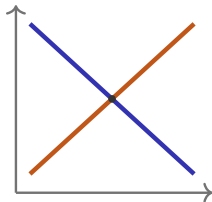


Supply and Demand

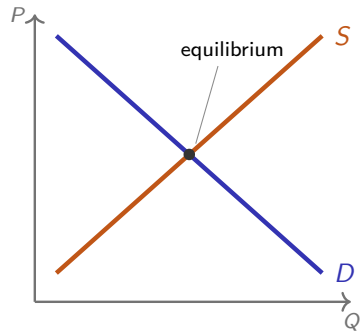
AP Microeconomics ■ Unit 2

AP Microeconomics



What we will cover

- 1 Demand & supply
- 2 Elasticity (PED & PES)
- 3 Cross-price & income elasticity
- 4 Equilibrium & surplus
- 5 Price controls & taxes
- 6 International trade



1

Demand & supply

The law of demand

Other conditions unchanged

At \$10, buyers want 100 units; at \$12, they want 85. They move along one demand curve.

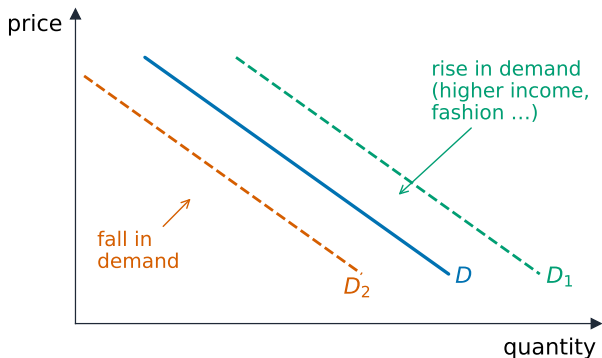
Substitution effect 替代效应: alternatives become relatively cheaper.

Income effect 收入效应: purchasing power falls.

Demand 需求 is the whole relationship; **quantity demanded** 需求量 is the amount wanted at one price.



The demand curve and its shifters



The demand curve slopes down; income, tastes, and related prices shift it

Movement vs shift

Movement along 沿曲线移动

only the good's **own price**
changed – slide to another point

Shift 移动

something **else** changed –
whole curve moves left/right

TIPEN shifts demand: **Tastes** 偏好, Income, Prices of related goods
(**substitutes** 替代品/**complements** 互补品), Expectations, Number of buyers.

What shifts each curve, and what a market needs first

property rights 产权

well-defined rights support exchange – owners can use, exclude others from, and transfer what they own

demand shifters

TRIBE: Tastes, Related goods, Income, Buyers (number of consumers), Expectations

supply shifters

input prices, technology, taxes and subsidies, number of sellers, expectations

horizontal summation 水平加总

the market curve is the individual curves added across quantities at each price

the determinants 决定因素

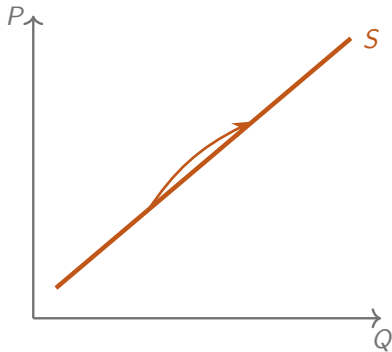
anything except the good's own price – which moves you *along* the curve

the exam skill

you must draw correctly labelled supply-and-demand graphs and shift the right curve in the right direction

Match the requested graph: label both axes, both curves and the equilibrium. Marks follow the task and official scheme, not the order in which you write.

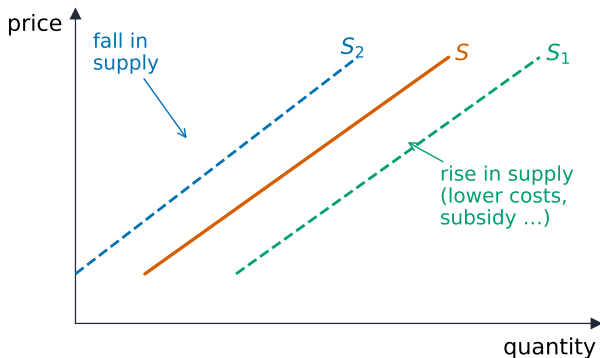
The law of supply



Supply 供给: price up $\Rightarrow$ quantity up (a **direct relationship** 正向关系). The curve slopes up because each extra unit adds **marginal cost** 边际成本.

TITEN shifts supply: **Technology** 技术, Input prices, Taxes/**subsidies** 补贴, Expectations, Number of sellers.

