Course Companion

International Baccalaureate · IB Diploma · Economics · HL

Every topic handout in one volume

全部专题讲义合集

exercises.lol

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Introduction to economics (1.1-1.2)

International Baccalaureate · IB Diploma · Economics · HL

What is economics? How do economists approach the world?

IB Diploma Programme Economics HL, Unit 1 *Introduction to economics* (first assessment 2022). This topic covers syllabus sections 1.1 and 1.2 in full: what economics is (scarcity, choice, the economic agents, positive and normative statements) and how economists approach the world (the scientific method, economic models, the ceteris paribus assumption, and the nine key concepts that frame the whole course). Worked numbers are original and re-derived below.

Must-know for Unit 1:

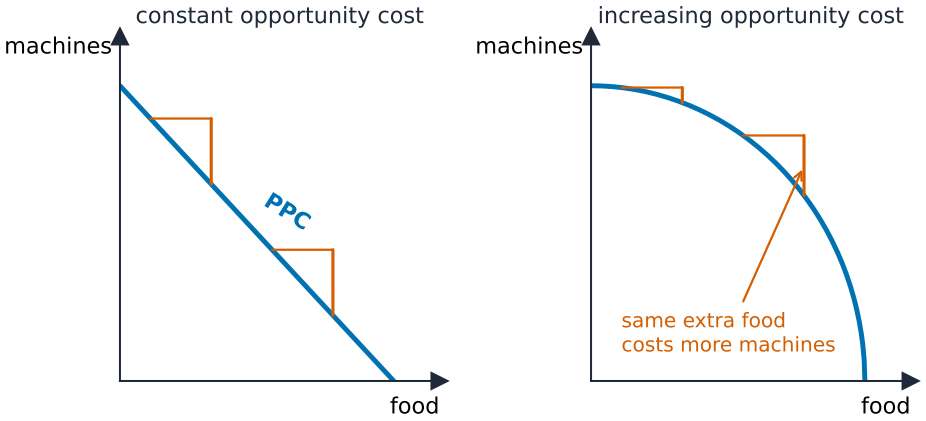
Family	Content
scarcity	unlimited wants, finite resources → choice and opportunity cost
agents	consumers, producers, government (and the "rest of the world" later)
method	hypothesis → model → test against data → revise (models are simplifications)
ceteris paribus	"all other things equal" – isolate one relationship at a time
statements	positive = testable; normative = value judgement
key concepts	scarcity, choice, efficiency, equity, well-being, sustainability, change, interdependence, intervention

What is economics?

Economics 经济学 studies the choices made by economic agents – CONSUMERS, PRODUCERS and the GOVERNMENT (joined later by the rest of the world) – under **scarcity** 稀缺性: unlimited wants against finite resources. Because resources are scarce, every choice has an **opportunity cost** 机会成本 – the next-best alternative forgone – and the basic economic questions are what to produce, how to produce it, and for whom. A student's hour spent revising economics cannot also be spent at work; a government budget spent on hospitals cannot also build schools. Economic **resources** 资源 (the factors of production) are land, labour, capital and enterprise, and each earns a reward – rent, wages, interest and profit.



An outdoor market: economics studies how scarce resources are allocated among competing uses



opportunity cost = goods forgone · bowed-out PPC ⇒ increasing opportunity cost

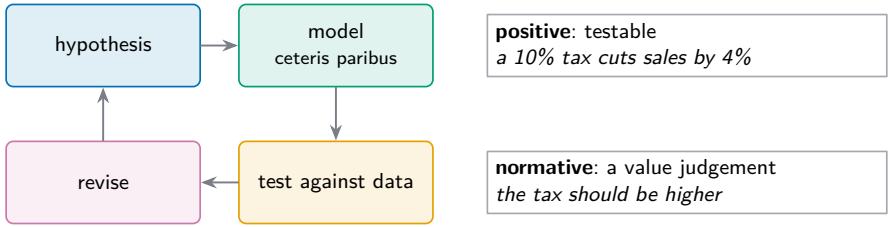
A straight PPC shows constant opportunity cost; a bowed-out PPC shows increasing opportunity cost

The distinction that runs through every IB data response: a POSITIVE statement is testable against evidence ("the inflation rate fell to 3%"), while a NORMATIVE statement carries a value judgement ("inflation should be lower"). Economists can disagree about values while agreeing about facts, and exam answers must keep the two apart.

> **Worked example.** A government has 10 billion to spend and can build one hospital (benefit valued at 10 bn) or two schools (benefit valued at 7 bn). Choosing the hospital has an opportunity cost of the two schools' 7 bn of benefit; the choice is rational if the hospital's benefit exceeds that of the best alternative forgone.

How do economists approach the world?

Economics follows the **scientific method** 科学方法: observe, form a hypothesis, build a **model** 模型 – a simplified representation of reality (demand curves, production possibility frontiers, circular flow) – make predictions, and test them against data, revising the model when it fails. Models deliberately simplify: their value is explanation and prediction, not photographic realism. The **ceteris paribus** 其他条件不变 assumption ("all other things equal") lets the economist isolate one relationship at a time – how quantity demanded responds to price, holding income and tastes fixed – the same discipline used in every later unit.



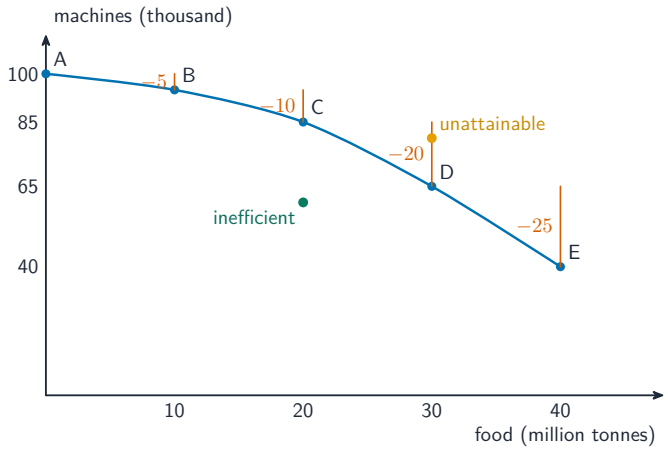
Models are tested simplifications

IB economics frames the whole course through nine **key concepts** 核心概念: SCARCITY and CHOICE (the underlying problem), EFFICIENCY and EQUITY (how well and how fairly resources are used), ECONOMIC WELL-BEING and SUSTAINABILITY (outcomes now and for the future), CHANGE, INTERDEPENDENCE (agents and nations linked through trade and markets) and INTERVENTION (when and how governments act). Every real-world issue the syllabus examines – and every HL commentary – is analysed through these lenses.

> **Worked example.** A tuition subsidy is a model question: the hypothesis is that lower fees raise enrolment; the model (demand) predicts enrolment rises when price falls, ceteris paribus; the test compares enrolment before and after, or across regions with and without the subsidy; a mismatch (say, enrolment flat because incomes also fell) sends the economist back to re-specify the model – the method in one loop.

Worked practice: opportunity cost on a PPC

An economy can produce these combinations of food and machines with all its resources, using today's technology:



each extra 10 food costs 5, then 10, 20, 25 machines: the PPC bows outwards

Increasing opportunity cost bows the PPC

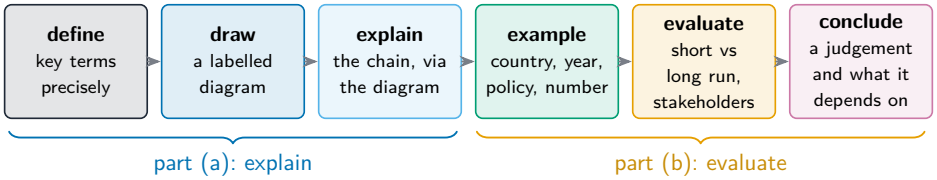
Point	Food (million tonnes)	Machines (thousand)	Opportunity cost of the extra 10 food
A	0	100	–
B	10	95	5 machines
C	20	85	10 machines
D	30	65	20 machines
E	40	40	25 machines

- **Increasing opportunity cost.** Each extra 10 million tonnes of food costs more machines (5, then 10, 20 and 25), so the PPC is bowed outwards. Resources are not equally good at both jobs: the first workers and land moved to farming are the best farmers and the best soil; later ones are better suited to factories.
- **Inside and outside.** Producing 20 food and 60 machines is possible but inefficient: at point C the economy could have 85 machines with the same food. Producing 30 food and 80 machines is unattainable now (D gives only 65 machines).
- **Growth.** Better technology in farming shifts the PPC out along the food axis more than the machine axis: the curve pivots outwards.

A real case. World military spending reached a record of about US$2.7 trillion in 2024 (Stockholm International Peace Research Institute). For each government, the opportunity cost of that spending is the schools, hospitals or lower taxes it could have funded instead. Economists can measure the size of the trade-off (a positive question); whether the spending is worth it is a normative judgement.

Writing a Paper 1 answer

Paper 1 is an extended-response paper. Each question has a part (a), which asks you to **explain** with a diagram, and a part (b), which asks you to **evaluate** using real-world examples. The same skills apply in every unit:



The shape of a Paper 1 answer

1. **Define** the key terms in the question precisely.
2. **Draw** a fully labelled diagram (axes, curves, equilibrium, shifts) and **refer to it** in your writing.
3. **Explain** the chain of cause and effect step by step, using the diagram.
4. **Use a real-world example** with specific detail: the country, the year, the policy and, where you can, a number.
5. **Evaluate:** weigh short-run against long-run effects, consider different stakeholders, question the assumptions (for example *ceteris paribus*), and say which effect matters most and why.
6. **Conclude** with a judgement that answers the question as it is set, and say what it depends on.

The key concepts (scarcity, choice, efficiency, equity, well-being, sustainability, change, interdependence, intervention) are useful frames for evaluation: name the one that fits and use it, rather than listing them all.

Checklist

- Economics defined through scarcity and choice; the three (later four) economic agents (1.1).
- Opportunity cost applied to consumers, producers and government (1.1).
- Resources/factors of production and their rewards (1.1).
- Positive versus normative statements, with the disagreement insight (1.1).
- The scientific method loop: hypothesis → model → prediction → data test → revision (1.2).

- Models as deliberate simplifications; ceteris paribus and what it isolates (1.2).
- The nine key concepts and how they frame every unit; Paper 1 essays reward concept-linked analysis – name the concept, then the theory (1.2).

Demand, supply and policy (2.1-2.7)

International Baccalaureate · IB Diploma · Economics · HL

Demand, supply and policy

IB Diploma Programme Economics HL, Unit 2 *Microeconomics* (first assessment 2022). This topic covers syllabus sections 2.1–2.7 in full: demand, supply, competitive market equilibrium, the critique of maximizing behaviour, elasticity of demand and supply, and the role of government in microeconomics. One shared market model runs through the worked examples: demand $Q_d = 140 - 2P$ and supply $Q_s = 20 + 4P$, equilibrium $P = 20$, $Q = 100$ – the same numbers used across the Edexcel drives, so every calculation cross-checks.

Must-know for this topic:

Family	Relationship
demand	$Q_d = 140 - 2P$; movements vs shifts; the Law from diminishing marginal utility
supply	$Q_s = 20 + 4P$; shifts with costs, technology, taxes, subsidies
elasticity	PED $= \frac{\%\Delta Q_d}{\%\Delta P}$; PES $= \frac{\%\Delta Q_s}{\%\Delta P}$; YED/XED; TR test
welfare	consumer + producer surplus; allocative efficiency where $P = MC$
government	indirect taxes, subsidies, price controls; max/min quantity controls

Demand and supply

Demand 需求 is the quantity consumers are willing AND able to buy at each price over a period (2.1). The demand curve slopes downward – the LAW of demand – explained by DIMINISHING MARGINAL UTILITY: each extra unit gives less additional satisfaction, so a lower price is needed to justify it. A change in the good's own price MOVES ALONG the curve; shifts follow income (normal/inferior), the prices of substitutes and complements, tastes, expectations and the number of consumers. CONSUMER choice theory (2.4's critique): the rational, utility-maximising consumer is a simplification – bounded rationality, herd behaviour, framing and imperfect information bend real choices, and BEHAVIOURAL economics supplies the evidence.

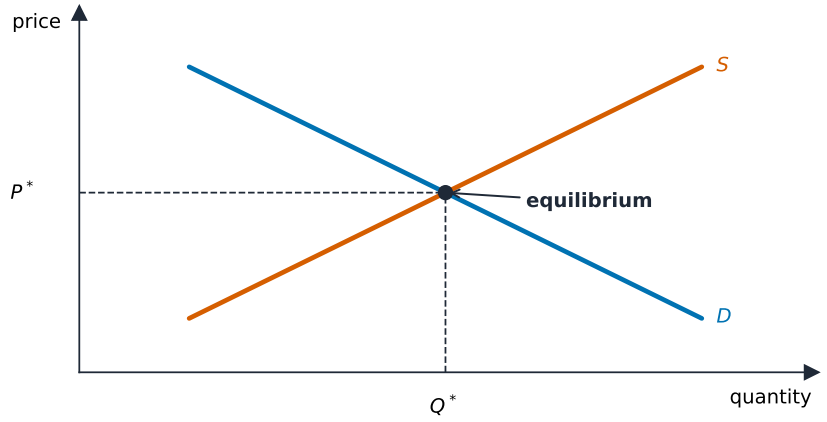


A price change moves along D; a non-price determinant shifts the whole curve

Supply 供给 is the quantity producers are willing AND able to sell at each price (2.2); higher prices make production profitable, so the curve slopes upward. Own-price changes move ALONG; shifts follow costs of production, technology, indirect taxes and subsidies, and the number of sellers. The profit-maximising producer assumption (2.4 again) is also a simplification – satisficing, corporate social responsibility and stakeholder aims bend it.

Competitive market equilibrium

Equilibrium (2.3) sets $Q_d = Q_s$: $140 - 2P = 20 + 4P$ gives $P^* = 20$, $Q^* = 100$. At $P = 12$: excess demand $= 116 - 68 = 48$ – the price is bid up; at $P = 25$: excess supply $= 120 - 90 = 30$ – the price is pushed down. The market's self-correction is the "invisible hand" allocating resources by price signals, rationing and incentives.



equilibrium: $Q_d = Q_s$ at (P^*, Q^*) (market clears)

Equilibrium is where quantity demanded equals quantity supplied

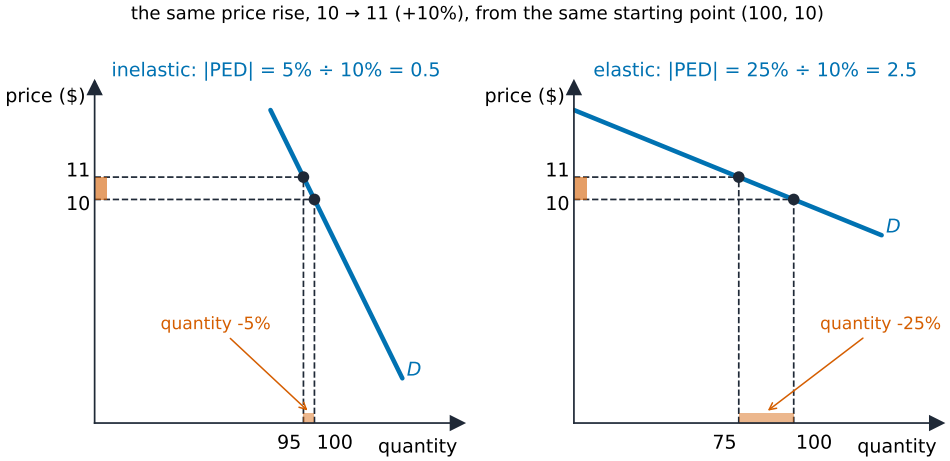
Welfare: **consumer surplus** 消费者剩余 is the area below the demand curve above price; **producer surplus** 生产者剩余 the area above supply below price. At equilibrium here: $CS = \frac{1}{2} \times 100 \times (70 - 20) = 2500$ and $PS = 20 \times 20 + \frac{1}{2} \times (100 - 20) \times 20 = 400 + 800 = 1200$ (supply starts at 20 units when the price is 0, so the area is a rectangle plus a triangle). **Allocative efficiency** 配置效率 holds where $P = MC$ – the competitive equilibrium in the absence of externalities – and the SUM of the surpluses (social surplus) is then maximised. Any price away from equilibrium creates deadweight loss.

Elasticity

Price elasticity of demand 需求价格弹性 (2.5): $PED = \frac{\%\Delta Q_d}{\%\Delta P}$. On the shared model at $P = 20$: price rising to 22 moves Q_d from 100 to 96, so $PED = \frac{-4\%}{+10\%} = -0.4$ – inelastic. The TOTAL REVENUE test: TR $= P \times Q$ rises from 2000 to 2112 when price rises, confirming inelastic demand; TR peaks (unitary PED) at $P = 35$, $Q = 70$, TR $= 2450$. PED depends on substitutes, necessity, the share of income and time. HL adds: linear demand is elastic at high prices and inelastic at low prices; marginal revenue $= 70 - Q$ here, and $MR = 0$ exactly where TR peaks.



A petrol station: with few substitutes in the short run, demand for fuel is price inelastic



The same 10% price rise: a small fall in quantity (inelastic) or a large one (elastic)

Price elasticity of supply 供给价格弹性 (2.6): $PES = \frac{\%\Delta Q_s}{\%\Delta P}$; price $20 \to 24$ moves Q_s $100 \to 116$, so PES $= +0.8$. PES depends on spare capacity, stocks, factor mobility and time. IB applications: primary commodities tend to have INELASTIC supply (growing periods, perishability) and often inelastic demand (necessities) – so small demand shifts cause LARGE price swings, the volatility that commodity exporters suffer.

