

Notes

Pearson Edexcel · International A-Level · Economics

XEC11/YEC11, 2018 specification, Issue 2

IAS assesses Units 1–2 only. IAL adds Units 3–4; do not substitute the UK Economics A themes or Cambridge paper structure.

WEC11/WEC12 are IAS units: 105 minutes, six MCQs (6 marks), five short answers (20), a five-part source question (34), and ONE essay selected from two (20). WEC13/WEC14 are IA2 units: 120 minutes, six MCQs (6), a five-part source question (34), and TWO essays selected from three (40). Each unit totals 80 marks and contributes 25% of IAL. WEC13 first assessment January 2020; WEC14 June 2020. WEC13 may draw on Units 1–2; WEC14 on Units 1–3. No coursework. Structure verified on specification physical pages 35, 43 and 54; qualification marking/rubric certification remains pending.

1.3.1–1.3.4 · Consumer behaviour and markets

Demand and supply model planned quantities at different prices. Equilibrium requires these quantities to agree.

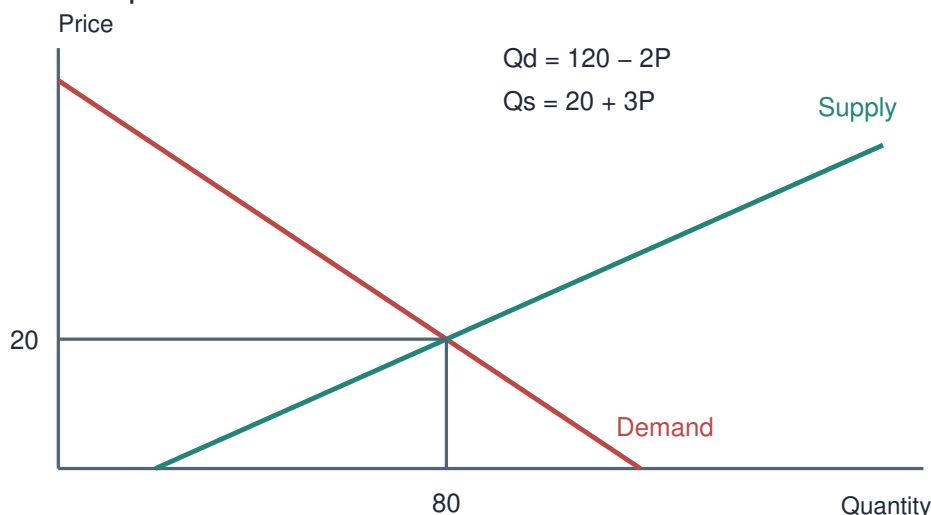
Marginal analysis compares the extra benefit and extra cost of a choice; imperfect information and habits can alter behaviour.

Checked example

Demand is $Q_d = 120 - 2P$ and supply is $Q_s = 20 + 3P$. Set $Q_d = Q_s$: $120 - 2P = 20 + 3P$.

Then $100 = 5P$, $P = 20$ and $Q = 80$. Check both equations before drawing the intersection.

Market equilibrium in the linear model



Limits and practice

An algebraic equilibrium is conditional on the functions and other factors staying constant.

A supply shift does not shift demand: it changes equilibrium through movement along the existing demand curve.

At $P = 10$, which imbalance occurs?

Answer: $Q_d = 100$ and $Q_s = 50$, so excess demand is 50.

1.3.5–1.3.6 · Market failure and policy

For a negative production externality, marginal social cost exceeds marginal private cost. The market quantity can exceed the socially efficient quantity.

A public good is non-rival and non-excludable; free riding can cause under-provision.

Checked example

A congestion charge can raise the private cost of peak journeys. If drivers respond, journeys and delays fall.

Compare the charge with public transport investment: one discourages journeys, the other improves alternatives.

Limits and practice

A transfer of tax revenue is not itself a social resource cost.

Policy evaluation should consider the size of the externality, enforcement costs, equity and unintended effects.

Which condition identifies the efficient output in the simple externality model?

Answer: Marginal social benefit equals marginal social cost.

2.3.1–2.3.5 · National income and aggregate activity

Aggregate demand is $C + I + G + (X - M)$. Aggregate supply links the price level to total output.

Real GDP removes price changes; per-capita GDP divides by population, but does not show distribution or unpaid work.

Checked example

In a simple closed model with no tax or imports, $MPC = 0.8$ gives multiplier $k = 1/(1 - 0.8) = 5$.

An autonomous injection of 10 gives a modelled income rise of 50; taxes and imports add leakages in a fuller model.

Limits and practice

State the model assumptions before using 5 as a prediction.

An AD increase can raise real output or mainly raise prices, depending on spare capacity and supply conditions.

What happens to the simple multiplier when the marginal propensity to save rises?

Answer: It falls because more of each extra unit of income leaks from spending.

2.3.6 · Macroeconomic objectives and policies

Demand-pull inflation arises when spending grows faster than productive capacity; cost-push inflation follows rising production costs.

Fiscal, monetary and supply-side policies work through different channels and over different time periods.

Checked example

An interest-rate rise may reduce borrowing, spending and aggregate demand, easing demand-pull inflation.

If inflation came from imported fuel, the policy may lower output without directly repairing the fuel shortage.

Limits and practice

Do not write that higher rates always reduce inflation immediately.

Compare effectiveness, exchange-rate effects, indebted households, confidence and lags before reaching a conditional judgement.

Which information matters most when choosing an inflation policy?

Answer: Whether inflation is driven mainly by excess demand or rising costs.

3.3.1–3.3.3 · Firms, costs and market structures

Average cost is total cost divided by output; marginal cost is the change in total cost for one more unit.

In the standard model, a profit-maximising firm chooses output where $MR = MC$ with the appropriate rising MC condition.

Checked example

At $Q = 100$, total revenue is 1,000 and total cost is 800, giving profit 200. At $Q = 101$, revenue is 1,006 and cost is 809.

The extra unit adds $MR = 6$ and $MC = 9$, so profit falls by 3; expansion is not justified by revenue alone.

Limits and practice

Market concentration does not prove collusion. Contestability depends on entry and exit barriers, including sunk costs.

Separate short-run shutdown decisions from long-run exit and distinguish profit from cash flow.

Should the firm add the 101st unit under these figures?

Answer: No: marginal cost exceeds marginal revenue, reducing profit.

3.3.4–3.3.5 · Labour markets and intervention

Derived demand links labour demand to product demand. Marginal revenue product equals marginal product multiplied by marginal revenue.

Wage differences can reflect skill, productivity, scarcity, bargaining power and discrimination.

Checked example

An extra worker adds 8 units sold at a constant 12 yuan per unit, so $MRP = 8 \times 12 = 96$ yuan.

If the relevant wage is 80 yuan, the simplified model supports hiring; other employment costs still matter.

Limits and practice

A minimum wage can have different employment effects under competitive labour markets and monopsony.

Do not apply one diagram to every institution: state bargaining, market structure and enforcement assumptions.

What is the worker's marginal revenue product in this case?

Answer: 96 yuan for the period used in the calculation.

4.3.1–4.3.3 · Globalisation, trade and payments

Comparative advantage concerns lower opportunity cost, not lower absolute resource use.

Trade protection can support infant industries or jobs, but may raise input costs, reduce choice and provoke retaliation.

Checked example

In A, one radio costs two shirts; in B, one radio costs one shirt. B has comparative advantage in radios.

A has comparative advantage in shirts: one shirt costs half a radio in A and one radio in B.

Limits and practice

The model assumes mobility within a country and a simplified production structure.

Exchange-rate changes may not repair a current-account deficit quickly because contracts and elasticities matter.

Which country has comparative advantage in radios?

Answer: Country B, because its opportunity cost is one shirt rather than two.

4.3.4–4.3.6 · Development, inequality and the state

Absolute poverty concerns inability to meet basic needs; relative poverty compares resources with a society's normal standard.

Development includes capabilities, health, education and living conditions as well as real income.

Checked example

A rural road can lower transport costs and connect producers to buyers. Health services can improve workers' capabilities.

Compare the projects using local bottlenecks, distribution, environmental effects and opportunity cost, rather than GDP alone.

Limits and practice

Aid may support capacity or create dependency; debt relief frees resources only if spending and institutions use them well.

Use several indicators and recognise inequality hidden by national averages.

Which evidence best supports a claim of wider development?

Answer: Improved health and education alongside real income gains, with attention to who benefits.

1.3.1.1–2 · Models, evidence and value judgements

A researcher predicts that a higher bus fare reduces journeys. During the same month, fuel costs and school attendance also change.

A before-and-after observation alone does not isolate the fare effect.

An economic model simplifies behaviour to explain a relationship. *Ceteris paribus* holds other relevant factors constant. Economics is a social science: whole economies cannot normally be controlled like a laboratory experiment, so data comparisons need careful assumptions.

A positive statement is testable against evidence; it may still be false. A normative statement includes a value judgement about what should happen. Policy choices combine evidence about effects with values about equity, freedom or welfare.

Checked example

A model predicts $Q = 200 - 5P$. At fare 10, predicted journeys are 150; at 12, they are 140. The isolated model effect is -10 journeys.

If actual journeys fall from 150 to 125 while attendance also falls, the observed -25 cannot all be assigned to the fare. “A fare rise lowers journeys, other factors unchanged” is positive. “The council should keep fares affordable even at a subsidy cost” is normative.

Positive does not mean desirable or proven. An estimated model can omit variables or apply poorly to another setting. Simple models are useful only when their assumptions suit the question.

Evidence can challenge the predicted effect; it cannot by itself decide how much weight to place on affordability versus public cost. Distinguish the causal estimate from the ethical choice.

1.3.1.3–4 · Scarcity, marginal sacrifice and capital goods

An island workshop can use resources for tools or household furniture. More tools reduce current furniture but may improve future production.

Investment has a current opportunity cost even when it promises later growth.

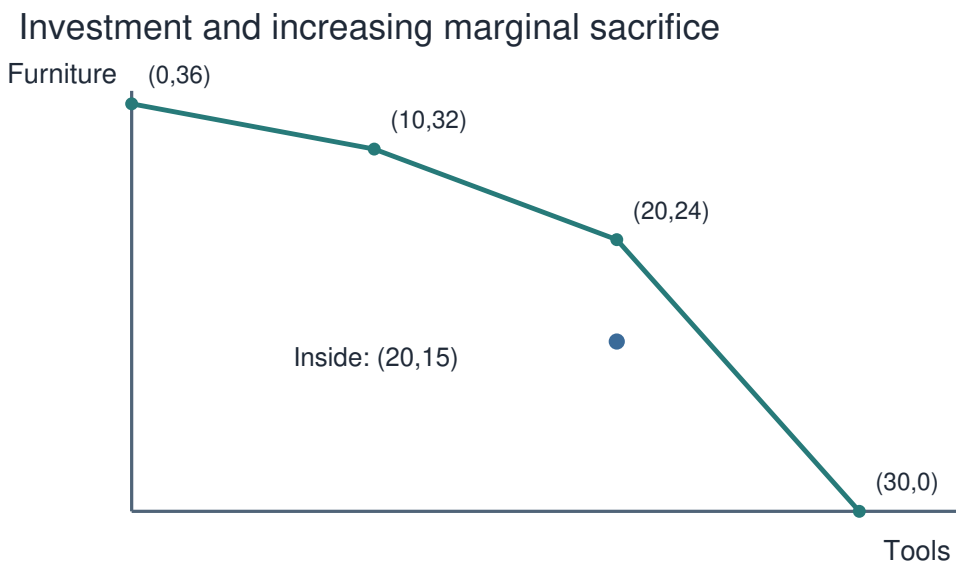
Scarcity arises because resources are finite relative to wants. An economic good uses scarce resources and has opportunity cost; a free good is not scarce in the relevant context. Zero money price does not prove a good is free. Renewable resources can replenish under suitable use; non-renewable stocks do not regenerate on the relevant timescale.

A PPF shows maximum feasible output combinations. On-frontier points are productively efficient; inside points leave capacity unused. A movement reallocates resources, while a shift changes potential. Capital goods produce other goods; consumer goods meet final consumption needs.

Checked example

The frontier (tools, furniture) is (0,36), (10,32), (20,24), (30,0). From 10 to 20 tools, furniture forgone is 8: marginal sacrifice over this interval = $8/10 = 0.8$ furniture unit per tool. From 20 to 30, it is $24/10 = 2.4$.

The rising sacrifice reflects resources less suited to tools as specialization expands. Productive tools can raise future productivity and shift the PPF outward, but investment needs suitable skills and maintenance. (20,15) lies inside current capacity; moving to (20,24) improves use without shifting the frontier.



Capital goods have current sacrifice and possible future capacity gains.

Productive efficiency does not establish that the output mix best meets people's preferences: allocative efficiency asks a different question. PPF data alone do not value the socially preferred mix.

Renewable does not mean inexhaustible: use can exceed regeneration. Clean air can be scarce in a polluted location. Productive damage, resource loss or declining skills can shift capacity inward; more actual output need not mean higher potential.

1.3.1.5 · Specialization, money and financial markets

A specialist repairer cannot live only on repairs. The repairer needs food, housing and transport supplied by other people.

Specialization requires a way to exchange output and finance activity.

Division of labour splits production into specialized tasks. Repetition can develop skill, reduce switching time and support specialized tools; coordination, boredom and

dependency can be costs. Adam Smith emphasized these mechanisms in his account of specialization.

Money is a medium of exchange, measure of value, store of value and standard of deferred payment. It avoids the need for a double coincidence of wants under barter. Financial markets help people save, obtain funds, make transactions, agree future commodity/currency exchange and trade equity ownership.

Checked example

A repairer earns 600 yuan and spends 300 on food, 100 on transport and saves 200. Money connects separate suppliers without requiring each to need a repair. A business can finance equipment by borrowing or issuing equity; equity gives an ownership claim rather than a fixed-interest loan.

A fictional importer agrees now to buy 1000 dollars in three months at 7 yuan per dollar. The forward agreement fixes 7000 yuan of currency cost. If the later spot rate is 8, the agreement avoids an 8000-yuan spot cost; if it is 6, it forgoes a cheaper 6000-yuan spot purchase.

A forward hedges a stated exposure; it does not guarantee an overall profit. Counter-party risk and contract terms still matter. Saving does not instantly become productive investment in every case.

Money's store-of-value function can weaken under inflation. Equity returns are uncertain and ownership can be diluted. Specialization benefits depend on demand, quality and coordination. Smith's original pin-making discussion is in *The Wealth of Nations*, Book I, Chapter I. Read its task/skill/time-saving argument, not an unsupported claim that all modern production has the same gains.

1.3.1.6 · Allocation systems and the role of the state

A city must decide which homes to build, which materials to use and who can occupy them.

Prices, administrative plans and public support can each influence these decisions.

In a free-market model, private decisions and prices play the main allocation role. A command model relies on central plans and public decisions. A mixed economy combines market activity with government ownership, spending, redistribution and regulation.

Markets can respond to demand and reward efficiency but may underprovide public goods, create external costs or allocate purchasing power unequally. Planning can prioritize collective aims but faces information, incentive and coordination problems.

Checked example

In a fictional city, private builders respond to high rents, while the council funds flood defences and supports low-income tenants. This is mixed allocation, not a pure command system because government acts.

A central planner can set a housing target, but needs information about locations, household needs, resources and construction costs. Private builders also need accurate signals and credible rules; neither system automatically solves every information gap.

Compare mechanisms, not political labels. A public firm can face competition, while a private firm can have monopoly power. Ownership and competition are distinct.

The best institutional mix depends on the good, external effects, administrative capacity and distributional priorities. Government participation does not prove successful intervention; market activity does not prove efficient allocation.

1.3.2.1 · Rational choices, framing and inertia

A customer accepts an automatically renewed subscription, follows friends' product choices and reacts differently to "90% success" and "10% failure".

Choices can depend on presentation and defaults as well as prices.

The rational-consumer model assumes utility maximization within constraints; the rational-firm model assumes profit maximization. Herding copies others; habit repeats familiar behaviour; inertia resists changing a current option. Poor computation can distort comparisons, while a wish to feel valued can influence purchases. Framing changes how equivalent information is presented; bias can systematically distort judgement.

These mechanisms can depart from the model's calculation, but observing a choice is not enough to prove it lowers the person's welfare. Convenience, trust or social enjoyment may themselves be valued.

Checked example

Plan A charges 10 yuan per month plus 60 setup, giving annual cost = $12 \times 10 + 60 = 180$. Plan B charges 16 per month and no setup: 192 annually. A headline comparison of monthly prices alone misses the full cost.

"90% success" and "10% failure" describe the same stated outcome frequencies. Different choices after the descriptions change, with other details fixed, suggest framing. A retained default despite a preferable alternative can suggest inertia, but switching effort may also be costly.

Do not conflate habit with herding: familiar repetition differs from following a group. Framing comparisons must keep outcomes and conditions identical.

A policy that changes a default may help some people yet impose a value judgement about the preferred option. Test explanations using choices, constraints and credible alternatives; do not invent a psychological motive from one observation.

1.3.2.2 · Marginal utility and an individual demand curve

The first bottle of water after exercise is highly valued; a fifth bottle may add little satisfaction.

The benefit of one more unit differs from total satisfaction from all units.

Marginal utility is additional satisfaction from an extra unit. Diminishing marginal utility means each further unit adds less satisfaction over the relevant range. With other factors fixed, a lower price may be needed to make additional units worth buying; this helps explain downward individual demand.

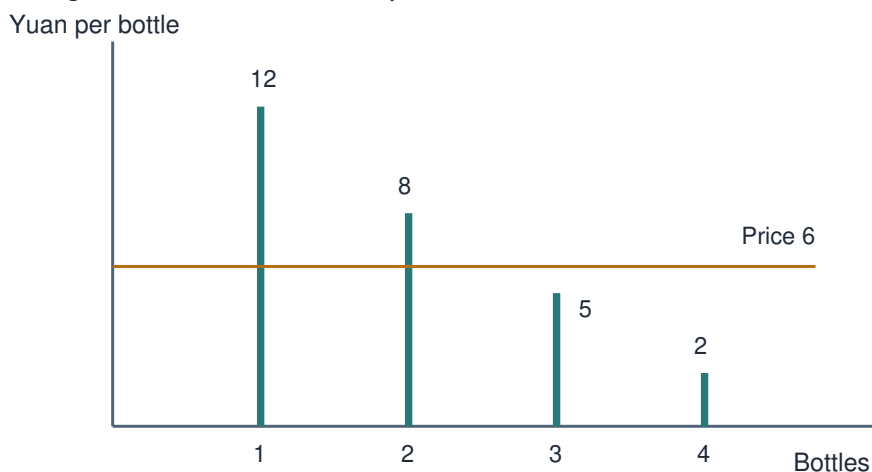
Demand requires willingness and ability to buy at alternative prices. Own price changes give movements along demand. Substitute/complement prices, real income, tastes, population size/age and advertising can shift demand.

Checked example

A fictional buyer with enough budget has maximum willingness to pay for four bottles of 12, 8, 5 and 2 yuan. At price 6, the first two are worth buying but the third is not: quantity is 2, with total payment 12. At price 4, quantity becomes 3.

If safe drinking fountains become more available, demand for purchased water may shift left because a substitute is more attractive. A hot-weather preference change may shift it right; these shifts differ from the movement after water's own price changes.

Marginal valuations and a purchase decision



Only bottles 1 and 2 have valuation above the price of 6.

The example uses willingness-to-pay units as a monetary representation of marginal valuation, not direct measurement of psychological utility. Diminishing marginal utility does not mean total utility must fall; it can rise more slowly.

The individual model does not by itself determine market demand: aggregate buyers differ. A simultaneous income or substitute-price change can invalidate an own-price-only interpretation.

1.3.2.3(a–g,j) · A straight demand line has changing elasticity

A seller sees a straight demand line and assumes responsiveness must be constant.

The same change in units is a different percentage of a large or small starting quantity.

PED is percentage quantity-demanded change divided by percentage own-price change. Interpret absolute magnitude: 0 perfectly inelastic, below 1 inelastic, 1 unitary, above 1 elastic; perfectly elastic demand is the horizontal limiting case. For a linear demand curve, a constant units-per-price slope does not imply constant PED.

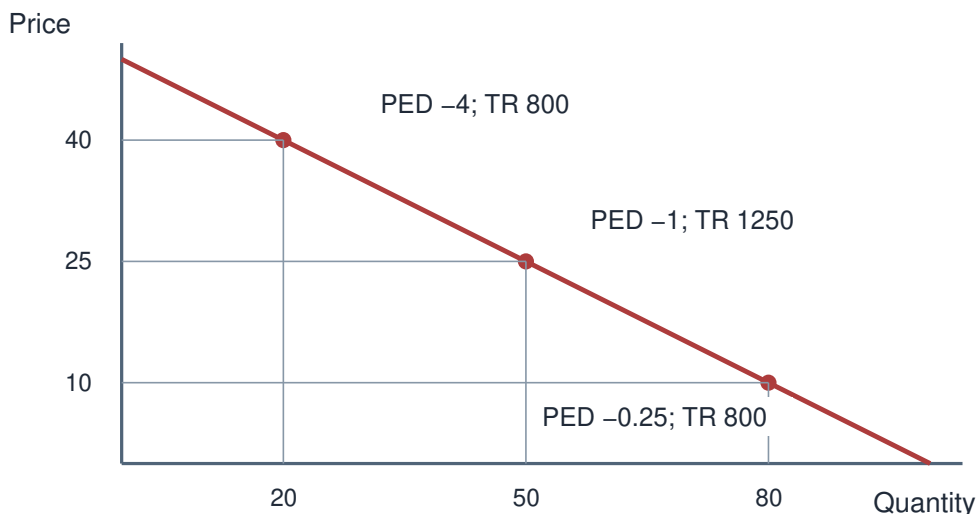
With $Q = 100 - 2P$, local $PED = -2 \times P/Q$. The ratio changes along the line. Substitutes, branding, expenditure share, addiction and durability affect responsiveness; durable goods can allow postponement, while strong attachment can limit switching.

Checked example

At $P=10$, $Q=80$: local $PED = -2 \times 10/80 = -0.25$; $TR = P \times Q = 800$. At $P=25$, $Q=50$: local $PED = -1$ and $TR = 1250$. At $P=40$, $Q=20$: local $PED = -4$ and $TR = 800$.

Below the midpoint, a small price rise increases revenue; above it, a small price cut increases revenue. The midpoint is the maximum of TR in this particular linear model. A point elasticity is local: it is not a claim that a large finite change has exactly the same percentage ratio.

Constant slope, changing local elasticity



$Q = 100 - 2P$. Point PED changes while the units-per-price slope stays 2.

Unitary elasticity implies no first-order revenue effect locally; revenue over a finite interval must be checked as $P \times Q$, rather than assuming unchanged revenue from a rounded estimate. Profit also depends on costs.

A slope comparison needs the same axis scales, and even then the price/quantity point matters. Taxes on addictive products may reduce quantity little over a short period while raising spending; the policy aim and distribution still matter.

1.3.2.3(a–b,h–j) · Income and cross-price responses

A rail operator considers forecasts based on incomes and the price of a competing coach service.

Own-price, income and another product's price are three different stimuli.

YED = percentage quantity-demanded change

percentage income change. Positive values identify normal goods, negative values inferior goods for the observed group/range. Positive magnitude above 1 is income-elastic; between 0 and 1 income-inelastic; zero means no response. Perfect income elasticity is a theoretical limiting case of arbitrarily large responsiveness to a tiny income change.

XED = percentage demand change for A

percentage price change of B. Positive XED suggests substitutes, negative complements, and approximately zero little measured relationship. Magnitude indicates responsiveness, not whether two products are physically similar.

Checked example

Income rises from 3000 to 3300, or 10%; rail journeys rise from 40 to 46, or 15%. $YED = 15/10 = 1.5$: an income-elastic normal service in this observation.

Coach fare rises 8%, while rail demand rises 4% with other conditions unchanged: $XED_{\text{rail relative to coach}} = 4/8 = 0.5$, consistent with substitution. If parking becomes 10% dearer and car journeys fall 3%, $XED_{\text{car journeys relative to parking}} = -3/10 = -0.3$, consistent with complementarity.

A product can change category across income groups or ranges. An inferior classification describes the income response, not defective quality. XED of A to B need not equal XED of B to A.

Business forecasts need population, prices and confidence too; simultaneous changes can confound attribution. A government assessing indirect taxes or subsidies should ask whether consumers can switch and who bears the cost, not simply read a sign as a complete recommendation.

1.3.3.1–2 · Supply adjustment, tax forms and time horizons

A fruit seller can release stored stock immediately but cannot grow another crop overnight. A factory can hire workers, but its building remains fixed this month.

The economic short run is about fixed factors, not a universal number of days.

Supply is willingness and ability to offer quantities at different prices during a period. Own price causes movement; costs, technology, subsidies, disasters and indirect taxes can shift supply. A specific tax is a fixed charge per unit; ad valorem tax is a percentage of value.

PES = percentage quantity-supplied change

percentage price change. Interpret zero, inelastic below 1, unitary 1, elastic above 1 and perfectly elastic as a horizontal limiting curve. The short run has at least one fixed productive factor; in the long run all factors can be adjusted.

Checked example

Price rises from 20 to 22, or 10%, and supply from 200 to 230, or 15%: $PES = 15/10 = 1.5$. Stored stock and spare machinery can support this response. Perishable stock, fixed buildings, immobile staff or licensing delays can constrain it.

A specific tax of 2 remains 2 per unit at product values 20 and 30. A 10% ad-valorem tax is 2 and 3 respectively. Tax or subsidy shifts net production incentives; the actual price split between buyer and seller still depends on market responsiveness.