The supply curve and its shifters



The supply curve slopes up; costs, technology, tax, and subsidy shift it

2

Elasticity

Price elasticity of demand

PED 需求价格弹性 = $\frac{\% \Delta Q_d}{\% \Delta P}$ – how strongly quantity responds to price. Use the stated percentage changes and read $|\text{PED}|$.

Elastic
 $|\text{PED}| > 1$

Unit elastic
 $|\text{PED}| = 1$

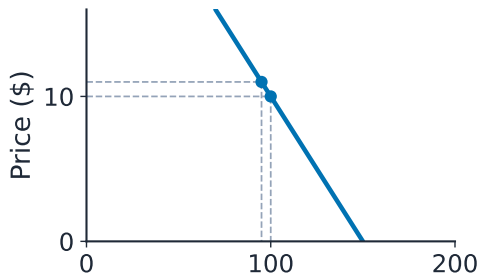
Inelastic
 $|\text{PED}| < 1$

More elastic when: many substitutes, a large share of income, more **time** 时间 to adjust.

Inelastic versus elastic demand

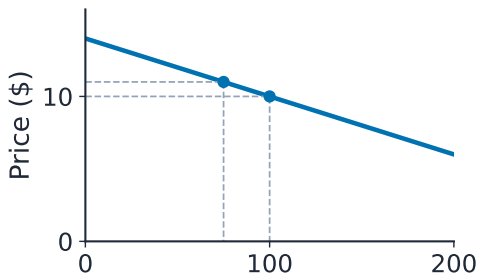
Price: 10 → 11 (+10%); both quantities start at 100

Inelastic



Quantity demanded
Q: 100 → 95 (-5%)
 $|E| = |-5 / 10| = 0.5$

Elastic



Quantity demanded
Q: 100 → 75 (-25%)
 $|E| = |-25 / 10| = 2.5$

Inelastic versus elastic demand: a small versus large response to a price change

Calculate demand elasticity and revenue

The opening market: price \$10 to \$12; quantity 100 to 85

Use initial values as the percentage-change base.

$$\% \Delta P = \frac{12 - 10}{10} \times 100 = 20\%$$

$$\% \Delta Q_d = \frac{85 - 100}{100} \times 100 = -15\%$$

$$|E_d| = \left| \frac{\% \Delta Q_d}{\% \Delta P} \right| = \left| \frac{-15}{20} \right| = 0.75$$

Demand is inelastic. $TR = PQ$: revenue rises from \$1000 to \$1020. Slope alone does not give elasticity.

The total revenue test

$TR = P \times Q$. When you change price, elasticity decides whether revenue rises.

Elastic

price & TR move **opposite**

cut price $\rightarrow$ TR up

Inelastic

price & TR move **together**

raise price $\rightarrow$ TR up

On a straight-line demand curve the **upper** half is elastic, the **midpoint** is unit elastic, the **lower** half inelastic. TR is greatest at the midpoint.

Price elasticity of supply

Two firms face the same price rise

Both start at $P = \$10$, $Q_s = 100$. Price rises to \$12. Firm A supplies 110 units; firm B supplies 140.

$$E_s = \frac{\% \Delta Q_s}{\% \Delta P}$$

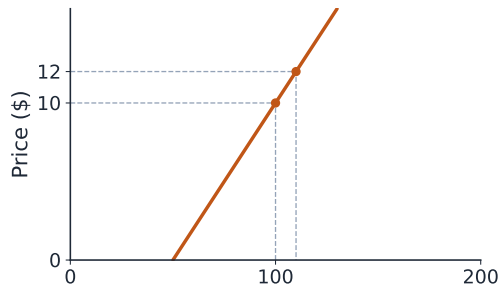
Attempt: calculate each percentage change from its initial value. Which firm has elastic supply? What might spare capacity or more time allow?

Vertical supply: perfectly inelastic ($E_s = 0$). Horizontal supply: perfectly elastic. Use percentage changes to classify other curves.

Price elasticity of supply: compare percentages

Price: 10 → 12 (+20%); both quantities start at 100

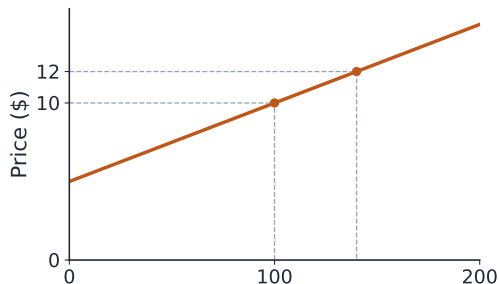
Inelastic



Quantity supplied
Q: 100 → 110 (+10%)

$$|E| = |10 / 20| = 0.5$$

Elastic



Quantity supplied
Q: 100 → 140 (+40%)

$$|E| = |40 / 20| = 2$$

The same 20% price rise gives a 10% or 40% rise in quantity supplied: PES 0.5 versus 2. Compare percentages, not visual steepness alone.