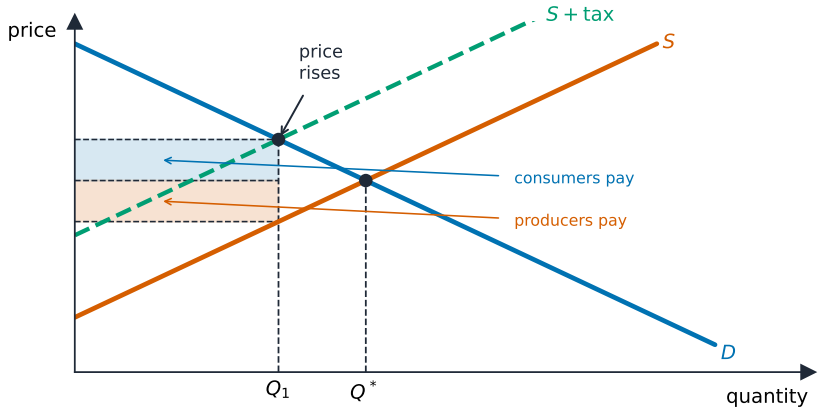
Other elasticities (HL within 2.5): income elasticity YED $= \frac{\%\Delta Q_d}{\%\Delta \text{income}}$ (positive for normal, negative for inferior; > 1 luxury) and cross elasticity XED between goods (positive substitutes, negative complements) – firms use YED to forecast over the business cycle and XED to price against rivals.

The role of government in microeconomics

Government intervenes (2.7) when markets fail or on equity grounds. **Indirect taxes** 间接税: a specific tax of 6 on the shared model shifts supply to $Q_s = 4P - 4$; equilibrium moves to $P_c = 24$, $Q = 92$ with producers keeping 18 – consumers pay 4 more, producers receive 2 less, revenue $6 \times 92 = 552$ per day, and incidence follows relative elasticity (demand at -0.4 is the inelastic side, so consumers bear more). **Subsidies** 补贴 (6 per unit) reverse the shift: $P_c = 16$, $Q = 108$, cost $6 \times 108 = 648$. Price controls: a **maximum price** 最高价格 at 16 creates excess demand $108 - 84 = 24$ (rationing, queues, black markets); a **minimum price** 最低价格 at 24 creates excess supply $116 - 92 = 24$ (the government may have to buy the surplus). Quantity controls (quotas) restrict supply directly. Every intervention answer weighs the correction against unintended consequences – the Unit-1 key concepts (intervention, efficiency, equity) are the framing.

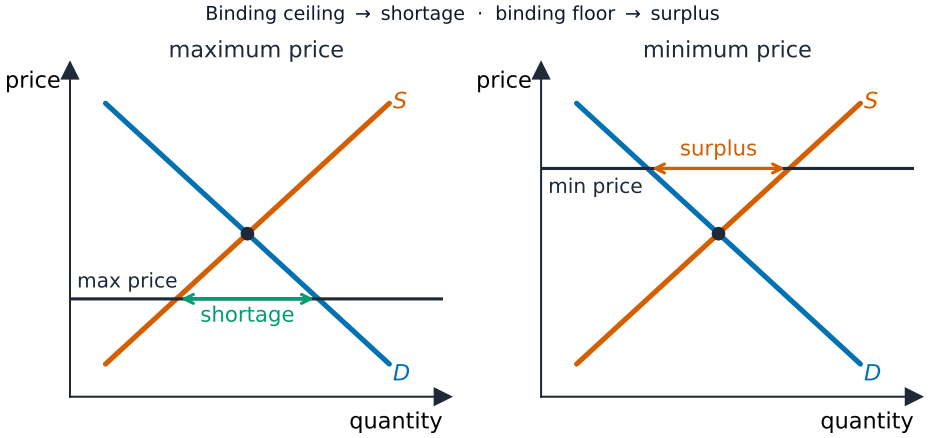


Cigarettes carry heavy indirect taxes: governments use taxes to change both price and consumption



tax: S shifts left · incidence split consumers/producers

An indirect tax shifts supply up; consumers and producers share the burden



A binding maximum price causes a shortage; a binding minimum price causes a surplus

> **Worked example (original, on the shared model).** The market sits at equilibrium (P = 20, Q = 100) and price rises to 25: quantity demanded falls to 140 − 50 = 90. Percentage changes: −10 ÷ 100 = −10% against +5 ÷ 20 = +25%, so PED = 0.4 – inelastic. Total revenue moves 20 × 100 = 2 000 to 25 × 90 = 2 250: with |PED| below 1, the price rise RAISES revenue – the TR test in one motion.

Data-response practice (Paper 2 style)

Extract. In July 2023 India, which supplied about 40% of world rice exports, put an **export ban** 出口禁令 on non-basmati white rice to keep food prices at home low. The FAO All Rice Price Index rose by almost 10% in one month and in August 2023 reached its highest level since 2008. Rice prices jumped in many importing countries in Asia and Africa. India eased the ban in September 2024.

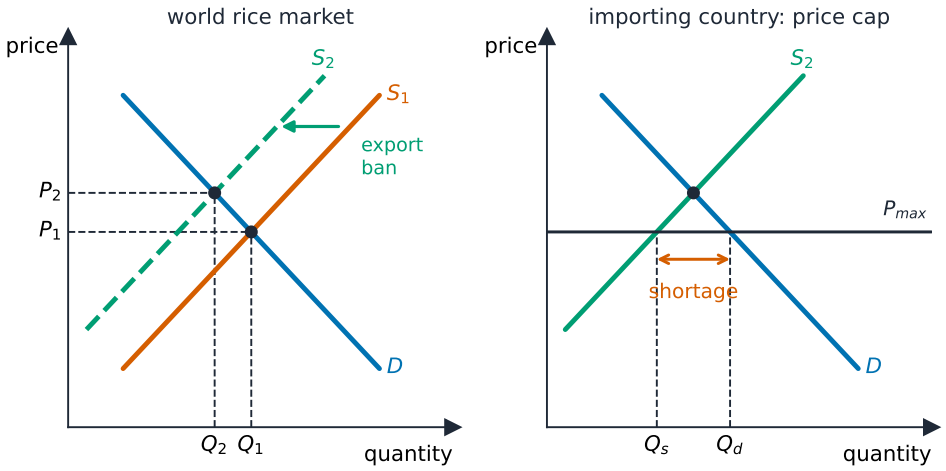
Country R imports most of its rice.

	Before the ban	After the ban
Price of rice ($ per kg)	0.80	1.00
Rice bought (thousand tonnes per month)	50	48

Country R's government is considering a maximum price of $0.85 per kg. At that price sellers would supply 44 thousand tonnes a month, but consumers would want to buy 49.5 thousand tonnes.

Questions

- (a) Define *maximum price*. [2]
- (b) Using a demand and supply diagram, explain why India's export ban raised the world price of rice. [4]
- (c) Calculate the price elasticity of demand for rice in Country R and comment on your answer. [2]
- (d) Using a diagram, explain the effect of the planned maximum price on the rice market in Country R. [4]
- (e) Using information from the text and your knowledge of economics, evaluate the use of a maximum price to protect consumers in Country R from higher rice prices. [15]



Left: the export ban shifts world supply left. Right: a maximum price below the new equilibrium creates a shortage.

Model answers

(a) A maximum price is a legal upper limit on the price of a good, set by the government below the equilibrium price. Sellers may not charge more than this price.

(b) The ban takes Indian rice off the world market, so world supply shifts left from S_1 to S_2 (left panel). At the old price P_1 there is now excess demand, so buyers bid the price up to P_2 and the quantity traded falls from Q_1 to Q_2. The price rises a lot because demand for rice is price inelastic: it is a staple food with few close substitutes.

(c) $\%\Delta Q_d = \frac{48-50}{50} \times 100 = -4\%$ and $\%\Delta P = \frac{1.00-0.80}{0.80} \times 100 = +25\%$, so $PED = \frac{-4}{25} = -0.16$. Demand is very price inelastic: rice is a necessity, so households keep buying it and spend more of their income on it.

(d) In the right panel the maximum price P_{max} is below the new equilibrium price P_2. At P_{max} quantity supplied falls to Q_s (44 thousand tonnes) and quantity demanded rises to Q_d (49.5 thousand tonnes), so there is a shortage of 5.5 thousand tonnes a month. The price cannot rise to clear the market, so rice is shared out in other ways: queues, "first come, first served" or rationing. Some rice may be sold illegally above P_{max} on a black market.

(e) A strong answer explains the theory, uses the diagram and the data, then weighs the arguments.

- **The case for.** Demand is very inelastic ($PED = -0.16$), so the price rise from \$0.80 to \$1.00 mostly raises spending, not saving. Poor households spend a large share of their income on rice and are hit hardest. A cap at \$0.85 lowers the price for everyone who can still buy rice, and it costs the government almost nothing to announce.
- **Shortage and black markets.** The shortage of 5.5 thousand tonnes is about 11% of what consumers want. Rice goes to those who queue first or know the sellers, not to those in most need, and black-market prices may rise above \$1.00.
- **Supply falls further.** Country R imports most of its rice and importers pay the world price. If they must sell below what they pay, they import less, and the shortage grows. Local farmers also receive less, so in the long run, when supply is more elastic, they grow less rice.
- **Stakeholders.** Consumers who get rice gain; those who cannot get it lose. Importers and farmers lose income. The government must pay to enforce the cap and to fight the black market.
- **Alternatives.** The government could pay importers the gap between the world price and \$0.85 (about 0.15×48 million kg = \$7.2 million a month), release rice from a **buffer stock** 缓冲库存, cut any import tariff, or give targeted **cash transfers** 现金转移 or food vouchers to poor households. Transfers protect the poor while the price still signals that rice is scarce.
- **Short run and long run.** The ban was temporary (India eased it in 2024). A short, time-limited cap combined with government imports could protect consumers through a temporary shock. A long-lasting cap would damage supply.

Judgement: a maximum price on its own is unlikely to protect the poorest consumers, because the shortage it creates falls hardest on them. Targeted transfers, with a buffer stock released during the shock, protect them at a known budget cost. If the government does cap the price, the cap should be temporary and the government should fund imports so that supply does not fall.

What examiners reward: precise definitions, a diagram that you refer to in the text, the extract's own numbers (the price rise, the PED, the shortage), more than one stakeholder, and a conclusion that answers the question.

Checklist

- Demand definition, the law from diminishing marginal utility, movements vs shifts (2.1).
- Supply definition, movements vs shifts (2.2).
- Equilibrium (20, 100); excess demand 48 at 12; excess supply 30 at 25; the invisible hand (2.3).
- The critique of maximizing behaviour: bounded rationality, herding, framing for consumers; satisficing and CSR for producers (2.4).
- PED with the -0.4 calculation and the TR test (2000 → 2112 → 2450); determinants; linear-demand elasticity ranges and MR (HL) (2.5).
- PES +0.8 with determinants; commodity volatility from double inelasticity (2.6); YED and XED classifications (HL).

- Consumer/producer surplus (2500/1200); allocative efficiency at P = MC; social surplus (2.3).
- Government (2.7): tax of 6 (price 24, quantity 92, revenue 552, incidence 4:2); subsidy of 6 (price 16, quantity 108, cost 648); maximum price 16 (shortage 24); minimum price 24 (surplus 24).

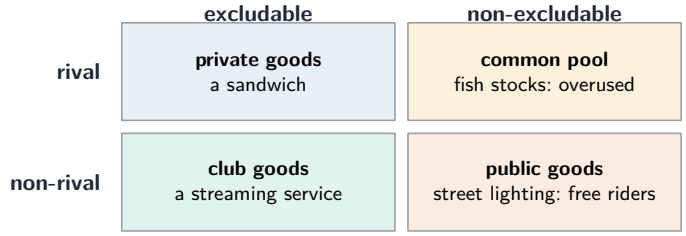
Boundary notes: HL Paper 3 quantifies exactly this arithmetic – elasticity from data, incidence, surplus areas. Paper 1's 25-mark essays want a diagram, definitions and evaluation of government failure against market failure. The nine key concepts (intervention, efficiency, equity) frame the policy questions. All worked numbers are original on the shared model.

Market failure and equity (2.8-2.9, 2.12)

International Baccalaureate · IB Diploma · Economics · HL

Market failure and equity

IB Diploma Programme Economics HL, Unit 2 *Microeconomics* (first assessment 2022). This topic covers syllabus sections 2.8 (market failure – externalities and common pool or common access resources), 2.9 (public goods) and 2.12 (the market's inability to achieve equity) in full. The externality model reuses the shared curves in inverse form – demand (marginal private benefit) $P = 70 - Q/2$, supply (marginal private cost) $P = Q/4 - 5$, market equilibrium $(100, 20)$ – with an external cost or benefit of 6 per unit, so every welfare area cross-checks against the earlier drives.



Classify goods by rivalry and excludability

Must-know for this topic:

Family	Relationship
welfare	MSC = MPC + EC; MSB = MPB + EB; social optimum where MSB = MSC
externality	external cost 6 → optimum $(92, 24)$, market over-produces 8, welfare loss $\frac{1}{2} \times 8 \times 6 = 24$
public goods	non-rival + non-excludable → free-rider → non-provision
equity	market outcomes carry no guarantee of fairness; Lorenz/Gini measure it

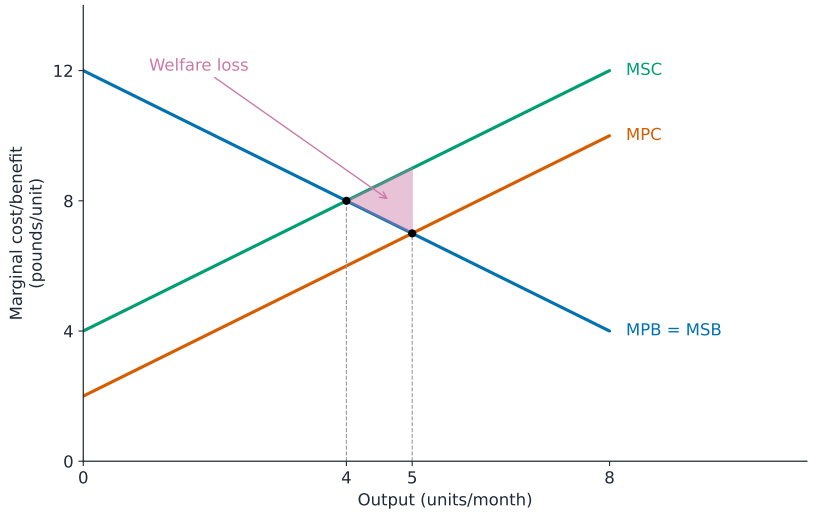
Externalities and common pool resources

An **externality** 外部性 is a cost or benefit falling on a THIRD PARTY not involved in the transaction (2.8). Negative production externalities – pollution, congestion – put the **marginal social cost** 边际社会成本 MSC above MPC; positive consumption externalities – vaccination, education – put the **marginal social benefit** 边际社会

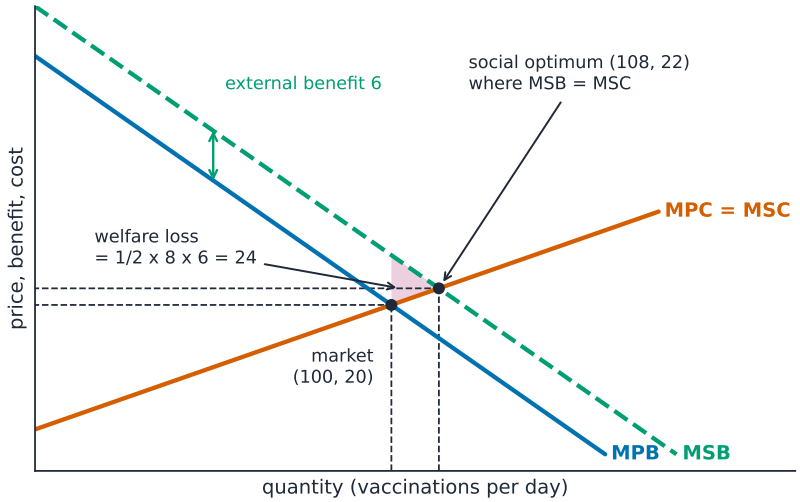
效益 MSB above MPB. The market trades at $(100, 20)$ where MPB = MPC; with an external cost of 6 per unit, MSC = MPC +6 crosses MSB at $(92, 24)$ – the market OVER-produces by 8 units and the deadweight welfare loss is $\frac{1}{2} \times 8 \times 6 = 24$ per day. With an external benefit of 6 on consumption, the social optimum moves to $(108, 22)$, where MSB $= 76 - Q/2$ meets MSC = MPC – the market UNDER-consumes by 8, again sacrificing 24 of welfare. HL diagrams label MPB/MSB and MPC/MSC and shade the welfare-loss triangle between the curves over the gap.



A trawler's net: fish stocks are a common pool resource, rivalrous but hard to exclude anyone from, so they tend to be overfished



Negative production externality: the market produces where MPC = MSB, more than the social optimum



Positive consumption externality on the shared model: the market stops at 100, but the social optimum is 108, where MSB = MSC

Policy responses follow the diagnosis: a Pigouvian TAX equal to the marginal external cost (6 here) shifts MPC to the social optimum; a SUBSIDY equal to the marginal external benefit does the reverse; regulation caps the quantity; tradable permits fix the total and let the market find the price. **Common pool or common access resources** 公共资源 (also 2.8) – fisheries, groundwater, the atmosphere – are RIVAL but NON-EXCLUDABLE: each user imposes costs on the others, so without property rights or quotas the resource is over-used (the tragedy of the commons), and sustainability – a Unit-1 key concept – frames the long-run evaluation.

Public goods

A **public good** 公共物品 (2.9) is NON-RIVAL (one person's consumption does not reduce another's) and NON-EXCLUDABLE (no one can be stopped from using it): street lighting, national defence, flood control. Non-excludability creates the **free-rider problem** 搭便车问题 – everyone can benefit without paying, so no private firm can collect revenue, so the market UNDER-provides or does not provide at all. The state provides public goods from taxation, valuing them at society's willingness to pay. The contrast pair: common pool resources are non-excludable but RIVAL (each fish caught is gone); public goods are non-excludable AND non-rival – the two exam cases travel together.