A calendar month can be long enough to adjust some processes but not others. Greater

time often increases responsiveness, but legal or resource constraints can remain. Higher stocks matter only if they are saleable and can reach buyers.

Manufactured versus primary products is a contextual comparison, not an absolute rule. A factory at full capacity may respond less immediately than a grower holding usable stock. A revenue ratio is not PES: use quantities and prices.

1.3.4.1 · Market clearing and simultaneous changes

A canteen offers meal vouchers. A price set too low creates queues; too high leaves vouchers unsold.

Equilibrium compares planned buying with planned selling, not total wishes.

Equilibrium occurs where quantity demanded equals quantity supplied. Excess demand can encourage price increases; excess supply can encourage price reductions when prices adjust. A demand shift normally changes equilibrium through movement along unchanged supply, and vice versa.

If both demand and supply rise, quantity normally rises but price depends on their relative shifts. If demand rises while supply falls, price normally rises but quantity is ambiguous. Do not invent a definite result for an unspecified magnitude.

Checked example

Fictional demand is $Q_d = 120 - 2P$ and supply $Q_s = 2P$. Set $120 - 2P = 2P$: $P = 30$ and $Q = 60$. At $P = 20$, $Q_d = 80$ and $Q_s = 40$: shortage = 40. At $P = 40$, $Q_d = 40$ and $Q_s = 80$: surplus = 40.

If demand becomes $Q_d = 160 - 2P$ with supply unchanged, equilibrium is $P = 40$ and $Q = 80$. If supply also becomes $Q_s = 20 + 2P$, solving gives $P = 35$ and $Q = 90$. Price rises in this specified case, but a larger supply shift could instead lower it.

Adjustment requires prices and production choices to respond. Binding controls, contracts, short production periods or imperfect information can delay clearing. The equations are an illustrative market, not an estimate of canteen behaviour.

A curve shift is not a move between two points on that curve. Always name which determinant changes and hold the other relevant influences fixed before interpreting a diagram.

1.3.4.2 · Consumer and producer surplus

A buyer would pay more than the market price; a seller would accept less.

The transaction creates gains on both sides, even though only one market price is paid.

Consumer surplus is willingness to pay minus actual payment, summed across purchased units. Producer surplus is receipts above the minimum required to supply those units. On linear diagrams they can be triangle areas, but not every curve produces a triangle.

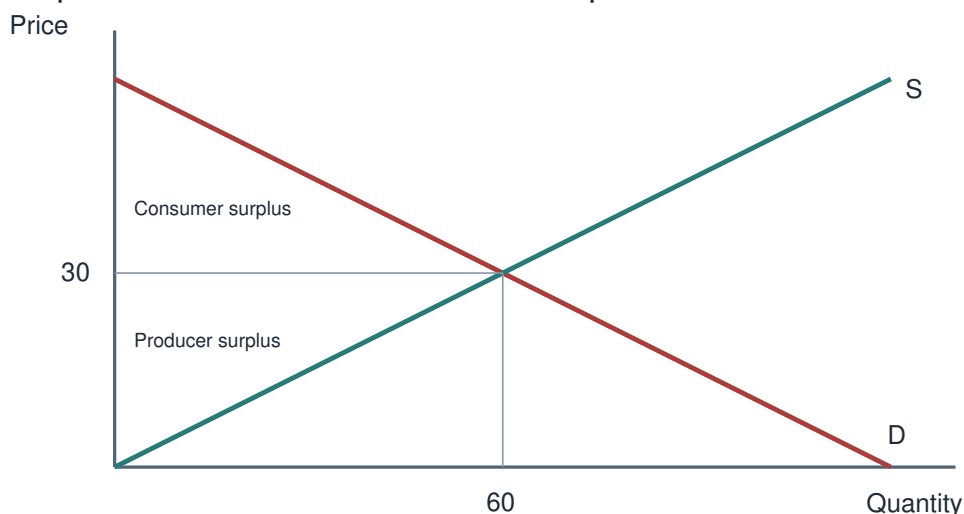
These are gains from trade under the model. Producer surplus is not automatically accounting profit because fixed costs and the time period matter. Consumer surplus is not a cash refund.

Checked example

Use $Q_d = 120 - 2P$ and $Q_s = 2P$. Inverse demand intercepts price 60; inverse supply begins at 0. Equilibrium is $P = 30, Q = 60$. $CS = \frac{1}{2} \times (60 - 30) \times 60 = 900$; $PS = \frac{1}{2} \times (30 - 0) \times 60 = 900$ currency units.

Demand shifts to $Q_d = 160 - 2P$, with intercept 80. New equilibrium $P = 40, Q = 80$ gives $CS = \frac{1}{2} \times (80 - 40) \times 80 = 1600$ and $PS = \frac{1}{2} \times 40 \times 80 = 1600$. Consumers pay a higher price yet surplus rises in this particular case because willingness to pay and quantity changed too.

Surplus above and below the market price



Each original triangular area = $\frac{1}{2} \times 30 \times 60 = 900$.

A higher price alone, with the original demand curve unchanged, usually reduces consumer surplus. The shift case has a different demand schedule, so a price-only comparison is incomplete.

Adding CS and PS is not a complete social-welfare measure when third-party effects or distributional values matter. Demand represents willingness and ability to pay; limited incomes can affect the measured valuation.

1.3.4.3 · Price as signal, incentive and rationing device

A crop failure makes ginger harder to obtain. Shop prices rise, buyers reconsider recipes and growers consider next season.

One price can convey information and change decisions on both sides.

Signalling communicates relative scarcity or changing demand. Incentives change rewards for supplying or conserving resources. Rationing allocates limited goods among buyers willing and able to pay. The functions are connected but analytically distinct.

In a local market, dearer ginger can encourage recipe substitution. Across national supply chains, expected returns can attract transport or storage. In global markets, a commodity price can affect extraction and substitution, subject to production periods and rules.

Checked example

A fictional grower expects revenue of 6000 and cost of 4500 from a crop, giving expected profit 1500. If expected revenue rises to 7000 while those costs stay fixed, profit becomes 2500: a possible incentive to expand.

The price rise also signals scarcity to buyers and rations available ginger through purchasing power. It does not itself create the land, skills or time needed for another harvest. A transport bottleneck can prevent a distant supplier responding immediately.

High willingness to pay is not the same as greatest need. Poorer households may lose access; rationing by price can conflict with equity aims. False or manipulated signals, market power and externalities can distort allocation.

A profitable expansion still needs financing and usable inputs. Separate a current quantity response from a future supply shift, and do not infer national or global supply data from one local shop.

1.3.4.4(a–b) · A tax wedge and who bears it

A tax is legally collected from sellers, but buyers can still pay part of its economic burden.

Legal responsibility for remitting the tax does not settle who bears the price change.

A specific tax creates a wedge: buyer price P_b minus seller receipt P_s equals tax t . Demand depends on P_b ; supply on P_s . Government receipts are t times the quantity actually traded after the tax.

Relative elasticities determine the price burden in the competitive model. The less responsive side tends to bear more because it has fewer effective ways to leave or

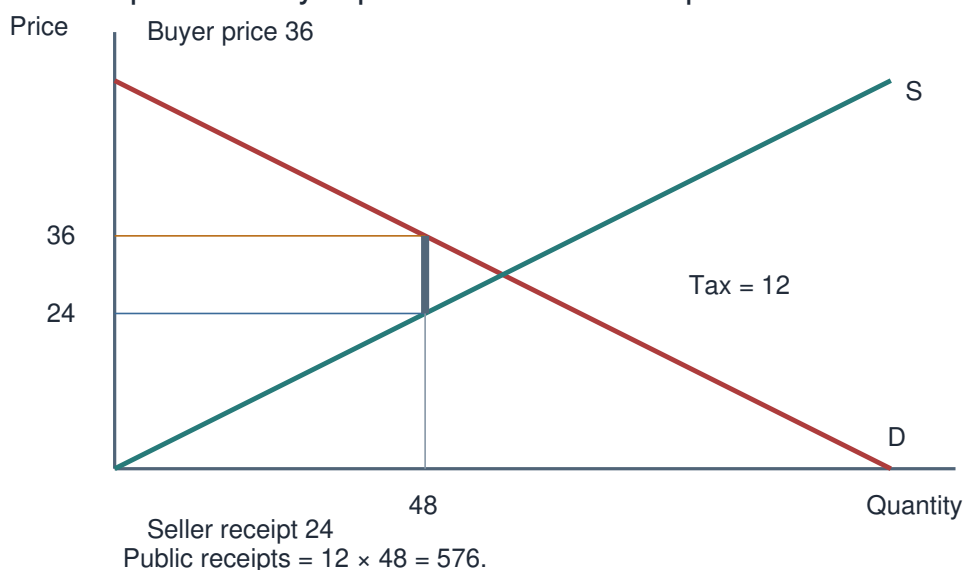
adjust. An ad-valorem tax instead changes the cash wedge with taxable value; use its stated tax base.

Checked example

Initially $Q_d = 120 - 2P$ and $Q_s = 2P$ give $P = 30, Q = 60$. With tax 12, $P_b = P_s + 12$. Solve $120 - 2(P_s + 12) = 2P_s$: $P_s = 24, P_b = 36$ and $Q = 48$.

Buyers pay 6 more per unit; sellers receive 6 less. Government revenue = $12 \times 48 = 576$, not 12×60 . $CS = \frac{1}{2} \times (60 - 36) \times 48 = 576$; $PS = \frac{1}{2} \times 24 \times 48 = 576$. Including revenue gives 1728 versus initial gains of 1800: the lost trades create loss 72 here, assuming no externality correction.

A tax separates buyer price and seller receipt



The equal split comes from this symmetric model, not a universal tax rule. With relatively inelastic demand, buyers tend to bear more; with relatively inelastic supply, sellers tend to bear more. Perfectly inelastic supply is an extreme case of seller burden when demand is otherwise responsive.

A tax can improve social allocation when it corrects an external cost; this no-externality arithmetic cannot establish that all taxes reduce welfare. Administration, evasion, revenue use and distribution also matter.

1.3.4.4(c-d) · Subsidy receipts, spending and distribution

A public payment supports suppliers, while competition can also lower the price buyers pay.

The recipient of the cheque need not receive the entire economic benefit.

A per-unit subsidy creates a reverse wedge: seller receipt P_s equals buyer price P_b plus subsidy s . Supply responds to the receipt; demand responds to the paid price. Public expenditure is s times eligible post-subsidy output.

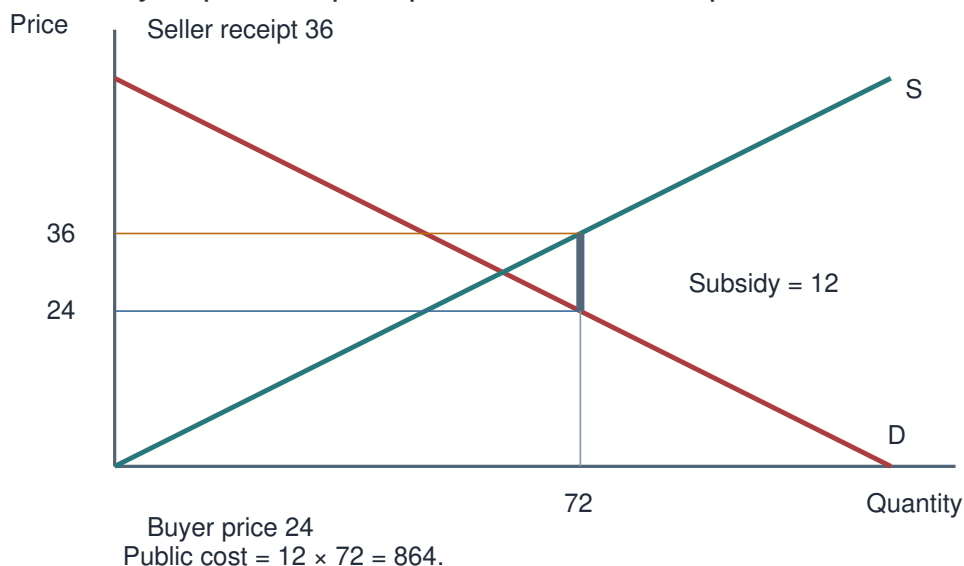
The benefit split depends on relative responsiveness. Less elastic demand can give consumers more of the price benefit; less elastic supply can leave more with producers. Market power, eligibility and contract terms can change the simple model.

Checked example

Use the original $Q_d=120-2P$ and $Q_s=2P$, with $P=30, Q=60$. Subsidy 12 gives $P_s=P_b+12$. Set $120-2P_b=2(P_b+12)$: $P_b=24, P_s=36, Q=72$.

Buyers save 6 per unit and sellers gain 6 in receipt. Public cost = $12 \times 72 = 864$. $CS=\frac{1}{2} \times 36 \times 72=1296$ and $PS=\frac{1}{2} \times 36 \times 72=1296$. Net of the public payment, gains are $2592-864=1728$, below original 1800 in this no-external-benefit model. More trades alone do not establish greater net welfare.

A subsidy separates paid price and received price



The equal benefit split is specific to the symmetric curves. A subsidy addressing external benefits may move output closer to the social optimum instead of creating inefficient extra output.

Public funds have alternative uses. Funding, targeting, fraud risk and administrative costs matter. A producer subsidy is not the same as handing every consumer the same cash sum; show both prices and the output actually supported.

1.3.5.1 · Private decisions and social allocation

A market can clear while missing the interests of people outside the transaction. Conversely, a socially valuable service may have no paying customer.

An equilibrium is not automatically an efficient social allocation.

Market failure occurs when the market allocates resources inefficiently: output can exceed or fall below the social optimum. In a marginal model, efficiency compares the social benefit of one extra unit with its social cost. Private buyers and sellers may omit external effects on third parties.

Other mechanisms are distinct: non-excludability invites free riding on a public good; information gaps distort choices; protection from losses may alter risk-taking; and speculative expectations can feed a bubble. Name the mechanism and explain its allocation consequence instead of listing every failure for every case.

Checked example

In a fictional market, marginal private benefit is $MPB=100-Q$ and marginal private cost $MPC=20+Q$. Private equilibrium solves $MPB=MPC$: $100-Q=20+Q$, giving $Q=40$. Suppose each extra unit also damages neighbours by 20: $MSC=MPC+20=40+Q$, while $MSB=MPB$.

The social optimum solves $MSB=MSC$: $100-Q=40+Q$, giving $Q=30$. Units 31–40 cost society more than their benefit. The market clears at 40, but this does not remove the external harm. If no external effect or other distortion existed in this model, private and social optimum would coincide.

Social efficiency is not identical to fairness. A distributional argument needs explicit value judgements; a high price alone does not prove market failure. A shortage under a binding price ceiling has a different cause from omitted external costs.

Do not claim every disliked outcome is failure or that any intervention improves it. Compare achievable alternatives, including information and enforcement costs, rather than an ideal government with an imperfect market.

1.3.5.2(a–e) · Production externalities and marginal social cost

A dye producer pays for labour and chemicals, but nearby households bear untreated effluent damage.

A payment to the producer is not the same thing as the total cost of producing the dye.

Private cost falls on the decision-maker; external cost falls on third parties outside the compensated transaction. Social cost is private plus external cost. Marginal values refer to one extra unit; a total-cost figure cannot simply be drawn as a marginal gap. For a negative production externality, MSC lies above MPC, while $MSB=MPB$ if consumption has no external effect.

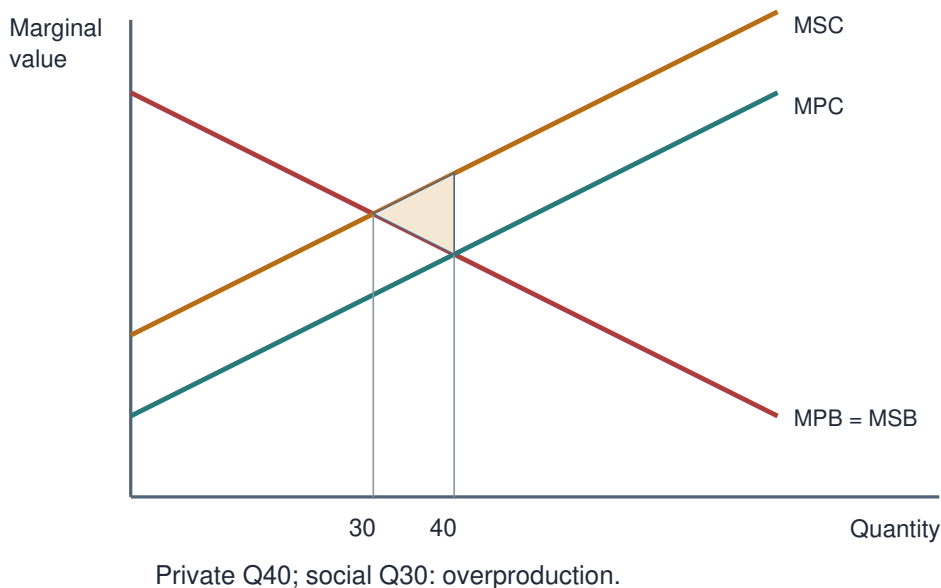
A positive production externality, such as uncompensated knowledge spillovers to other firms, makes net marginal social cost lower than private cost in this cost-side representation. State the mechanism before choosing which curve separates. A fall in a competitor's revenue caused merely by a price change is not automatically an uncompensated resource externality.

Checked example

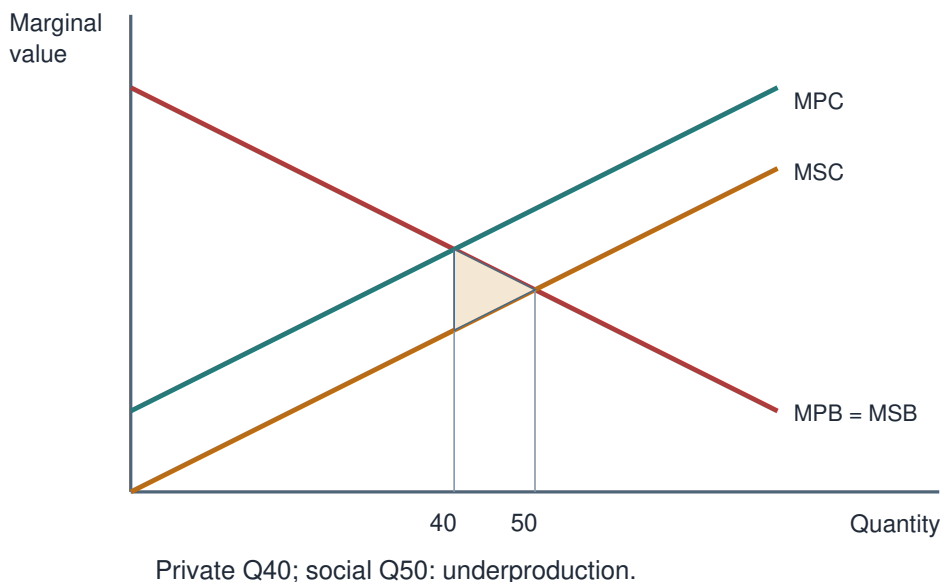
Take $MPB=MSB=100-Q$, $MPC=20+Q$ and marginal external cost $MEC=20$. Hence $MSC=MPC+MEC=40+Q$. Private output solves $100-Q=20+Q$, so $Q_m=40$; social output solves $100-Q=40+Q$, so $Q^*=30$.

At Q_m , $MSC=80$ and $MSB=60$: the vertical gap is 20. Between 30 and 40 the lost net gain is a triangle: $\text{loss} = \frac{1}{2} \times (40-30) \times 20 = 100$ currency units. It is not total damage, which is $MEC \times Q_m = 800$ in this constant-damage case. For an alternative positive spillover of 20 per unit, $MSC=MPC-20=Q$. The social optimum would be $100-Q=Q$, $Q^*=50$: the unregulated private output of 40 is too low.

External production cost



Positive production spillover



The numerical marginal harm is assumed constant. Actual environmental damage may depend on location, thresholds and cumulative emissions. Transport has both production and consumption effects; congestion from driving can be treated as an external consumption cost when the choice model is journeys.

Financial-system risk can impose costs on firms and households outside a lending transaction, but a bank's own unpaid loss is a private cost. Avoid counting the same effect twice on both MSC and MSB. Measuring external damage and enforcing a corrective policy remain separate tasks.

1.3.5.2(a–e) · Consumption benefits and underuse

A vaccination protects its recipient and may reduce infection risk for other people. Education can benefit its learner and generate spillovers.

Count the private return separately from the uncompensated gain to others.

Private benefit goes to the chooser; external benefit goes to third parties outside the transaction. Social benefit is private plus external benefit. In a positive consumption externality model, MSB lies above MPB; $MPC = MSC$ if provision has no external production effect. The market may consume too little because individuals compare their own benefit with price.

For a negative consumption externality, such as uncompensated disturbance from late-night use, MSB lies below MPB and market quantity can exceed the social optimum. This benefit-side diagram and the production cost-side diagram represent different

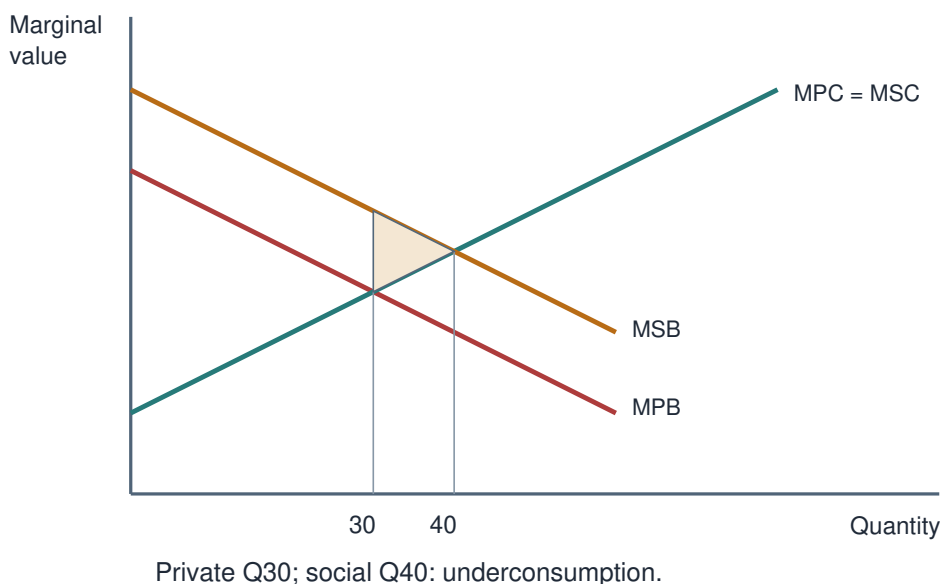
causal mechanisms; do not switch labels just because the desired quantity change is similar.

Checked example

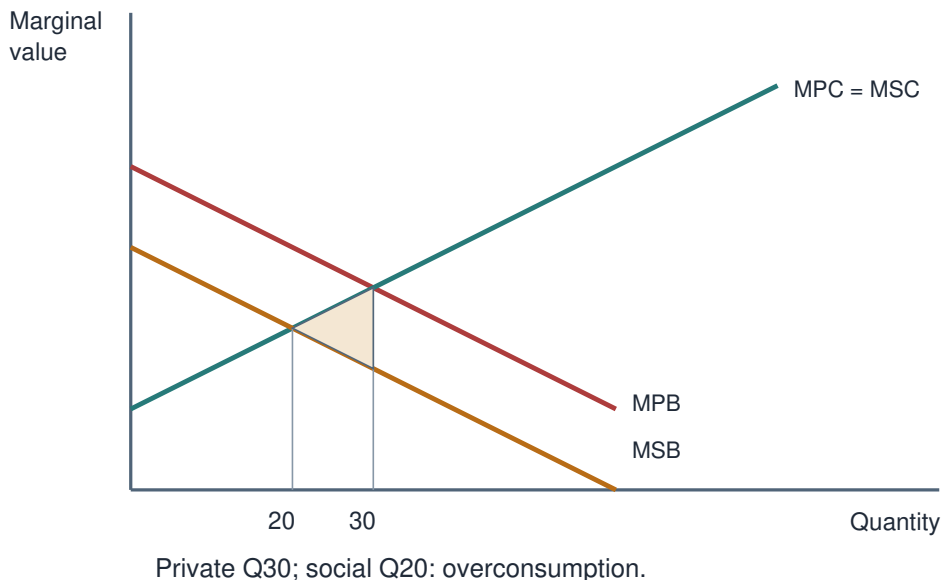
Let $MPB=80-Q$ and $MPC=MSC=20+Q$. Private equilibrium solves $80-Q=20+Q$, giving $Q_m=30$. Suppose each use benefits others by 20: $MEB=20$ and $MSB=MPB+MEB=100-Q$. The optimum solves $100-Q=20+Q$, giving $Q^*=40$.

At Q_m , $MSB=70$ and $MSC=50$, a gap of 20. The missed net gain from Q_{30} to Q_{40} is $\text{loss} = \frac{1}{2} \times (40-30) \times 20 = 100$ currency units. It is a potential welfare gain if those additional units can be provided at the modeled cost. For an alternative external consumption cost of 20, $MSB=MPB-20=60-Q$, and $Q^*=20$: private output 30 would be excessive.

External consumption benefit



External consumption cost



Higher lifetime earnings are mainly a private education benefit, while knowledge shared with others may be an external benefit. A clinic's treatment cost is private production cost, not an external benefit merely because the service is health care. Vaccination effects depend on disease, uptake and effectiveness; no numeric real-world effectiveness is claimed here.