Other Elasticities

Calculate first, then interpret the sign

Coffee price rises 10%

Tea quantity demanded rises 6%.

Printer price rises 10%

Ink quantity demanded falls 4%.

Income rises 10%

Bus-ticket quantity demanded falls 5%.

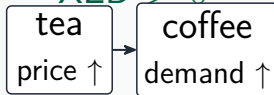
Task: choose cross-price or income elasticity for each case. Calculate its value and classify the relationship. Hold other determinants constant.

Keep the sign for cross-price and income elasticity. An own-price elasticity alone cannot identify substitutes, complements, normal goods or inferior goods.

Other Elasticities, in detail

substitutes

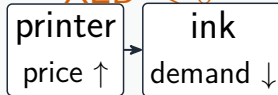
$$XED > 0$$



tea +10%, coffee +4%:
 $XED = +0.4$

complements

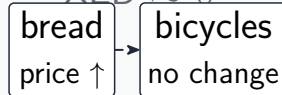
$$XED < 0$$



used together, so both
are bought less

unrelated

$$XED \approx 0$$



one price says nothing
about the other good

Cross elasticity: positive for substitutes, negative for complements

Cross-price & income elasticity

Cross-price elasticity

$$E_{XY} = \frac{\% \Delta Q_X}{\% \Delta P_Y}$$

$$E_{\text{tea, coffee}} = \frac{6}{10} = +0.6$$

Positive: substitutes.

$$E_{\text{ink, printer}} = \frac{-4}{10} = -0.4$$

Negative: complements.

Income elasticity

$$E_Y = \frac{\% \Delta Q}{\% \Delta \text{income}}$$

$$E_{Y, \text{bus}} = \frac{-5}{10} = -0.5$$

Negative: an **inferior good** 低档商品
in this example.

Separate own-price from cross-price elasticity

AP 2024 Set 1, Q1(e)

Quinoa price rises 25%; quinoa quantity demanded falls 5%; tofu quantity demanded rises 10%.

$$|E_{d,\text{quinoa}}| = \left| \frac{-5}{25} \right| = 0.2$$

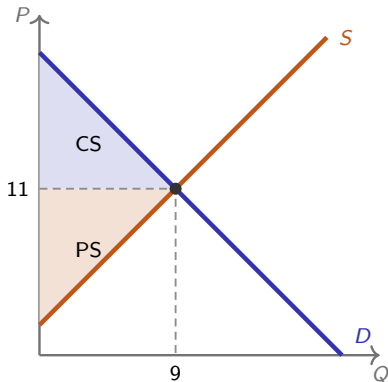
$$E_{\text{tofu},\text{quinoa}} = \frac{10}{25} = +0.4$$

Quinoa demand is inelastic. The positive cross-price value identifies substitutes; it does not tell us whether tofu is normal or inferior.

3

Equilibrium & surplus

Equilibrium, consumer & producer surplus



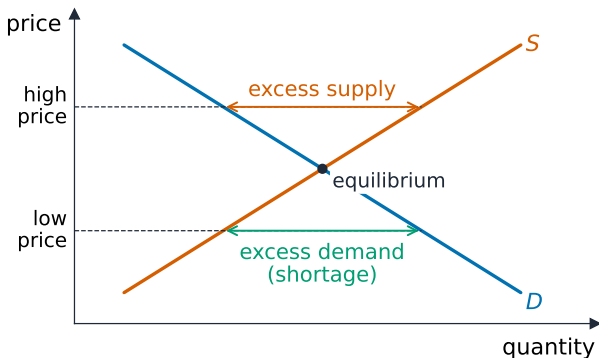
Equilibrium 均衡: $Q_d = Q_s$. Here $P = 11$, $Q = 9$.

Consumer surplus 消费者剩余:
below D , above price.

Producer surplus 生产者剩余:
above S , below price.

Competitive equilibrium maximizes surplus when private benefits and costs reflect social benefits and costs.