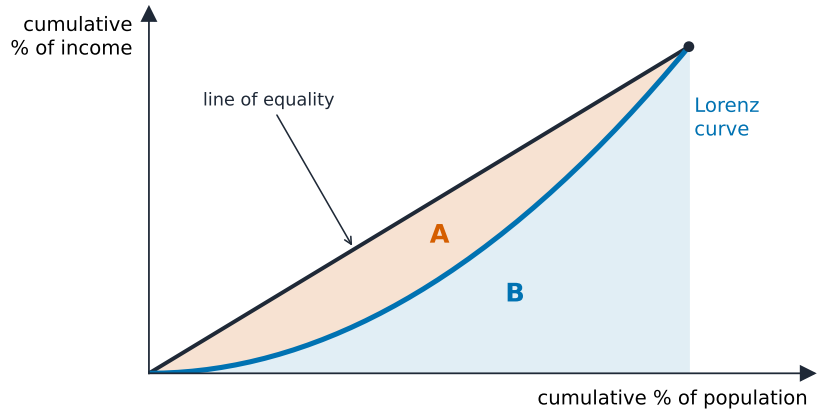
A lighthouse is the classic public good: one ship's use does not reduce another's, and no passing ship can be made to pay

The market's inability to achieve equity

Markets reward scarcity of resources, not need (2.12): the price mechanism answers "for whom?" by willingness and ability to pay, so market outcomes can be efficient yet grossly UNEQUAL – the **equity** 公平 half of the efficiency-equity key-concept pair. IB measures: the LORENZ CURVE plots cumulative income against cumulative population (from the poorest); the GINI COEFFICIENT – area between the equality line and the Lorenz curve over the whole triangle – runs from 0 (perfect equality) to 1 (one person takes all). Original example: quintile shares $5, 10, 15, 20, 50$ percent give a Lorenz curve through $(20, 5), (40, 15), (60, 30), (80, 50)$; the area under it is 3000 of the 10000 square, so Gini $= 1 - 2 \times 0.30 = 0.40$. **Poverty** 贫困 may be ABSOLUTE (basic needs unmet) or RELATIVE (deprivation against the social norm). Responses: progressive taxation, transfer payments, and access to education and health – each weighing equity gains against incentive and efficiency costs, the trade-off every Paper-1 essay must evaluate.



Wealth and poverty side by side: a market rewards what people own and can sell, which need not be equitable



Gini $= A/(A+B)$ · 0 = equal, 1 = most unequal

The further the Lorenz curve bows from the diagonal, the more unequal income is; Gini = A/(A+B)

Worked example (original, on the shared model). Production carries an external cost of 3 per unit, so a corrective tax of 3 shifts supply to Q_s = 20 + 4(P − 3). New equilibrium: 140 − 2P = 8 + 4P, so P = 22 and Q = 96. Consumers pay 2 of the 3 (20 → 22); producers keep 19 of the 22; the state collects 3 × 96 = 288 while the quantity shrinks toward the social optimum – incidence and internalisation in one set of numbers.

Data-response practice (Paper 2 style)

Extract. The European Union's Emissions Trading System (EU ETS) started in 2005. It sets a cap on the total carbon dioxide that power stations, factories and airlines inside the EU may emit, and firms must hold one permit for each tonne. Firms that cut emissions cheaply can sell spare permits; firms that pollute more must buy them. Too many permits were issued at first, so for much of 2012–2017 the price stayed below €10 per tonne and firms had little reason to change. After the EU removed surplus permits, the price passed €100 per tonne for the first time in February 2023. Because firms outside the EU pay no such price, the EU is adding a carbon charge on some imports such as steel and cement, with payments due from 2026. China's national carbon market began trading in July 2021. It covers the power sector and is the world's largest carbon market by emissions covered, but its permit price has been far below the EU's.

Firm K, an EU steel maker, emits 1.0 million tonnes of CO_2 a year but holds permits for only 0.8 million tonnes. It can cut 0.2 million tonnes at a cost of €60 per tonne, and the permit price is €90 per tonne.

Questions

- (a) Define *negative externality*. [2]
- (b) Using an externality diagram, explain why a market for electricity from coal produces more than the social optimum. [4]
- (c) Explain how a **cap and trade** 总量管制与交易 scheme reduces emissions. [4]
- (d) Calculate the cost to Firm K of each way to cover its extra 0.2 million tonnes, and state which it will choose. [2]
- (e) Using information from the text and your knowledge of economics, evaluate the use of tradable permits, compared with a **carbon tax** 碳税, to reduce carbon emissions. [15]

Model answers

(a) A negative externality is a cost that falls on a third party, outside the transaction, and is not paid by the buyer or the seller. It makes marginal social cost greater than marginal private cost.

(b) Burning coal releases CO_2, which harms third parties through climate change. This external cost puts MSC above MPC (see the diagram above). The market produces where MPB = MPC, but the social optimum is where MSB = MSC, at a lower output and a higher price. Every unit between the two quantities costs society more than it is worth, so there is a welfare loss: the triangle between MSC and MSB over the extra output.

(c) The government sets a cap: the total number of permits, so total emissions cannot exceed it. Permits can be traded, which gives them a price. A firm that emits one more tonne must buy a permit or give one up, so pollution now has a private cost and MPC moves towards MSC. Firms that can cut emissions cheaply sell permits to firms for which cutting is expensive, so the total cut is reached at the lowest cost. Lowering the cap each year raises the permit price and cuts emissions further.

(d) Cutting costs $0.2 \times 60 = 12$, that is €12 million; buying permits costs $0.2 \times 90 = 18$, that is €18 million. Firm K cuts its own emissions and saves €6 million. A permit price above the firm's cost of cutting is what makes it cut.

(e) A strong answer explains both tools, uses the data, then weighs them.

- **Certainty of quantity.** A permit scheme fixes the total emissions (the cap), and the market finds the price. A carbon tax fixes the price, and the quantity is uncertain, because the government does not know how strongly firms will respond. For a climate target in tonnes, the cap is the more direct tool.
- **Cost-effectiveness.** Both tools give every firm the same price per tonne, so the cheapest cuts happen first: Firm K cuts, because €60 is below €90. Permits do this without the government needing to know each firm's costs.
- **Price instability.** The EU price stayed below €10 for years because too many permits were issued. That gave firms little reason to invest, and the price must be stable for firms to plan long-lived investments such as new furnaces. A carbon tax gives a known, steady price. Sweden has used one since 1991, and it is now among the highest in the world. The EU had to remove permits to make its price work, which shows the risk of government failure in setting the cap.
- **Revenue and fairness.** Auctioned permits and a tax both raise revenue that could cut other taxes or help poor households with higher energy bills. Permits given away free reward existing polluters.
- **Carbon leakage** 碳泄漏. If only one region prices carbon, production can move to places without a price, with no fall in world emissions. The EU's import charge tries to stop this, but it raises costs for trading partners and may cause trade disputes.
- **Monitoring.** Both tools need emissions to be measured accurately. Permits also need a working market. China's low permit price shows that the design (how tight the cap is, and the penalties) matters as much as the choice of tool.

Judgement: tradable permits are the better tool when the aim is a fixed emissions target and the cap is set tight and lowered over time; a carbon tax is better when price stability matters most and the government cannot judge the right cap. In practice the EU combined them: a tighter cap with a reserve that removes surplus permits gives a price floor, which is close to a tax. Either way, the result depends on a strict cap or a

high enough rate, and on how other countries respond.

What examiners reward: a fully labelled externality diagram (MPB, MSB, MPC, MSC, both quantities, the welfare-loss triangle), the extract's own numbers (the €10 and €100 prices, Firm K's €60 and €90), at least two stakeholders, and a conclusion that compares the two tools.

Checklist

- Externality definition; MSC/MSB with the $(100, 20) \rightarrow (92, 24)$ negative-production and $(108, 22)$ positive-consumption optima; welfare loss 24 in each direction (2.8).
- Pigouvian tax and subsidy at the marginal external cost/benefit; regulation; tradable permits (2.8 policy, HL diagrams).
- Common pool or common access resources: rival + non-excludable, tragedy of the commons, sustainability (2.8).
- Public goods: non-rival + non-excludable; the free-rider problem and non-provision; state provision (2.9).
- The market's "for whom" answer and its equity failure; Lorenz curve and Gini with the 0.40 calculation; absolute vs relative poverty; the three redistribution instruments and their trade-offs (2.12).

Boundary notes: HL Paper 1 25-mark essays on market failure want the labelled diagram (MPB/MSB/MPC/MSC, both optima, the shaded triangle), a policy with its mechanism, and evaluation of government failure against the market failure it corrects. The key concepts sustainability, equity, efficiency and intervention frame this whole topic. All worked numbers are original on the shared model.

Information and market power (2.10-2.11)

International Baccalaureate · IB Diploma · Economics · HL

Information and market power

IB Diploma Programme Economics HL, Unit 2 *Microeconomics* (first assessment 2022). This topic covers the two HL market failures: **asymmetric information** 信息不对称 (2.10) and **market power** 市场力量 (2.11). Market power needs the four **market structures** 市场结构, so you also learn perfect competition, monopoly, monopolistic competition and oligopoly here. All numbers are original, and each diagram is drawn from them.



Market structures range from perfect competition to monopoly

In April 2021 China's market regulator fined Alibaba 18.2 billion yuan. The platform had told sellers they could not also sell on rival platforms. A firm can only give such orders when buyers and sellers have few other choices: that is market power. This topic explains where such power comes from, why it makes markets fail, and what governments can do about it.

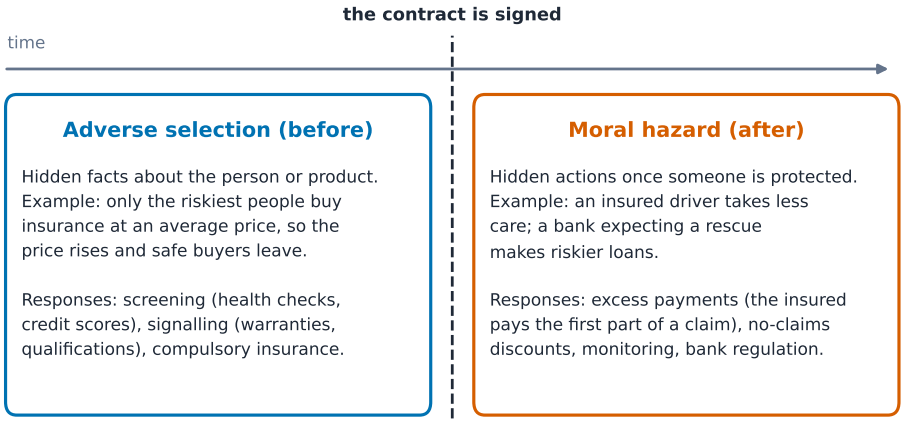
Must-know for this topic:

Idea	Key relationship
information gaps	adverse selection BEFORE the deal; moral hazard AFTER it
profit rule	every firm produces where MR = MC
profit	abnormal if P > ATC; normal if P = ATC; a loss if P < ATC
efficiency	allocative: P = MC; productive: output at the lowest ATC
perfect competition	P = MR; entry and exit bring normal profit in the long run
monopoly	MR = MC at $Q = 40$, $P = 50$; profit 300; deadweight loss 200

Idea	Key relationship
natural monopoly	AC still falling where demand meets it; regulate the price
monopolistic competition	short-run profit; long run P = ATC with excess capacity
oligopoly	interdependence; game theory; collusion or competition
concentration	CR4 = shares of the four largest firms added

Asymmetric information

Asymmetric information (2.10) means one side of a deal knows more than the other. The seller of a used car knows its faults. A person buying health insurance knows their own health. A borrower knows how likely they are to repay. When information is unequal, the market can fail. Some trades that would help both sides do not happen, and some trades that happen are bad ones.



Adverse selection comes before the contract; moral hazard comes after it

Adverse selection

Adverse selection 逆向选择 happens BEFORE the contract. One side hides facts about itself or its product. Think of a used-car market where buyers cannot tell good cars from bad ones ("lemons"). Buyers will only pay an average price. Owners of good cars will not sell at that price, so they leave the market. Now the average car is worse, so buyers offer even less. In the end mostly bad cars are left. Insurance works the same way: at one average price, the riskiest people buy most and the safest people buy less.

Moral hazard

Moral hazard 道德风险 happens AFTER the contract. Once someone is protected, they take more risk, because someone else pays for the damage. An insured driver may drive less carefully. A bank that expects the government to rescue it may make riskier loans.

Responses to asymmetric information

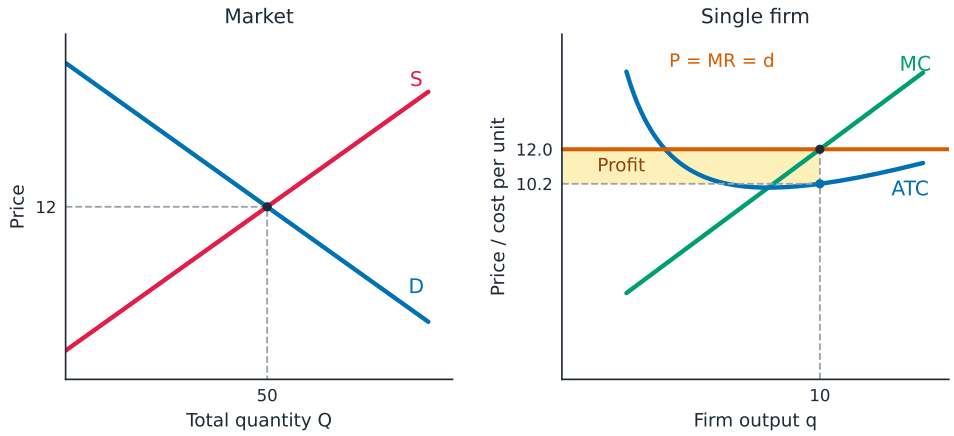
- **Screening** 筛选: the side with less information collects it. Insurers ask for health checks; banks check credit scores.
- **Signalling** 信号传递: the side with more information proves its quality. Sellers offer a **warranty** 保修; workers show qualifications.
- **Government regulation** 政府监管: rules that force sellers to tell the truth (food labels, car inspection reports), licences for doctors and lawyers, and compulsory insurance so the low-risk people stay in.
- **Contract design**: an **excess** 免赔额 (the insured person pays the first part of any claim) and no-claims discounts keep some risk with the insured, which reduces moral hazard.

Each response has a limit. Screening costs money. A signal can be faked. Regulation needs inspectors who can be trusted.

Revenue, costs and profit

The profit-maximising rule

Every firm in this topic is assumed to want the most profit. It compares the extra revenue and the extra cost of one more unit:



Market price becomes the firm's horizontal MR line; the profit rectangle uses ATC at the chosen output

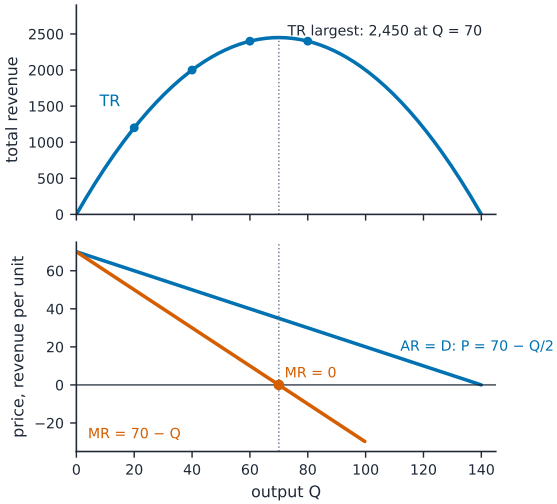
- **Total revenue** 总收益 (TR) $= P \times Q$.
- **Average revenue** 平均收益 (AR) $= TR/Q$, which is the price. So the AR curve is the firm's demand curve.
- **Marginal revenue** 边际收益 (MR) is the extra revenue from selling one more unit.
- **Marginal cost** 边际成本 (MC) is the extra cost of producing one more unit, and **average total cost** 平均总成本 (ATC) is total cost $/Q$.

The rule for **profit maximisation** 利润最大化 is to produce where **MR = MC**. Below that output, one more unit adds more to revenue than to cost, so profit rises. Above it, one more unit adds more to cost, so profit falls.

Worked example. A firm faces the demand curve $P = 70 - Q/2$.

Output Q	**Price** P	$TR = P \times Q$
20	60	1,200
40	50	2,000
60	40	2,400
80	30	2,400

TR rises by 800 from 20 to 40 units, but only by 400 from 40 to 60 units. MR falls because the firm must lower the price on ALL its units to sell one more. For a straight-line demand curve, the MR line starts at the same point and is twice as steep: here MR $= 70 - Q$. MR is zero at $Q = 70$, where TR is largest.



MR falls twice as fast as AR, and TR peaks where MR = 0

Three kinds of profit

Economists count the owner's next-best use of their money and time as a cost. **Normal profit** 正常利润 is the least profit that keeps the owner in this business. It is already inside ATC. So:

- **abnormal profit** 超额利润: price above ATC ($P > ATC$);
- **normal profit**: price equal to ATC ($P = ATC$);
- **loss** 亏损: price below ATC ($P < ATC$).

Profit (or loss) per day $= (P - ATC) \times Q$.

Two kinds of efficiency

- **Allocative efficiency** 配置效率: $P = MC$. The value buyers put on the last unit equals the cost of making it, so society gets the right amount.
- **Productive efficiency** 生产效率: the firm produces at the lowest point of its ATC curve, so nothing is wasted in production.

Compare each market structure against these two tests.

Perfect competition

Characteristics

Perfect competition 完全竞争 is a model with:

- very many small firms and buyers;

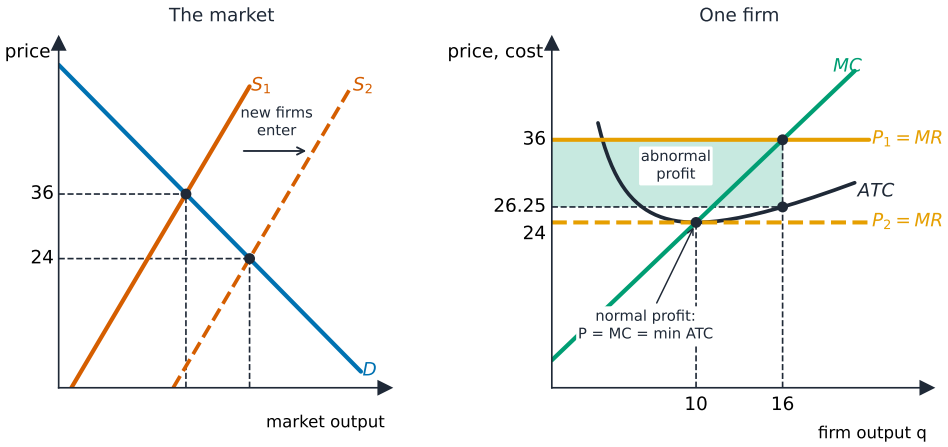
- **homogeneous** 同质的 (identical) products, such as one farmer's wheat and another's;
- no **barriers to entry** 进入壁垒, so firms can enter or leave freely;
- perfect information for everyone.