Education, health, transport, environmental quality and financial stability need a named third-party effect. A merit-good information argument can coexist with an externality, but it is a different mechanism and should be evaluated separately.

1.3.5.3 · Public goods, rivalry and free riding

A flood-warning signal can protect people who did not pay for it. A school meal is used by one person and can be withheld from non-payers.

Funding by government does not determine whether a good is public in the economic sense.

Rivalry means one person's use reduces the amount or service available to others. Excludability means non-payers can feasibly be prevented from using it. A pure public good is non-rival and non-excludable; a private good is rival and excludable. A subscription broadcast can be non-rival but excludable; an open-access fish stock can be rival but hard to exclude.

Free riding occurs when someone benefits without contributing and hopes others pay. If beneficiaries can enjoy a public good regardless of their own payment, voluntary

private financing may fall below the level that their combined benefits justify. The problem concerns incentives to contribute, not the absence of any benefit.

Checked example

Three fictional households value a shared warning service at 40, 35 and 25 currency units per month. Their combined willingness to pay for the SAME service is $40+35+25=100$. Provision costs 80; stated aggregate benefit exceeds cost by 20. Yet if nobody can be excluded, each may withhold payment expecting others to cover it.

Sharing cost equally would require $80/3 \approx 26.67$ each, more than the third household's stated value of 25. A compulsory equal levy can finance the service but has a distributional consequence. A voluntary contribution of $40+35+5=80$ covers cost only if these contributions actually occur; the values do not prove that they will.

Non-rivalry can fail under congestion, and technology can make exclusion feasible. A road may be non-rival below capacity and rival during congestion; a toll can change exclusion. Education and health treatment normally use scarce staff and places, so they are not pure public goods merely because government provides them.

Public provision, collective agreements and bundled financing can overcome some contribution problems. Each has costs and constraints. Do not confuse common-resource overuse with public-good underprovision; rivalry is the key distinction.

1.3.5.4 · Information gaps and adverse selection

An insurer may not observe each applicant's risk as well as the applicant does. A pension buyer may not understand a fee shown in the small print.

A missing fact matters through the choice it changes.

With symmetric information, parties have comparable relevant knowledge; both can still face uncertainty. Asymmetric information occurs when one party knows more of the information relevant to the transaction. A broader information gap can cause a consumer to underestimate costs or benefits even when no seller deliberately conceals them.

Adverse selection arises before a contract when hidden characteristics influence who chooses it. A pooled insurance price can attract higher-risk applicants and drive lower-risk applicants away. Moral hazard is different: incentives change after protection is obtained, affecting behaviour rather than merely selecting types.

Checked example

Fictional applicants have expected claims of 200 or 800 currency units per year; initially half are each type. Expected pooled claims $= (200+800)/2 = 500$. Ignore administration

and profit for this example. If low-risk applicants reject a premium of 500 because their expected claim is 200, only high-risk applicants remain and expected claims rise to 800.

This selection story assumes applicants know their type and make the stated choice. Insurance also transfers risk; expected claims alone do not determine willingness to pay. For a separate pension case, an unrecognized fee of 1% on a balance of 10000 is 100 in the stated year, before returns. A repeated percentage fee acts on changing balances, so multiplying 100 by the number of years is not a general projection.

Health decisions can omit treatment risks or long-term prevention benefits; education choices can misjudge course quality or returns; pension choices can omit fees, inflation or withdrawal restrictions. Explain which fact is missing and how the decision changes, rather than asserting that all consumers are uninformed.

Disclosure, independent advice, quality standards or risk assessment may help, but comprehension, cost, privacy and unequal access matter. There can be legitimate limits on information collection. A price change alone cannot tell us whether selection, uncertainty or moral hazard caused an observed outcome.

1.3.5.5 · Moral hazard and protection from losses

After buying cover, a person may take fewer precautions if someone else now pays part of an accident's cost. A bank may take greater risks if its decision-makers expect rescue.

The relevant mechanism is the incentive change, not an accusation that every insured person behaves badly.

Moral hazard arises when protection from consequences changes incentives to take care or take risks. Hidden or costly-to-monitor actions can reinforce the problem. Consumers may reduce prevention; producers may take riskier decisions; workers' effort or safety incentives can weaken under poorly designed protection; government may face larger expected claims or rescue costs.

Insurance and banking also provide useful risk sharing and finance. Deposit protection can help confidence while expected rescue may weaken monitoring or encourage risky lending. Distinguish shareholders, managers, depositors, borrowers and taxpayers: they do not necessarily receive the same protection.

Checked example

A fictional precaution costs 30 and reduces accident probability from 10% to 2%; damage is 1000. Without cover, expected avoided loss = $(0.10 - 0.02) \times 1000 = 80$, exceeding cost 30. With full cover and no premium response, the person avoids no out-of-pocket damage by taking the precaution.

With a deductible of 200 per accident, expected avoided private loss $= (0.10 - 0.02) \times 200 = 16$, still below cost 30 in this simplified risk-neutral case. A deductible therefore restores some incentive but does not necessarily restore enough. In banking, a decision that pays managers a bonus on an upside while losses fall on creditors or an expected public rescue can similarly separate private rewards from social risk.

Real choices include risk aversion, inconvenience, injury not covered by money, premium changes, exclusions and legal duties. The numerical example is an incentive model, not advice about buying insurance.

Monitoring, deductibles, co-payments, capital requirements and credible loss-sharing can help but create costs and may reduce access or valuable risk taking. A worker's safety can depend on an employer's equipment, not simply individual effort. Adverse selection concerns hidden types entering a contract; moral hazard concerns changed incentives under protection.

1.3.5.6 · Speculation, leverage and market bubbles

Buyers may purchase an asset because they expect another buyer to pay more later. Rising prices can seem to confirm that belief and attract still more borrowing.

An expectation of resale is different from valuing the income or services an asset provides.

Speculation involves buying or selling on expected price changes. A bubble can develop when expectations and imitation feed price increases beyond levels supported by expected fundamental returns. Easy borrowing may amplify demand; collateral values can support further loans; falling prices can reverse that loop through forced sales and tighter credit.

Housing provides accommodation and equity gives claims on uncertain business returns. A price rise may reflect genuine scarcity, improved profits or lower discount rates rather than a bubble. The future is uncertain: describe the feedback mechanism rather than declaring every rapid rise irrational.

Checked example

A fictional house costs 300, financed with debt 240 and equity 60. If its price rises 10%, its value is 330 and equity becomes 90 with debt unchanged: equity gain $= (90 - 60) / 60 \times 100 = 50\%$. If the price instead falls 20% to 240, equity is zero before sale costs; a further fall to 220 leaves asset value 20 below debt.

A separate unleveraged share purchase of 100 rising to 120 then falling 25% reaches 90, a 10% loss relative to its initial value. Percentage rises and falls use different bases. Borrowing can magnify losses; this arithmetic makes no forecast or investment recommendation.

During expansion, owners may enjoy wealth gains, construction and related firms may expand, and workers may gain jobs. After a reversal, indebted households may cut spending; developers and banks may suffer losses; workers can face unemployment; government revenue may fall while support demands rise. Some renters or new buyers may benefit from lower housing prices if finance remains available.

Loan terms, recourse, income, interest, liquidity and regulation affect the outcome. A loss in market value is not automatically a realized cash loss, but it can affect collateral and spending. Equity prices can adjust to revised profits without a speculative bubble.

1.3.6.1(a–c) · Price limits, tax and subsidy choices

A low legal maximum may make a listed price affordable while leaving too few units available. A guaranteed minimum may support producers while requiring public purchases.

The price rule and how it is enforced determine the outcome.

A maximum price below equilibrium can create excess demand; a minimum above equilibrium can create excess supply. A non-binding limit does not change the competitive equilibrium. Rationing, queues, quality changes or informal markets may follow; a posted low price does not ensure access.

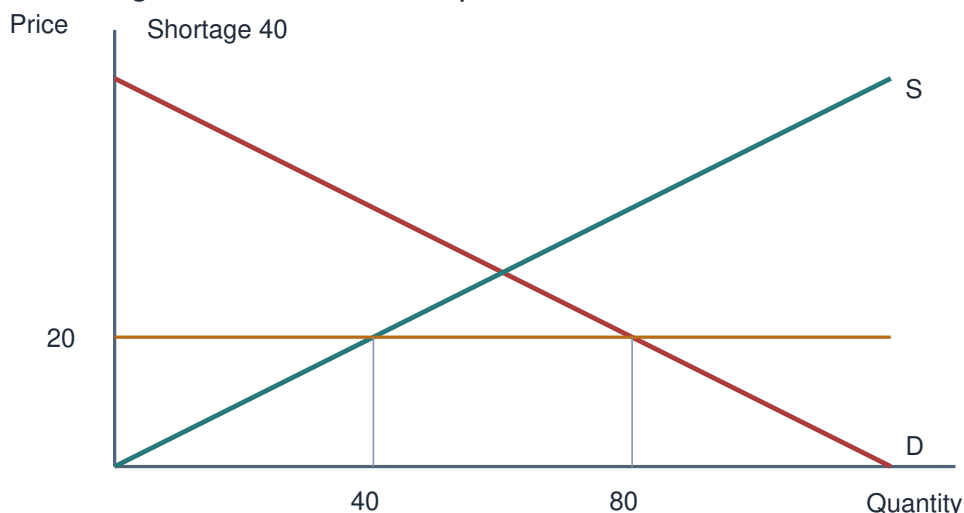
A guaranteed minimum differs from a legal floor without purchases: the government may buy surplus to sustain the price. Storage, disposal and incentives to produce then matter. A specific tax is fixed per unit; an ad-valorem tax is a percentage of a stated value. A subsidy may lower the buyer price and raise the supplier receipt. Use the earlier two-price incidence models rather than assuming who legally pays receives the whole burden or benefit.

Checked example

For $Q_d = 120 - 2P$ and $Q_s = 2P$, equilibrium is $P = 30, Q = 60$. A maximum $P = 20$ gives $Q_d = 80, Q_s = 40$: shortage 40, with at most 40 units supplied under the static model. A guaranteed minimum $P = 40$ gives $Q_d = 40, Q_s = 80$: surplus 40. If government buys all surplus at 40, expenditure $= 40 \times 40 = 1600$; consumers buy 40 and government buys 40.

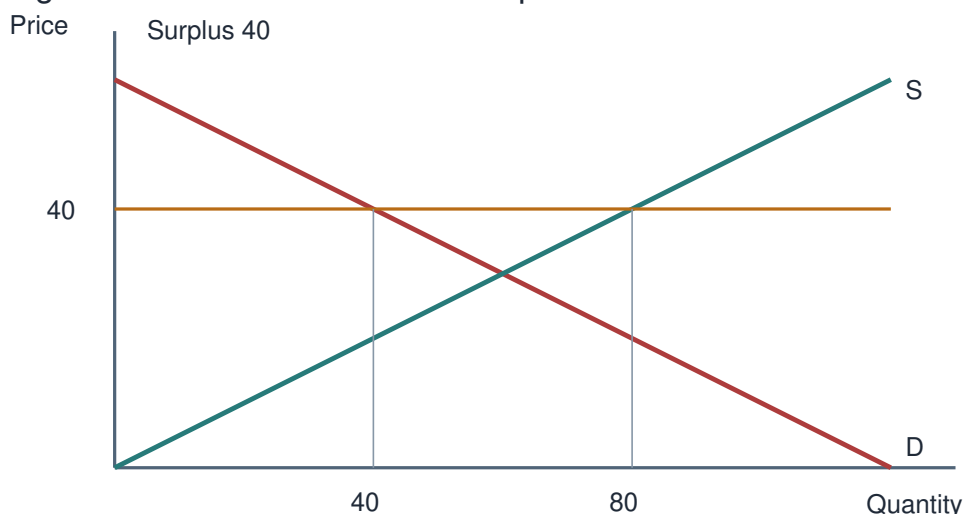
A specific tax of 3 on a unit priced 20 is 15% of that value; a 10% ad-valorem tax is 2 at value 20 but 3 at value 30. A corrective tax should respond to the marginal external harm, not simply reproduce the same percentage for every context. In the earlier constant-MEC 20 production case, a specific tax 20 can move private output from 40 toward the modeled social 30.

A binding maximum below equilibrium



Only 40 supplied; 80 demanded at the ceiling.

A guaranteed minimum above equilibrium



Government buys 40 at price 40: expenditure 1600.

A housing rent ceiling can help sitting tenants while reducing maintenance or new supply, depending on rules and elasticities. Energy or transport price caps can protect users but may weaken conservation incentives or require funded supplier compensation. Agricultural or commodity guarantees can stabilize producer receipts while encouraging surplus and costly storage.

Health or education subsidies may address external benefits or access, but eligibility,

opportunity cost and provider capacity matter. Compare targeted transfers, provision or regulation where appropriate. A floor without a purchasing guarantee need not result in 80 units actually sold.

1.3.6.1(a–c) · Pollution permits and property rights

Two factories can reduce the same pollution at different costs. A shared emissions cap can allow reductions to occur where they are cheaper, provided emissions are measured and the rule is enforced.

Tradability changes who abates; the cap sets the permitted total.

Tradable pollution permits require covered firms to hold rights for specified emissions. An enforced cap constrains total covered emissions; trade can shift abatement toward firms with lower marginal reduction costs. Unlike a tax that sets a charge and leaves the resulting quantity uncertain, a cap fixes permitted quantity while the permit price responds to demand.

Extending property rights can give affected parties an enforceable claim and an incentive to bargain over external effects. Clear rights alone do not ensure an efficient outcome when parties are numerous, damage is uncertain, transaction costs are high or enforcement is weak. Initial rights and permit allocation affect distribution even when efficient abatement is possible.

Checked example

Each fictional factory initially emits 10 units; total 20. A cap of 12 requires 8 units of total abatement. Assume constant abatement costs: A costs 10 per unit and B costs 30, and each can reduce up to 10. Equal reductions of 4 each cost $4 \times 10 + 4 \times 30 = 160$. A instead abates 8 and B 0, reducing resource cost to $8 \times 10 = 80$ while final emissions remain $A\ 2 + B\ 10 = 12$.

If each starts with 6 permits, A has 4 spare after its 8 reductions and B needs 4 more. Trading 4 permits at 20 transfers 80 from B to A. A's abatement cost 80 is offset by receipts 80; B pays 80. The trading payment redistributes money: total resource abatement cost is still 80, not 160. The assumed permit price 20 is illustrative, not an asserted market forecast.

Marginal abatement costs normally change as more is removed; compare next-unit costs, not a fixed average. A cap may leak emissions into uncovered regions or activities, and monitoring, penalty credibility, banking of permits and market power matter. Auctions can generate public revenue; free allocation can confer rents.

A local noise dispute with a few parties may be easier to bargain over than diffuse air pollution affecting thousands. Environment, energy, transport and commodity production can require different coverage and harm measures. Neither permits nor rights automatically protect every household or eliminate all residual harm.

1.3.6.1(a–c) · Provision, regulation and information

A warning service may need collective funding. Unsafe emissions may need enforceable limits. Misunderstood pension fees may need clearer information.

A policy works through a mechanism; naming an instrument is only the start of an explanation.

State provision can finance or deliver services where free riding, external benefits or access concerns weaken market provision. Public financing and public production are distinct: a government may pay an independent provider. Regulation can set product, safety, emissions or behaviour standards, with monitoring and sanctions. Information provision can improve choices where relevant facts are missing or misunderstood; it does not directly solve every externality or inability to pay.

Match the chain: failure or objective → instrument → changed incentives/constraints/knowledge → allocation → stakeholders → limitations. Information must be accurate and understandable; compliance rules need enforcement; publicly funded services need staff, equipment and a fair allocation of scarce capacity.

Checked example

A fictional transport campaign costs 1000 and is estimated to reduce 50 harmful journeys, each with external harm 30. Gross avoided harm = $50 \times 30 = 1500$. Ignoring other changes, net benefit = $1500 - 1000 = 500$. If it reduces only 20 journeys, avoided harm 600 gives net -400 .

The switch-point is $1000/30 \approx 33.33$ journeys: more than 33.33 effective reductions are needed under this simple model. Actual effects can include lost travel benefits, substitute modes, congestion, emissions and unequal burdens; the estimate alone cannot certify the campaign. If a public clinic can provide 200 appointments but 300 are requested, free access still requires a capacity/allocation decision.

In health, regulation can set medicine standards while provision supports treatment and information explains risks. In education, funded places and credible course-quality information address different constraints. In housing, building standards and supply measures differ from rent controls. In transport, information about routes differs from emissions standards or road provision.

Energy efficiency labels need comprehension; environmental limits need measured coverage; agriculture and commodities may require quality standards or resilience support. State provision can suffer weak cost incentives or waiting lists. Regulation can raise compliance costs or barriers to entry. Information can be ignored, biased or ineffective against habit and financial constraints. Choose a policy mix only after identifying these conditions.

1.3.6.2 · Government failure and feasible alternatives

A policy can have a reasonable aim and still cost more than the benefit it creates. A scheme that fixes one distortion can also create another.

Evaluate what it actually changes against a feasible alternative.

Government failure occurs when intervention produces a net welfare loss. Causes include information gaps about benefits, costs or behaviour; weak incentives to control costs or respond to users; unintended consequences; excessive administration; and moral hazard when expected public protection encourages risk. A policy's stated intention is not evidence of its net outcome.

Separate resource costs from transfers. A subsidy payment redistributes purchasing power but financing, administration and distorted incentives may impose real costs. Distribution still matters: an aggregate gain need not benefit every group. Compare actual intervention with the relevant no-policy or alternative-policy baseline, keeping assumptions explicit.

Checked example

A fictional policy generates modeled gross social gains 1200, uses implementation resources 900 and adds administration 400. Net change= $1200-900-400=-100$: government failure in this stated comparison. If redesign reduces administration to 150 with other effects unchanged, net change= $1200-900-150=150$.

The result depends on the unchanged-effects assumption. Cutting monitoring might instead reduce genuine gains. Suppose an information error overstates gross gains by 300: the redesigned estimate falls to $900-900-150=-150$. Sensitivity analysis tests whether the judgement survives plausible changes; it does not replace evidence.

A housing control may create maintenance or supply problems; an agricultural guarantee may encourage unwanted surplus; energy support may weaken conservation; a bank rescue expectation may encourage risk. These are mechanisms to investigate, not claims that all such policies fail. In health, education and environmental programmes, poor measurement and slow feedback can misdirect resources even where intervention is valuable.

A lack of market profit signals need not imply that every public provider is inefficient; explicit targets, user feedback and accountability can improve incentives. Include timing, monitoring, financing, capacity, elasticity and stakeholder impacts. End an evaluation with a conditional judgement about the most important constraint and a feasible comparison, rather than a memorized list.

2.3.1.1(a–e) · GDP, GNI and comparable real income

A larger money value of output may reflect higher prices or more people rather than higher output per person.

Choose a measure that answers the comparison being made.

GDP measures production within an economy over a period. Nominal GDP values it at current prices; a real or volume measure removes price changes using a stated reference-price/index method. Gross national income (GNI) adds net primary income received from abroad to GDP: it concerns resident income, not simply citizenship. Total measures describe the whole economy; per-capita measures divide by population.

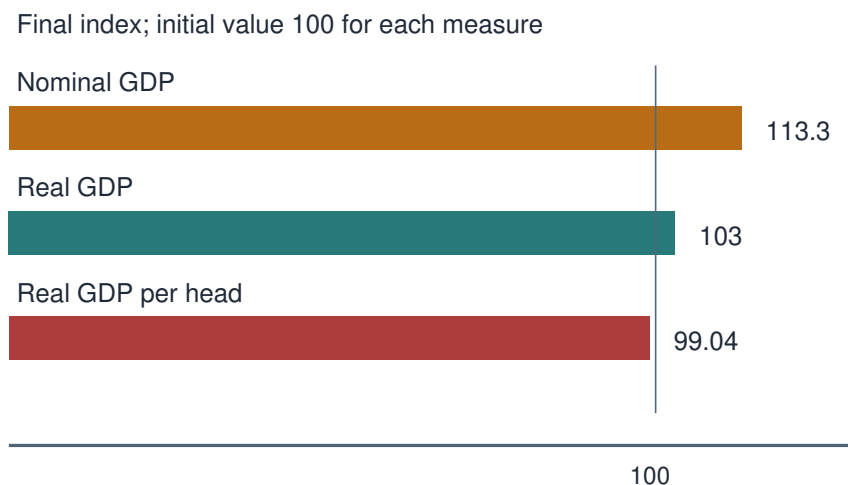
Compare growth using equivalent real measures, periods and bases. A level and a growth rate answer different questions. Purchasing-power parity adjusts currency comparisons for differences in price levels; market exchange conversion answers a different question and can change rankings.

Checked example

Fictional nominal GDP rises from 1000 to 1133; the GDP deflator rises from 100 to 110. Real GDP = nominal GDP $\div$ deflator $\times$ 100, so final real output = $1133/110 \times 100 = 1030$. Nominal growth is 13.3%, but real growth is 3%. Population rises from 50 to 52; real GDP per head moves from $1000/50 = 20$ to $1030/52 \approx 19.81$, a fall of about 0.96%.

With primary income received 40 and paid 70, final GNI = $1133 + 40 - 70 = 1103$ in current-price units. For a separate country comparison, A has 60000 local units per head and a PPP conversion factor of 3 local units per international dollar: 20000 international dollars. B has 12000 and a PPP factor 0.8: 15000. These differ from market conversions of 6 and 1 local units per US dollar, which would give 10000 and 12000 US dollars.

Three different income comparisons



Output rises 3%; population rises 4%; per-head output falls.

The deflator is not automatically the consumer-price index: it covers domestic production rather than only household purchases. A second-hand asset transfer is not newly produced output, though a current transaction service can count. Capital gains are not new production.

PPP estimates depend on baskets, coverage and methods; per-capita averages hide distribution. Never compare the fictional international-dollar values with actual country data without matching definitions and dates. Real growth does not alone prove improved wellbeing.

2.3.1.1(f-i) · Growth rates, recession and wellbeing

A recovery quarter can have positive growth while output is still below its previous peak. Higher average income can also coexist with worse outcomes for some households.

Levels, rates and wellbeing need separate evidence.

Positive real growth means output rises relative to the stated previous period; negative growth means it falls. The specification uses two consecutive quarters of negative real growth as its recession criterion. Apply it to quarter-on-quarter real output, not to a single monthly fall or an unrelated annual comparison.

GDP/GNI omit much unpaid household work, imperfectly capture informal activity, and do not directly measure leisure, environmental quality, health, security or income distribution. Subjective wellbeing asks people about their experience; objective

wellbeing indicators can include life expectancy, access to education, housing and environmental conditions. Income can support basic needs and choice, but adaptation, relative comparisons and unequal gains complicate the relationship.

Checked example

Fictional quarterly real output is 100,99,98,98.5. First growth= $(99-100)/100 \times 100 = -1\%$; next growth= $(98-99)/99 \times 100 \approx -1.01\%$. These two successive contractions meet the taught recession criterion. The final quarter grows $(98.5-98)/98 \times 100 \approx 0.51\%$, yet output 98.5 remains 1.5% below 100.

In a separate two-household example, incomes 20 and 80 average 50. Later they become 15 and 95, averaging 55: the mean rises 10%, while the lower-income household loses 25%. The average alone cannot establish that everyone is better off. A wellbeing survey and distribution data would answer questions that the average cannot.

For households, disposable income after taxes and transfers differs from gross income. National accounts are revised; seasonal adjustment and period definitions affect interpretation. The taught recession criterion is the qualification's rule, not a claim that every institution defines recessions identically. Subjective reports face wording, cultural comparison, response and sampling issues; an index's weights embody choices.

Avoid claiming a universal income threshold above which happiness stops rising. Compare multiple indicators and identify who benefits, the period and the missing dimensions before making a conditional living-standard judgement.

2.3.1.2(a–d) • Weighted price indices and disinflation

Households spend different shares on food, housing and travel. An index must reflect weights rather than simply averaging every price change.

A falling inflation rate can still mean a rising price level.

Inflation is a sustained increase in the general price level; deflation is a decrease; disinflation is a slower positive inflation rate. The consumer price index (CPI) compares the cost or price relatives of a representative household basket using expenditure weights. Calculate the rate of change from the previous index, not by subtracting 100 whenever the base is a different period.

CPI is an average: households with different baskets face different experiences. Substitution, new products, quality adjustment, sampling and changing weights complicate measurement. Producer/wholesale price indices can signal input or output cost pressure before consumer prices change, but margins, productivity, imports and demand affect pass-through.

Checked example

Fictional basket weights are food 0.5, housing 0.3, travel 0.2, summing to 1. Their current price relatives are 104, 110, 95 against base 100. Weighted $\text{CPI} = 0.5 \times 104 + 0.3 \times 110 + 0.2 \times 95 = 104$. Against prior CPI 100, $\text{inflation} = (104 - 100) / 100 \times 100 = 4\%$. An unweighted mean would be 103 and answer a different question.

If CPI next becomes 106.08, $\text{inflation} = (106.08 - 104) / 104 \times 100 = 2\%$: disinflation, because prices still rise. A later 2% fall makes $\text{CPI} = 106.08 \times 0.98 = 103.9584$: deflation. A producer index rising from 120 to 126 increases 5%, not 26%; it does not prove CPI inflation will also be 5%.

A price index is not a household budget in currency, and an index point is not automatically a percentage change. Use the same scope, population and period when comparing indices. The GDP deflator and CPI cover different expenditure/production sets.

One product becoming cheaper is not evidence of general deflation. Quality changes or temporary price movements complicate inference. The fictional basket illustrates the calculation; it is not an official national CPI weighting system. Always state the comparison period and interpret both the price level and its rate of change.