Above equilibrium there is excess supply; below it



Above equilibrium there is excess supply; below it, excess demand

Worked example – surplus

Fictional competitive market

Demand $P_D = 20 - Q$; supply $P_S = 2 + Q$.

$$P_D = P_S$$

$$20 - Q = 2 + Q$$

$$Q^* = 9, \quad P^* = \$11$$

$$CS = \frac{1}{2} Q^* (P_{D,0} - P^*)$$

$$CS = \frac{1}{2} (9) (20 - 11) = \$40.50$$

$$PS = \frac{1}{2} Q^* (P^* - P_{S,0})$$

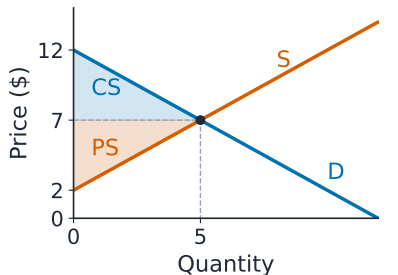
$$PS = \frac{1}{2} (9) (11 - 2) = \$40.50$$

Total surplus = $CS + PS = \$81$. Assume no external costs or benefits. These equations also define the following control and tax examples.

Worked example – surplus, in detail

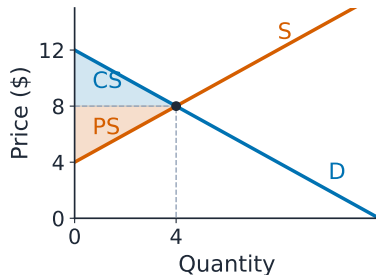
Demand: $P = 12 - Q$; supply: $P = 2 + Q$, then $P = 4 + Q$

Before: lower costs



$P = 7$; $Q = 5$; $CS = PS = \$12.5$

After: higher costs



$P = 8$; $Q = 4$; $CS = PS = \$8$

Consumer surplus and producer surplus at the market equilibrium

Disequilibrium & shifts

Price too high $\Rightarrow$ surplus 过剩 $\rightarrow$ price falls

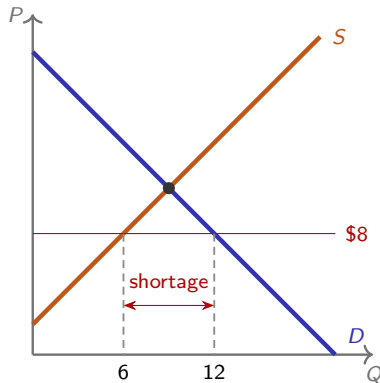
Price too low $\Rightarrow$ shortage 短缺 $\rightarrow$ price rises

Shift rules: D right $\rightarrow P \uparrow Q \uparrow$; D left $\rightarrow P \downarrow Q \downarrow$; S right $\rightarrow P \downarrow Q \uparrow$; S left $\rightarrow P \uparrow Q \downarrow$. When **both shift** 同时移动, one result is **indeterminate** 不确定.

4

Intervention & trade

Price controls



A **price ceiling** 价格上限 of \$8 binds below \$11.

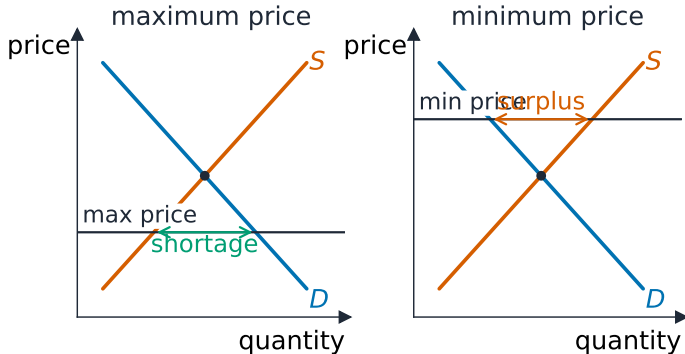
$$Q_d = 20 - P = 12$$

$$Q_s = P - 2 = 6$$

$$\text{shortage} = Q_d - Q_s = 6$$

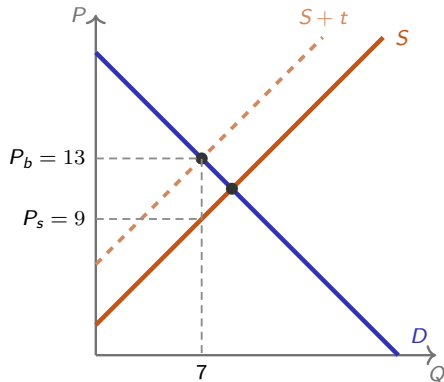
Without other supply, at most 6 units trade.