No single firm can change the market price. If it charged more, buyers would go to another firm. Each firm is a **price-taker** 价格接受者: the market's price is its demand curve, and also its AR and MR ($P = AR = MR$).

Short run and long run

Worked example. One firm's costs give MC $= 4 + 2q$ and ATC $= 100/q + 4 + q$.

1. *Short run.* The market price is 36. MR = MC: $36 = 4 + 2q$, so $q = 16$. ATC at 16 is $100/16 + 4 + 16 = 26.25$. Abnormal profit $= (36 - 26.25) \times 16 = 156$ per day.
2. *Entry.* There are no barriers, so new firms join. Market supply shifts right (S1 to S2) and the price falls.
3. *Long run.* Entry stops when profit is normal. That happens at the lowest ATC: $q = 10$, ATC $= 10 + 4 + 10 = 24$. At $P = 24$, MR = MC gives $24 = 4 + 2q$, so $q = 10$ and $P = ATC$.



Abnormal profit attracts new firms until the price falls to the lowest ATC

It also works the other way. If the price is below ATC, firms make losses. Some leave the market, supply shifts left, and the price rises until the remaining firms earn normal profit.

In the long run, $P = MC$ (allocatively efficient) and output is at the lowest ATC (productively efficient). This is why perfect competition is the benchmark for judging the other structures. Real markets are rarely perfect, but some farm markets come close.

Monopoly

Characteristics and barriers to entry

A **monopoly** 垄断 is one firm supplying the whole market, with no close **substitutes** 替代品. In practice, a firm with a very large share can act like a monopoly (UK competition law uses a 25% share as one test). A monopolist is a **price-maker** 价格制定者: it faces the downward-sloping market demand curve, so it chooses a price and accepts the quantity buyers then want.

Its power lasts only while **barriers to entry** keep rivals out:

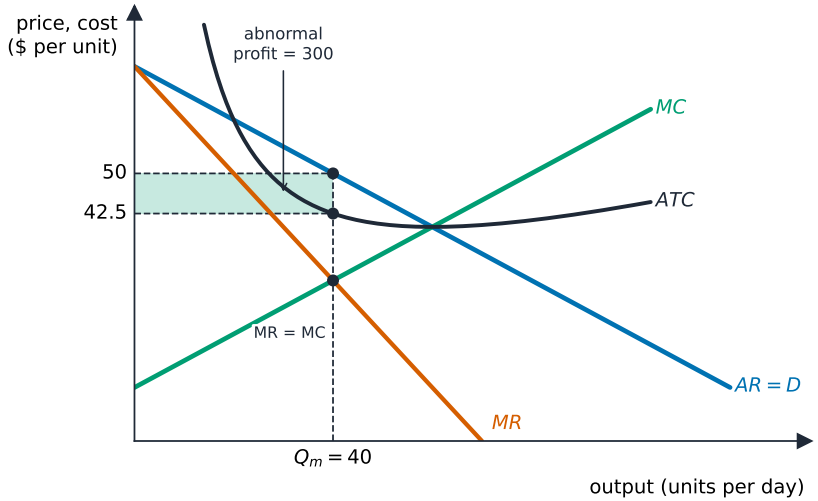
- **economies of scale** 规模经济: a big firm's low cost per unit means a small entrant cannot compete;
- legal barriers: **patents** 专利, licences and copyrights;
- control of an essential resource, such as a mine or a port;
- strong brands and heavy advertising;
- **network effects** 网络效应: a platform is more useful when everyone else already uses it, as with social media and online shopping sites.

The monopoly diagram

The monopolist uses the same rule as every firm. With demand (AR) $P = 70 - Q/2$, MR $= 70 - Q$ and MC $= 10 + Q/2$:

$$70 - Q = 10 + \frac{Q}{2} \quad \Rightarrow \quad 60 = 1.5Q \quad \Rightarrow \quad Q_m = 40$$

The firm charges the highest price buyers will pay for 40 units, read from the demand curve: $P_m = 70 - 40/2 = 50$. Its ATC is $900/Q + 10 + Q/4$, so at 40 units ATC $= 22.5 + 10 + 10 = 42.5$. Abnormal profit $= (50 - 42.5) \times 40 = 300$ per day. Barriers to entry stop new firms from competing it away, so the profit can last into the long run.



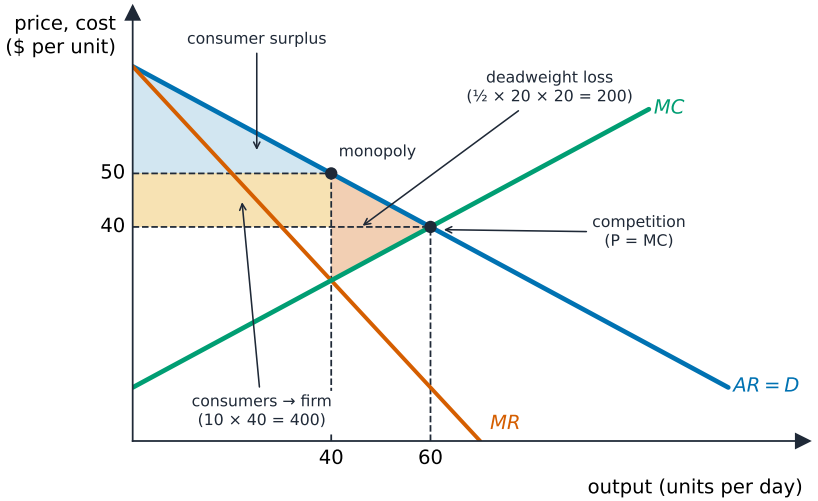
The monopolist produces where MR = MC and sets the price from the demand curve

Notice that MR = MC happens where MC is 30, but the price is 50. A monopolist always sets the price above marginal cost.

Monopoly and efficiency

Compare the monopoly with a competitive market facing the same demand and cost. Under competition, output goes to where $P = MC$: $70 - Q/2 = 10 + Q/2$, so $Q = 60$ and $P = 40$.

- The monopolist produces 20 fewer units and charges 10 more.
- Consumers lose $(50 - 40) \times 40 = 400$ per day to the firm as a higher price.
- The units from 40 to 60 are not made, though buyers value them above their cost. This is the **deadweight loss** 无谓损失: $\frac{1}{2} \times (60 - 40) \times (50 - 30) = 200$ per day.



Compared with competition, monopoly takes 400 from consumers and destroys 200 of welfare

So a monopoly is allocatively inefficient ($P = 50 > MC = 30$). It is also productively inefficient: its ATC is lowest at 60 units (ATC = 40), but it produces only 40. Without competition, managers may also let costs rise above the lowest possible level. This is called **X-inefficiency** X 非效率.

The case for large firms

Size can also help consumers:

- **Economies of scale** can make costs so low that even the monopoly price is below what small competing firms could charge.
- **Abnormal profit** can pay for **research and development** 研发 (R&D): new medicines, phones and software often come from large, profitable firms. This is **dynamic efficiency** 动态效率, improvement over time.
- A monopoly that is open to a world market may still face strong foreign competition.

An evaluation compares these gains with the deadweight loss, and asks whether the barriers protect real advantages or just protect profit.

Natural monopoly

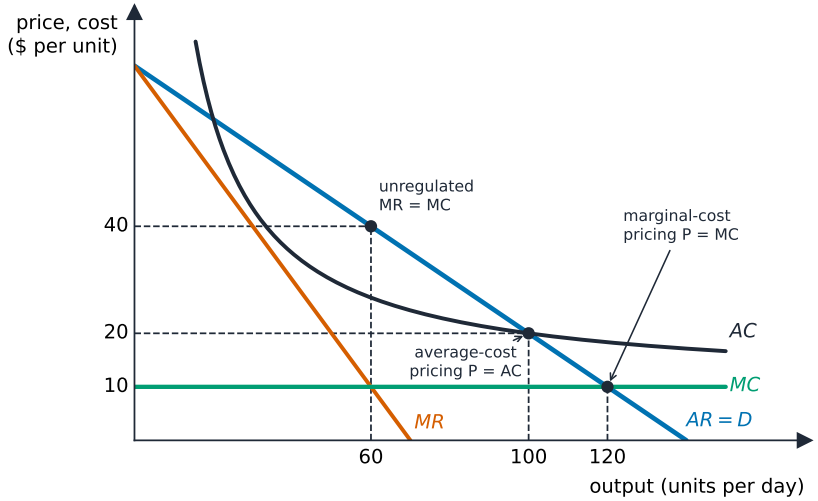
A **natural monopoly** 自然垄断 is an industry where one firm can supply the whole market at a lower cost than two or more firms. The reason is a very large fixed cost: one water network, one electricity grid, one railway line. Average cost keeps falling across the whole market demand. Splitting the firm would raise costs, so governments regulate it instead.



A power grid: one network can serve a whole region at lower average cost than two competing ones, a natural monopoly

Worked example. Demand is $P = 70 - Q/2$, MC is a constant 10, and the fixed cost is 1,000 per day, so AC $= 10 + 1000/Q$.

Rule	Output	Price	Result
unregulated: MR = MC	60	40	abnormal profit $= (40 - 10) \times 60 - 1000 = 800$
marginal-cost pricing: $P = MC$	120	10	allocatively efficient, but a loss of 1,000 (the fixed cost)
average-cost pricing: $P = AC$	100	20	normal profit; most of the efficiency gain

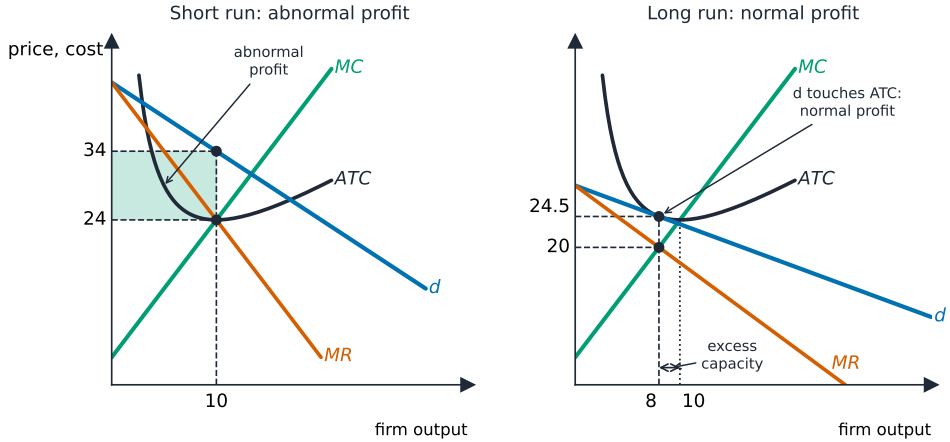


Regulating a natural monopoly: $P = MC$ is efficient but makes a loss; $P = AC$ breaks even

Marginal-cost pricing needs a **subsidy** 补贴 of 1,000 a day, or the firm closes. Average-cost pricing needs no subsidy and still raises output from 60 to 100. Many governments choose this, or own the firm themselves.

Monopolistic competition

Monopolistic competition 垄断竞争 has many firms, low barriers to entry and **product differentiation** 产品差异化: each firm's product is a little different. Milk-tea shops, hair salons and restaurants are examples. Each firm has a few loyal customers, so it faces its own downward-sloping demand curve (d). But there are many close substitutes, so demand is quite elastic. Firms compete with **non-price competition** 非价格竞争: brands, advertising, location, service and new flavours.



New firms take customers until each firm's demand curve just touches ATC

Worked example. One shop has MC $= 4 + 2q$ and ATC $= 100/q + 4 + q$.

1. *Short run.* Demand is $P = 44 - q$, so MR $= 44 - 2q$. MR = MC gives $q = 10$ and $P = 34$. ATC is 24, so abnormal profit $= (34 - 24) \times 10 = 100$.
2. *Long run.* The profit attracts new shops nearby. Each shop loses customers, so its demand curve shifts left. Entry stops when demand just touches the ATC curve: here at $q = 8$, where $P = ATC = 24.5$ and profit is normal.

In the long run the firm is still inefficient. Its price (24.5) is above MC (20), so it is not allocatively efficient. It produces 8 units, not the 10 where ATC is lowest, so it is not productively efficient either. This gap is **excess capacity** 过剩产能: the shop could serve more customers at a lower cost per customer. In return, consumers get more variety.

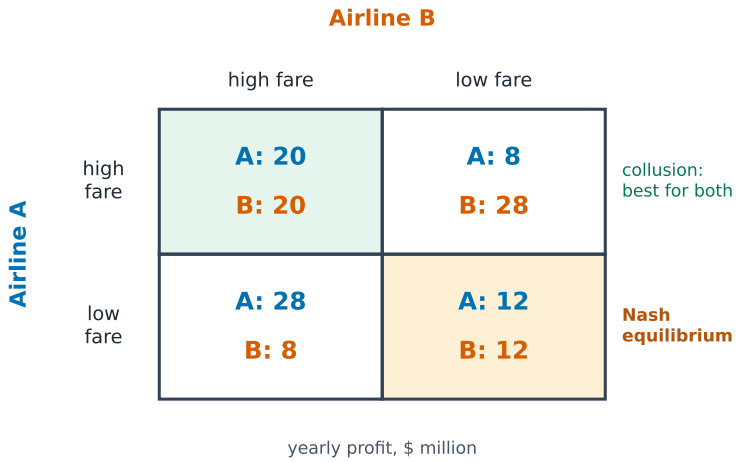
Oligopoly

Characteristics

An **oligopoly** 寡头垄断 is a market with a few large firms and high barriers to entry. Products may be the same (oil, steel) or differentiated (cars, phones, airlines). The key feature is **interdependence** 相互依存: each firm's best choice depends on what its rivals do. If one airline cuts its fares, the others lose passengers unless they cut too.

Game theory

Game theory 博弈论 studies choices that depend on what others choose. A payoff matrix shows each firm's profit for each pair of choices.



Each airline does better with a low fare whatever the other does, so both end on 12

Read it from Airline A's side:

- If B sets a high fare, A earns 20 with a high fare or 28 with a low fare. Low is better.
- If B sets a low fare, A earns 8 with a high fare or 12 with a low fare. Low is better again.

So a low fare is A's **dominant strategy** 占优策略: its best choice whatever B does. The same is true for B. Both choose low and earn 12 each. Neither can gain by changing alone, so this is the **Nash equilibrium** 纳什均衡. But both would earn 20 if both kept fares high. This "prisoner's dilemma" explains both sides of oligopoly: the reward for working together, and the temptation for each firm to cheat.

Collusion and competition

- **Collusion** 共谋: firms agree to limit output or fix prices, moving towards the monopoly outcome. A formal agreement is a **cartel** 卡特尔. OPEC, a group of oil-exporting countries, sets output targets for its members. Cartels between firms are illegal in most countries, including China.
- **Tacit collusion** 默契共谋: no agreement is made, but firms follow each other. One firm acts as **price leader** 价格领导者 and the others copy its prices.
- **Non-collusive oligopoly**: firms compete. A **price war** 价格战 can push prices close to cost. Because price cuts are quickly copied, most oligopolies prefer non-price competition: advertising, brands and new models.

Cartels tend to break down. Each member can gain by secretly producing more than its quota, exactly as in the game above.

Measuring concentration

A **concentration ratio** 集中度 adds the market shares of the largest firms. If the five largest firms have shares of 40%, 25%, 15%, 10% and 10%, the four-firm ratio is $CR4 = 40 + 25 + 15 + 10 = 90\%$: a highly concentrated market. The ratio has limits. It ignores foreign rivals and imports. It does not show whether the largest firm has 40% or 85% of a CR4 of 90. And it says nothing about how firms actually behave.

Comparing the market structures

	Perfect competition	Monopolistic competition	Oligopoly	Monopoly
number of firms	very many	many	a few	one
product	identical	differentiated	identical or differentiated	unique
barriers to entry	none	low	high	very high
control over price	none (price-taker)	some	considerable	great (price-maker)
long-run profit	normal	normal	often abnormal	often abnormal
allocatively efficient?	yes ($P = MC$)	no	usually no	no
productively efficient?	yes	no (excess capacity)	usually no	no

Government responses to market power

Market power is a market failure because output is too low and the price too high ($P > MC$). Governments respond in several ways:

- **Competition law** 竞争法: bans cartels and the abuse of a dominant position, and can block **mergers** 并购 that would create too much power. In 2017 the European Commission fined Google 2.42 billion euros for favouring its own shopping service in search results.
- **Regulation**: price caps and quality targets for natural monopolies such as water and electricity.
- **Fines** that are large enough to make breaking the law unprofitable.
- **Government ownership** 国有化 (nationalisation) of natural monopolies.
- **Trade liberalisation** 贸易自由化: removing tariffs lets foreign firms compete with a domestic monopoly.

Each response has costs. Regulators may lack information about the firm's true costs (asymmetric information again). Breaking up a firm may lose economies of scale. State-owned firms may suffer from X-inefficiency. A good answer weighs the efficiency gain against these costs.