2.3.1.2(e–g) • Inflation sources and stakeholder effects

Prices can rise because spending expands or because producing goods becomes more costly. Prices can fall because demand weakens or because productivity improves.

The cause changes the output effect and the policy trade-off.

Demand-pull inflation follows higher aggregate spending relative to capacity. In an upward-sloping SRAS region, an AD increase can raise output and the price level. Cost-push inflation follows an adverse supply change, such as higher energy costs: the price level rises while output can fall. Excessive money growth can support nominal spending beyond real capacity, but velocity, credit, confidence and spare capacity affect the outcome.

Deflation can follow weaker AD or contraction of money/spending; an outward AS shift can instead lower prices while real output rises. An AD/AS diagram uses the general price level and real national output, not one product's price and quantity. Explain the source and assumptions before applying the picture.

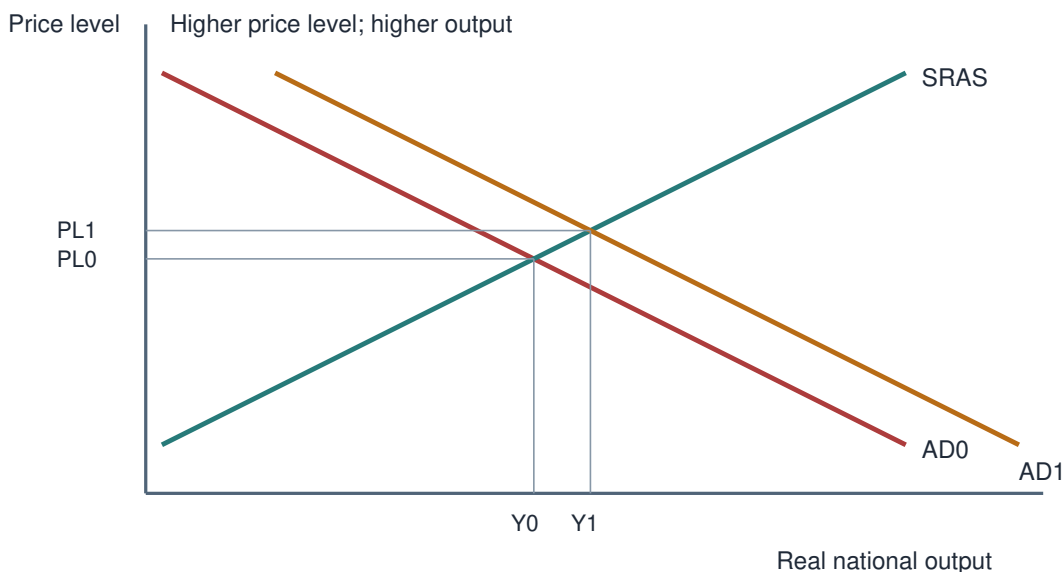
Checked example

In a fictional fixed-nominal-wage case, a worker receives 100 and the price index rises from 100 to 110. Real wage at base prices $= 100 / 110 \times 100 \approx 90.91$: purchasing power falls about 9.09%, not exactly 10%. A fixed nominal debt repayment also buys fewer

goods after an unexpected price rise; the debtor may gain and creditor lose in real terms, with unchanged contract terms.

If nominal wages rise 12% while the price level rises 10%, real wages change by $1.12/1.10 - 1 \approx 1.82\%$. Nominal growth alone cannot identify the real outcome. Under deflation, fixed nominal debt becomes heavier in real terms; delayed purchases and weak revenue can harm firms, but productivity-driven cheaper supply need not produce the same output decline.

Demand-pull: aggregate spending expands



Cost-push: adverse short-run supply shift



Consumers' outcomes depend on income adjustment and baskets. Workers with indexed wages differ from fixed-wage workers. Firms may face input costs, demand and repricing costs; uncertain inflation can complicate investment. Government may face indexed spending, changing nominal revenue and real debt burdens. Income distribution shifts according to contracts and asset holdings.

Domestic inflation relative to trading partners can weaken price competitiveness and the current account, but exchange rates, quality and elasticities matter. Do not state that inflation always improves profits, reduces every wage or worsens trade. Stable expected low inflation differs from an unexpected or volatile increase.

2.3.1.3 · Labour-force rates and hidden slack

A lower unemployment rate may reflect people finding jobs, or people leaving the labour force. A person with a paid job may still want and be available for more hours.

Headline rates need flows and classification evidence.

In the ILO framework, unemployment generally concerns working-age people not employed, seeking employment and available to take it within the specified reference periods. The labour force comprises employed plus unemployed people; others are outside it: economic inactivity. Employment can include temporarily absent jobholders, and working at least an hour for pay/profit can count under the applicable framework. Underemployment concerns employed people whose work is insufficient, such as wanting and being available for more hours; it is not the same as being unemployed.

Frictional unemployment arises during job matching; seasonal from recurring activity patterns; structural from mismatched skills/location; demand-deficient from weak spending; real-wage inflexibility can prevent adjustment in a stated labour-market model. Identify the mechanism rather than assigning a category from unemployment duration alone.

Checked example

A fictional working-age group has 1000 people: employed 720, unemployed 80, inactive 200. Labour force = $720 + 80 = 800$. Unemployment rate = $80/800 \times 100 = 10\%$; employment-to-population ratio = $720/1000 \times 100 = 72\%$; inactivity rate = $200/1000 \times 100 = 20\%$. If 20 unemployed people stop seeking while employment stays 720, unemployed becomes 60 and inactive 220. New unemployment rate = $60/780 \times 100 \approx 7.69\%$, with no new jobs.

Suppose 30 of the 720 employed want and are available for more hours under the stated measure: they remain employed while showing time-related underemployment. Net migration of 100 jobseekers initially raises labour supply, but employment depends on demand, skills, investment and later spending; neither rising unemployment nor one-for-one job displacement follows automatically.

Specific age, job-search and availability windows follow the survey and standard used; do not equate benefit claimants with survey unemployment. ILO framework explains the classification; underutilization covers wider slack.

Unemployment can lower household income and demand, reduce firms' sales, weaken skills and wellbeing, lower tax receipts and raise benefit spending. Idle resources can place output inside a PPF, without necessarily shrinking capacity immediately. Migration can add skills, entrepreneurship and spending, but adjustment, housing and training matter. Compare employment, inactivity, hours and participation as well as the unemployment rate.

2.3.1.4 · Trade balances and the current account

A country can have a deficit on goods trade and a surplus on services. Income from assets and current transfers can then change the current-account total again.

Name the balance before judging its sign.

The balance of payments records transactions between residents and non-residents over a period. The current account includes goods, services, primary income such as labour/investment income, and secondary income such as current transfers. Its balance is not just merchandise trade. The capital account includes capital transfers and non-produced non-financial assets; the financial account records financial asset/liability transactions.

A goods/services trade surplus means exports exceed imports for the stated scope; a deficit means the reverse. A current-account deficit requires counterpart financing or asset changes in the accounting framework, but this does not by itself explain its sustainability. Financial-account sign conventions vary; do not invent a plus sign for every inward flow without defining the convention.

Checked example

Fictional goods exports 120 and imports 150 give goods balance -30 . Services exports 60 and imports 40 give services balance $+20$. Combined goods/services trade $=-10$. Primary income received 15 and paid 25 gives -10 ; secondary income received 8 and paid 3 gives $+5$. Current-account total $=-10-10+5=-15$.

A foreign investor's purchase of a domestic company share is a financial transaction, not an export of a newly produced service. A dividend payment abroad instead enters primary income. A migrant's current remittance can enter secondary income under the applicable residence classification; immigration status alone does not decide statistical residence.

A deficit may reflect investment-related imports that support future capacity, weak competitiveness, high domestic demand or temporary shocks; the context matters. A

surplus is not automatically evidence of higher living standards. Financing composition, future returns, debt service, exchange rates and external demand affect sustainability.

Do not count a share purchase as both financial inflow and export. Distinguish stocks of foreign assets/debt from annual flows. Accounting counterparts, reserve transactions and errors/omissions must be interpreted using the published convention rather than assuming every component individually balances to zero.

2.3.2.1 • Aggregate spending and the AD curve

A household buys an imported phone while a firm buys a domestically produced machine. Both are expenditure, but their contribution to domestic demand differs.

Aggregate demand concerns the economy's production, not the demand for one product.

Aggregate demand is planned spending on domestic output at different general price levels over a period. Its components are consumption C, investment I, government purchases G and net exports X–M. Imports are deducted because imported spending can already be inside C, I or G; the deduction isolates domestic production.

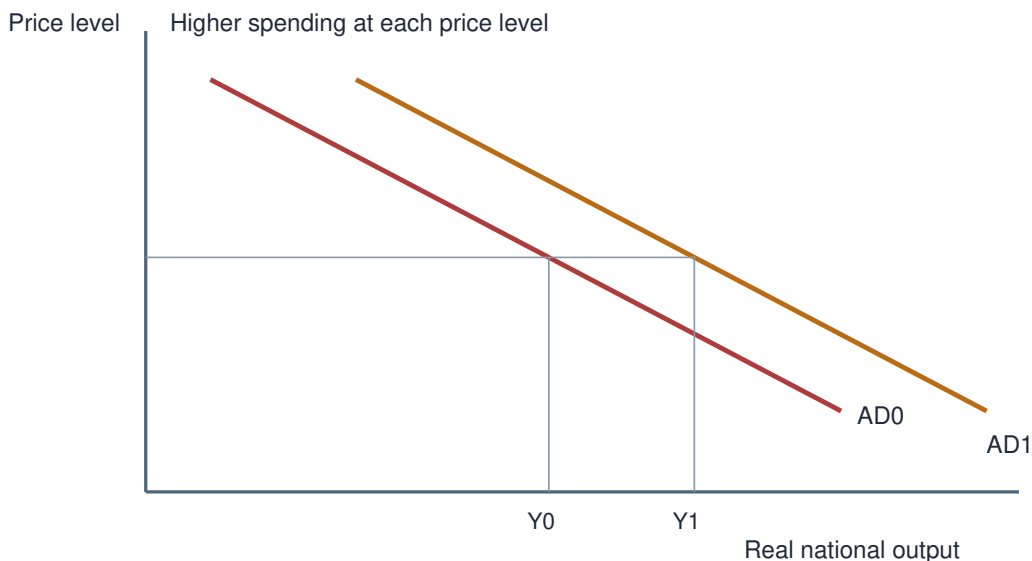
A change in the general price level gives a movement along a given AD curve, other determinants held constant. A change in confidence, policy or foreign demand can shift AD at each price level. The macro downward slope can reflect real purchasing-power, interest-rate and international-competitiveness effects under stated conditions; it is not explained simply by the diminishing marginal utility of one good.

Checked example

Fictional aggregate expenditure values for one period are C=320, I=80, G=120, X=100, M=90. Use $AD=C+I+G+(X-M)$: $AD=320+80+120+(100-90)=530$. Without the import subtraction, the total 620 would include spending on foreign production.

At the same price level, an independent rise in investment from 80 to 95 gives planned AD 545, a 15 increase before multiplier feedback. Government pension transfers do not directly purchase current output, so adding a pension payment 20 again to G would be wrong. The pension may instead influence household C. Buying an existing company share is financial investment, not new productive investment I in this account.

A shift in planned aggregate demand



The identity organizes expenditure; it is not a claim that any injection automatically raises real output by the same amount. Imports, capacity, prices and induced responses matter. If spending changes because the price level itself changes, trace a movement rather than shifting AD.

A higher price for one imported input is not automatically an increase in the whole economy's price level. The diagram's horizontal axis is real national output and its vertical axis is the general price level. Keep nominal spending totals and volume measures consistent before drawing a quantitative prediction.

2.3.2.2 · Consumption, saving and changing ratios

Households can respond to uncertainty by saving more, even with unchanged current income. An increase in wealth can affect spending without being the same as an increase in monthly income.

Trace which determinant changes.

Consumption depends on disposable income, interest rates, consumer confidence, welfare payments, wealth and access to credit. Disposable income is available after relevant taxes and transfers; saving is the part not consumed in the stated simplified household account. A savings ratio is saving divided by disposable income, usually expressed as a percentage.

A ratio over the whole income amount is an average, unlike a marginal propensity calculated from changes. Higher interest rates can discourage borrowing and reward saving, but they also change income for savers and borrowers. Welfare changes affect

recipients' disposable income; a wealth effect can influence spending independently of current income. Credit availability and confidence condition every channel.

Checked example

A fictional household has disposable income 1000, consumption 800 and saving 200. Saving ratio = $200/1000 \times 100 = 20\%$. In a later comparable period, disposable income 1100 and consumption 875 give saving 225; ratio = $225/1100 \times 100 \approx 20.45\%$.

The marginal propensity to consume over this change is $\Delta C/\Delta Y_d = (875 - 800)/(1100 - 1000) = 0.75$. The marginal propensity to save is 0.25, not the later average ratio 0.2045. Separately, if concern about future employment lowers consumption to 750 at the original income 1000, saving becomes 250 and the ratio 25%; at unchanged prices this weakens the C component of AD. It does not prove every household responds identically.

A higher savings ratio may reflect uncertainty, retirement planning, interest, reduced credit access or income distribution. More saving can finance investment, but investment needs willing borrowers and expected demand. A sudden fall in spending can weaken activity and income, so intended additional saving need not become the same additional realized saving across the economy.

Distinguish a household's stock of wealth from its income flow. Consider debt service and who gains from an interest-rate change. An average ratio alone does not identify the cause or the multiplier's marginal parameters.

2.3.2.3 · Investment, replacement and incentives

A firm replacing worn equipment records investment, yet its productive capital may barely increase. A lower interest rate is useful only if the firm can borrow and expects a worthwhile project.

Investment means productive spending here, not every purchase called an investment in everyday language.

Gross investment includes new productive spending that replaces depreciated capital as well as additions. Net investment is gross investment minus depreciation, the consumption of fixed capital over the stated period. Investment can respond to economic growth and expected demand, interest rates, business confidence, credit availability and taxes on company profits.

Growth can raise the need for capacity, but unused equipment or uncertainty may weaken the response. Higher interest raises financing cost and can make future returns less attractive. Tax relief, subsidies and lower corporation tax may increase retained funds or net returns, but do not guarantee additional productive projects. State the incentive and the condition required for a response.

Checked example

A fictional capital stock begins at 500. Gross investment 90 and depreciation 30 give $\text{net investment} = 90 - 30 = 60$; closing stock $= 500 + 60 = 560$, ignoring revaluation and other changes. If gross investment instead equals depreciation 30, net investment is zero even though replacement spending occurs.

A fictional loan of 1000 at 5% costs 50 interest per year under simple terms; at 7% it costs 70. A project yielding cash inflow before interest and other relevant costs of 60 would leave 10 after interest at 5% but -10 at 7% in this deliberately simplified comparison. A subsidy 20 to initial capital cost or tax relief affects different parts of the decision; it cannot be assumed to remove every later cost.

This short arithmetic is not a full investment appraisal: lifetime cash flows, risk, repayment, depreciation, taxes, financing terms and alternatives matter. An existing share purchase transfers financial ownership and is not itself new production of a capital good. Investment increases AD now and may increase productive capacity later, but poor targeting or idle capital can weaken that supply effect.

A tax incentive may reward projects firms would have undertaken anyway. A lower corporation-tax rate can raise retained profit but public revenue and competing spending uses matter. Credit rationing, expectations and implementation lags can dominate the nominal incentive.

2.3.2.4 • Government purchases and expenditure choices

A government can commission a bridge or pay a household benefit. Both use public funds, but only the first directly purchases current output.

A budget label does not replace national-accounting classification.

Government purchases G contribute directly to AD. A transfer payment provides funds without buying current output. Spending decisions can reflect fiscal stabilization, the level of economic activity, attempts to correct market failure and policy priorities. In a downturn, discretionary purchases may rise to support demand; automatic benefit payments may also rise as unemployment increases, affecting household income rather than entering G directly.

A public-good service or education infrastructure can be justified by a different objective from immediate stabilization. Spending composition, financing and implementation determine the effect. Public purchases can support capacity over time, while current services may chiefly meet present needs. The government faces opportunity costs even if unused resources make a short-run expansion easier.

Checked example

A fictional programme raises domestic government purchases by 40 and pays additional household transfers 20. The direct G increase is 40. If recipients spend 15 of the transfers on domestic output and save 5, the immediate C contribution is 15 under the stated assumptions. Direct planned domestic demand therefore increases $40+15=55$ before further feedback, not 60 automatically and not 75 by counting transfers twice.

If the purchases include imported equipment worth 10 already inside the 40, subtract that import increase in $X-M$: immediate domestic contribution becomes $30+15=45$, assuming the household purchases contain no imports. This separates spending labels from domestic-production content.

Government expenditure responds to priorities and constraints, not only recession. Correcting an externality may call for regulation or incentives rather than simply more purchases. Financing through taxes or borrowing can affect private spending, interest, confidence and future fiscal room; those effects require assumptions, not automatic crowding-out claims.

Procurement delays, skills, imported inputs and delivery quality matter. A bridge project may add demand before opening but only improve supply after completion and effective use. Judge timing, additionality, domestic content, opportunity cost and who benefits rather than assuming every pound or yuan of public outlay raises GDP by one.

2.3.2.5 · Net trade and conditional currency effects

A depreciation can make one export cheaper to a foreign buyer while making its imported input more costly. Global demand or delivery quality may matter more than that price change.

A currency calculation is the beginning of trade analysis.

An exchange-rate quotation states one currency's units per unit of another. Net trade $X-M$ can change with domestic real income, exchange rates, global economic conditions, protectionism and non-price competitiveness. Higher domestic income often raises import demand, conditional on preferences and import responsiveness. Higher foreign income may raise export demand. Depreciation can alter relative prices but contracts, capacity, elasticities and imported inputs condition the net effect.

Protection can reduce some imports yet invite retaliation or raise producers' input costs. Product quality, reliability, after-sales service, technology and delivery times affect demand independently of price. Name the quotation and the changed determinant before claiming a shift in net exports or AD.

Checked example

The fictional quote moves from 5 to 6 local currency units per US dollar: the local currency depreciates. A local-priced export of 120 costs a foreign buyer $120/5=24$ dollars initially, then $120/6=20$ dollars if its local price stays fixed. A dollar-priced imported input of 10 costs 50 locally initially and 60 later.

A producer using that input per export unit has margin before other costs $120-50=70$, then $120-60=60$ if local sale price remains 120. The foreign buyer sees a lower dollar price while the producer faces a lower local margin. If exporters raise local prices or contracts are fixed in dollars, the arithmetic changes. Without quantities and other flows, these two prices cannot determine the change in $X-M$.

Demand may respond slowly to prices because contracts, habit and supplier switching take time. Higher import costs can raise domestic production costs and affect supply as well as demand. A global slowdown can weaken exports despite depreciation; improved quality or reliability can strengthen exports without currency change.

Tariff protection is not costless: consumers, downstream producers, export access and retaliation matter. The examples do not predict an actual exchange rate or advise a currency transaction. Compare quantities, values, production capacity and time horizons before making a conditional current-account judgement.

2.3.3.1–3(a) · Short-run supply and two long-run models

Firms may raise production as the general price level rises with some costs fixed. A rise in energy costs changes the schedule itself. Longer-run capacity models make different assumptions about slack.

The time horizon and model shape matter.

Short-run aggregate supply (SRAS) relates planned economy-wide real output to the general price level. With relevant costs and determinants unchanged, a price-level change moves along a given supply curve. Higher raw-material or energy costs, cost-changing exchange rates or production taxes can shift SRAS left/up; lower costs can shift it right/down. Do not shift AS merely because output rises along its curve.

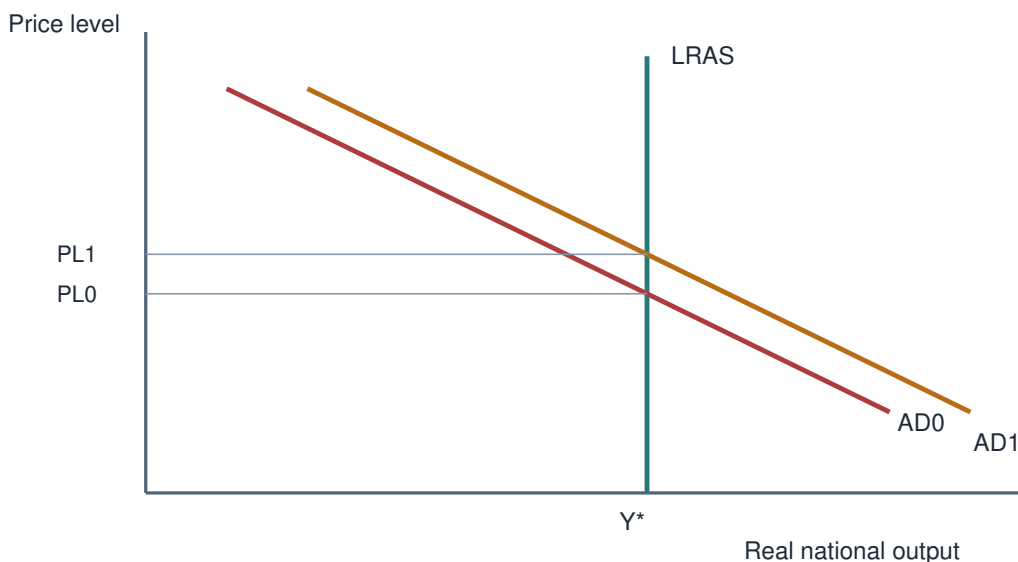
In the classical model, long-run aggregate supply (LRAS) is vertical at potential output determined by productive resources and technology; a higher price level alone does not permanently raise that capacity. A Keynesian AS representation has a low-output region with substantial spare capacity, a rising region as bottlenecks grow and a steep/vertical region near full capacity. The shapes imply different price/output responses to AD shifts.

Checked example

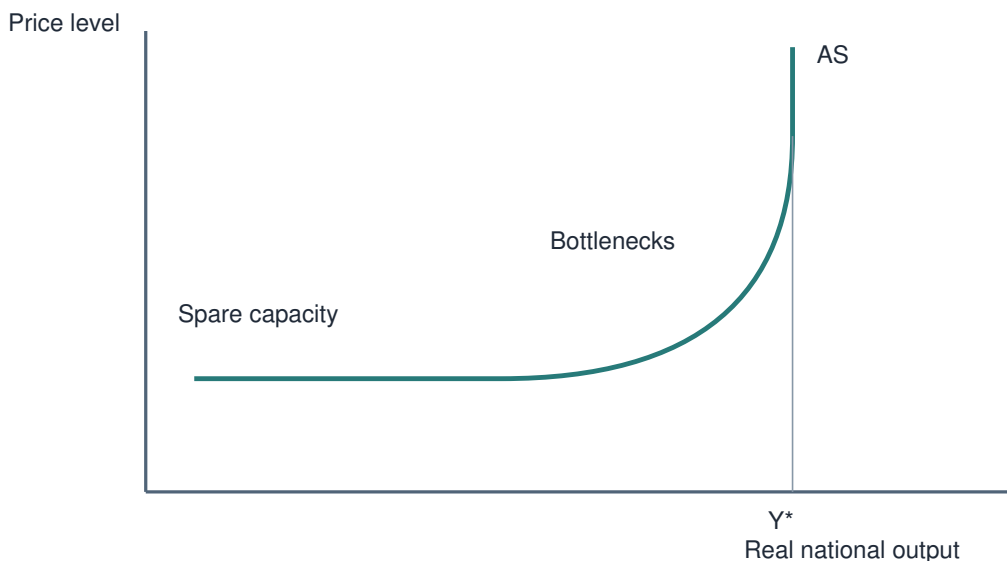
A fictional firm pays for 100 dollars of imported energy. A quote changing from 5 to 6 local units per dollar raises that bill from 500 to 600. With selling prices and other determinants fixed, higher production cost can shift the economy's SRAS adversely if sufficiently widespread; one firm alone does not establish an economy-wide magnitude.

For a separate classical long-run illustration, potential real output is 100. An AD increase changes the long-run intersection from price index 100 to 110 at output 100, with capacity unchanged. In a spare-capacity Keynesian region, an AD increase can instead raise output from 60 to 80 with little price pressure, subject to the assumed flat segment. These are distinct models, not two measured forecasts for one economy.

Classical long-run fixed capacity



Keynesian supply and capacity regions



Cost-push: adverse short-run supply shift



The Keynesian flat segment is an idealization; prices and wages need not be perfectly fixed. The classical LRAS model abstracts from transition, unemployment and demand-side hysteresis. Distinguish short-run output from sustainable capacity.

Exchange depreciation can raise import costs and shift $SRAS$ left, while export demand changes AD ; show both channels rather than confusing their curves. Different taxes

affect costs and incentives differently. A VAT or production levy is not interchangeable with an income-tax change. Explain which cost is affected, the scale, pass-through and horizon before drawing a shift.

2.3.3.3(b) · Capacity, productivity and policy conditions

Training can raise output per worker, while migration can add workers. New technology is useful only if firms can adopt it and use complementary skills and infrastructure.

More capacity requires an economic mechanism, not just a spending label.

Productive capacity concerns sustainable real output. LRAS can change through technology, productivity, education and skills, regulation and taxation, demography/net migration and competition policy. Labour productivity is output per labour input; more workers increase the input quantity, which is a different mechanism. Training and innovation can raise effectiveness; demographic change affects the labour force and skills available.