The Effects of Government Intervention in Markets



A binding ceiling causes a shortage; a binding floor causes a surplus

Taxes & incidence



A \$4 **per-unit tax** 从量税:

$$20 - Q = 2 + Q + 4$$

$$Q_t = 7, P_b = \$13, P_s = \$9$$

Buyers pay \$2 more; sellers receive \$2 less than the original \$11.

Tax incidence 税收归宿 depends on relative elasticity. The more inelastic side generally bears more; these symmetric schedules split the burden equally.

Tax revenue and deadweight loss

Continue the \$4 tax: quantity falls from 9 to 7

$$\text{Tax revenue} = tQ_t = 4(7) = \$28$$

$$DWL = \frac{1}{2}t(Q^* - Q_t) = \frac{1}{2}(4)(9 - 7) = \$4$$

The \$28 is a transfer to government. The \$4 is the lost net benefit of trades prevented by the tax.

These losses assume an initially efficient market. A policy correcting an externality can instead improve social welfare; Unit 6 develops that case.

International trade

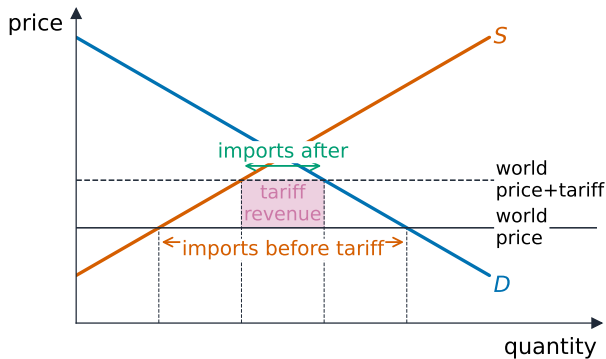
Use the same market: $P_D = 20 - Q$, $P_S = 2 + Q$

The no-trade price is \$11. The country can import at a world price of \$6. Assume a small competitive economy and no market failures.

Attempt before the next slide:

- 1 Calculate domestic quantity demanded and quantity supplied at \$6. How many units are imported?
- 2 A \$2 tariff raises the domestic price to \$8. Calculate the new imports and government revenue.
- 3 Do either domestic curve's determinants change?

A tariff changes quantities along the curves



A tariff raises quantity supplied, lowers quantity demanded, and reduces imports; neither domestic curve shifts

Worked imports and tariff

Before the tariff: $P_w = \$6$

$$Q_d = 20 - P_w = 14$$

$$Q_s = P_w - 2 = 4$$

$$M = Q_d - Q_s = 10$$

After the tariff: $P_w + t = \$8$

$$Q_{d,t} = 20 - 8 = 12$$

$$Q_{s,t} = 8 - 2 = 6$$

$$M_t = Q_{d,t} - Q_{s,t} = 6$$

Tariff revenue = $tM_t = 2(6) = \$12$. Quantity supplied rises and quantity demanded falls along unchanged domestic curves.

Exam tips

- Separate a **movement along** a curve (own price) from a **shift** (a determinant); a single shift gives a definite result, a double shift leaves one variable indeterminate.
- Compute elasticity $E_d = |\% \Delta Q \div \% \Delta P|$; elastic (> 1) means a price cut raises total revenue, inelastic (< 1) lowers it.
- Read the sign of cross-price elasticity (substitutes $+$, complements $-$) and income elasticity (normal $+$, inferior $-$).
- Shade **consumer/producer surplus** and the **deadweight loss** from a tax or price control; incidence falls on the more **inelastic** side.
- A price ceiling below equilibrium causes a shortage; a price floor above causes a surplus.

5

Recap

Unit 2 – key takeaways

1

Move vs shift

own price vs a determinant

2

Elasticity

$E_d = |\% \Delta Q \div \% \Delta P|$; a price cut raises TR if elastic

3

Signs

cross-price + substitutes; income + normal

4

Controls

binding ceiling: shortage; binding floor: surplus

Check yourself

- 1 Price rises and total revenue falls. Elastic or inelastic?
- 2 A change in price: movement or shift?
- 3 A price ceiling below equilibrium causes what?
- 4 Who bears more of a tax – the more inelastic side or the more elastic?

Check yourself

- 1 Price rises and total revenue falls. Elastic or inelastic?
- 2 A change in price: movement or shift?
- 3 A price ceiling below equilibrium causes what?
- 4 Who bears more of a tax – the more inelastic side or the more elastic?

Answers 1. elastic 2. a movement along the curve 3. a shortage 4. the more inelastic side