Checklist

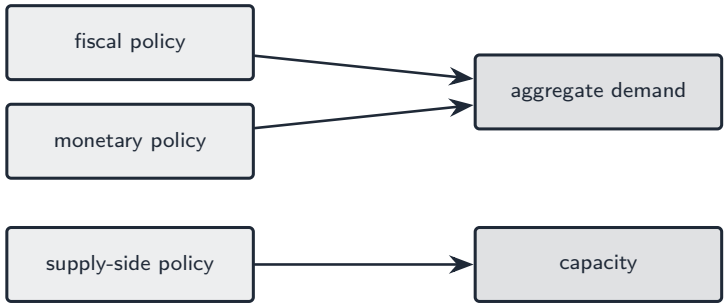
- Asymmetric information: adverse selection before the contract (the used-car "lemons" market, insurance) and moral hazard after it; screening, signalling, regulation and contract design as responses, each with a limit (2.10).
- TR, AR and MR from a demand curve; for a straight-line demand curve MR is twice as steep; the MR = MC rule and why it maximises profit.
- Abnormal profit, normal profit and losses from P against ATC; allocative efficiency ($P = MC$) and productive efficiency (lowest ATC).
- Perfect competition: characteristics, price-taker with $P = AR = MR$; short-run profit of 156 at $P = 36$; entry until $P = 24$ = lowest ATC; efficient in the long run.
- Monopoly: barriers to entry; $Q_m = 40$, $P_m = 50$, ATC 42.5, profit 300; against competition at (60, 40), consumers lose 400 and the deadweight loss is 200; allocatively and productively inefficient, X-inefficiency; economies of scale and R&D as the case for size.
- Natural monopoly: AC still falling across market demand; unregulated (60, 40), $P = MC$ at (120, 10) with a loss of 1,000, $P = AC$ at (100, 20).
- Monopolistic competition: differentiation and non-price competition; short-run profit of 100; long run $P = ATC = 24.5$ at $q = 8$, above MC of 20, with excess capacity.
- Oligopoly: interdependence; the payoff matrix, dominant strategy and Nash equilibrium (12, 12) against collusion (20, 20); cartels, tacit collusion and price leadership, price wars and non-price competition; CR4 = 90% and its limits.
- Government responses: competition law and merger control, regulation, fines, nationalisation and trade liberalisation, and their costs.

Macroeconomic activity, objectives and policy (3.1-3.7)

International Baccalaureate · IB Diploma · Economics · HL

Macroeconomic activity, objectives and policy

IB Diploma Programme Economics HL, Unit 3 *Macroeconomics* (first assessment 2022). This topic covers sections 3.1 to 3.7: measuring the economy, its ups and downs, aggregate demand and supply, the government's goals, inequality and poverty, and the three kinds of policy (monetary, fiscal and supply-side). One model runs through the worked examples: real GDP in $billion, aggregate demand P = 90 - Y/2, short-run aggregate supply P = 20 + Y/2$ and full-employment output 80. All numbers are original.



Fiscal and monetary policy act on demand; supply-side on capacity

In 2020 many countries saw output fall faster than at any time since the 1930s. Shops closed, workers lost hours, and governments spent huge sums to support incomes. Central banks cut interest rates close to zero. Two years later, inflation in many rich countries reached its highest level in about 40 years, and the same central banks raised rates quickly. Macroeconomics explains why output, jobs and prices move together like this, and what policy can do about it.

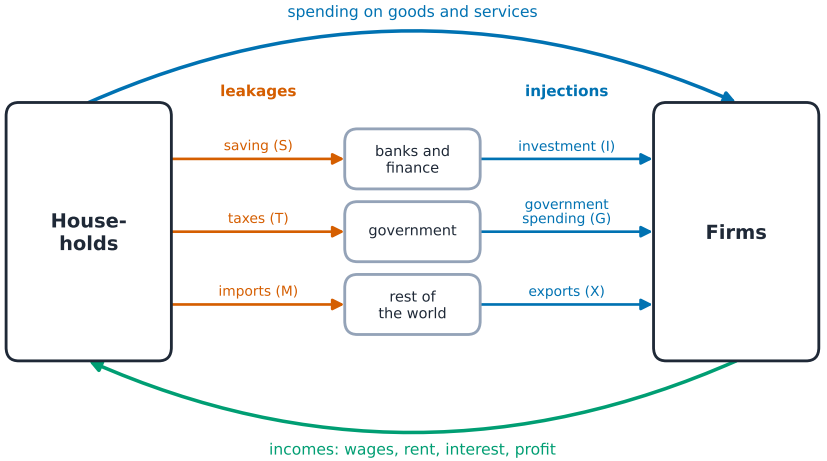
Must-know for this topic:

Idea	Key relationship
GDP	output = income = expenditure; real GDP = nominal GDP ÷ deflator ×100
aggregate demand	$AD = C + I + G + (X - M)$
equilibrium	AD meets SRAS at $Y = 70$, $P = 55$; full employment 80, so a recessionary gap of 10
multiplier (HL)	$k = \frac{1}{1 - MPC} = \frac{1}{MPS + MPT + MPM}$
objectives	low unemployment, low and stable inflation, growth, equity, sustainable debt
Phillips curve (HL)	short-run trade-off; vertical in the long run at the natural rate
policy	monetary (interest rates), fiscal (G and T), supply-side (LRAS)

Measuring economic activity

The circular flow of income

Households own the **factors of production** 生产要素 (land, labour, capital and enterprise). They sell them to firms and earn incomes. They spend these incomes on firms' goods and services. Money therefore flows in a circle.



Leakages leave the flow of income; injections come back in

Some money leaves the circle. These are **leakages** 漏出: saving (S), taxes (T) and spending on imports (M). Other money enters it. These are **injections** 注入: investment (I), government spending (G) and export revenue (X). If injections are larger than leakages, national income grows. If leakages are larger, income falls.

Three ways to measure output

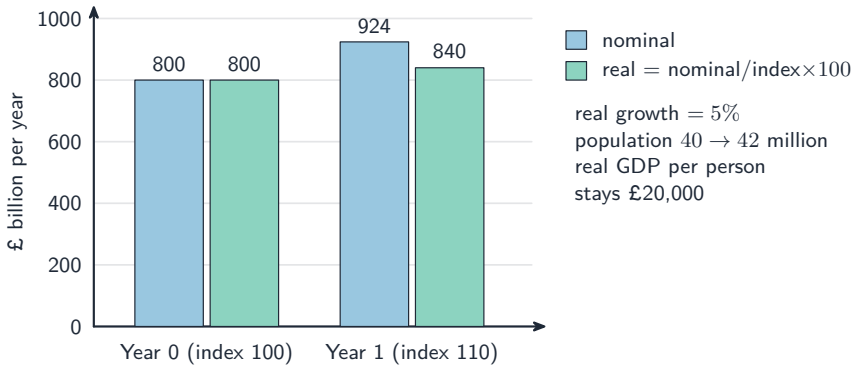
Gross domestic product 国内生产总值 (GDP) is the value of all final goods and services produced in a country in one year. The circular flow shows three ways to measure it, and in principle they give the same answer:

- the **output method**: add the value of what each industry produces;
- the **income method**: add all incomes (wages, rent, interest, profit);
- the **expenditure method**: add all spending, $C + I + G + (X - M)$.

Gross national income 国民总收入 (GNI) is GDP plus income that residents earn abroad, minus income that foreigners earn in the country. It matters for countries with many workers abroad or much foreign-owned industry.

Nominal and real, totals and per person

- **Nominal GDP** 名义国内生产总值 uses each year's own prices.
- **Real GDP** 实际国内生产总值 removes the effect of price changes: real GDP = nominal GDP ÷ price deflator ×100.
- **GDP per capita** 人均国内生产总值 divides by the population, which is better for comparing living standards.
- **Purchasing power parity** 购买力平价 (PPP) converts currencies at rates that buy the same basket of goods in each country. A dollar buys more haircuts in Chengdu than in London, so PPP figures compare real living standards more fairly.



Real GDP removes price rises; per-capita figures also divide by population

Worked example. Nominal GDP is 500 billion when the deflator is 125, and 540 billion a year later when the deflator is 130.

- Real GDP in year 1 = $500 \div 125 \times 100 = 400$.
- Real GDP in year 2 = $540 \div 130 \times 100 \approx 415.4$.
- Real growth = $(415.4 - 400) \div 400 \times 100 \approx 3.8\%$, although nominal GDP rose by 8%.

Limits of GDP and other measures

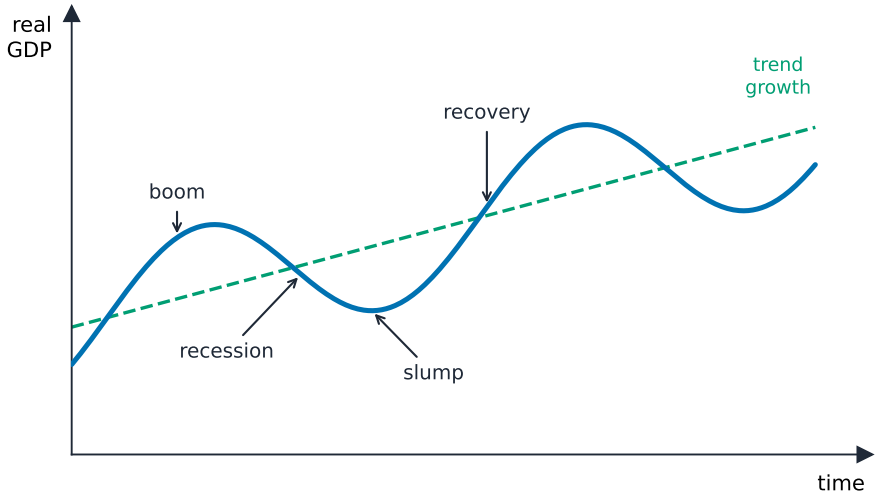
GDP is not the same as well-being. It leaves out unpaid work at home and the **informal economy** 非正规经济. It says nothing about how income is shared. It counts the output of a polluting factory but not the damage the pollution does. It ignores leisure time and the quality of goods.

So economists also use other measures:

- the **Human Development Index** 人类发展指数 (HDI), which combines income per head (GNI per capita at PPP), health (life expectancy) and education (years of schooling);
- the OECD Better Life Index, the Happy Planet Index and the Genuine Progress Indicator, which add measures such as the environment, health, work-life balance and how satisfied people say they are.

The business cycle

Real GDP does not grow smoothly. It moves up and down around its long-term **trend** 趋势 in a pattern called the **business cycle** 经济周期.



Real GDP rises and falls around its long-term trend

- In a **boom** 繁荣, output is above trend, unemployment is low and inflation tends to rise.
- In a **recession** 衰退, real GDP falls. Often this means two quarters in a row of falling output. Unemployment rises.
- At the bottom (the slump), output is furthest below trend.
- In the **recovery** 复苏, output and jobs grow again.

The gap between actual and potential output is the **output gap** 产出缺口.

Aggregate demand and aggregate supply

Aggregate demand

Aggregate demand 总需求 (AD) is total planned spending on a country's goods and services at each price level:

$$AD = C + I + G + (X - M)$$

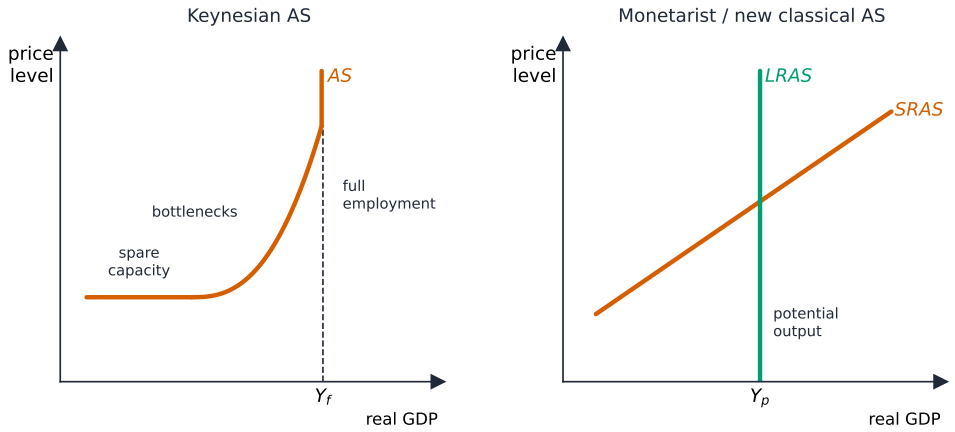
Component	What changes it
consumption (C)	income, interest rates, confidence, wealth, household debt
investment (I)	interest rates, business confidence, technology, profits
government spending (G)	government priorities, the state of the economy
net exports (X − M)	incomes abroad, the exchange rate, trade policy

The AD curve slopes down. A higher price level makes people's money and savings worth less, raises interest rates and makes exports dearer, so real spending falls. A change in the price level is a movement ALONG AD. A change in any component (at the same price level) SHIFTS AD.

Aggregate supply

Short-run aggregate supply 短期总供给 (SRAS) slopes up: when the price level rises and wages stay fixed for a while, production becomes more profitable. SRAS shifts when firms' costs change: wages, oil and raw material prices, business taxes, or a supply shock such as a drought.

Economists disagree about the long run.



Keynesian and monetarist views of aggregate supply

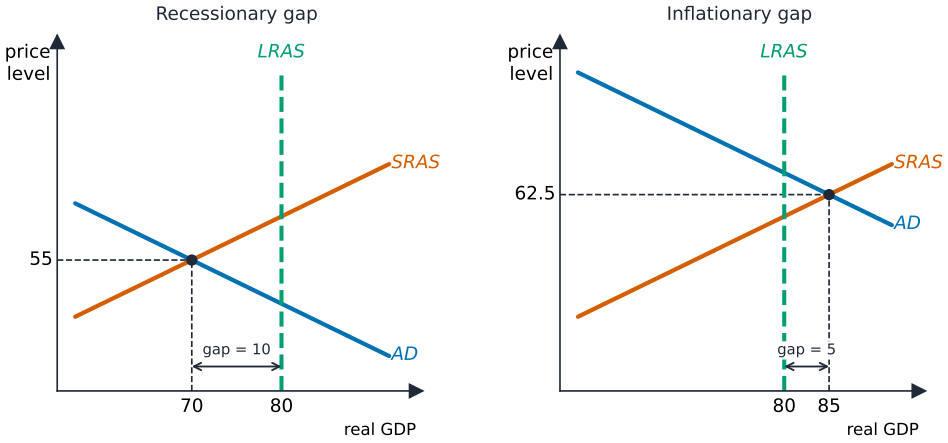
- In the **monetarist** 货币主义 (new classical) view, the **long-run aggregate supply** 长期总供给 (LRAS) curve is vertical at **potential output** 潜在产出. In the long run wages adjust, so the economy returns to full employment by itself. Demand changes only move the price level.
- In the **Keynesian** 凯恩斯主义 view, the economy can stay stuck below full employment. When there is a lot of spare capacity, AS is flat: more demand raises output without raising prices. Near full capacity, bottlenecks push prices up, and at full employment AS is vertical.

LRAS (and the vertical part of Keynesian AS) shifts right when the quantity or quality of factors of production increases: more workers, better education, new technology, more capital, better institutions.

Equilibrium and output gaps

> **Worked example.** AD is $P = 90 - Y/2$ and SRAS is $P = 20 + Y/2$. Full-employment output is 80.

- Equilibrium: $90 - Y/2 = 20 + Y/2$, so $Y = 70$ and $P = 55$.
- Output is 10 below full employment. This is a **recessionary gap** 衰退性缺口 (also called a deflationary gap), with cyclical unemployment.
- If AD rises to $P = 105 - Y/2$: $105 - Y/2 = 20 + Y/2$, so $Y = 85$ and $P = 62.5$. Output is 5 above full employment. This is an **inflationary gap** 通胀性缺口: the price level is pushed up.

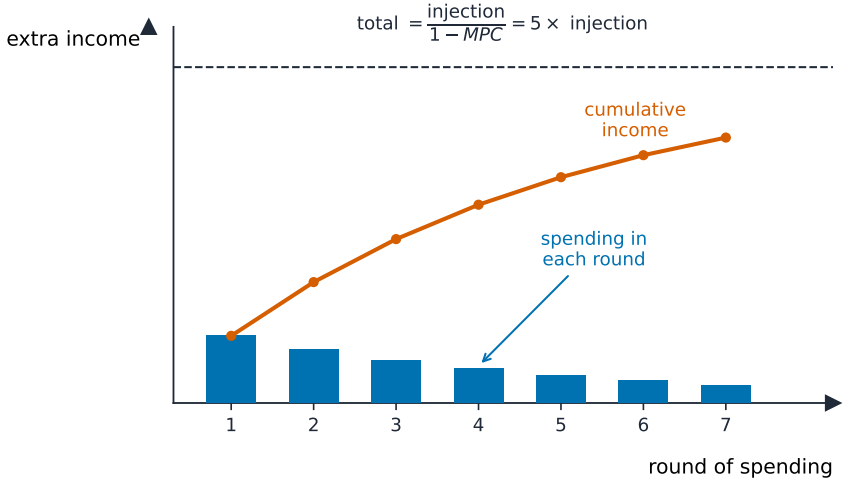


A recessionary gap and an inflationary gap on the same SRAS and LRAS

In the monetarist view, both gaps close by themselves in the long run. With a recessionary gap, unemployed workers accept lower wages, SRAS shifts right and output returns to 80. Keynesians reply that wages rarely fall, so a recession can last for years unless the government acts.

The multiplier (HL)

An injection of spending becomes someone else's income. They spend part of it, which becomes another person's income, and so on. So the final rise in national income is larger than the first injection. The **multiplier** 乘数 measures how much larger:



One injection multiplies into a larger overall rise in income

$$k = \frac{1}{1 - MPC} = \frac{1}{MPS + MPT + MPM}$$

The **marginal propensity to consume** 边际消费倾向 (MPC) is the share of extra income that is spent at home. The rest leaks out as saving (MPS), tax (MPT) or imports (MPM). Together these leakages are the marginal propensity to withdraw (MPW).

> **Worked example.** Out of each extra dollar of income, households save 0.1, pay 0.2 in tax and spend 0.2 on imports.

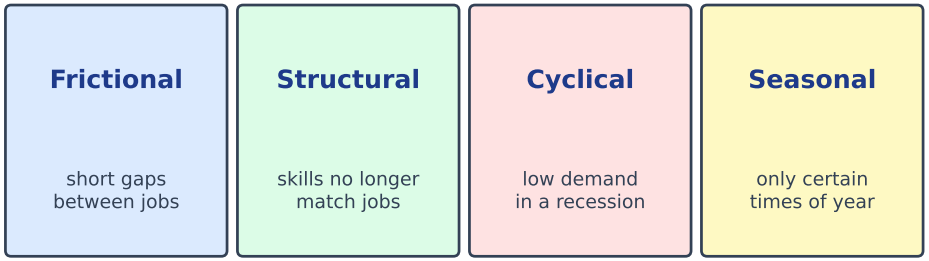
1. $MPS + MPT + MPM = 0.1 + 0.2 + 0.2 = 0.5$, so $MPC = 0.5$.
2. $k = 1 \div 0.5 = 2$.
3. The government spends an extra 10 billion on new railways. National income rises by $2 \times 10 = 20$ billion.