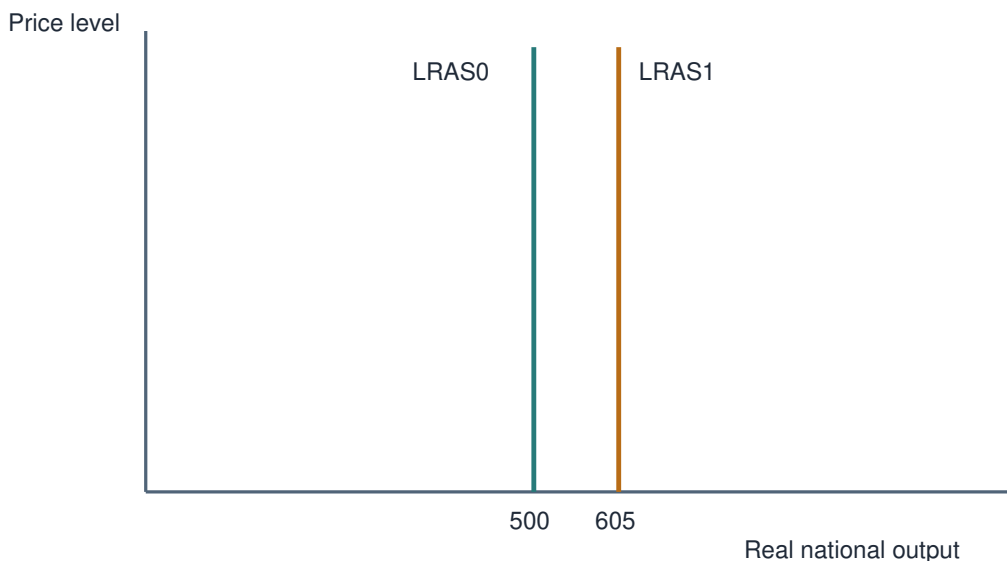
Regulation can impose costs but also protect safety, quality or trust; taxation can alter incentives and fund productive services. Competition policy can improve efficiency and innovation when it reduces harmful barriers or market power, but scale and investment incentives matter. Explain the intended capacity channel and the conditions required rather than assuming every deregulation or tax cut shifts LRAS right.

Checked example

A fictional economy has 100 workers producing 5 real-output units each: potential output = $100 \times 5 = 500$ under this simple labour-only model. Training raises output per worker to 5.5 with the workforce unchanged, giving 550. If the workforce then increases to 110 with the same productivity 5.5, potential output becomes 605.

Combined growth is $(605 - 500) / 500 \times 100 = 21\%$, not 20%: multiply the 1.10 productivity factor by the 1.10 workforce factor. This model assumes sufficient capital, demand-independent capacity measurement and successful skill matching. If equipment supports only 100 workers, adding people does not automatically realize 605. A demographic headcount change is not necessarily a labour-force change.

Potential output after productivity and labour gains



Policies take time and have opportunity costs. Training quality, participation and suitable jobs matter; technology may require finance, electricity and management. Migration can add needed skills but depends on recognition, infrastructure and integration. An ageing population can affect participation differently from total population.

Lower compliance costs can help firms, but removing effective standards may create external costs. Competition rules need evidence about market power and entry, not a presumption that size alone is harmful. Distinguish a rightward capacity shift from temporarily fuller use of existing capacity; a lower current unemployment rate does not by itself prove that potential output increased.

2.3.4.1 · Circular flows, income and wealth

A worker supplies labour and receives wages. A household buys output and the firm receives sales revenue. These are linked transactions, not separate additions to national income each time money passes a boundary.

A stock of savings differs from the income received this month.

In a simple circular flow, households supply factors to firms and receive factor incomes; firms supply goods/services and receive household expenditure. Real resources and money payments move in opposite directions for each exchange. The model shows the relationship between production, income and expenditure without counting every linked payment as another final product.

Income is a flow measured over a period. Wealth is a stock of assets less liabilities measured at a date. A household can receive income from using its assets, but the

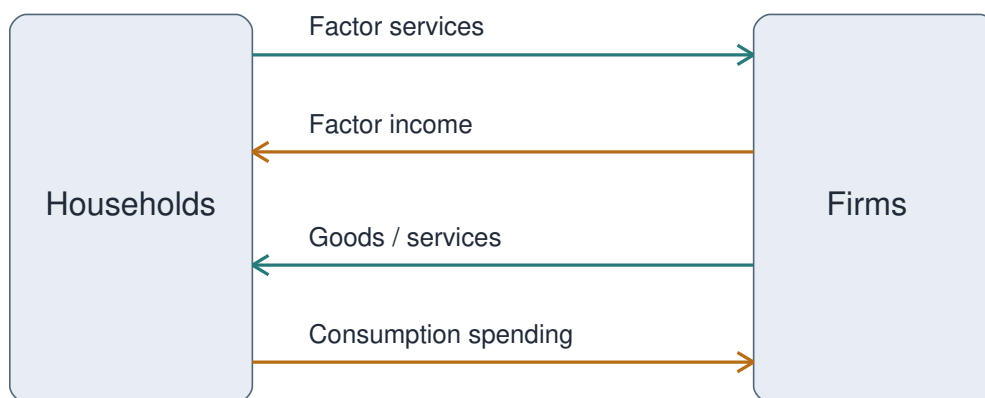
asset's market value and its income are different measures. A gain in the value of an existing asset is not itself new production. Add government, financial intermediation and foreign transactions only after explaining what each changes.

Checked example

A fictional household has assets 12000 and debts 3000 on 1 January, so net wealth = $12000 - 3000 = 9000$. During a month it receives wages 1000 and rental income 100, a total income flow 1100; it spends 900 and saves 200 under the stated account. If all 200 increases assets and debts stay 3000, end-month net wealth becomes 9200, with other changes excluded.

The 9200 stock is not monthly income. If an existing asset instead rises 500 in price without new production, net wealth may rise another 500, but adding that capital gain to measured GDP would confuse an asset revaluation with current output. In the two-sector diagram, factor income supports spending and firm receipts support factor payments; treat the linked flows consistently.

The simple two-sector circular flow



Real flows are teal; matching money flows are amber.

Savings can accumulate into wealth, but revaluation, depreciation, gifts and debt changes also affect a balance sheet. A high-income household can have little net wealth, while a low-current-income household can own valuable assets. Gross assets and net wealth differ when debts exist.

The simple model omits saving, tax and international flows; the next lesson adds these rather than claiming all income must always be consumed. Informal and unpaid work complicate measurement. Specify a date for wealth and a period for income before

interpreting household or national data.

2.3.4.2 · Injections, withdrawals and adjustment

Saving interrupts a round of household consumption. A firm's investment can add spending without waiting for that household to consume. Imports send part of demand to foreign production.

Follow the flow rather than treating every cross-border payment as a domestic injection.

Investment I , government purchases G and exports X are injections into the spending flow. Saving S , taxation T and imports M are withdrawals from the domestic circular flow. Saving may finance investment through financial institutions, but a decision to save is not automatically a matching decision to invest immediately. Taxation and public purchases have different effects and need not move together.

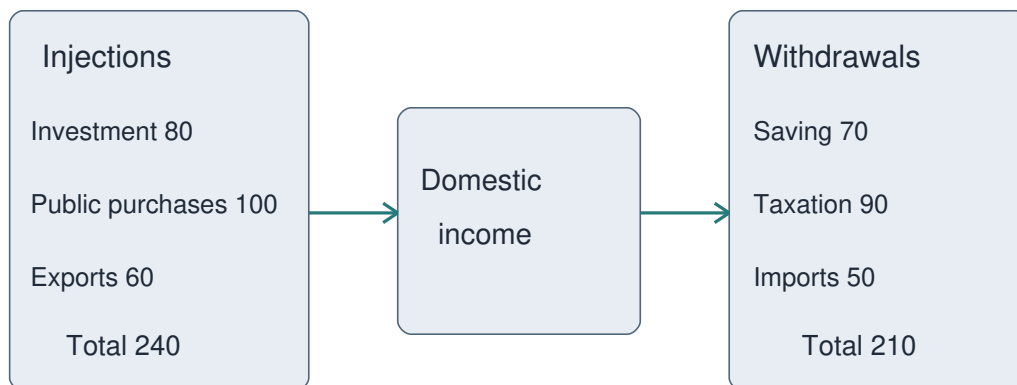
In a simple planned-income model, injections exceeding withdrawals create upward spending pressure; withdrawals exceeding injections create downward pressure. At equilibrium, planned injections equal planned withdrawals under the model. Ex-post accounting includes inventory changes and other adjustments, so an observed equality is not proof that firms sold everything they planned to sell or that output is at potential.

Checked example

Fictional planned injections are $I\ 80 + G\ 100 + X\ 60 = 240$. Withdrawals are $S\ 70 + T\ 90 + M\ 50 = 210$. Net injections = $240 - 210 = 30$, implying upward pressure on income in the fixed-price model, other plans unchanged. If imports increase to 80 with other stated values fixed, withdrawals become 240 and the planned net gap is zero.

An import purchase may be included inside C , I or G before M is deducted. Do not count it as an independent domestic injection too. A public cash benefit is a transfer rather than G purchases; it can affect recipients' C or S . A foreign purchase of existing domestic shares is a financial transaction, not X exports of current goods/services.

Injections and withdrawals in the planned model



Planned net injection = $240 - 210 = 30$; adjustment follows.

The 30 spending gap is not the final increase in income: induced withdrawals, capacity and prices determine adjustment. If income rises, imports, saving and taxes often rise too; higher withdrawals can help close the initial gap. A fixed-price model is more plausible with spare capacity than at full use.

Transfers and financial transactions require accounting care. Government can borrow rather than matching tax and purchases in the same period; the economic effect depends on financing and responses. A circular-flow equilibrium can still contain unemployment, inequality or external costs, so neither equilibrium nor a zero net gap proves an ideal allocation.

2.3.4.3 · Equilibrium output and simultaneous shifts

A rise in planned spending and a fall in production cost can occur together. Both can raise real output, while their price effects oppose one another.

A single definite price prediction needs information about their relative size.

Equilibrium real output in the AD/AS model is the output level at which planned aggregate spending and supply are consistent at the associated general price level. It need not be potential output or maximum employment. An AD shift changes equilibrium along unchanged supply; an aggregate supply shift changes equilibrium along unchanged demand.

Increased AD can raise output and the price level in an upward-sloping SRAS region. Increased supply can raise output and lower the price level. When both AD and AS shift outward, real output normally rises in the stated model but the price-level

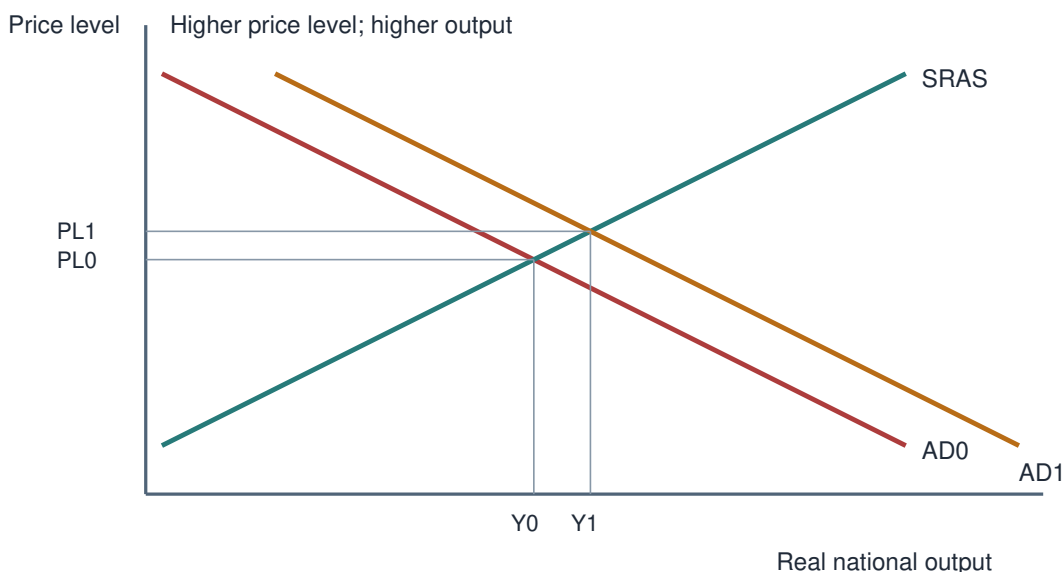
direction needs their relative magnitudes. Supply shape and time horizon matter; classical long-run output at unchanged capacity has a different response.

Checked example

Use fictional inverse schedules in index units: AD is $P=140-2Y$; SRAS is $P=20+Y$. Equilibrium requires $140-2Y=20+Y$, so $120=3Y$, $Y=40$ and $P=60$. If AD becomes $P=170-2Y$ with SRAS unchanged, $150=3Y$ gives $Y=50$, $P=70$.

If only SRAS instead becomes $P=5+Y$, $135=3Y$ gives $Y=45$, $P=50$. If both changes occur, $165=3Y$ gives $Y=55$, $P=60$. Output rises but the two price effects cancel in this specified example. That unchanged price result is not a universal rule for simultaneous outward shifts. P denotes a general price index and Y real national output, not one market's money price and sales.

Demand-pull: aggregate spending expands



Cost-push: adverse short-run supply shift



The equations illustrate intersections; they are not estimates of an actual economy or a claim that AD is a physical law. Price/output adjustment, expectations, credit and capacity affect the real response. Short-run equilibrium below capacity can coexist with demand-deficient unemployment.

Do not draw an AD shift to explain a movement caused only by the price level, or an AS shift merely because firms move along an unchanged schedule. Separate short-run cost changes from long-run capacity changes and state the reason for each curve's movement before evaluating stakeholders.

2.3.4.4 · Multiplier rounds and leakage conventions

An autonomous purchase creates income for someone else, who spends part of it. Subsequent recipients repeat the process while some income leaves each domestic spending round.

The multiplier adds rounds; it does not mean every original currency unit is counted repeatedly without a matching transaction.

The multiplier k is the ratio $\Delta Y/\Delta J$ of the total income change to an initial autonomous injection in a stated model. In a closed fixed-price model without tax or imports and with constant MPC, $k=1/(1-MPC)$. MPC is a marginal response, not an average consumption ratio. Larger saving leakage reduces later spending rounds and k .

For the fuller withdrawal model, the marginal propensity to withdraw is $MPW=MPS+MPT+MPM$ and $k=1/MPW$, with all marginal propensities measured

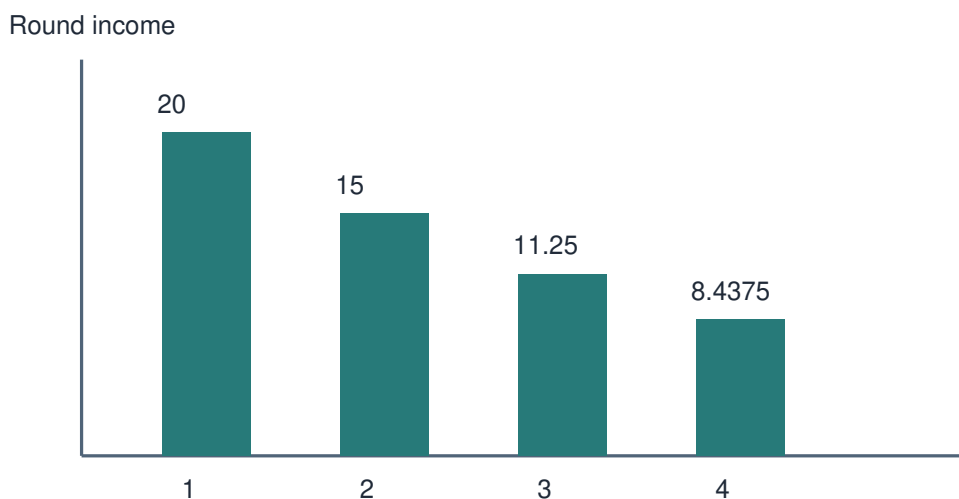
consistently against the same additional income. Taxes, saving and imports withdraw spending from domestic rounds. Imported consumption can be inside total C, so simply using $1/(1-MPC)$ with an inclusive consumption propensity would miss import leakage. Name the convention and tax-income base before substituting.

Checked example

In the no-tax/no-import case, $MPC=0.75$ gives $k=1/(1-0.75)=4$. Injection 20 produces successive income rounds 20,15,11.25,8.4375; their sum 54.6875 is only the first four rounds. The infinite geometric sum is 80 under the stated constant-response assumptions.

In a separate open-economy example, each extra 100 income generates tax 10, saving 20 and consumption 70, of which 20 is imported and 50 domestic. Against the same gross-income base, $MPT=0.1$, $MPS=0.2$, $MPM=0.2$, so $MPW=0.5$ and $k=2$. Injection 20 gives total income 40 in that model. Total-consumption MPC 0.7 cannot be used alone to give $1/0.3$ here because it includes imported purchases and tax also withdraws income.

Successive income rounds when MPC is 0.75



First four rounds = 54.6875; all modeled rounds = 80.

If a propensity is measured against disposable income rather than gross additional income, convert the base before combining it with tax propensities. For example, a disposable-income MPC 0.8 with proportional tax 0.25 generates consumption $0.8 \times 0.75 = 0.6$ per extra gross-income unit before its import content is removed.

Constant propensities, spare capacity, unchanged prices, no offsetting spending and sufficient time are strong assumptions. At capacity, higher demand can mainly raise

prices; imports, interest responses, financing and confidence can weaken the real-output effect. The multiplier magnifies the AD impact of an injection in the model; it does not automatically shift LRAS or certify that a policy benefits every group.

2.3.5.1 · Actual growth, capacity and productivity

An economy can increase production by using idle resources without installing new capacity. Another can train workers and install machinery, expanding capacity before demand uses it.

These are distinct growth channels, although they can occur together.

Actual growth is an increase in real output over a period; potential growth expands estimated sustainable productive capacity. Increased consumption, investment, government purchases or net exports can raise aggregate demand and actual output when supply responds. Export-led growth uses rising foreign demand for domestic goods/services; trade can also support specialization, scale and access to inputs or technology. Export revenue is not the same as net-export demand when imports also rise.

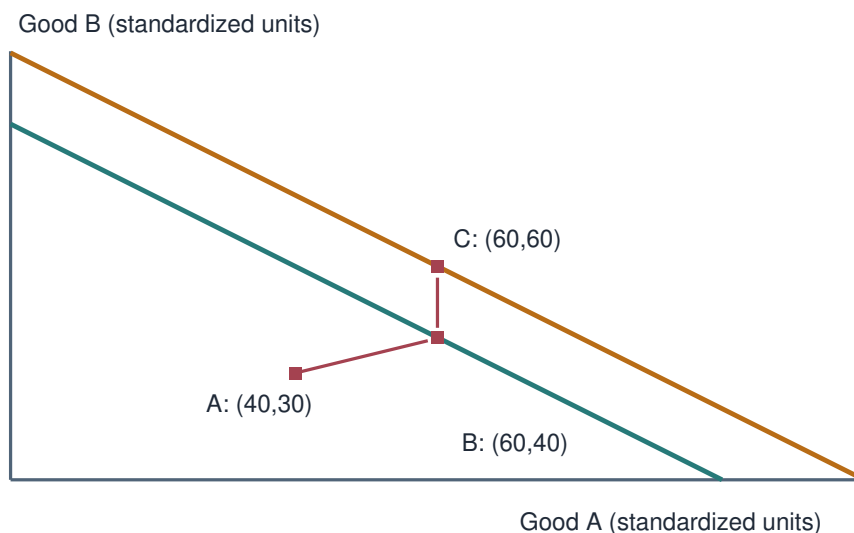
Domestic investment and productive foreign direct investment can build capital or transfer skills; innovation can improve products and processes. A larger or better-skilled labour force, including net migration, can expand capacity when complementary resources and jobs exist. Competition may encourage efficiency and innovation, but the response depends on incentives and market conditions. Productivity is output per unit of input: it can raise capacity and lower unit resource costs, whereas longer total hours alone need not increase output per hour.

Checked example

Fictional real GDP rises from 450 to 480: $\text{growth} = (480 - 450) / 450 \times 100 = 6.67\%$. Estimated potential stays 500, so greater resource use produces actual growth without potential growth. Subsequent training and capital expansion raise potential to 550: $\text{potential growth} = (550 - 500) / 500 \times 100 = 10\%$; actual output need not instantly reach 550.

Separately, 100 workers produce 500 units, or 5 per worker. Training raises output to 550 with the same workers and comparable hours: productivity becomes 5.5, up 10%. Adding 10 equally productive workers instead produces 550 but leaves productivity at 5. An export increase 30 combined with an import increase 20 adds only 10 to net exports, other expenditure unchanged.

Actual versus potential growth in a two-good model



A→B: fuller use; B→C: capacity expands. Separate PPF illustration.

The diagram is a separate two-good illustration using standardized output units, not a calculation of GDP by adding unlike physical goods. Moving from inside to an existing frontier illustrates fuller use; shifting the frontier illustrates capacity growth. Switching along a frontier reallocates output and does not establish economy-wide growth.

Productive FDI differs from a financial purchase of existing shares; even a direct acquisition does not guarantee new capacity. Investment can be inefficient, labour needs equipment, and migration effects depend on skills, participation and infrastructure. Export-led strategies face foreign downturns, protection and imported-input dependence. Faster productivity can release labour in one sector; employment depends on demand and mobility, not arithmetic alone.

2.3.5.2 · Who benefits from growth?

More output can support higher consumption and public services. It does not say who receives the extra income, whether employment rises, or how government uses additional revenue.

Build a causal chain for each proposed benefit.

Higher real income per head can improve material living standards if gains reach households and valued goods/services; distribution and non-market wellbeing still matter. Rising demand can reduce cyclical unemployment when firms hire, rather than exclusively raising hours, productivity or prices. Higher sales may raise profits if receipts grow faster than costs. Profits and confidence can encourage investment, but firms

also consider finance, capacity and expected demand.

Growth can expand taxable income, expenditure and profits, raising revenue at unchanged tax rules. That fiscal space can fund better public services if government allocates and implements spending effectively. These six channels—living standards, unemployment, profits, investment, tax revenue and public services—are possibilities with mechanisms, not six guaranteed outcomes.

Checked example

In a fictional firm, real sales receipts rise 1000→1200 and comparable costs 850→1000, so profit rises 150→200, or 33.33%. Revenue growth of 20% alone would not prove that profit rises: costs of 1250 would instead produce a loss 50.

A separate simplified economy has taxable real income 500→550, a fixed proportional tax 20%, unchanged prices and full compliance. Revenue rises 100→110; the extra 10 can support services, debt reduction or other choices. If population also rises 10%, real output per head is unchanged despite 10% total growth. If firms obtain higher output solely through automation, total employment may not rise.

A firm's profit example is not a national-income accounting identity: transfer pricing, financing, depreciation and tax rules complicate real accounts. A higher tax take does not guarantee better service quality, and public investment may operate with long lags.

Gains can be concentrated in particular regions or owners. Judge real purchasing power, income distribution, job quality, leisure, health and environmental outcomes as well as output. Growth can finance responses to social problems, but choices and institutions determine whether it does. Use conditional evidence rather than equating GDP growth with universal wellbeing.

2.3.5.3 • Growth costs and competing objectives

Cleaner production per unit can coexist with more total pollution when output rises fast enough. Average income can rise while a poorer group loses income.

Compare totals and distributions before judging the growth outcome.

Resources devoted to investment or expansion have an opportunity cost: they could support current consumption or another public priority. Growth can increase pollution, habitat loss and resource depletion if activity expands faster than cleaner technology or regulation reduces damage. Rapid demand can raise imports and a trade deficit when domestic supply cannot meet expenditure, but export-led growth or import replacement may improve trade instead.

Unequal ownership, skills or regional access can concentrate gains and increase income inequality. When aggregate demand outruns available supply, growth can accompany

inflation, especially near capacity; productivity-led supply growth can relieve price pressure. These costs are conditional. Identify the growth source, time horizon, distribution and policy response rather than presenting growth as either universally harmful or costless.

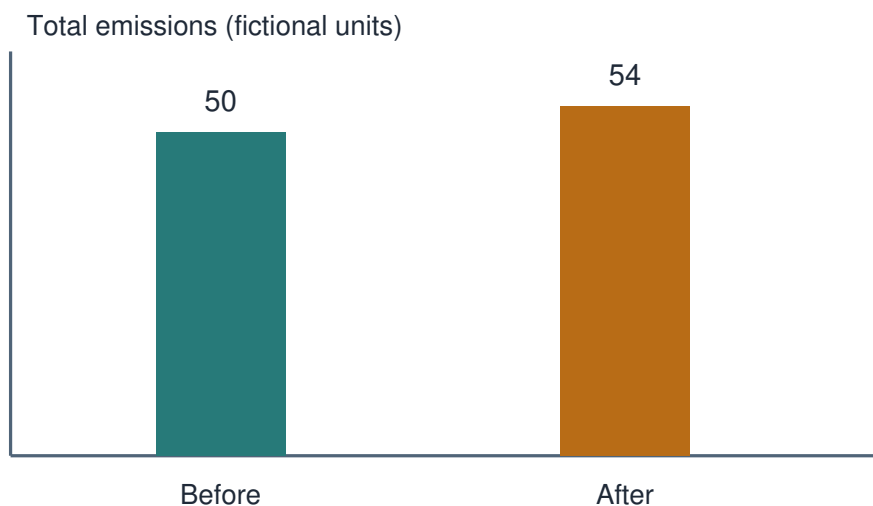
Checked example

A fictional output index rises $100 \rightarrow 120$ and emissions per index unit fall $0.50 \rightarrow 0.45$. Total emissions rise from 50 to 54, an 8% increase, despite 10% lower intensity. Reducing intensity is progress but does not establish falling total emissions.

