crop), using each piece of evidence in the text.

Worked examples

Example 1

A firm supplies 400 units a week at a price of \$5. Its price elasticity of supply is 0.6. The price rises to \$6. How many units a week will it now supply?

- **A** 412
- **B** 448
- **C** 480
- **D** 533

[1]

$\% \Delta P = \frac{6 - 5}{5} \times 100 = +20\%$. $\% \Delta Q_s = 0.6 \times 20 = +12\%$. New quantity = $400 \times 1.12 = 448$. The answer is **B**. (1)

A adds 12 units instead of 12%; C assumes PES of 1; D divides by PES instead of multiplying ($20 \div 0.6$).

Example 2

Extract: A vanilla vine takes three years to flower for the first time, and each flower must be pollinated by hand. The pods are then dried for several months before sale. In 2024 a storm destroyed a third of the vanilla crop in one of the main growing countries, and the world price rose from \$250 to \$400 per kilogram. Since then, some farmers have planted new vines, and farmers in two nearby countries have started growing vanilla for the first time.

(a) Calculate the percentage change in the price of vanilla. [1]

(b) Using the information provided, consider whether the supply of vanilla is price elastic or price inelastic in the short run and in the long run. [4]

(a) $\frac{400 - 250}{250} \times 100 = +60\%$ (1).

(b) In the short run supply is price inelastic (1), because a new vine takes three years to flower and the pods take months to prepare, so farmers can't raise output quickly when the price rises by 60% (1). In the long run supply becomes more price elastic (1), because the new vines planted after the price rise come into production and new growers in nearby countries enter the market, so quantity supplied can respond to the high price (1).

Example 3

Explain the factors that determine the price elasticity of supply of a product and consider whether the supply of hotel rooms in a city is likely to be more price elastic in the long run than in the short run. [8]

Price elasticity of supply (PES) measures the responsiveness of the quantity supplied of a good to a change in its price, calculated as the percentage change in quantity supplied divided by the percentage change in price (AO1, 1). Supply is elastic when quantity supplied changes by a larger percentage than price (PES above 1) and inelastic when it changes by a smaller percentage (PES between 0 and 1) (AO1, 1). One factor is spare capacity: a firm with idle machines and workers can raise output quickly and at little extra cost, so its supply is elastic (AO1, 1).

In the short run a hotel has a fixed number of rooms, because its building is a fixed factor. When a festival raises room prices, it can't add rooms that night, so the quantity supplied barely changes and supply is highly inelastic, close to zero if the hotel is already full (AO2, 1). Only if it has empty rooms (spare capacity) can it supply more (AO2, 1). In the long run all factors are variable: existing hotels can build extensions and new hotels can be built and enter the market, so a lasting rise in prices brings a larger rise in rooms supplied, and supply is more elastic (AO2, 1).

However, how much more elastic it becomes depends on how easily land and planning permission can be obtained in a crowded city centre; where land is scarce, supply may stay inelastic even in the long run, although nearby flats rented out to visitors may add rooms more quickly (AO3, 1).

So supply of hotel rooms is likely to be more elastic in the long run, because time allows new capacity to be built, but in a city short of land the long-run increase in elasticity may be small (AO3, 1, justified conclusion).

Total: $3 + 3 + 2 = 8$.

Example 4

A bicycle maker expects incomes in its country to keep rising for several years. Assess whether knowledge of the price elasticity of supply of its bicycles is more useful to the firm than knowledge of the income elasticity of demand for them. [12]

Knowledge and analysis (Table A):

PES measures how responsive the quantity of bicycles the firm supplies is to a change in their price: the percentage change in quantity supplied divided by the percentage change in price. YED measures how responsive the quantity demanded is to a change in consumers' incomes: the percentage change in quantity demanded divided by the percentage change in income.

YED is useful because it predicts what rising incomes will do to demand. If bicycles are a normal good with YED of +1.5, a 4% rise in incomes raises demand by 6% a year, so the firm can plan output, staff and investment. If its cheapest models are an inferior good (people buy scooters or cars as they get richer), demand for them will **fall**, so it should shift production towards better models.

PES is useful because it tells the firm whether it can meet that rising demand. If its supply is inelastic, because it is at full capacity or needs skilled frame builders who are scarce, rising demand will raise the price instead, and customers may buy imported bicycles. Knowing this, the firm can hold more stock of parts, keep some spare capacity or train workers in advance, so that it gains the extra sales rather than rivals.

Both are estimates from past data and assume other things stay the same. YED may change as incomes rise (a bicycle may become less of a luxury), and PES changes over time as the firm invests.

(Developed, accurate chains on both measures, focused on a bicycle maker with rising incomes: Level 3, 8 marks.)

Evaluation (Table B):

YED is more useful first, because the firm must know **whether** and **by how much** demand will grow before it knows how much capacity it needs; PES on its own says how output can respond, not whether it should. But once growth is expected, PES becomes more useful: a firm that knows its supply is inelastic has time to invest, and one that doesn't will lose sales to rivals. So for a firm planning several years ahead, YED is probably more useful, as long as the firm also uses its PES to check it can deliver the extra bicycles in time.

(A balanced judgement that answers the question, says what it depends on and reaches a conclusion: Level 2, 4 marks.)