The multiplier works in both directions: a fall of 10 billion in investment cuts national income by 20 billion. A country that imports a lot has a high MPM, so its multiplier is small.

Macroeconomic objectives

Low unemployment

A person is **unemployed** 失业 if they are of working age, have no job, and are actively looking for work (the ILO definition).



Exam: name the type + cause — match policy to cause; results depend on vacancies and spare capacity

The four types of unemployment: frictional (between jobs), structural (skills no longer match), cyclical (low demand in a recession) and seasonal

$$\text{unemployment rate} = \frac{\text{number unemployed}}{\text{labour force}} \times 100$$

The **labour force** 劳动力 is everyone who is employed plus everyone who is unemployed. With 2.4 million unemployed in a labour force of 40 million, the rate is

$2.4 \div 40 \times 100 = 6\%$.

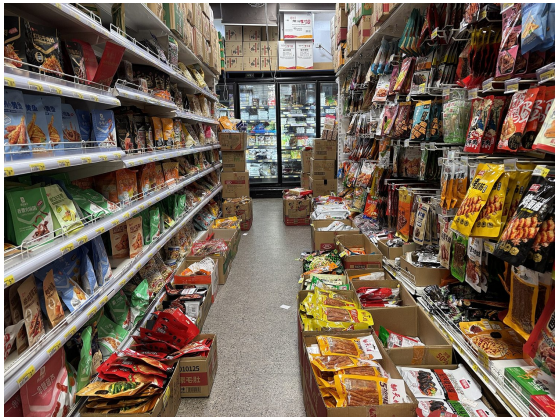
The official rate can hide problems. It leaves out **discouraged workers** 丧志工人 who have stopped looking, and people working part-time who want more hours. It also hides big differences between regions, ages and ethnic groups.

Type	Cause	Example
cyclical (demand-deficient)	AD falls in a recession	factory jobs cut as orders fall
structural	skills or location no longer match the jobs	coal miners after mines close
frictional	time spent moving between jobs	a graduate searching for a first job
seasonal	demand changes with the season	ski instructors in summer

The **natural rate of unemployment** 自然失业率 is the rate when there is no cyclical unemployment: only structural, frictional and seasonal unemployment remain. Unemployment costs the jobless (lost income, lost skills, stress and poor health) and the whole economy (lost output, lower tax revenue, higher benefit spending, and possibly crime and social tension).

Low and stable inflation

Inflation 通货膨胀 is a sustained rise in the general price level. **Deflation** 通货紧缩 is a sustained fall. **Disinflation** 通胀放缓 is a fall in the rate of inflation: prices still rise, but more slowly. Inflation is measured with a **consumer price index** 消费者价格指数 (CPI), the weighted average price of a basket of goods that a typical household buys.



A CPI follows prices across a household consumption basket, not just one product.

> **Worked example.** A basket has three groups. Food has a weight of 50, housing 30 and transport 20 (the weights add to 100). One year later the price index of food is 110, housing 100 and transport 120 (base year = 100).

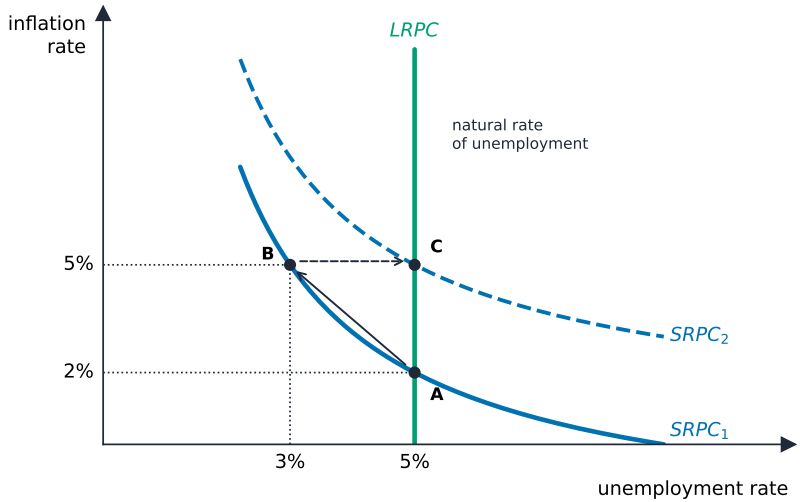
$$CPI = \frac{50 \times 110 + 30 \times 100 + 20 \times 120}{100} = \frac{5500 + 3000 + 2400}{100} = 109$$

So the inflation rate is 9%. The CPI has limits. A household's own basket may be different, quality improvements are hard to count, and people switch to goods whose prices rose less.

- **Demand-pull inflation** 需求拉动型通胀: AD grows faster than the economy can produce (an inflationary gap).
- **Cost-push inflation** 成本推动型通胀: firms' costs rise (oil, wages, imported materials) and SRAS shifts left. Prices rise while output falls.

High inflation hurts people on fixed incomes and savers, makes planning hard, and makes exports less competitive. Deflation is also harmful: consumers delay spending because goods will be cheaper later, the real value of debts rises, and firms cut output and jobs. This is why most central banks aim for low, steady inflation of about 2%.

Unemployment and inflation together (HL)



Pushing unemployment below the natural rate buys only a short-run gain

The **short-run Phillips curve** 短期菲利普斯曲线 (SRPC) shows a trade-off: lower unemployment comes with higher inflation. Follow the points in the diagram:

1. At A, unemployment is at its natural rate (5%) and inflation is 2%.

2. The government raises AD. Unemployment falls to 3%, but inflation rises to 5% (point B).
3. Workers now expect 5% inflation and ask for higher wages. The SRPC shifts up to SRPC2, and unemployment returns to 5% with inflation still at 5% (point C).

So the **long-run Phillips curve** 长期菲利普斯曲线 (LRPC) is vertical at the natural rate. To lower unemployment for good, a government must lower the natural rate itself, with supply-side policy. **Stagflation** 滞胀 (high unemployment and high inflation together, as after the oil price shocks of the 1970s) is a cost-push problem that the simple trade-off cannot explain.

■ Economic growth

Economic growth 经济增长 is an increase in real GDP. In the short run, growth can come from more AD using spare capacity. In the long run it needs more or better factors of production, shown by LRAS (or the production possibilities curve) shifting right. Growth raises incomes and tax revenue and can reduce poverty, but it can also harm the environment and widen inequality. So the goal is sustainable growth.

■ Sustainable government debt

Government debt 政府债务 is the total the government owes after years of budget deficits. It is usually measured as a percentage of GDP. Debt is easier to carry when the economy grows faster than the interest rate on the debt. High debt brings costs: interest payments take money from schools and hospitals, lenders may demand higher interest rates, and **credit rating agencies** 信用评级机构 may lower the country's rating, which makes borrowing dearer still.

The economics of inequality and poverty

■ Measuring inequality

Income 收入 is a flow (money earned each year). **Wealth** 财富 is a stock (the value of what people own). Wealth is usually far more unequal than income.

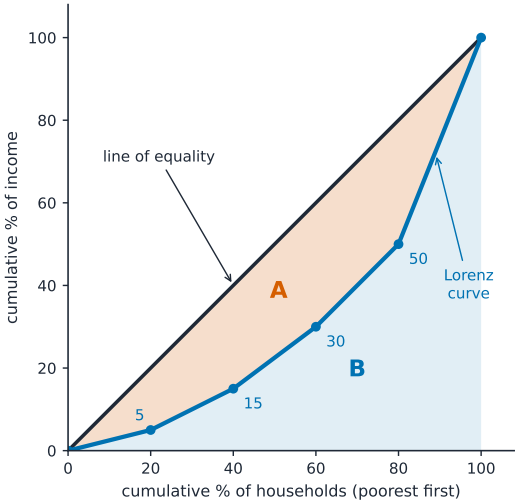
The **Lorenz curve** 洛伦兹曲线 plots the share of income received by the poorest 20%, 40%, and so on. The straight line is perfect equality. The further the curve sags below it, the more unequal the country. The **Gini coefficient** 基尼系数 is area A divided by the whole area under the line of equality (A + B). It runs from 0 (perfect equality) to 1 (one person has everything).

> **Worked example.** The five quintiles (fifths) of households earn 5%, 10%, 15%, 20% and 50% of national income.

Poorest ... of households	20%	40%	60%	80%	100%
cumulative share of income	5%	15%	30%	50%	100%

Area B is a row of five trapezia, each 0.2 wide: $B = 0.2 \times \frac{(0+0.05)+(0.05+0.15)+(0.15+0.30)+(0.30+0.50)+(}{2}$

0.30. The whole triangle is 0.5, so $A = 0.5 - 0.30 = 0.20$ and Gini $= 0.20 \div 0.50 = 0.40$.



The quintile shares give a Gini coefficient of 0.40

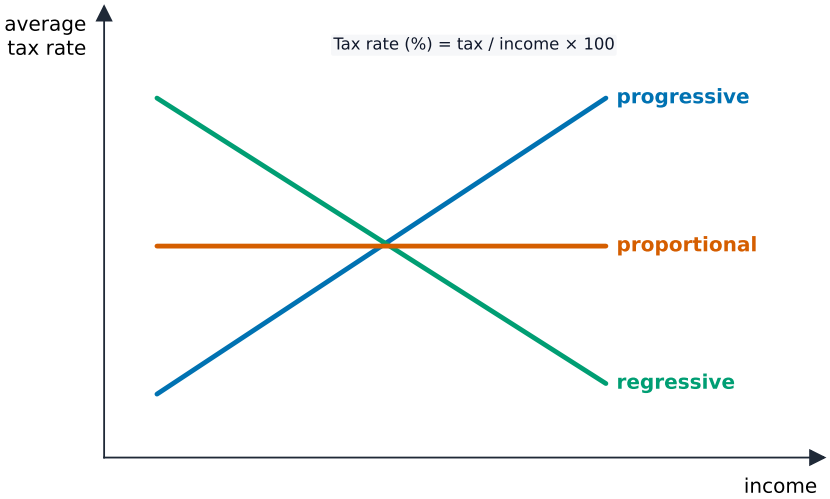
■ Poverty

- **Absolute poverty** 绝对贫困: income too low to buy basic needs. The World Bank's international poverty line is $3.00 a day per person (at 2021 PPP prices).
- **Relative poverty** 相对贫困: income far below others in the same country, often below 50% or 60% of the median income.
- The **Multidimensional Poverty Index** 多维贫困指数 (MPI) counts lack of health, education and living standards (such as clean water, electricity and cooking fuel), not only income.

Causes of inequality and poverty include differences in education and skills, inherited wealth, discrimination, unemployment, weak social protection, and tax systems that favour the rich. Globalisation and new technology have also raised the pay of highly skilled workers faster than others.

■ Policies to reduce inequality

- **Progressive taxes** 累进税: richer people pay a higher share of their income. A **regressive tax** 累退税 takes a larger share from the poor (indirect taxes such as VAT often do). A proportional tax takes the same share from everyone.
- **Transfer payments** 转移支付: pensions, unemployment benefits and child benefits.
- Spending on education and health, so that poor children get the same chances.
- A minimum wage, and laws against discrimination.



Under a progressive tax the average rate rises with income; under a regressive tax it falls; under a proportional tax it stays the same.

Worked example (HL). Income tax is 0% on the first 10,000, 20% on income from 10,000 to 40,000, and 40% on income above 40,000. A person earns 50,000.

- Tax $= 0 + 0.2 \times 30{,}000 + 0.4 \times 10{,}000 = 6{,}000 + 4{,}000 = 10{,}000$.
- The **average tax rate** 平均税率 $= 10{,}000 \div 50{,}000 = 20\%$.
- The **marginal tax rate** 边际税率 (the rate on the next dollar) is 40%.

Because the average rate rises with income, this tax is progressive. Redistribution has costs: high marginal rates may reduce the reward for working or investing, and generous benefits can discourage some people from taking jobs. This is the trade-off between **equity** 公平 and **efficiency** 效率.

Monetary policy

The central bank and its tools

Monetary policy 货币政策 is run by the **central bank** 中央银行, such as the People's Bank of China or the US Federal Reserve. Many central banks have an **inflation target** 通胀目标, often 2%. Their tools:

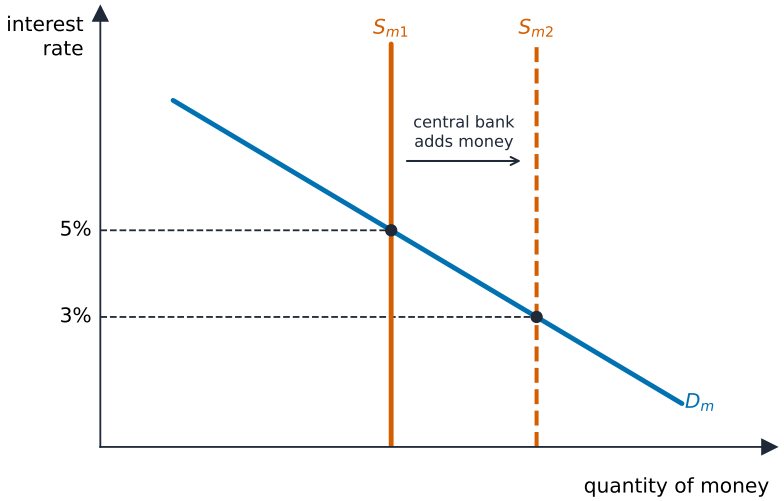


The European Central Bank: central banks set policy interest rates to steer aggregate demand and inflation

- the **policy interest rate** 政策利率 (the rate at which the central bank lends to commercial banks);
- **open market operations** 公开市场操作: buying or selling government bonds to change the money supply;
- **minimum reserve requirements** 存款准备金率: the share of deposits banks must keep and cannot lend. Lowering it lets banks lend more;
- **quantitative easing** 量化宽松 (QE): large-scale bond buying with newly created money, used when interest rates are already near zero.

The money market

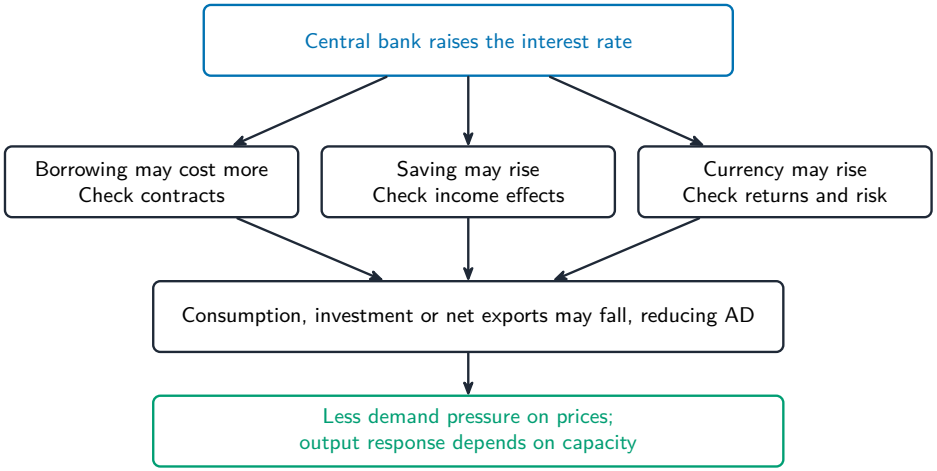
The interest rate is the price of money. The central bank controls the **money supply** 货币供给, shown as a vertical line. People's demand for money slopes down: at a high interest rate, holding cash means giving up a lot of interest.



More money supply lowers the equilibrium interest rate

The **real interest rate** 实际利率 is the nominal rate minus inflation. A loan at 5% when inflation is 3% costs only 2% in real terms.

How monetary policy reaches AD



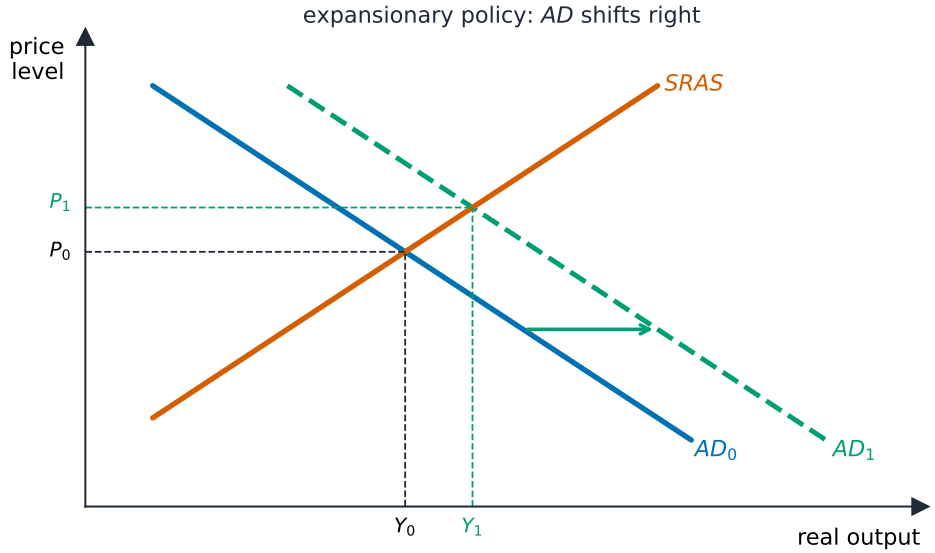
A rise in the interest rate reaches aggregate demand through several channels

Contractionary 紧缩性 (tight) monetary policy raises interest rates to fight inflation. Borrowing costs more, so households buy fewer homes and cars and firms invest less. Saving becomes more attractive. A higher rate also attracts money from abroad, so the currency rises and net exports fall. AD shifts left. **Expansionary** 扩张性 (loose) monetary policy cuts rates to fight a recession and works the other way.