In a separate two-household example, comparable real incomes change $20/80 \rightarrow 18/102$: mean rises $50 \rightarrow 60$, up 20%, while the lower income falls 10%. The top/bottom income ratio rises $4 \rightarrow 5.67$, demonstrating greater inequality in this deliberately small case.

A capacity project costing 40 from a fixed resource budget 100 leaves 60 for other uses rather than 100; the forgone alternatives are its opportunity cost, although later benefits may justify it.

Lower intensity, higher total emissions



Output +20%; intensity -10%; total emissions +8%.

The fictional emissions calculation concerns one measured pollutant, not a complete ecological assessment or actual national data. Inequality measures and household needs vary; the two-person ratio illustrates distribution, not a national Gini estimate.

An investment cost is not automatically a net social loss: compare future benefits, external effects and alternative uses. Import growth can reflect productive machinery with future export benefits; a trade deficit is not automatically unsustainable. Inflation risk depends on spare capacity, costs, expectations and supply response. Regula-

tion, redistribution and cleaner innovation can reduce particular costs but themselves require resources and evaluation.

2.3.5.4 · Output gaps and uncertain potential

Real output can grow rapidly while remaining below potential. A revised capacity estimate can reverse the sign of a reported gap even when measured production is unchanged.

A growth rate and an output gap answer different questions.

Actual growth measures change in real output over time; the long-run trend growth rate describes the underlying growth path rather than every cyclical fluctuation. The output gap compares actual output with estimated potential at a date: $(\text{actual} - \text{potential}) / \text{potential} \times 100$. A negative gap indicates underuse relative to estimated sustainable capacity, often with cyclical unemployment and weaker demand-driven price pressure. A positive gap indicates output above that benchmark, potentially supported temporarily by overtime or unusually intensive use and associated with bottlenecks and inflationary pressure.

Potential is sustainable capacity, not an absolute physical ceiling. Gap characteristics are tendencies rather than definitions requiring every observed price or labour indicator to move together. Supply shocks can create inflation alongside spare capacity. A trend-growth estimate must not be confused with a directly observed quantity of unused factories.

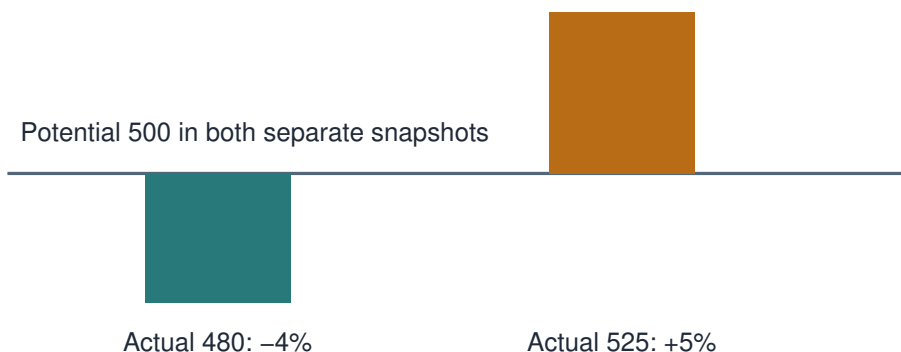
Checked example

Actual real output 480 with estimated potential 500 gives $(480 - 500) / 500 \times 100 = -4\%$. Actual 525 against potential 500 gives $+5\%$. Production above estimated sustainable capacity can occur temporarily; it does not refute the definition.

Now actual output rises $480 \rightarrow 500$, growth 4.17% , while potential rises $500 \rightarrow 520$, growth 4% . The final gap is $(500 - 520) / 520 \times 100 = -3.85\%$, still negative despite positive actual growth.

With actual output 520 and potential plausibly between 510 and 530, the gap ranges from $+1.96\%$ to -1.89% . The uncertainty interval includes zero: confident sign classification would overstate the evidence.

Output deviations and uncertain sustainable capacity



Bars show deviations only: 20 below versus 25 above.

Actual 520 with potential 510–530: +1.96% to –1.89%.

Potential is an estimate of sustainable output, not a hard ceiling.

Potential is unobservable and depends on estimates of capital, sustainable labour use, skills, productivity and non-inflationary resource utilization. Data revisions, structural changes and assumptions about trend filters or production relationships can change it; end-of-series estimates are especially sensitive to future information.

Distinguish uncertainty about the potential level from uncertainty about its growth rate. Positive growth below trend can widen spare capacity; growth above trend can narrow it without producing a positive gap. Monetary/fiscal decisions based on a mistaken gap can over- or under-stimulate demand. Use employment, wages, capacity surveys and price evidence together while acknowledging that none is a perfect independent measure.

2.3.6.1 · Six macroeconomic objectives and their measures

A government can have a budget deficit while the economy has a current-account surplus. Falling inflation can still mean rising prices.

Specify which objective a statistic measures before judging policy success.

Economic growth raises real output; sustained potential and real-per-head growth matter for long-run living standards. Low, stable inflation reduces uncertainty about purchasing power and contracts; this differs from zero prices or a permanently falling price level. Low unemployment concerns people available for and seeking work, not every person outside employment. Structural matching and cyclical demand both matter.

Current-account equilibrium concerns goods/services and primary/secondary income

flows with other economies. A balanced government budget concerns public revenue and expenditure over a period, not national imports and exports. Greater income equality concerns distribution: a higher mean alone does not establish smaller income gaps. Objectives need explicit periods, price adjustment, definitions and policy priorities; progress on one does not prove progress on all six.

Checked example

In a fictional annual account, government revenue 200 and total expenditure 220 give a budget balance $200 - 220 = -20$, a deficit. Separately, the country has net goods/services 12, primary income -4 and secondary income 2: current-account balance $= 12 - 4 + 2 = 10$, a surplus. The two balances have opposite signs because they measure different flows.

Real output rises $500 \rightarrow 515$, growth 3%; population rises $100 \rightarrow 105$, so output per head falls from 5 to 4.9048, about 1.90%. Inflation falls $6\% \rightarrow 3\%$: prices still rise in the second year, more slowly. In a simplified two-group income distribution $20/80 \rightarrow 30/90$, both gain and the upper/lower ratio falls $4 \rightarrow 3$; the absolute gap remains 60. State the inequality measure rather than treating relative and absolute gaps as identical.

This budget uses total expenditure including transfers and interest, whereas G in the aggregate-demand identity means public purchases; do not swap the accounting definitions. A deficit is a flow, public debt a stock accumulated through borrowing and other adjustments. A one-year balanced budget may conflict with stabilization or long-term investment.

Current-account balance need not be exactly zero every year to be sustainable; financing, composition and duration matter. Low unemployment is not necessarily zero unemployment because job search and changing skills continue. The growth and distribution cases demonstrate measurement distinctions, not official policy targets or a universal optimum. Judge objectives together using welfare and context.

2.3.6.2 · Policy conflicts and the short-run Phillips curve

Demand stimulus may reduce cyclical unemployment while increasing inflation pressure. A new clean technology may expand output while reducing environmental damage.

A possible conflict needs a mechanism; it is not an unavoidable law.

With expectations and supply conditions fixed, stronger aggregate demand can raise output and employment while increasing wage/price pressure: the short-run Phillips curve represents a possible inverse inflation/unemployment relationship. A movement along that curve differs from a shift after changed expected inflation or supply costs. An adverse supply shock can raise both inflation and unemployment, so there is no stable permanent menu that policy can exploit without consequences.

Growth can conflict with environmental protection when production increases pollution or resource use. Relatively high domestic inflation can weaken price competitiveness and worsen net trade/current-account balance, other conditions unchanged. Growth can widen income inequality when capital owners, skilled workers or favored regions capture disproportionate gains. These are the four prescribed conflicts; cleaner technology, productivity and inclusive investment can reduce particular tensions.

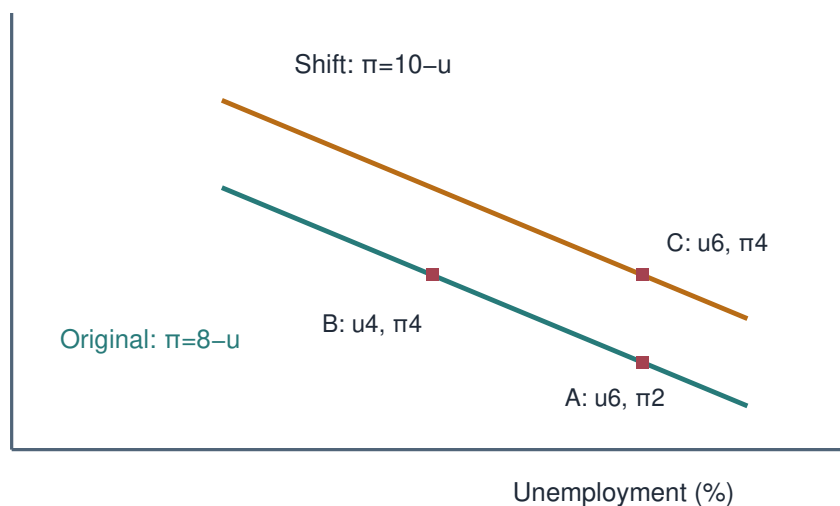
Checked example

A fictional short-run illustration with fixed expectations follows inflation $\pi = 8 - u$, where u is unemployment in percentage points. At $u = 6\%$, $\pi = 2\%$; at $u = 4\%$, $\pi = 4\%$. This is a movement, not evidence of a permanent two-point policy exchange. If supply costs or expectations instead shift the illustrative relation to $\pi = 10 - u$, then at $u = 6\%$ inflation is 4% ; the old curve no longer applies.

A separate exporter keeps nominal exchange rates unchanged and raises its domestic price $100 \rightarrow 110$ while the competitor stays 100 : relative price rises 10% , which may weaken demand if buyers can substitute. It does not prove an exact current-account loss. A growth project raises owners' income $80 \rightarrow 100$ and workers' income $20 \rightarrow 22$: both gain but the owners/workers ratio rises $4 \rightarrow 4.55$. Aggregate growth does not settle distribution.

A conditional short-run inflation/unemployment model

Inflation (%)



A $\rightarrow$ B is a movement; A $\rightarrow$ C compares different short-run relations.

The linear Phillips equation is an invented teaching schedule, not an estimated country relationship. Unemployment has structural and frictional components, while inflation can reflect imported costs and expectations. Do not apply the short-run curve to long-run policy or interpret correlation as a complete causal explanation.

Trade responses also depend on non-price quality, contracts, exchange rates, foreign demand and import costs. Growth and environmental protection can complement each other if cleaner methods reduce damage; regulation has implementation costs too. Redistributive taxes, training and access to assets can alter distribution but may affect incentives. Weigh time lags and affected groups instead of asserting that every objective pair necessarily conflicts.

2.3.6.3b · Market-based supply-side policies

Removing an entry barrier can encourage a new firm. Selling a public monopoly can instead leave a private monopoly.

Ownership change, competition and productivity are different steps in a causal chain.

Supply-side policies aim to improve productive capacity through productivity, competition and incentives. Product-market deregulation can lower unnecessary entry barriers; labour-market deregulation can change hiring flexibility and employment costs. These can support activity but may weaken consumer, worker or environmental protections. Privatization transfers ownership to private owners; stronger incentives can improve efficiency, but rivalry and regulation determine whether a monopoly retains market power.

Lower taxation can raise rewards to work, enterprise or investment, with effects depending on the tax base and responses. Welfare-payment changes can alter gains from taking work, yet childcare, health, skills and job availability also matter. Cutting bureaucracy costs reduces resources spent on unnecessary procedures, rather than deleting every reporting or safety requirement. Explain each of these five instruments before evaluating their combined effect.

Checked example

In a fictional simplified worker budget, taking a job adds gross wages 100, pays extra tax 20 and loses benefits 30. Disposable-income gain = $100 - 20 - 30 = 50$ before work costs. Reducing benefit withdrawal to 20 raises the gain to 60, but costs government 10 more under this narrow comparison; it differs from cutting the benefit paid to someone without a job.

A separate firm spends 40 staff-hours on a form; a simpler procedure takes 15, releasing 25 hours. If released hours can make 2 units each, potential additional output is 50, conditional on orders and complementary inputs. Privatizing a sole supplier does not change the number of rivals: one public supplier becomes one private supplier. Entry policy or regulation may still be needed.

Tax cuts can reduce revenue and public investment; incentives depend on elasticities, information and expectations. Benefits should be evaluated for poverty protection as

well as work incentives: a lower payment need not create a suitable job. Deregulation can remove useful safeguards and create external costs.

Released administrative hours may be redeployed, idle or used for better compliance; they are not a guaranteed GDP rise. A private monopoly may raise prices despite lower costs. Compare competition, service access, quality, fiscal costs and transition time. Supply-side policy can also raise demand in the short run, but its capacity mechanism needs evidence of better resources or efficiency.

2.3.6.3c–d · Interventionist supply-side policy and evaluation

A training subsidy may finance skills that firms would otherwise neglect. It may also pay for training already planned.

Gross activity supported is not the same as additional activity caused by policy.

Education, training and skills investment can improve labour productivity and mobility if learning matches jobs and is used. Investment incentives, including tax relief or subsidies, can lower the private cost of equipment and research. Infrastructure investment can improve transport, power or digital reliability, reducing costs and linking markets. Finance for start-ups can relieve credit constraints, but appraisal and risk-sharing matter. Regional policy can support areas with weak infrastructure or job access; moving activity between regions is not automatically a national capacity gain.

Compare these five interventionist instruments with market-based measures. Use a causal chain from the identified barrier to changed inputs, productivity or competition, then to LRAS or a frontier shift. Assess additionality, benefits, opportunity costs, time lags, affordability, administrative capacity and distribution. A spending increase may shift AD immediately while capacity improves later; those are separate effects.

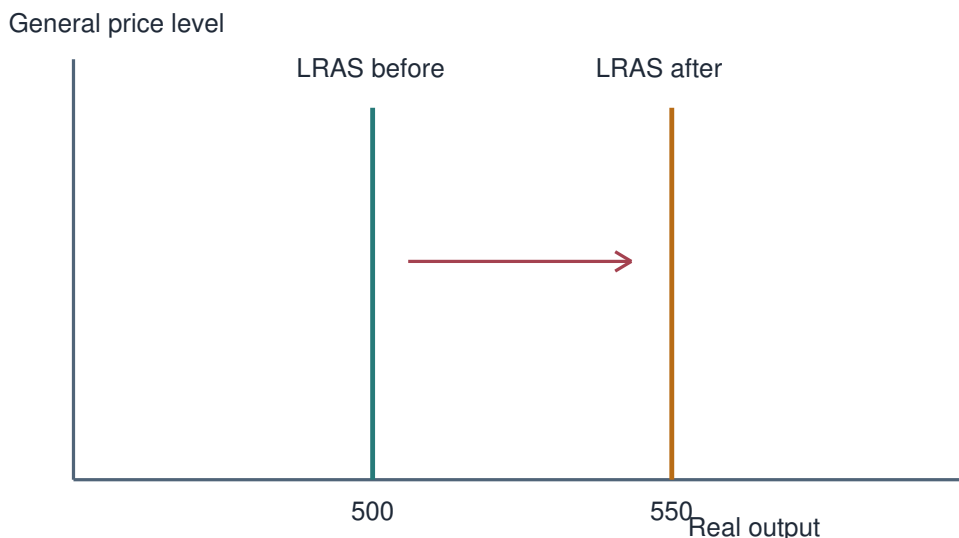
Checked example

A fictional programme trains 100 workers. Comparable output per worker rises 5→5.5 under adequate equipment and successful job matching, so potential output rises 500→550. If only 60 workers use the new skills, output is $60 \times 5.5 + 40 \times 5 = 530$, a 6% increase rather than 10%.

A separate investment grant of 20 supports a project costing 100, reducing the firm's private outlay to 80. The resource cost remains 100; the grant is financing, not a disappearance of 20 resources. If the firm would have invested anyway, the supported project does not establish additional investment.

A road upgrade cuts delivery time 50→40 minutes, down 20%; potential benefits include reliability and lower costs, but maintenance, land and environmental costs still enter the appraisal.

Training and a conditional capacity increase



All workers use training + adequate capital: capacity 500→550.

Training may take years, while a cyclical demand shortfall may need a faster response. Finance can help viable credit-constrained start-ups yet transfer losses to taxpayers if appraisal is poor. Regional grants can displace jobs from another area; distinguish local gains from net national gains.

Tax incentives can reward existing plans, and infrastructure can be underused or delay other priorities. Market-based measures may be quicker and cheaper fiscally but fail when information, external benefits or essential infrastructure are missing. Neither category always dominates. Choose the policy mix for the diagnosed barrier, fiscal capacity, distributional goal and implementation evidence; an LRAS shift is a conditional model outcome, not a certification that every funded project succeeds.

2.3.6.4a–b · Fiscal policy and demand management

A public purchase directly adds demand for production. A tax cut first changes disposable income, of which households may save part.

Equal budget costs need not give equal initial demand changes.

Fiscal policy changes public spending and taxation; monetary policy changes monetary and financial conditions through the central bank and related institutions. Reflationary demand policy seeks to increase spending, often when there is a negative output gap; deflationary demand policy seeks to restrain spending and inflation pressure. A tax cut or higher public purchases can be expansionary; tax increases or spending reductions can be contractionary, depending on financing and responses.

Public purchases enter G directly. Transfers affect recipients' disposable income and

then consumption or saving rather than automatically entering G. Direct taxes affect disposable income and incentives; indirect taxes can also change prices. Fiscal measures may affect both AD and capacity, but the short-run spending mechanism differs from a later supply improvement. Automatic tax/benefit changes during the cycle differ from a new discretionary decision.

Checked example

In a fictional closed fixed-price model with no imports or proportional taxes, $MPC=0.75$ and the spending multiplier is 4. An autonomous G purchase increase 20 initially adds 20 demand; total model income rises 80 if the assumptions hold. A separate lump-sum tax cut 20 increases disposable income 20, of which initial consumption is 15 and saving 5. Its total model demand effect is $15 \times 4 = 60$, not 80.

In a separate balanced-budget change, G rises 20 and lump-sum taxes rise 20 together: initial net spending change $= 20 - 15 = 5$, with total model income change 20. The tax and spending changes have equal budget amounts but different first-round expenditure effects. These are fixed-propensity calculations, not universal fiscal forecasts.

Different first-round fiscal demand effects



Closed fixed-price model: $MPC\ 0.75$, k_4 ; no imports/proportional tax.

Real-output effects depend on spare capacity and unchanged responses.

Government borrowing, interest rates, imports, expectations, capacity and implementation timing can change the effects. At capacity, stimulus may raise prices more than real output; debt-service costs and possible displacement of private activity matter. Fiscal contraction can weaken employment and public services even while reducing demand pressure.

Tax cuts may be saved if confidence is weak; purchases can be delayed or poorly

targeted. Progressive taxes and benefits can stabilize disposable income automatically, but a cyclical deficit is not identical to a deliberate stimulus. Compare timing, distribution, fiscal sustainability and the type of shock. Use the withdrawal-based multiplier when taxes/imports change with income; do not reuse this closed lump-sum model unchanged.

2.3.6.4c · Monetary instruments and transmission limits

A lower loan rate can reduce financing costs, yet a firm may still refuse to invest if it expects no customers. Asset purchases can change financial conditions without guaranteeing new bank lending.

Trace the instrument to decisions and demand, rather than promising a mechanical outcome.

Interest-rate changes can influence borrowing costs, saving returns, asset values, confidence and exchange rates. Lower rates may support consumption and investment; higher rates may restrain them, with effects varying by debt contracts and household positions. Quantitative easing is central-bank asset buying financed by newly created central-bank money, often aimed at easing broader financial conditions. Purchases can affect asset prices/yields and portfolio choices; more reserves do not guarantee a corresponding increase in loans.

Looser lending criteria can widen access to credit, while tighter criteria can restrain risky borrowing; creditworthiness, collateral and safeguards remain relevant. Lower binding reserve or liquidity requirements can ease a bank's constraint, while higher requirements can restrict it or improve resilience. Actual frameworks differ: not every central bank uses the same rule, and reserves are not a pot of money directly handed to non-bank borrowers.

Checked example

A fictional fixed principal loan 1000 has annual simple interest 50 at 5%, versus 30 at 3%, saving 20 before fees or repayment changes. This does not establish a household spending increase 20: it may save the difference or repay debt.

A simplified perpetual fixed-coupon bond pays 5 annually: price 100 implies current yield 5%; price 125 implies 4%. Asset buying can raise price and lower this yield, but a dated bond's full yield also depends on redemption and timing.

In a stylized QE purchase 100 from a non-bank investor through its bank, the investor exchanges the bond for deposit 100. The bank receives reserves 100 and owes an additional deposit 100; the central bank acquires the bond and issues reserves. This balance-sheet transaction is not itself a new customer loan. A separate bank with deposits 1000 and eligible liquid assets 100 meets a simple 10% rule; a 20% rule requires 200, a shortfall 100 before adjustment.

A stylized QE transaction, not a lending guarantee

Central bank	Commercial bank	Non-bank seller
Assets: bond +100 Liabilities: reserves +100	Assets: reserves +100 Liabilities: deposit +100	Bond holding -100 Deposit holding +100

Stylized purchase through a bank: no new customer loan occurs here.

The bond and bank cases are teaching accounts, not a trading recommendation or a description of every jurisdiction's operations. The simplified reserve requirement does not describe the current UK system; broader capital/liquidity rules, funding, profitability and credit demand matter. Rate changes can take time and may not pass through fully to fixed-rate borrowers.

QE can face uncertain transmission, distribution effects through asset holdings and exit/balance-sheet risks. Tighter lending standards can reduce fragility but deny viable projects; looser ones can increase defaults. Exchange-rate movements depend on relative policies and expectations. Demand stimulus cannot by itself repair a missing skill or damaged supply capacity. Supplementary reference: Bank of England explanation of QE and market-operation objectives.

2.3.6.4d–e • Central-bank roles and policy choice

A solvent bank may lack cash to meet payments today. A bank whose assets are worth less than its obligations has a different problem.

Stabilizing payment liquidity is not the same as guaranteeing every bank owner's losses.

Central banks implement monetary policy through their instruments and operating arrangements. An inflation target supplies a stated objective and accountability benchmark, but shocks, forecasts and policy lags make precise control impossible; a target is not proof of achieved inflation. As banker to government, a central bank can hold accounts and provide payment/banking services; this role differs from deciding government taxes and spending.

As banker to banks and lender of last resort, it can provide emergency liquidity under defined conditions when normal funding is disrupted, supporting settlement and financial stability. Lending conditions and collateral help limit risk and moral hazard. Liquidity support and solvency repair differ. Compare monetary and fiscal responses for speed, precision, distribution, uncertainty, public finance, credit conditions and the shock being addressed; demand management is not a substitute for every supply-side remedy.

Checked example

A fictional bank has assets valued 100 and liabilities 90, equity 10. It owes immediate payments 20 but has cash 5, a liquidity shortfall 15; borrowing against suitable assets could bridge timing without proving new net wealth. If assets instead fall to 80 with liabilities 90, equity becomes -10 : the problem includes insolvency, not just payment timing.

A fictional inflation target 2% and observed inflation 4% give a deviation of 2 percentage points, not a price-level gap of 2%. If inflation reflects weak supply and cost shocks while output falls, aggressive demand restraint can reduce inflation pressure but deepen unemployment. In a demand slump with spare capacity, stimulus can support output; fiscal targeting may reach constrained households, while monetary changes affect borrowers, savers and financial conditions more broadly.

Targets, independence and emergency powers vary between countries; the fictional 2% example does not claim a universal numerical mandate. A central bank normally acts within a legal framework and cannot promise to eliminate all shocks. Emergency liquidity can create moral hazard if institutions expect unconditional rescue; collateral, terms, supervision and resolution arrangements matter.

Monetary tools can be adjusted quickly but transmission has lags and may weaken when confidence or credit demand is low. Fiscal measures can target public projects or groups yet face authorization, delivery delays and debt constraints. Policy coordination can reduce offsets, but the appropriate mix depends on capacity and the shock. Evaluate results against the six objectives and affected groups, not just an AD arrow. The official Bank of England market-operation guide is a named institutional illustration, not a universal operating rule.

3.3.1.1a; 3.3.1.2a · Business forms and size measures

A private cooperative can earn a surplus and use it for members. A state-owned business can sell output and pursue profit alongside public-service duties.

Sector, legal ownership and purpose are different dimensions.

Private-sector organizations are controlled outside the state; state-owned enterprises belong to the public sector. For-profit organizations seek returns for owners; not-for-

profit organizations use surpluses to support their mission rather than distributing them as the principal purpose. Not-for-profit does not mean no revenue or no surplus. Co-operatives are owned and governed for their members, who can be workers, consumers or producers. A joint venture is an agreed collaboration with shared control/resources for a purpose; it need not merge every activity of the partners.

SMEs are small/medium enterprises under a specified definition, often using employee, turnover or asset thresholds; thresholds vary by country and industry. Large corporations may operate across markets with complex ownership and management. Compare employment, sales, assets and market reach rather than pretending one size measure always ranks every firm identically. A large enterprise is not automatically a monopoly and a listed public company is not thereby state-owned.

Checked example

Fictional membership cooperative sales are 500 and costs 440, leaving surplus 60; retaining 40 and allocating 20 to members is consistent with member-focused enterprise under its rules. A separate not-for-profit arts centre earns 300 and spends 280, retaining surplus 20 for its mission: a surplus does not convert it into a for-profit business.