Common mistakes

- **Confusing PES with PED.** Examiners report candidates writing about price elasticity of demand in a question about supply, and scoring nothing for that part. PES is about **producers** and quantity **supplied**; its factors are all on the supply side.
- **Using demand factors for supply.** Substitutes for consumers, share of income, necessity or luxury, and advertising do not affect PES. They are the popular wrong options in multiple choice.
- **"Elastic means a big change, inelastic means little or no change."** Examiners see this even after correct definitions. Elastic means quantity supplied changes by a **greater percentage** than price; inelastic means a **smaller percentage**, not zero.
- **Missing out "percentage".** A definition without percentage (proportionate) changes in quantity supplied **and** price loses the mark.
- **Judging PES by steepness.** A steep line through the origin has PES 1, the same as a flat one. Look at where the line starts. And PES along a line that starts on the quantity axis **rises** as price rises (30% of candidates chose the opposite in one question).
- **Price on top.** $\% \Delta P \div \% \Delta Q_s$ gives $1 \div \text{PES}$. Quantity supplied always goes on top.
- **Working percentages from the new value**, or adding a percentage as a number of units.
- **Writing about both kinds of good** when the question asks only about manufactured products, or only about one time period.
- **Mixing up elastic and inelastic in data questions.** Weather shocks and slow growing times mean **inelastic** supply. Say which, then link the evidence to how **responsive** output is.
- **Explaining a price that keeps rising with fixed supply alone.** A vertical supply curve means price depends on demand; a price that keeps rising needs demand that keeps rising.
- **Describing each elasticity in a part (b) instead of using it.** There are no marks for description on its own; the marks are for analysing how each helps the firm in the setting given, and for judging which helps more.

How to get the marks

- **Command words.** *Calculate*: show the percentage changes and the division. *Explain*: say why, with "because... so...". *Consider, assess, discuss*: explain both sides, then judge.
- **Definitions** need: "responsiveness", "quantity supplied", "change in (its own) price", and the formula with **percentage** changes.
- **Size and sign** means relative percentages **and** the sign: "PES of +0.4 means quantity supplied rises by 0.4 times the percentage rise in price: inelastic. It is positive because price and quantity supplied move together."
- **Part (a), 8 marks, is 3 + 3 + 2.** Knowledge: definition or formula, elastic and inelastic explained, a factor. Analysis: developed chains, up to 2 marks for one well-explained point, applied to the goods in the question. Evaluation: one "it depends" point and one justified conclusion.

- **Part (b), 12 marks, is 8 + 4.** Level 3 needs accurate, developed analysis of **both** sides, focused on the setting. Evaluation needs a weighed comparison and a conclusion that answers the exact words ("more useful", "most useful"). One-sided answers get no evaluation marks.
- **Evaluation on this topic** usually turns on: the time period, whether goods can be stored, whether storage technology or spare capacity changes the picture, and that PES values are estimates that change over time.
- **Data response parts** (2 marks): state elastic or inelastic (1) and justify it from the text, linked to how responsive supply is (1).
- **Diagrams** when asked: price and quantity on the axes, curves labelled S and D, the shift shown ($D_1 \rightarrow D_2$), the new equilibrium marked. Draw inelastic supply **steep** and elastic supply **flatter** when PES matters to the answer.
- **Multiple choice:** one mark each, no penalty for guessing. Cross out demand-side options, and write the percentages in the margin.

Quick check

1. The price of a good rises from \$8 to \$10 and the quantity supplied rises from 500 to 540 units. Calculate the PES and say whether supply is elastic or inelastic.
2. A firm's PES is 1.2 and it supplies 2000 units a month. If the price rises by 15%, how many units will it supply?
3. A supply curve is $Q_s = 30 + 6P$. Calculate the PES when the price rises from \$5 to \$6. What happens to PES along this curve as the price rises further?
4. Which change would make the supply of a firm's furniture **more price inelastic**?
 - **A** The firm builds a larger warehouse for finished furniture.
 - **B** Consumers come to see furniture as a necessity.
 - **C** The skilled carpenters the firm needs become harder to recruit.
 - **D** The firm installs extra machines that it does not yet use.
5. Explain why the supply of seats for one concert is perfectly inelastic, and what happens to the price and the number of seats sold if demand for the concert rises.

Answers

1. $\% \Delta P = \frac{10 - 8}{8} \times 100 = +25\%$; $\% \Delta Q_s = \frac{540 - 500}{500} \times 100 = +8\%$. $PES = \frac{8}{25} = 0.32$: **inelastic**, because quantity supplied rises by a smaller percentage than price.
2. $\% \Delta Q_s = 1.2 \times 15 = 18\%$, so $2000 \times 1.18 = 2360$ units.
3. At \$5, $Q_s = 60$; at \$6, $Q_s = 66$. $PES = \frac{10\%}{20\%} = 0.5$. The line starts on the quantity axis (30 units at a price of zero), so it is inelastic everywhere, and PES **rises** towards 1 as the price rises.
4. **C**. Scarce skilled labour means output can't be raised quickly. A (stocks) and D (spare capacity) make supply more elastic; B is about demand, not supply.
5. The venue has a fixed number of seats, so the quantity supplied can't change whatever the price: $PES = 0$ and the supply curve is vertical. A rise in demand raises only the **price**; the number of seats sold stays the same.

Past questions to try

- **9708/11/O/N/23 Q9**: PES from a straight-line supply equation.
- **9708/13/M/J/23 Q12**: reading the PES of four supply curves from a diagram.
- **9708/21/M/J/22 Q3**: part (a), two factors that determine the PES of a manufactured product.
- **9708/23/M/J/22 Q1**: part (c), whether avocado supply is elastic in the short run and the long run.