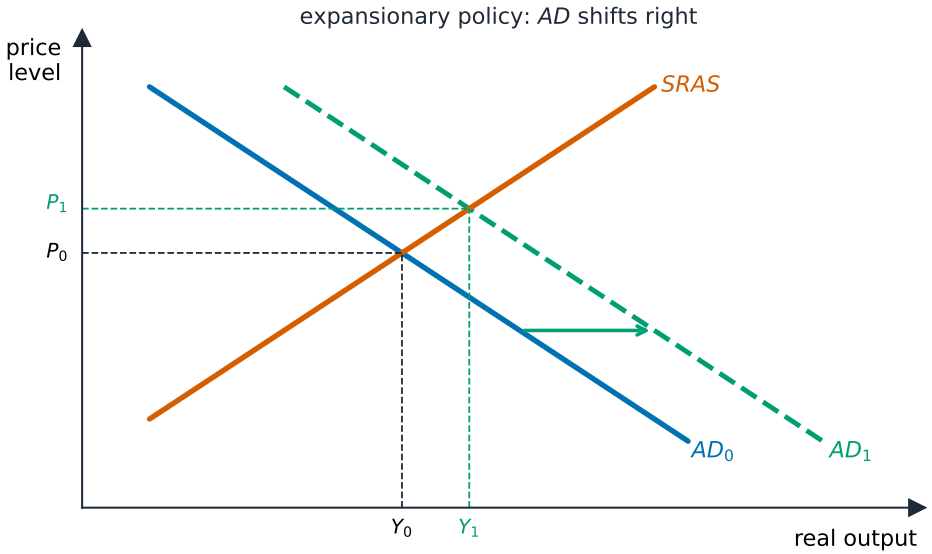
Strengths: central banks can act quickly, change rates in small steps, and are independent of politics. Limits: the full effect takes 18 months or more. In a deep recession, low confidence means people will not borrow even at very low rates. Rates cannot go far below zero, so QE is needed. And a rate rise cannot fix cost-push inflation without also cutting output.

Fiscal policy

Fiscal policy 财政政策 uses government spending and taxation to influence AD.



Expansionary fiscal policy shifts AD right, raising output and prices



Expansionary fiscal policy shifts AD right, raising output and prices

- Government revenue: **direct taxes** 直接税 (on income and profits), **indirect taxes** 间接税 (on spending, such as VAT), the sale of goods and services, and the sale of state-owned firms.
- Government spending: **current spending** 经常性支出 (wages of teachers and doctors, medicines), **capital spending** 资本性支出 (roads, schools, railways) and **transfer payments** (pensions, benefits).
- A **budget deficit** 预算赤字 means spending is greater than revenue; a **budget surplus** 预算盈余 means revenue is greater.

Expansionary fiscal policy raises G or cuts taxes. AD shifts right, by more than the first change because of the multiplier. **Contractionary fiscal policy** cuts G or raises taxes to cool an inflationary gap.

Automatic stabilisers 自动稳定器 work without any new decision. In a recession, tax revenue falls and benefit spending rises by itself, which supports AD. In a boom, the opposite happens and AD is held back.

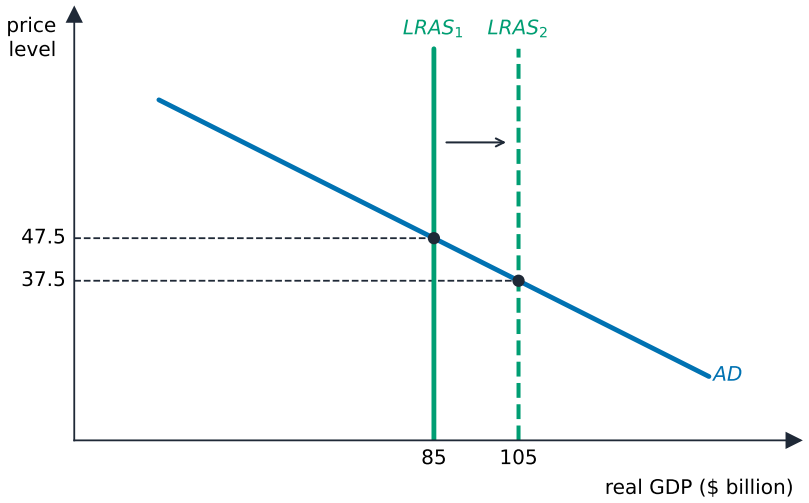
> **Worked example (HL).** The economy has the recessionary gap of 10 from the model above, and the multiplier is 2. If AD shifts right by $k \times \Delta G$, an extra 10 billion of G shifts AD right by 20 billion, from $P = 90 - Y/2$ to $P = 100 - Y/2$. The new equilibrium is $100 - Y/2 = 20 + Y/2$, so $Y = 80$ and $P = 60$: full employment, with a higher price level. Output rises by only 10, not 20, because part of the extra spending goes into higher prices.

Strengths: fiscal policy can target spending at particular regions or groups, works well in a deep recession, and capital spending also raises LRAS. Limits: **crowding out** 挤出效应 (government borrowing may raise interest rates and reduce private investment), long time lags (laws and projects take time), political pressure against cutting spending, and rising debt.

Supply-side policies

Supply-side policies 供给侧政策 aim to raise the economy's productive capacity, shifting LRAS to the right.

> **Worked example.** LRAS shifts from 85 to 105 along AD $P = 90 - Y/2$. The price level falls from $90 - 85/2 = 47.5$ to $90 - 105/2 = 37.5$ while real GDP rises by 20. Unlike demand-side policy, this gives growth without inflation.



Supply-side policy raises output and lowers the price level

Interventionist (the government acts)	Market-based (markets work more freely)
spending on education and training	lower income and business taxes to raise incentives
spending on healthcare	weaker trade union power, more flexible labour laws
infrastructure: roads, ports, broadband	lower or no minimum wage
grants for research and development	deregulation: removing unneeded rules
industrial policy: support for chosen industries	privatisation: selling state-owned firms
	competition policy: more rivals, lower prices

Strengths: supply-side policies can lower unemployment (especially structural), reduce inflation and raise long-run growth at the same time. Limits: most take years to work, education and infrastructure cost a lot of money, and market-based policies such as weaker labour laws can widen inequality.

Checklist

- The circular flow: leakages (S, T, M) and injections (I, G, X); GDP by the output, income and expenditure methods; GNI (3.1).
- Nominal and real GDP (500 at 125 → 400; 540 at 130 → 415.4; growth 3.8%); per capita; PPP; the limits of GDP; HDI and other measures; the business cycle and output gaps (3.1).
- AD $= C + I + G + (X - M)$ with what changes each part; movements along and shifts of AD; SRAS and its shifters (3.2).
- Keynesian AS (flat, curving, vertical) against the monetarist vertical LRAS; LRAS shifters (3.2).
- Equilibrium at $(70, 55)$; a recessionary gap of 10 against full employment at 80; an inflationary gap at $(85, 62.5)$ (3.2).
- HL multiplier $k = 1/(1-MPC) = 1/(MPS+MPT+MPM)$: $0.1+0.2+0.2 = 0.5$ gives $k = 2$; 10 billion → 20 billion (3.2).
- Unemployment: ILO definition, rate 2.4 of 40 million = 6%, hidden unemployment, four types, the natural rate, the costs (3.3).
- Inflation, deflation and disinflation; CPI = 109 from weights 50/30/20; demand-pull and cost-push; the costs of each (3.3).
- HL Phillips curves: A (5%, 2%) → B (3%, 5%) → C (5%, 5%); the vertical LRPC at the natural rate; stagflation (3.3).
- Growth (short run from AD, long run from LRAS) and sustainable government debt (3.3).
- Inequality and poverty: income against wealth; Lorenz curve and Gini 0.40 from quintiles 5/10/15/20/50; absolute and relative poverty, MPI; causes; progressive, regressive and proportional taxes; transfer payments; HL average tax rate 20% and marginal rate 40% on 50,000; equity against efficiency (3.4).
- Monetary policy: central bank tools (policy rate, open market operations, reserve requirements, QE); the money market; real interest rates; transmission to AD; strengths and limits (3.5).
- Fiscal policy: revenue and spending types; deficits; expansionary and contractionary policy; automatic stabilisers; the HL example closing the gap of 10 with 10 billion of G at $k = 2$; crowding out and other limits (3.6).
- Supply-side policies: interventionist and market-based; LRAS 85 → 105 with the price level 47.5 → 37.5; strengths and limits (3.7).

The global economy (4.1-4.10)

International Baccalaureate · IB Diploma · Economics · HL

The global economy

IB Diploma Programme Economics HL, Unit 4 *The global economy* (first assessment 2022). This topic covers sections 4.1 to 4.10: why countries trade, how they protect their industries, trading blocs, exchange rates, the balance of payments, and economic development. The trade examples use one market, with demand $Q_d = 140 - 2P$ and domestic supply $Q_s = 20 + 4P$, at a world price of 12. All numbers are original.



Container shipping: comparative advantage and trade let countries specialise and gain

In 1980 China opened its first special economic zone in Shenzhen, then a small town near Hong Kong. Foreign firms could build factories there and export to the world. Today Shenzhen is a city of more than 17 million people, and China is the world's largest exporter of goods. Over the same years, hundreds of millions of Chinese people left extreme poverty. This topic asks how trade causes growth like this, who loses from it, and why some countries still struggle to develop.

Must-know for this topic:

Idea	Key relationship
comparative advantage	specialise in the good with the LOWER opportunity cost
tariff (worked model)	world price 12 → imports 48; tariff of 4 → price 16, imports 24, revenue 96, deadweight loss 48
integration	free trade area → customs union → common market → economic and monetary union
exchange rates	floating, fixed or managed; demand and supply of a currency
balance of payments	current account + capital account + financial account = 0 (with errors and omissions)
Marshall–Lerner (HL)	a depreciation helps the current account if PED for exports + PED for imports > 1

Idea	Key relationship
terms of trade (HL)	$ToT = \dfrac{\text{index of export prices}}{\text{index of import prices}} \times 100$
development	sustainable development; HDI; barriers; strategies

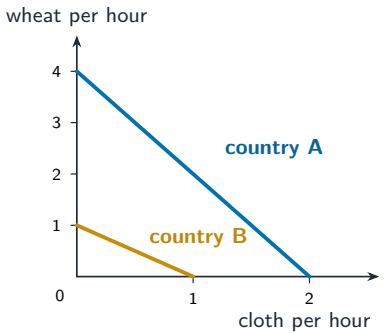
International trade

Why countries trade

International trade gives consumers lower prices and more choice. Firms can sell to bigger markets and gain **economies of scale** 规模经济. Competition from abroad pushes local firms to be more efficient. Trade also spreads new technology and ideas.

Absolute and comparative advantage

A country has an **absolute advantage** 绝对优势 in a good if it can make more of it with the same resources. It has a **comparative advantage** 比较优势 if it can make the good at a lower **opportunity cost** 机会成本. Trade is based on comparative advantage, not absolute advantage.



A: 4 wheat or 2 cloth
1 cloth costs 2 wheat
comparative advantage: **wheat**

B: 1 wheat or 1 cloth
1 cloth costs 1 wheat
comparative advantage: **cloth**

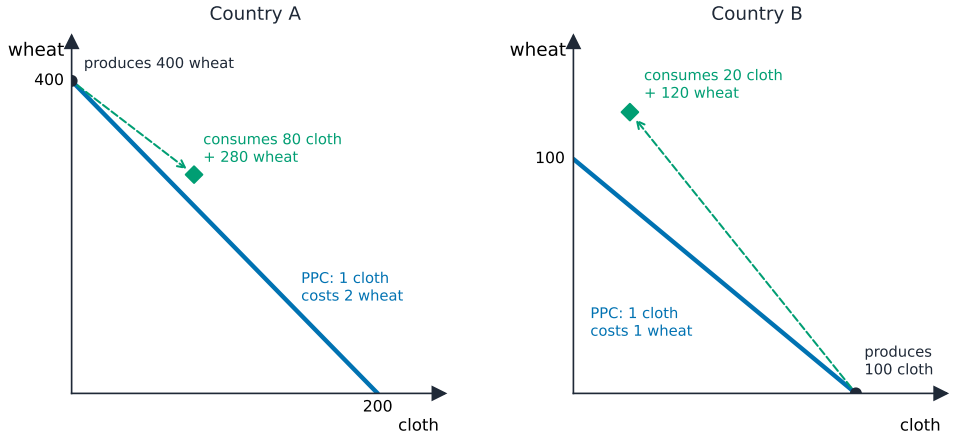
A is faster at both (absolute advantage); trading at 1.5 wheat per cloth sits between the two costs

Original data: output per labour hour; the trade ratio 1.5 wheat per cloth sits between the two opportunity costs.

Worked example. In one day, one worker makes:

	Wheat	Cloth	Opportunity cost of 1 cloth	Opportunity cost of 1 wheat
Country A	4	2	2 wheat	0.5 cloth
Country B	1	1	1 wheat	1 cloth

1. A has an absolute advantage in BOTH goods: it makes more of each.
2. But one cloth costs A 2 wheat and costs B only 1 wheat. So B has the comparative advantage in cloth.
3. One wheat costs A only 0.5 cloth and costs B 1 cloth. So A has the comparative advantage in wheat.
4. A specialises in wheat and B in cloth. Any trade price between 1 and 2 wheat per cloth helps both: A gets cloth for less than 2 wheat, and B gets more than 1 wheat for each cloth.



With 100 workers each and a price of 1.5 wheat per cloth, both countries consume outside their own PPC

Suppose each country has 100 workers and they trade 120 wheat for 80 cloth (1.5 wheat per cloth). A makes 400 wheat and ends with 280 wheat and 80 cloth; working alone, it could have 80 cloth and only 240 wheat. B makes 100 cloth and ends with 20 cloth and 120 wheat; alone, it could have 20 cloth and only 80 wheat. Both gain.

The theory has limits. It assumes no transport costs, constant opportunity costs, and workers who can move easily from one industry to another. In reality, the workers in a closing cloth factory may not find new jobs quickly. And a country may become too dependent on one or two goods.

The World Trade Organization

The **World Trade Organization** 世界贸易组织 (WTO), set up in 1995 and now with more than 160 members, sets rules for world trade. It runs rounds of talks to lower trade barriers, and it settles **trade disputes** 贸易争端 between members. Critics say its rules favour rich countries, and its dispute system has been weak since its appeals body stopped working in 2019.

Trade protection

Trade protection 贸易保护 means government action that limits imports to help domestic producers. Most tools make foreign goods dearer or scarcer.

Types of protection

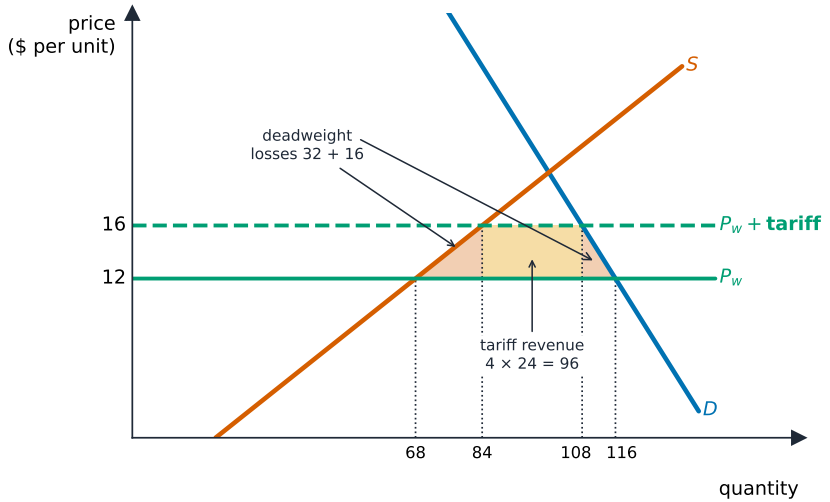
- **Tariffs** 关税: taxes on imports.
- **Quotas** 配额: limits on the quantity of a good that can be imported.
- **Production subsidies** 生产补贴: payments to domestic producers, which lower their costs.

- **Export subsidies** 出口补贴: payments to firms for each unit they export.
- **Administrative barriers** 行政壁垒: slow customs checks, strict product standards, or long paperwork that make importing harder.

The effects of a tariff (HL calculation)

Worked example. Domestic demand is $Q_d = 140 - 2P$ and domestic supply is $Q_s = 20 + 4P$. The country can import as much as it wants at the world price of 12.

1. *Free trade.* At $P = 12$: $Q_d = 140 - 24 = 116$ and $Q_s = 20 + 48 = 68$. Imports $= 116 - 68 = 48$.
2. *Tariff of 4.* The domestic price rises to 16: $Q_d = 108$ and $Q_s = 84$. Imports $= 108 - 84 = 24$.
3. *Government revenue* $= 4 \times 24 = 96$.
4. *Deadweight loss.* Domestic firms now make 16 extra units that foreign firms made more cheaply: $\frac{1}{2} \times 4 \times (84 - 68) = 32$. Consumers give up 8 units they valued above the world price: $\frac{1}{2} \times 4 \times (116 - 108) = 16$. Total: 48.



A tariff of 4 halves imports, raises 96 for the government and wastes 48

Who gains and who loses? Consumers lose: they pay more and buy less. Domestic producers gain: they sell more at a higher price. The government gains revenue. Foreign producers lose sales. Society as a whole loses the deadweight loss of 48.

A **quota** of 24 units would raise the domestic price to 16 in the same way. But there is no tariff revenue. The extra 4 per unit goes to whoever holds the import licences, often foreign firms. A **production subsidy** of 4 per unit would raise domestic output to 84 while the price stays at 12, so consumers do not lose. But the government pays $4 \times 84 = 336$.