For a classroom classification only, define small as fewer than 50 employees and medium as 50–249; firm A with 45 workers is small and B with 180 is medium under this assumed rule, not a universal official threshold. A has revenue 12 million, B 8 million: employee and revenue rankings differ. Firm C with 300 workers is outside this assumed SME employee range, but the full chosen definition may also consider assets or ownership.

Business-form categories overlap: a private cooperative can be for-profit, and a joint venture can involve public and private partners. Legal duties, tax treatment and governance depend on jurisdiction. Do not infer efficiency or ethical behaviour from ownership alone.

A small specialist firm may have high sales per worker, while a labour-intensive enterprise has many employees and lower revenue. Employee counts need full-time-equivalent and period definitions for careful comparison. The classroom threshold is deliberately invented for a stated exercise; use verified local criteria when advising an actual school enterprise. Teacher examples should identify ownership, control, purpose and size separately.

3.3.1.2b–c · Organic growth and four integration types

A bakery opens a second shop using its own investment. Another buys a flour mill. A third buys a rival bakery.

The size may rise in every case, but the growth mechanism and risks differ.

Organic growth expands a business through its own capacity, outlets, products or market development. External growth uses merger or takeover; distinguish an agreed combination from an acquisition of control without assuming every deal is hostile. Forward vertical integration moves toward distribution or final customers; backward vertical integration moves toward input supply. Horizontal integration combines firms at the same production stage in the same or closely related market. Conglomerate integration combines substantially unrelated activities.

Forward integration can improve distribution, information and access to customers but adds retail responsibilities and can exclude rivals. Backward integration can improve supply reliability and coordination but ties capital to one supplier and may lose flexible sourcing. Horizontal integration can create scale or complementary products but reduce competition and face regulation. Conglomerate integration can diversify risk across activities but make management harder and distract from specialist competence.

Checked example

A fictional bakery's own new outlet costing 100 is organic expansion. Buying a flour mill is backward integration; buying a retailer selling its bread is forward integration; buying a competing bakery is horizontal integration; buying an unrelated repair company is conglomerate integration. The same transaction can have mixed features if it acquires several activities: specify the relevant stages rather than relying only on a company name.

Two rivals have market shares 18% and 12%; their combined share is initially 30%, assuming the market definition and other sales remain fixed. That does not establish monopoly or prove that prices rise. A proposed integration claims annual cost saving 40 but incurs annualized coordination cost 15, giving net saving 25 before financing, transition and regulatory costs. Gains need evidence and can differ by integration type.

Integration types relative to a producer



Horizontal: producer + rival producer at the same stage.

Conglomerate: producer + unrelated repair enterprise.

The original supply-chain flow is left→right; ownership can expand.

The initial 30% share is an arithmetic combination, not a forecast of future demand or a regulatory threshold. Market definition and customer alternatives determine power. Predicted savings can fail if IT, culture or work practices cannot be integrated.

Workers may gain investment or face duplication/redundancy; consumers may gain service or lose choice; suppliers can face stronger bargaining pressure. Conglomerate diversification is imperfect if shocks affect all activities or managers cannot run them well. Organic growth is often gradual and less disruptive but may be slow or finance-constrained. Evaluate type-specific benefits and risks against the firm's purpose and the actual market.

3.3.1.2d–g · Growth constraints, small firms and demergers

An owner may reject a profitable expansion to keep personal control. A large group may split to let specialist managers focus on separate businesses.

Bigger size is not automatically the firm's objective or the best arrangement.

Growth can be constrained by the size of the market, access to finance, owner objectives and government regulation/bureaucracy. A niche market may not support large output; lenders may doubt risk or collateral; an owner may value independence or quality over scale; licensing, competition rules or necessary safety compliance can limit expansion. Small firms can remain viable through specialization, personal service, local flexibility or owner preferences, while scalable demand, finance and potential economies encourage others to grow.

Growth can lower unit costs and fund innovation, yet add coordination difficulties

or market power. Workers may gain training, security and promotion or face restructuring; consumers may gain variety/service or lose choice. A demerger separates previously combined activities into distinct businesses. Motives include focus, reversing diseconomies, resolving conflicting objectives, releasing value or meeting regulatory requirements. Separation can restore accountability but duplicate overheads and lose purchasing, finance or knowledge links.

Checked example

A fictional specialist sells at price 10, variable cost 6 per unit and fixed cost 300. At 100 units $\text{profit} = 1000 - 600 - 300 = 100$. Expanding raises fixed cost to 700 and output only to 130: $\text{profit} = 1300 - 780 - 700 = -180$. In this restricted case market demand and overheads make expansion unattractive; it does not prove small firms are always more profitable.

A proposed group demerger removes annual coordination cost 30 but duplicates administration 18 and loses purchasing savings 8. Net annual cost saving $= 30 - 18 - 8 = 4$ before one-off separation, financing and tax costs. A one-off cost 20 would equal five years of unchanged undiscounted saving; that crude comparison is not a full investment appraisal. Workers and customers need a separate service/employment assessment.

Regulation can protect competition, safety or public interests, not just obstruct firms. Finance constraints can prevent beneficial expansion, while easy credit can fund inefficient growth. Measure profitability, service quality, autonomy and risk rather than treating growth as the sole success criterion.

Demergers can create smaller units with sharper incentives but weaker negotiating power or resilience. Local job losses may coexist with national efficiency gains, and the reverse can occur. Evaluate who bears transition costs, how contracts and pensions are handled, and whether promised focus produces better performance. This fictional case gives no recommendation for an actual transaction.

3.3.1.3 • Objectives, decision conditions and agency

A manager rewarded for sales may choose a different output from an owner rewarded for profit. A business may instead meet a satisfactory profit target while protecting service quality.

Identify the objective before calling an output decision optimal.

Profit maximization seeks the largest $TR - TC$, including relevant opportunity costs. In a differentiable interior model, $MR = MC$ is the candidate condition; marginal profit must change from positive to negative or the global choices must be compared. Revenue maximization seeks the largest TR ; the interior condition $MR = 0$ needs a maximum and feasible demand. Sales-volume maximization seeks the greatest feasible Q under a stated constraint: with a normal-profit constraint this often lies where

$TR=TC$, or $AR=AC$, on the high-output break-even boundary. Without that constraint the decision is different.

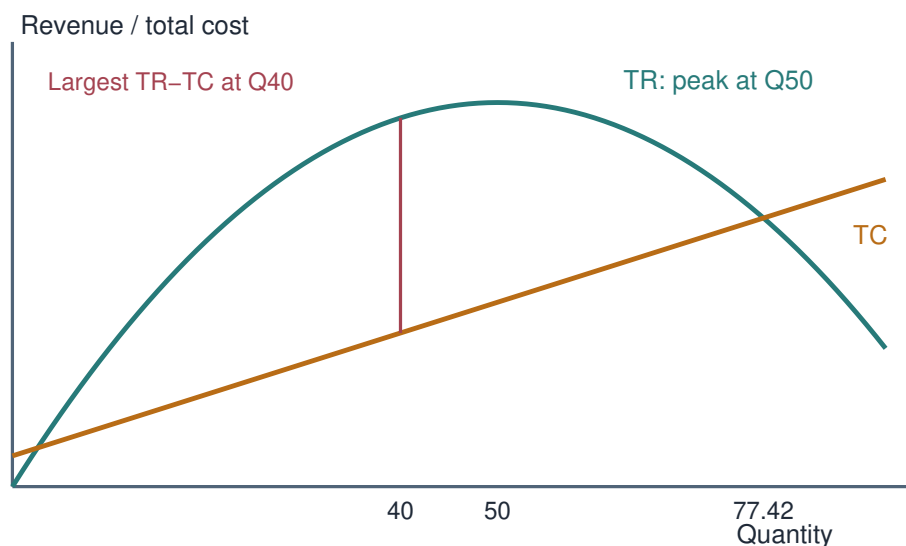
Satisficing means achieving an acceptable target rather than maximizing one measure; multiple goals, limited information and stakeholder duties can motivate it. Separation of ownership and control creates a principal-agent problem when managers' incentives or information differ from owners' interests. Pay, oversight and governance can reduce conflicts but introduce costs or encourage narrow measured targets.

Checked example

Use a fictional continuous-output model: $P=100-Q$, $TR=100Q-Q^2$, $TC=200+20Q$, with cost including the required normal return and Q between 0 and 100. $MR=100-2Q$ and $MC=20$. Profit maximum occurs at $Q40$: price60, $TR2400$, $TC1000$, profit1400. Revenue maximum occurs at $Q50$: price50, $TR2500$, $TC1200$, profit1300.

For sales maximization subject to non-negative economic profit, solve $100Q-Q^2=200+20Q$, so $Q^2-80Q+200=0$. Roots are approximately 2.5834 and 77.4166; choose the larger feasible boundary, $Q77.4166$, with price22.5834 and economic profit0. A revenue-focused manager chooses more output than the profit-focused owner here. A satisficing target profit1200 could be met by several outputs; it does not identify a unique maximum.

Different objectives choose different outputs



Sales maximum with $TR \geq TC$ uses high-output break-even $Q \approx 77.42$.

The formula conditions require the model's differentiability, feasibility and cost definitions. $MR=MC$ is not sufficient for a maximum if it occurs at a minimum or an

inferior boundary. Integer production, capacity constraints and discontinuous costs require direct comparison. Sales maximization without the normal-profit constraint can reach another boundary, so never state $AR=AC$ as a universal rule for selling most units.

The normal return is inside economic costs; zero economic profit is not necessarily zero accounting profit. Not-for-profit/public/member enterprises can choose different purposes. Bonus schemes based only on revenue can encourage costly sales or misleading reporting; a balanced governance arrangement needs evidence of service, risk and longer-term outcomes. The fictional equations are not a forecast or a business recommendation.

3.3.2.1 · Revenue curves and elasticity

A firm sells extra units by cutting the price of every unit. Extra sales bring receipts, but the price cut reduces receipts on units it could already sell.

Marginal revenue is not automatically the new price.

Total revenue $TR=P \times Q$. Average revenue $AR=TR/Q$ equals price when every unit sells at the same price and Q is positive. Marginal revenue $MR=\Delta TR/\Delta Q$ measures extra receipts per additional unit over a stated interval; in a smooth model it is the derivative of TR . With downward-sloping demand, a price cut on all units makes MR below price. In perfect competition the firm takes a fixed market price, so $AR=MR=P$ for its relevant output range.

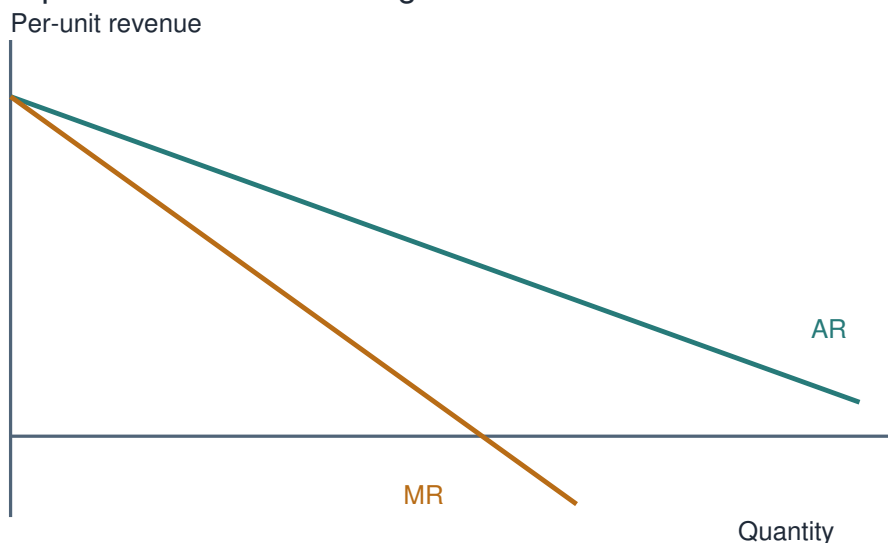
On a demand curve, a price cut raises TR in an elastic region and lowers TR in an inelastic region; at a unit-elastic point of a smooth curve, TR is locally stationary. Distinguish point elasticity from finite-interval estimates. A revenue maximum is not necessarily a profit maximum because costs also change. Revenue diagrams need quantity on the horizontal axis and a clear choice of total receipts or per-unit receipts on the vertical axis.

Checked example

In a fictional smooth demand model, $P=100-Q$, so $TR=100Q-Q^2$, $AR=100-Q$ and $MR=100-2Q$. At $Q40$, $P60$, $TR2400$ and point $MR20$. Point $PED=(dQ/dP) \times P/Q = -60/40 = -1.5$, elastic. At $Q60$, $P40$, $TR2400$ and point $MR-20$; point $PED=-40/60 \approx -0.667$, inelastic. TR reaches 2500 at $Q50$, $P50$, with $MR0$ and point $PED-1$.

Across a separate finite move $Q40 \rightarrow 41$, prices $60 \rightarrow 59$ and $TR2400 \rightarrow 2419$. Interval $MR=19$, not the endpoint price 59 or the derivative 20 at $Q40$. Extra-unit receipts 59 are offset by the price loss 1 on forty earlier units, giving $59-40=19$. State whether a question asks for an interval calculation or a point value.

Uniform-price demand and marginal revenue



$AR=100-Q$; $MR=100-2Q$. MR reaches zero at Q50.

The revenue/elasticity result concerns a price movement along unchanged demand, not a shift caused by advertising or income. Mixed prices, discounts and discrimination can make average receipts differ from one posted price. Point and midpoint elasticity are valid conventions for different tasks; do not mix a starting-point finite percentage with a derivative and call them identical.

The linear demand curve is fictional and applies only over its stated positive-price range. Revenue maximization at Q50 does not show that selling more always helps: TR declines beyond that point. Cost, capacity, objectives and uncertainty determine the business decision. The diagram shows AR/MR per unit; TR belongs in a separate total-receipts curve.

3.3.2.2a–b,d • Fixed inputs, product and marginal cost

Adding a worker to a fixed workshop may initially improve teamwork. Later workers share crowded equipment. Total production can still rise even when each extra worker adds less.

Diminishing marginal returns are not falling total output or long-run diseconomies of scale.

The short run has at least one fixed input. Holding that input and technology constant, diminishing marginal returns occur when additional variable input eventually adds less extra output. Total product TP is total output; marginal product $MP=\Delta TP/\Delta \text{input}$; average product $AP=TP/\text{input}$. Falling positive MP means TP still rises, but more slowly. Negative MP would make TP fall; the two statements differ.

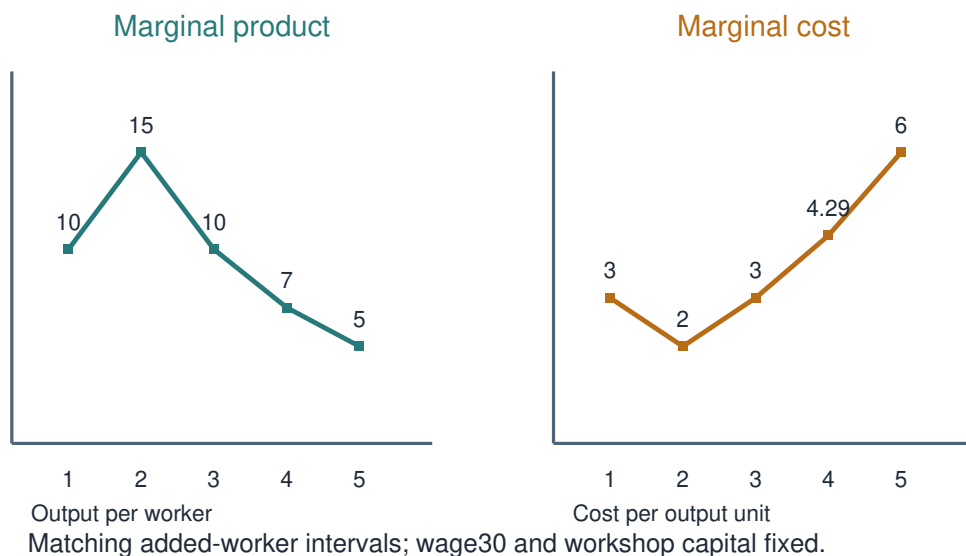
With labour the only variable input and constant wage w , $TVC=wL$. Over a one-worker interval, $MC=\Delta TVC/\Delta Q=w/MP$; low marginal productivity means high marginal cost under these assumptions. $AVC=w/AP$ for the stated labour-only variable costs. The total-product relation can be inverted to show the variable labour/cost required for an output. In the long run all inputs can vary; changing scale is different from adding labour to fixed capital.

Checked example

A fictional fixed workshop employs L0,1,2,3,4,5 with total output 0,10,25,35,42,47. The successive marginal products are 10,15,10,7,5: diminishing returns start after the second worker in this schedule. At L2, $AP=25/2=12.5$; at L5, $AP=47/5=9.4$. Output still rises $35 \rightarrow 42 \rightarrow 47$ while marginal product falls.

With wage 30 per worker, TVC at L2 is 60 and at L5 is 150. Successive interval marginal costs are $30/10=3$, $30/15=2$, $30/10=3$, $30/7 \approx 4.286$ and $30/5=6$ per extra output unit. At L5, $AVC=150/47 \approx 3.191$, also $30/9.4$. Fixed costs do not enter these variable-cost calculations, but they do enter total/average total cost.

Diminishing marginal product and rising marginal cost



The inverse cost relationships require constant wage, comparable workers, labour as the only variable input and no output-measure changes. Material costs, overtime premiums or changing quality alter the calculation. Average product is not marginal product, and AP/AVC does not determine ATC without fixed costs.

Diminishing returns describe a short-run input experiment. Long-run economies can coexist with short-run diminishing returns because capital can expand too. A lower

wage changes costs without necessarily changing physical productivity; a technical improvement changes the product schedule. When using data, check the input interval and distinguish workers, hours and full-time equivalents before comparing MP.

3.3.2.2c–d · Cost identities, averages and marginal curves

A higher total bill need not mean a higher cost per unit. An additional unit below the existing average pulls the average down.

Define the denominator and compare the right cost measures.

$TC = TFC + TVC$. At positive Q , $ATC = TC/Q$, $AFC = TFC/Q$ and $AVC = TVC/Q$, so $ATC = AFC + AVC$. $MC = \Delta TC / \Delta Q$; with unchanged fixed cost it also equals $\Delta TVC / \Delta Q$. Fixed costs stay unchanged over the relevant short-run range, so AFC declines as positive output rises. Variable costs depend on activity; they need not be proportional to output.

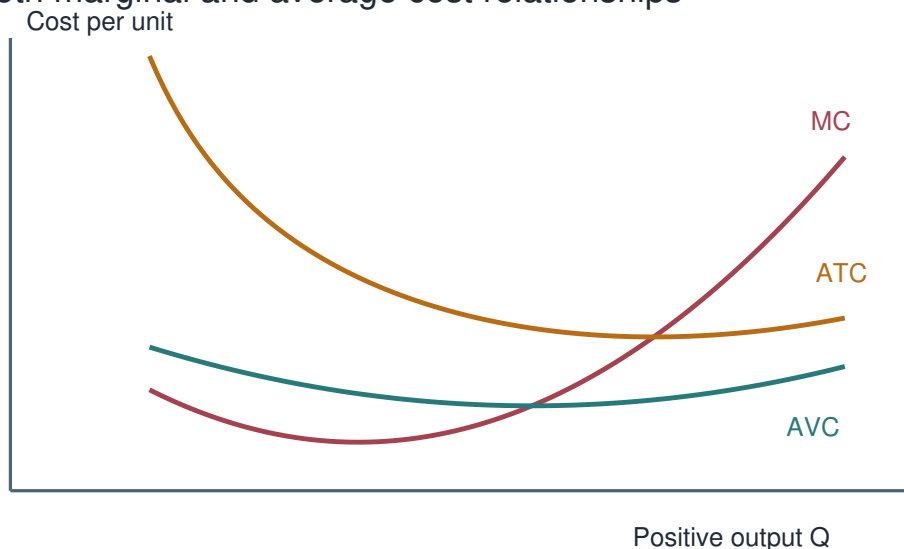
An MC below an average cost pulls that average down; MC above it pushes the average up. In a smooth interior model MC crosses AVC and ATC at their respective minima. Do not interchange total and average curves. Short-run curves hold some capacity fixed, whereas $LRAC$ describes the lowest achievable average cost when the firm can choose its input scale. A short-run operating point need not be the cheapest long-run scale.

Checked example

A fictional firm has $TFC 60$. At $Q 10$, $TVC 140$ gives $TC 200$, $AVC 14$, $AFC 6$ and $ATC 20$. At $Q 12$, $TVC 168$ gives $TC 228$, $AVC 14$, $AFC 5$ and $ATC 19$. The two-unit interval $MC = (228 - 200) / (12 - 10) = 14$. ATC falls because this interval cost 14 is below the starting average 20; AVC stays 14 because variable cost here is locally proportional.

A separate smooth illustration uses $TC = 60 + 20Q - 3Q^2 + 0.2Q^3$. Then $MC = 20 - 6Q + 0.6Q^2$, $AVC = 20 - 3Q + 0.2Q^2$, $AFC = 60/Q$ and $ATC = AVC + 60/Q$ for $Q > 0$. At $Q 10$, $MC 20$, $AVC 10$, $AFC 6$ and $ATC 16$. AVC reaches 8.75 at $Q 7.5$ where MC also 8.75. These smooth values are a different model from the earlier finite table, not data to splice together.

Smooth marginal and average cost relationships



MC crosses each smooth average curve at that curve's minimum.

At Q_0 , average costs are undefined because division by zero is not allowed; total fixed cost may still exist. Fixed means fixed over a specified period/output range, not unavoidable forever. A rent can become avoidable when a contract ends.

Step-fixed capacity costs can jump; marginal costs then require the actual interval rather than a smooth derivative. MC intersects an average at a minimum only under appropriate smooth conditions; discontinuous data may straddle it. LRAC is not the same as a single SRATC curve. Compare feasible scales, input prices, technology and demand before interpreting low average cost as high profit.

3.3.2.3 · Scale economies, MES and organizational costs

A larger plant can spread specialist equipment costs over more output. A bigger management hierarchy can also slow decisions. A nearby training cluster can help firms of several sizes.

Separate benefits inside one firm from benefits of an expanding industry.

Economies of scale reduce long-run average cost as the firm increases its chosen scale; diseconomies raise it. Minimum efficient scale MES is the smallest scale/output at which the lowest LRAC is attained in the stated technology. Internal economies arise within a firm: financial access/terms, technical specialization or indivisible equipment, specialist managers, spreading marketing costs, bulk purchasing and spreading risks across activities. Each needs a mechanism, not just a label.

External economies benefit firms through industry/location development, including skilled labour availability, transport links and knowledge sharing. They can shift a

firm's LRAC rather than being a movement caused only by its own scale. Diseconomies can arise from communication delays, coordination problems and X-inefficiency: actual costs above attainable efficient costs because organizational slack or weak incentives persist. X-inefficiency need not be unique to large firms or a technological necessity.

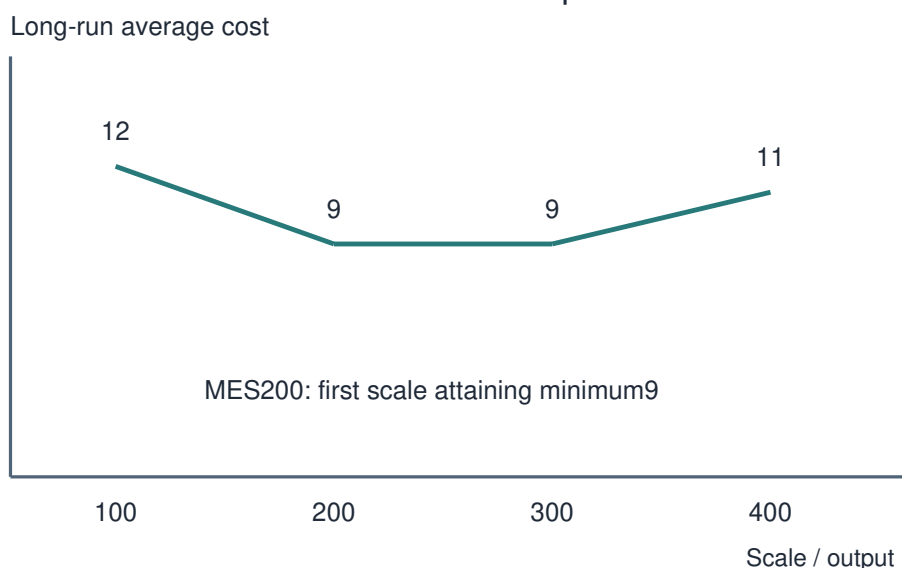
Checked example

In a fictional technology comparison, achievable minimum average costs at scales 100, 200, 300, 400 are 12, 9, 9, 11. Economies occur 100→200; the flat minimum spans 200–300; MES is 200, the smallest scale attaining it. Expanding 300→400 shows diseconomies in this comparison.

At output 200, lowest feasible total cost is 1800, but poor coordination leads to actual cost 2000: excess cost 200, average 1 per unit, is a possible X-inefficiency gap if the efficient benchmark is credible. It is not evidence that the minimum technology itself became dearer.

A shared skills programme lowers attainable average cost at every listed scale by 1, to 11, 8, 8, 10; this external improvement shifts the comparison downward. It is separate from one firm moving between scales.

Minimum efficient scale in a discrete comparison



These discrete scale data illustrate the concepts, not a complete envelope of short-run plants. MES may be a range or change with technology, and its size relative to market demand affects how many efficient firms can fit. A large MES can encourage concentration but does not alone establish monopoly power.