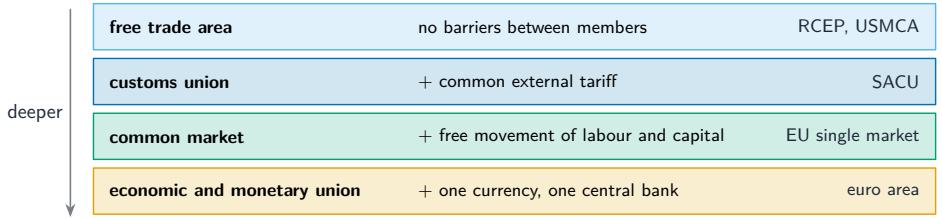
Arguments for and against protection

For protection	Against protection
protect an **infant industry** 幼稚产业 until it can compete	higher prices and less choice for consumers
protect jobs in industries facing cheap imports	other countries may **retaliate** 报复, leading to a trade war
stop **dumping** 倾销 (selling abroad below cost)	protected firms have little reason to become efficient
national security: food, energy, weapons	resources stay in industries without a comparative advantage
raise tax revenue (important in some low-income countries)	higher costs for firms that use imported inputs
diversification 多元化 away from a few exports	it can lead to corruption around licences

Many economists accept some of these arguments in a few cases, such as a real infant industry for a limited time. They reject most others, because the losses to consumers are usually larger than the gains to producers.

Economic integration

Countries can agree to lower barriers with each other. This is **economic integration** 经济一体化.



Each stage adds to the last

- A **bilateral** 双边 agreement is between two countries. A **multilateral** 多边 agreement is among many (such as the WTO's rules).
- A **preferential trade agreement** 优惠贸易协定 lowers barriers on some goods only.

Trading blocs 贸易集团 go further, in stages:

Stage	What members do	Example
free trade area 自由贸易区	no barriers between members; each keeps its own barriers against others	RCEP (China and 14 Asia-Pacific countries), USMCA
customs union 关税同盟	a free trade area plus a **common external tariff** 共同对外关税	Southern African Customs Union
common market 共同市场	a customs union plus free movement of labour and capital	the EU single market
economic and monetary union 经济与货币联盟	a common market plus one currency and one central bank	the euro area

Integration brings bigger markets, economies of scale, more competition and more investment. But it can also cause **trade diversion** 贸易转移: a member buys from a higher-cost partner inside the bloc instead of a lower-cost country outside it. When integration lets a member buy from a lower-cost partner instead of its own higher-cost producers, that is **trade creation** 贸易创造, which raises efficiency.

A monetary union removes exchange-rate costs and risks, and makes prices easy to compare. But each member loses its own interest rate and exchange rate. In the euro crisis after 2010, countries such as Greece could not devalue or cut interest rates to escape recession.

Exchange rates

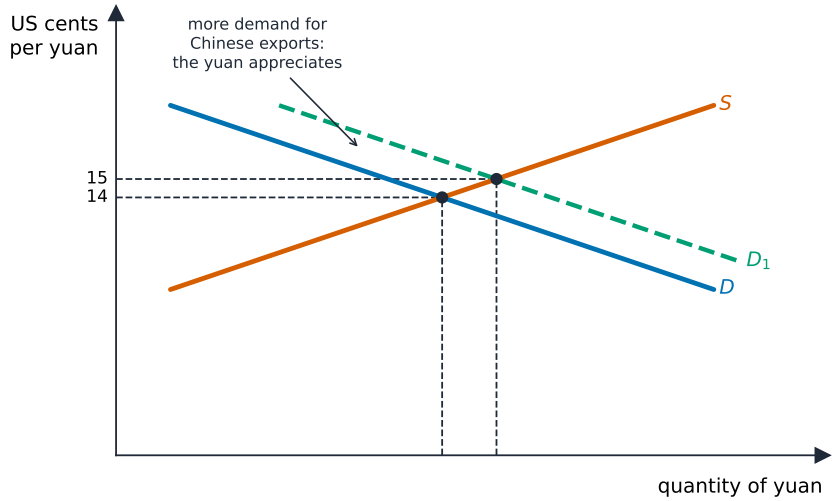
What sets the exchange rate

The **exchange rate** 汇率 is the price of one currency in another currency. Under a **floating exchange rate** 浮动汇率, demand and supply in the foreign exchange market set it.



A currency exchange board: exchange rates are set by the demand for and supply of each currency

- Demand for yuan comes from foreigners buying Chinese exports, tourists visiting China, and foreign investors buying Chinese assets.
- Supply of yuan comes from Chinese people and firms buying imports, travelling abroad, and investing abroad.



More demand for Chinese exports raises the demand for yuan, so the yuan appreciates

A rise in a currency's value is an **appreciation** 升值; a fall is a **depreciation** 贬值.

The exchange rate changes when:

- foreign demand for a country's exports changes;
- interest rates change (higher rates attract **hot money** 热钱, short-term money looking for the best return);
- inflation differs between countries (high inflation makes exports less competitive);
- investors **speculate** 投机 that a currency will rise or fall;
- the central bank buys or sells its own currency.

Effects of a change

If the yuan appreciates, Chinese exports become dearer abroad and imports become cheaper in China. Exporters may lose sales, but import prices and inflation fall. A depreciation does the opposite: it helps exporters but raises the price of imported fuel and food.

> **Worked example (HL).** One US dollar buys 7.00 yuan. A Chinese phone is priced at 2,100 yuan. In the US it costs $2{,}100 \div 7.00 = 300$ dollars. If the yuan appreciates to 6.00 per dollar, the same phone costs $2{,}100 \div 6.00 = 350$ dollars.

Fixed and managed systems

- Under a **fixed exchange rate** 固定汇率, the government or central bank sets the currency's value against another currency and buys or sells to keep it there. The Hong Kong dollar has been fixed to the US dollar since 1983. A deliberate cut in a fixed rate is a **devaluation** 法定贬值; a deliberate rise is a **revaluation** 法定升值.
- A **managed exchange rate** 有管理的浮动汇率 floats, but the central bank steps in to limit big moves. The People's Bank of China sets a daily central rate and lets the yuan move only within a band around it.

Fixed rates give certainty to traders and investors. But the central bank must hold large **foreign currency reserves** 外汇储备, and it gives up control of its own interest rate. Floating rates adjust by themselves, but they can swing sharply and make planning hard.

The balance of payments

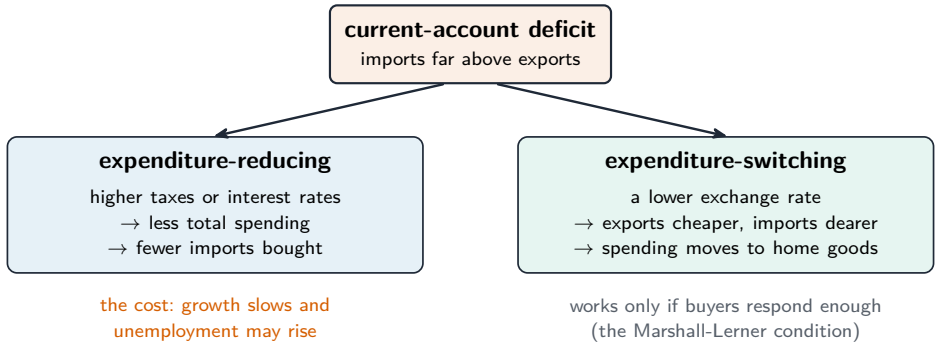
The **balance of payments** 国际收支 records all of a country's money transactions with the rest of the world in one year.

Account	What it records
current account 经常账户	trade in goods and in services; **primary income** 初次收入 (wages, profits, interest and dividends from abroad); **secondary income** 二次收入 (transfers such as money workers send home, and foreign aid)
capital account 资本账户	small items such as debt forgiveness and the sale of patents or land
financial account 金融账户	**foreign direct investment** 外国直接投资 (FDI), **portfolio investment** 证券投资 (buying shares and bonds), changes in reserve assets

The accounts must add to zero. So a current account deficit is matched by a surplus on the capital and financial accounts: the country pays for extra imports by borrowing or by selling assets to foreigners.

Current account deficits and surpluses

A small deficit can be harmless, for example if it pays for imported machines that raise output later. A large, long-lasting deficit is a problem. The country builds up foreign debt, may need higher interest rates to attract money, and its currency may fall suddenly.



Two routes out of a deficit: spend less overall, or switch spending to home goods

Policies to reduce a deficit:

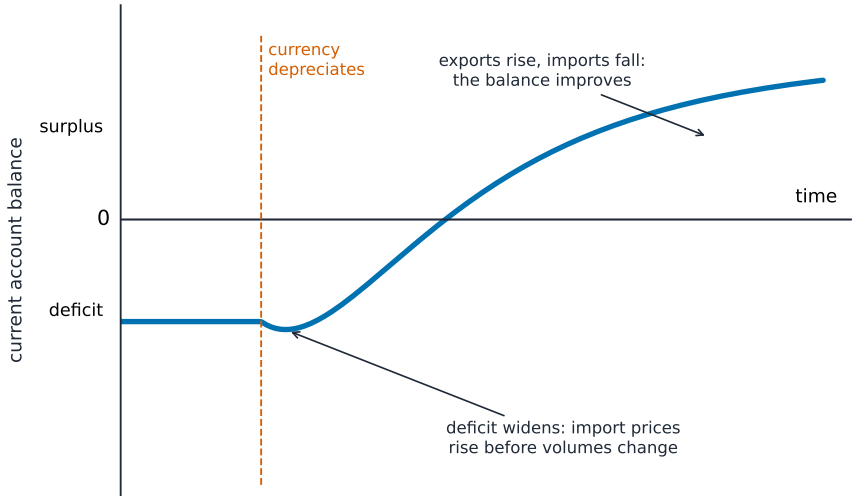
- **Expenditure-switching policies** 支出转换政策 move spending from imports to domestic goods: protection, or a lower exchange rate.
- **Expenditure-reducing policies** 支出削减政策 cut total spending, and so imports: contractionary fiscal or monetary policy. These can cause unemployment.
- **Supply-side policies** make exports more competitive over the long run.

A persistent surplus can also cause problems: a rising currency, less consumption at home, and trade disputes with deficit countries.

■ Marshall–Lerner and the J-curve (HL)

A depreciation makes exports cheaper and imports dearer. It improves the current account only if buyers respond enough. The **Marshall–Lerner condition** 马歇尔-勒纳条件 says this happens when the price elasticity of demand for exports plus the price elasticity of demand for imports is greater than 1.

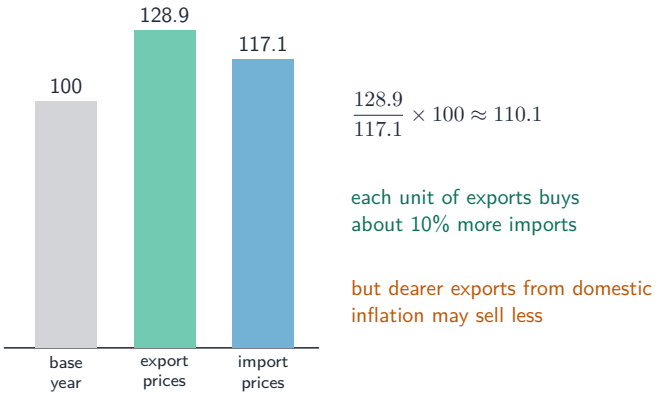
In the short run, demand is inelastic. Contracts are already signed, and buyers take time to find new suppliers. So right after a depreciation the country pays more for the same imports, and the deficit gets WORSE. Later, volumes adjust and the balance improves. The path looks like a "J".



After a depreciation the current account gets worse before it gets better

■ The terms of trade (HL)

The **terms of trade** 贸易条件 compare the prices of a country's exports with the prices of its imports:



Terms of trade from two indices

$$\text{terms of trade} = \frac{\text{index of average export prices}}{\text{index of average import prices}} \times 100$$

> **Worked example.** From the base year, a country's export price index rises to 128.9 and its import price index to 117.1. The terms of trade are $128.9 \div 117.1 \times 100 \approx 110.1$. They have improved by about 10%: each unit of exports now buys about 10% more imports.

Better terms of trade are not always good news. If exports become dearer because of domestic inflation, sales may fall. For many low-income countries that export **primary products** 初级产品 (food, metals, oil), prices swing a lot. Over the long run their terms of trade have often fallen against manufactured goods, so they must export more just to buy the same imports.

Economic development

■ Sustainable development

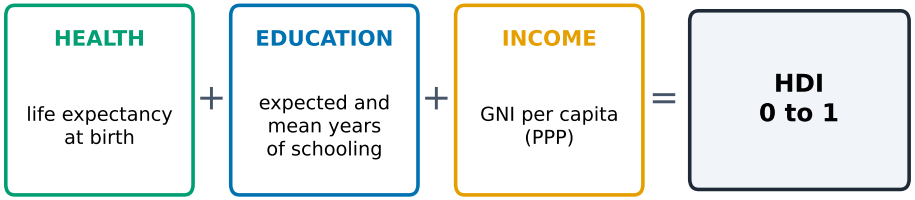
Economic development 经济发展 is broader than growth. It means better living standards: less poverty, better health and education, more freedom and choice. **Sustainable development** 可持续发展 meets the needs of people today without harming the ability of future generations to meet their own needs. In 2015 the United Nations agreed 17 **Sustainable Development Goals** 可持续发展目标 (SDGs) for 2030, including no poverty, zero hunger, quality education, clean water and climate action. Poverty and environmental damage are linked: very poor people may have no choice but to cut forests or overuse land.



A busy market in a fast-growing economy: growth raises output, development asks whether lives improve

Measuring development

Type	Measures	Limits
single indicators	GDP or GNI per capita at PPP; life expectancy; infant mortality; years of schooling	each shows only one side of development
composite indicators 综合指标	the **Human Development Index** 人类发展指数 (HDI): income (GNI per capita at PPP), health (life expectancy) and education (years of schooling), on a scale from 0 to 1	HDI hides inequality and the environment
adjusted indices	the **Inequality-adjusted HDI** 不平等调整后人类发展指数 (IHDI) and the **Gender Inequality Index** 性别不平等指数 (GII)	data can be old or poor in low-income countries

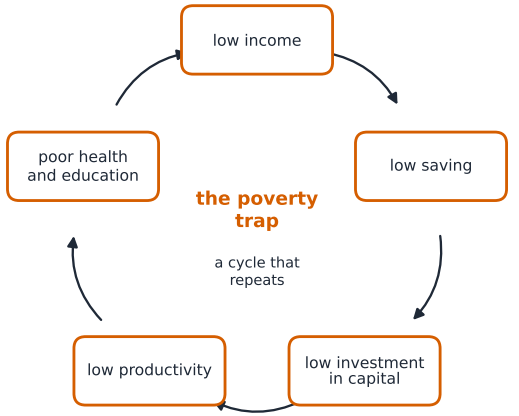


GDP alone misses health and schooling; the GII adds gender inequality

The Human Development Index combines health, education and income

A country whose HDI rank is much higher than its GNI rank turns its income into health and education well. A country whose HDI rank is much lower may have high income from oil but poor public services or great inequality.

Barriers to development



break a link: aid, FDI, microfinance, education, healthcare

Each link in the poverty trap keeps the next one weak

- The **poverty trap** 贫困陷阱: people with low incomes cannot save, so there is little money for investment, so productivity and incomes stay low.

- **Economic barriers**: high inequality; poor infrastructure (roads, power, internet); little access to credit and markets; a large informal economy that pays no taxes; **capital flight** 资本外逃 (rich people moving money abroad); and unsustainable foreign debt.
- **Dependence on primary products**: for example, copper makes up most of Zambia's exports, so a fall in the world copper price cuts national income sharply.
- **Geography**: being **landlocked** 内陆的 raises transport costs; tropical disease and climate shocks hurt health and farming.
- **Political and social barriers**: weak institutions, corruption, poor legal and property rights, political instability and conflict, and **gender inequality** 性别不平等 (when girls cannot go to school, half the country's talent is wasted).

Strategies for development

Strategy	How it helps	Problems
export promotion 出口导向	uses comparative advantage; China, South Korea and Singapore grew this way	depends on world demand; may need cheap labour
import substitution 进口替代	protects new domestic industries (Latin America, 1950s–1980s)	firms stayed inefficient; high prices for consumers
diversification	less risk from one export price	needs skills and investment
foreign direct investment (FDI) by **multinational corporations** 跨国公司	brings capital, jobs, technology and skills	profits leave the country; firms may use low wages or weak environmental rules
foreign aid 对外援助	grants and cheap loans for health, schools and emergencies	can be tied to the donor's goods; corruption; dependency
multilateral help (World Bank, IMF)	long-term loans; help in a crisis	loan conditions may force spending cuts
debt relief 债务减免	frees money for schools and hospitals	may encourage new borrowing
microfinance 小额信贷	small loans to people banks ignore, often women (the Grameen Bank)	high interest rates; loans may pay for consumption, not business
fair trade 公平贸易	guaranteed minimum prices for farmers	reaches only a small share of producers
better institutions, education and health	raise productivity and attract investment	take many years and need good government

Most successful countries have used a mix: market reforms and open trade, together with strong government investment in education, health and infrastructure. Every strategy should be judged by the barrier it removes, and by whether the gains are equal and sustainable.

Checklist

- The benefits of trade; absolute against comparative advantage; the 4/2 against 1/1 table; trade at 1.5 wheat per cloth puts both countries outside their PPCs; the limits of the theory; the WTO (4.1).
- Tariffs, quotas, production and export subsidies, administrative barriers; the tariff worked example: imports $48 \to 24$, revenue 96, deadweight loss $32 + 16 = 48$; who gains and who loses; quota and subsidy compared (4.2).
- The arguments for and against protection, with evaluation (4.3).
- Bilateral, multilateral and preferential agreements; free trade area, customs union, common market, economic and monetary union with examples; trade creation and trade diversion; the costs of a monetary union (4.4).
- Floating, fixed and managed exchange rates; what shifts the demand and supply of a currency; appreciation and depreciation and their effects; the phone priced at 2,100 yuan; devaluation and revaluation; reserves (4.5).
- The current, capital and financial accounts; why they balance; the problems of persistent deficits and surpluses; expenditure-switching, expenditure-reducing and supply-side corrections; HL Marshall–Lerner and the J-curve; HL terms of trade $128.9 / 117.1 \to 110.1$ and why primary exporters lose (4.6).
- Development against growth; sustainable development and the 17 SDGs (4.7).
- Single and composite indicators: GNI per capita at PPP, HDI, IHDI, GII; comparing HDI and GNI ranks (4.8).
- Barriers: the poverty trap, economic barriers, primary-product dependence, geography, political and social barriers (4.9).
- Strategies: export promotion, import substitution, diversification, FDI, aid, multilateral help, debt relief, microfinance, fair trade, institutions and human capital, each with its problems (4.10).