Bulk purchase savings may reflect bargaining transfers rather than lower social resource

use. Risk diversification can fail when shocks are correlated. Specialist management can reduce costs or add bureaucracy. External industry growth can also congest roads or raise input prices. Compare actual versus attainable cost carefully before diagnosing X-inefficiency; demand weakness and capacity utilization can raise observed average cost without a change in LRAC.

3.3.2.4 · Normal profit, losses and shutdown

A firm can make an accounting surplus yet earn only the required return on the owner's resources. It can also minimize a short-run loss by operating while covering variable costs.

Zero economic profit is different from no sales or no accounting return.

Economic profit is revenue minus all economic costs, including the normal return needed to keep resources in their current use. Normal profit means zero economic profit after that required return; supernormal profit is a positive excess and an economic loss is negative. If accounting costs exclude an owner's opportunity cost, accounting profit and economic profit differ.

In a short-run shutdown comparison, fixed unavoidable costs remain even if output stops, while avoidable operating costs are saved. Operating can be preferable if receipts cover avoidable variable costs and contribute to those unavoidable costs. In the standard competitive smooth model the shutdown threshold is minimum AVC; at equality the firm is indifferent under the assumptions. In the long run costs can become avoidable and sustained prices below minimum LRAC do not cover the normal return, supporting exit rather than indefinite production.

Checked example

A fictional enterprise has revenue 1000, recorded cash/resource costs 700 and an owner opportunity cost 300. Accounting surplus 300 becomes economic profit 0: the stated normal return is covered. Raising revenue to 1100 with these costs unchanged yields economic profit 100.

A separate constrained short-run firm can operate a batch of 50 units or close. Unavoidable fixed cost 100 and variable cost 3 per unit give TC 250 when operating. At price 4, revenue 200 and economic loss 50; closure leaves loss 100, so operation reduces the loss by 50. At price 2, receipts 100 produce loss 150, worse than closure's 100, so close under these assumptions. At price 3, receipts 150 cover variable cost 150 and either choice loses 100.

For a separate long-run case, suppose the minimum attainable LRAC across feasible scales is 5 and market price stays 4: sustained operation cannot cover all economic costs; exit is indicated if the assumptions persist.

Compare losses rather than profit signs alone

Operate at price4	Close temporarily
Receipts200; VC150 Fixed100; total loss50	Receipts0; VC0 Fixed100; total loss100

Batch choice:50 units or0; fixed100 remains unavoidable.

A loss can be smaller while operating; long-run avoidability differs.

For the batch case, Q50 is a stated feasible operating choice, not proof that it maximizes profit over every possible quantity. For a smooth competitive firm, first choose the best output and then compare receipts with avoidable costs. Fixed/variable classifications are not identical to sunk/avoidable classifications; contract terms, shutdown costs and time horizons matter.

The long-run benchmark is minimum attainable cost, not any arbitrary current ATC. Temporary losses can be consistent with rational operation, while expected future returns may influence investment or exit. Market power, multi-product links, restarting costs and worker commitments can complicate the choice. Never call normal economic profit zero income for the owner: the normal return is already included in cost.

3.3.3.1a · Four efficiency concepts and market outcomes

A firm can make each unit cheaply yet sell too little for social benefit. Another can accept a current research cost to lower future costs.

Efficiency needs a named benchmark and time horizon.

Allocative efficiency means output matches marginal benefit and marginal cost; with external effects use social measures, not just private price and cost. In a competitive no-externality benchmark $P=MC$ can represent that condition. Productive efficiency means producing at the lowest attainable average resource cost for the relevant technology and scale. Dynamic efficiency concerns improvements in products, methods or resource use over time, often through innovation and investment. X-inefficiency is actual cost above an attainable efficient benchmark because resources are used poorly.

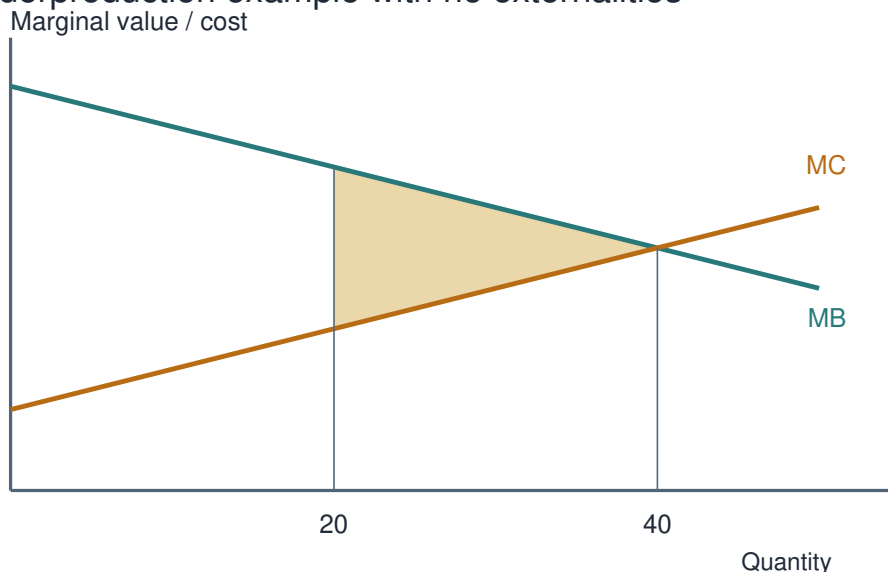
Market structures create different incentives and constraints. Competitive pressure can promote cost discipline and choice; entry and imitation can affect the rewards to research. Market power can provide funds for innovation yet weaken pressure to reduce waste or expand output. Perfect competition's long-run model gives static allocative/productive benchmarks under its assumptions; differentiated competition offers variety but may have markups and excess capacity. Monopoly or oligopoly must be evaluated using actual costs, entry, innovation and external effects, not a firm-size label alone.

Checked example

In a fictional one-market no-externality illustration, $MB=100-Q$ and $MC=20+Q$. Their equality gives $Q=40$ and marginal value 60. At $Q=20$, $MB=80$ exceeds $MC=40$: the unproduced units $20 \rightarrow 40$ have benefits above costs. The triangular forgone net benefit is $0.5 \times 20 \times 40 = 400$. This is an underproduction illustration, not a proof that a particular market structure causes $Q=20$.

Separately, a firm's attainable cost for a fixed output is 600 but actual cost 660, an excess 60 suggesting X-inefficiency if the benchmark is credible. A research project costs 30 now and reduces future comparable annual resource costs $100 \rightarrow 80$ for two years: undiscounted savings 40 exceed cost 30 by 10, but risk, discounting and alternatives remain excluded. These separate cases illustrate different concepts; do not add their quantities or welfare amounts.

An underproduction example with no externalities



Social externalities, information gaps and public goods can break the simple $P=MC$ welfare benchmark. Lowest private accounting cost is not necessarily lowest social

resource cost. Productive efficiency also needs a credible attainable benchmark, not just the lowest observed bill from firms making different quality products.

Dynamic gains are uncertain and may justify a short-run cost only when benefits exceed alternatives. Neither competition nor market power guarantees innovation. Compare prices, quantity, quality, resource cost, accessibility and future improvements with evidence. A structure can do well on one efficiency dimension and poorly on another; equity is a separate evaluation rather than a synonym for efficiency.

3.3.3.2 · Concentration ratios and market definition

Four brands may look like four competitors while one parent owns them all. A national share may hide a town with only one supplier.

Define the market, measure and ownership before adding shares.

An n-firm concentration ratio adds the market shares of the n largest independent firms in the defined market. Specify product, geography, period and share measure, such as sales value or physical volume. Rank firms rather than summing whichever n appear first in a table. A ratio describes the share held by the largest group, not how those firms behave. Higher concentration can suggest greater scope for market power or interdependence but does not establish collusion or a monopoly.

Interpretation depends on entry barriers, import competition, substitutes, buyer power and ownership. Similar ratios can hide different distributions within the leading group. A merger can change concentration even with unchanged total sales; brand names should not be mistaken for independent decision makers. Broad national and narrow local definitions can yield different meaningful results, so justify the chosen scope.

Checked example

Fictional market sales shares are A30%, B25%, C15%, D10%, E8%, F7%, G5%, totaling 100%. $CR_3 = 30 + 25 + 15 = 70\%$; $CR_4 = 80\%$. If E and F combine without changed sales, their share 15% joins the leading group: the four largest become 30, 25, 15, 15 and CR_4 rises to 85%, not merely 83%. A tie at third place does not affect this sum.

Two separate markets can both have $CR_3 = 70\%$: one has 30/25/15 for its leaders, another 60/5/5. The same ratio conceals very different largest-firm shares. If total sales are 200 and firm A sells 60, its value share is $60/200 \times 100 = 30\%$; a volume-share calculation may differ when unit prices vary.

Do not add percentages with different denominators, years or geographies. Company groups may have overlapping sales requiring careful consolidation; count distinct transactions once. A narrow market definition can raise measured concentration, but it must reflect meaningful substitution, not a desired conclusion.

Ratios omit potential entrants, efficiency, differentiated quality, conduct and future innovation. High concentration can coexist with strong potential-entry pressure; low concentration can coexist with coordination or local bottlenecks. Use the ratio as one piece of evidence alongside price-cost margins, entry/exit, customer alternatives and the costs of switching. The fictional figures are not current company statistics or legal thresholds.

3.3.3.3 · Perfect competition: firm and industry

One small producer accepts the market price; it cannot increase the entire industry price by making one extra unit. If many firms enter, industry supply can change.

Keep the individual firm's horizontal demand separate from the market's demand and supply.

Perfect competition assumes many buyers and sellers, homogeneous output, good information, free entry/exit and no individual firm able to influence price. The industry price is determined by market demand/supply; the firm takes that price, so $P=AR=MR$. With its own costs, it chooses a feasible profit-maximizing output where rising MC crosses MR, checking shutdown and boundaries. In the short run some costs/capacity are fixed and positive economic profit or losses can occur.

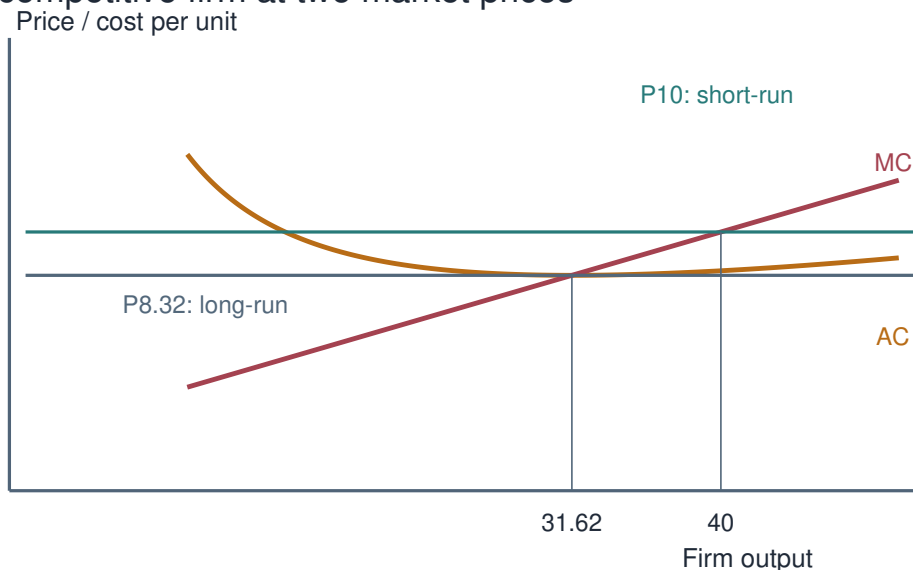
In the standard identical-firm constant-cost long-run model, profits encourage entry and losses encourage exit. Industry supply adjustment moves price toward minimum LRAC and normal economic profit, with $P=MC=\min AC$ at the efficient scale. This supports allocative efficiency without externalities and productive efficiency under the specified technology. In the short run $P=MC$ can hold while output is away from minimum AC, so productive efficiency is not guaranteed. A firm with receipts below avoidable cost should shut down rather than operate just because MC equals price at some point.

Checked example

A fictional competitive firm has $TC=100+2Q+0.1Q^2$, $MC=2+0.2Q$ and $AVC=2+0.1Q$. At market price 10, choose Q40: TR400, TC340 and economic profit60. At price6, choose Q20: TR120, TC180 and loss60, better than closure loss100 because variable cost80 is covered. At price1, every positive output has AVC above2 and above price, so closing minimizes the short-run loss; a positive-output $MR=MC$ solution does not exist.

The model's $AC=100/Q+2+0.1Q$ reaches its minimum at $Q=\sqrt{1000}\approx 31.6228$, with $AC\approx 8.3246$ and MC the same. If identical firms can enter/exit, input prices and technology remain fixed, and market demand supports viable firms, that price/output is the long-run normal-profit benchmark. Entry shifts industry supply; it is not the existing firm moving its own demand curve by choice.

One competitive firm at two market prices



At the long-run benchmark $P=MC=\min AC$; normal profit is covered.

The numerical long-run comparison assumes this schedule gives the lowest attainable cost at each feasible positive output, with no cheaper plant omitted; setup cost 100 becomes avoidable on exit. The quadratic case has AVC rising with Q and lower bound 2 as Q approaches 0; it is not the usual U-shaped AVC curve with an interior minimum. The general shutdown rule compares revenue with avoidable cost at the best operating output; the numerical price 1 is safely below all positive-output AVC here.

Long-run normal profit does not mean the owner receives nothing: normal returns are included in economic costs. Rising industry input costs, non-identical firms, externalities, information problems or entry restrictions change the benchmark. Perfect competition is a model, not a claim that any market with many shops meets every assumption. Static efficiency does not automatically prove strong dynamic innovation or equal distribution.

3.3.3.4 • Differentiated competition and excess capacity

Several cafes offer different drinks, packaging and delivery choices. Customers may pay more for a particular variety, but new rivals can enter.

Many firms can coexist with some price-setting ability.

Monopolistic competition combines many firms and relatively open entry with differentiated products. Each firm faces downward-sloping demand for its own variety and has limited market power; close substitutes constrain it. Physical differentiation changes features, marketing differentiation uses advertising/packaging, and distribution dif-

ferentiation changes access through shops, online or telephone ordering. Distinguish useful quality/access changes from unsupported claims.

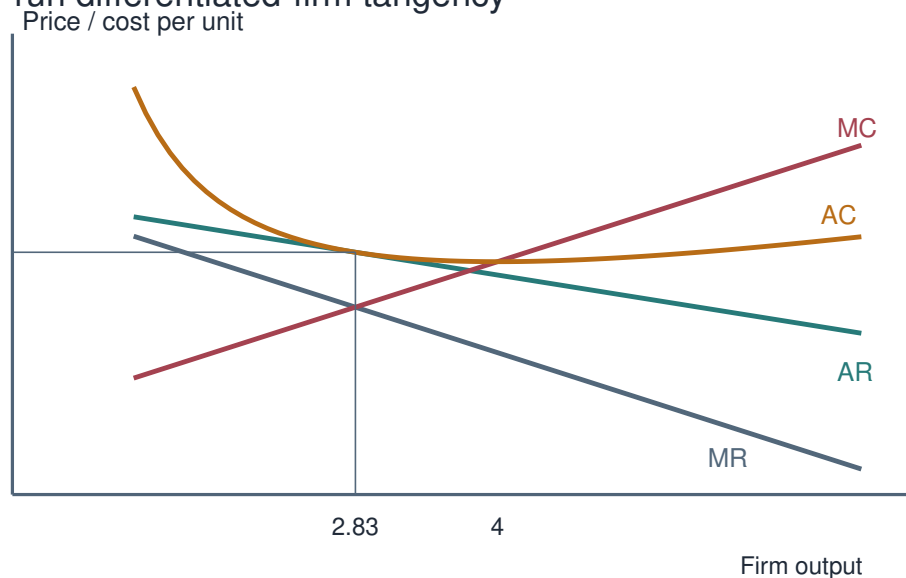
In the short run a firm chooses the feasible profit maximum where rising MC crosses MR and reads price from AR/demand; it can earn economic profit or losses. With entry and sufficient substitutability, positive profits attract new varieties and reduce each incumbent's demand. In the standard long-run tangency model AR touches AC at the $MR=MC$ output, giving normal economic profit. Output lies below the minimum-AC scale: excess capacity and $P > MC$ imply static productive/allocation inefficiency in the simple benchmark, alongside possible benefits of variety.

Checked example

Use a fictional firm with $TC=16+4Q+Q^2$, $MC=4+2Q$ and short-run demand $P=20-Q$, $MR=20-2Q$. Profit maximization gives $20-2Q=4+2Q$, so $Q=4$, $P=16$, $TR=64$, $TC=48$ and profit 16. In this particular short-run case $Q=4$ also minimizes AC; that coincidence is not a universal short-run result.

A separate long-run entry-adjusted demand is $P=a-Q$, where $a=4+4\sqrt{8}\approx 15.3137$. Its equilibrium $Q=\sqrt{8}\approx 2.8284$ gives price $4+3\sqrt{8}\approx 12.4853$ and AC the same, so economic profit 0. $MC=4+2\sqrt{8}\approx 9.6569$, below price by $\sqrt{8}$. AC is minimized at $Q=4$ with value 12, so excess capacity is $4-\sqrt{8}\approx 1.1716$. The AR/AC tangency is a whole equilibrium condition, not just any crossing of the two curves.

Long-run differentiated-firm tangency



AR touches AC at $Q=\sqrt{8}$; minimum AC is at $Q=4$. P remains above MC .

For the long-run numerical comparison, assume the stated cost curve represents attainable costs and no alternative plant gives a lower cost. Normal profit is compatible

with a markup over marginal cost because price also covers fixed and normal-return costs. The standard entry result needs open entry, demand redistribution and stable relevant costs; branding, strategic barriers or changing input prices can prevent it. Do not confuse monopolistic competition with monopoly or assume that every advertised product meets the model.

Excess capacity refers to the minimum-AC benchmark, not necessarily physically idle seats at every moment. Consumers may value differentiated products enough to prefer variety over a single standardized low-cost output. Advertising can inform or create misleading preferences; distribution can improve accessibility or create exclusion. Assess price, quality, information, innovation and variety, with social externalities handled separately from the private P/MC comparison.

3.3.3.5a–b • Oligopoly and barriers to entry or exit

A supplier watches two major rivals before changing its price. An entrant can buy equipment but may lose its launch advertising if it leaves.

Few firms and difficult entry are separate pieces of evidence.

Oligopoly is a market dominated by a few significant firms whose decisions are interdependent: each expects rivals to respond to price, output or product changes. Products may be homogeneous or differentiated. Firms need not have equal shares or agree with each other. A barrier to entry makes market entry harder or less viable. Entry barriers can sustain positions; exit costs affect whether entry is attractive.

Scale economies can make small-scale entry costly. Limit pricing may make entry appear unprofitable. Patents restrict use of protected methods/products for their applicable scope; branding can create loyalty and switching difficulties. Sunk expenditure cannot be recovered on exit; legal licensing or other rules can constrain entry. These six sources can combine, but a large initial investment is not automatically sunk if assets have a resale use.

Checked example

A fictional entrant pays equipment 100 and launch advertising 40. It can resell equipment for 80 but cannot recover advertising. If it exits immediately with other effects excluded, irrecoverable cost = $(100 - 80) + 40 = 60$; total initial outlay 140 is not all sunk.

Separately, an entrant's attainable average cost at its likely scale is 14. An incumbent price 12 would not cover that cost if the entrant sells the same product at the same price. This can deter entry in the stated case, but lower cost, a differentiated product, expected future prices or a larger scale can change it.

A high minimum efficient scale relative to market demand may leave room for only a few low-cost firms; the ratio alone does not prove any agreement.

A barrier can protect returns on innovation or meet safety goals while also limiting rivalry. Evaluate the policy purpose and scope rather than treating every restriction as waste. Branding may reflect reliable quality or costly persuasion. Scale economies can lower unit costs and also make entry harder.

Entry and exit barriers differ: an unavoidable exit loss affects expected entry risk, while a licence limits permission to start. Resale value is uncertain, not guaranteed⁸⁰ in real markets. Oligopoly does not imply monopoly, identical prices or collusion; check rival responses, alternatives and entry conditions. These cases are original teaching examples, not descriptions of actual firms or legal advice.

3.3.3.5c–d · A two-firm pricing game and collusion

Two firms could both earn more by keeping a high price, yet each can gain by cutting while the other stays high.

Check the incentives cell by cell before predicting the outcome.

Interdependence means a firm's payoff depends on both its choice and its rival's. In a simple simultaneous two-firm game, identify each firm's best response to each possible rival choice. A dominant strategy is best against either rival choice; a Nash equilibrium has no profitable unilateral deviation. Do not confuse the highest combined payoff with individually stable choices.

A cartel coordinates decisions such as output or prices; members can have incentives to cheat. Price leadership means others follow a leading firm's price changes and is not by itself proof of an agreement. Price wars are repeated competitive cuts, possibly eroding margins. Collusion may seek higher profit and reduced uncertainty; non-collusion can reflect entry, different costs/objectives, cheating incentives and restrictions on coordination. Repeated interactions and credible responses can alter incentives, but cannot be inferred from a one-round table.

Checked example

Use fictional profits in order(A,B). If both choose High, payoffs are(8,8); A Low/B High gives(12,2); A High/B Low gives(2,12); both Low gives(4,4). Against B High, A prefers 12 to 8; against B Low, A prefers 4 to 2. B has the symmetric comparisons, so Low is dominant for both and (Low,Low) is a Nash equilibrium. Both High yields combined 16 rather than 8, but each can gain from deviating when the other stays High.

A coordinated high-price outcome may benefit producers through margins and predictability, but consumers can face higher prices, less output and choice. Workers may gain stable employment or face reduced output/investment; government may receive higher taxable profit but face enforcement costs and welfare losses. The table's profit total is not social welfare: consumer surplus, resource costs and external effects are not shown.

One-shot two-firm pricing game

	B: High	B: Low
A: High	8, 8	2, 12
A: Low	12, 2	4, 4

Each cell is(A payoff, B payoff); Low is dominant for each.

Highlighted Low/Low: neither firm gains by switching alone.

The game assumes known payoffs, two specified choices and one simultaneous round; it is not a complete model of every oligopoly. Do not select a cell using only the first payoff or assume that both firms maximize the sum. In repeated markets, monitoring, punishment, demand changes and entry can matter; the one-shot result remains conditional.

Parallel prices can follow similar costs or demand without an agreement. Coordination can reduce waste or uncertainty but can also restrict rivalry; actual rules and evidence vary. This lesson diagnoses incentives and stakeholder effects, not instructions to coordinate real pricing. Profit gains for firms do not by themselves establish benefits for consumers or workers.

3.3.3.5e—g · Price and non-price rivalry

A price cut may be ordinary competition, an attempt to discourage entry, or part of a strategy to exclude an existing rival. Better repairs and service can compete without a price cut.

A low price alone does not identify motive or long-run effect.

Price wars involve rival price reductions that can lower margins and benefit current buyers. Limit pricing aims to discourage potential entry by making expected entry returns unattractive; the price need not be below the incumbent's cost. Predatory pricing involves a strategy of sacrificing returns to exclude rivals with an intended later recovery of losses; evidence, cost benchmarks and the feasibility of future recovery matter. Do not label every discount predatory or make a universal legal claim.

Non-price competition includes advertising/branding, quality, endorsement, product placement and after-sales service. Advertising can inform or persuade; quality can improve durability or performance; endorsements and placements associate products with people/media; service can reduce customers' repair risk. These channels may improve value or raise costs and switching barriers. Evaluate each mechanism and who pays.

Checked example

A fictional incumbent sells 100 units at price 12 with average economic cost 9: profit 300. Price 10 at unchanged volume and cost gives profit 100. If volume rises to 130 but average cost stays 9, profit becomes 130. These calculations illustrate margin/volume effects, not a demand forecast.

In a separate entrant case, incumbent cost 9 and entrant attainable cost 11 make price 10 profitable for the incumbent but unattractive for that entrant: limit pricing need not be below incumbent cost.

A service upgrade costs 200 and prevents an expected 300 customer repair loss under the stated assumptions. Its expected combined resource gain is 100 before other costs, but how price and risk are shared determines each party's benefit. A paid endorsement adding no verified product quality should not be counted automatically as a technical improvement.

Consumers may gain lower prices, better information, quality and service, but face misleading advertising, weaker future rivalry or switching costs. Firms may gain sales or loyalty while spending more and risking retaliation. Workers may gain new roles or face margin pressure; suppliers may gain orders or be squeezed by stronger bargaining.

A price war can be temporary or sustainable with lower costs; below-cost sales can have several explanations. Assess time horizon, costs, entry, consumer alternatives and the evidence of exclusion rather than asserting motives from one observed price. Endorsement/product placement need attribution and honest claims. Non-price spending is neither inherently wasteful nor guaranteed innovation; compare resource costs with information, quality and welfare gains.

3.3.3.6a–d,h · Monopoly output, welfare and efficiency

A sole supplier can influence price, but customers still buy less when its price rises. It cannot choose price and sales independently.

Market power does not guarantee profit or remove demand constraints.

The pure monopoly model has one supplier in the defined market, no close substitutes and barriers protecting its position. Market definition and alternatives matter; a large firm is not automatically a monopoly. Barriers may involve scale advantages,

protected technology, exclusive resources, branding, licences or sunk entry/exit costs. The monopolist faces market demand as AR and has MR below price under uniform pricing. It chooses feasible output where $MR=MC$ at a profit maximum, then reads price from demand; it does not set $P=MC$ as its profit rule.

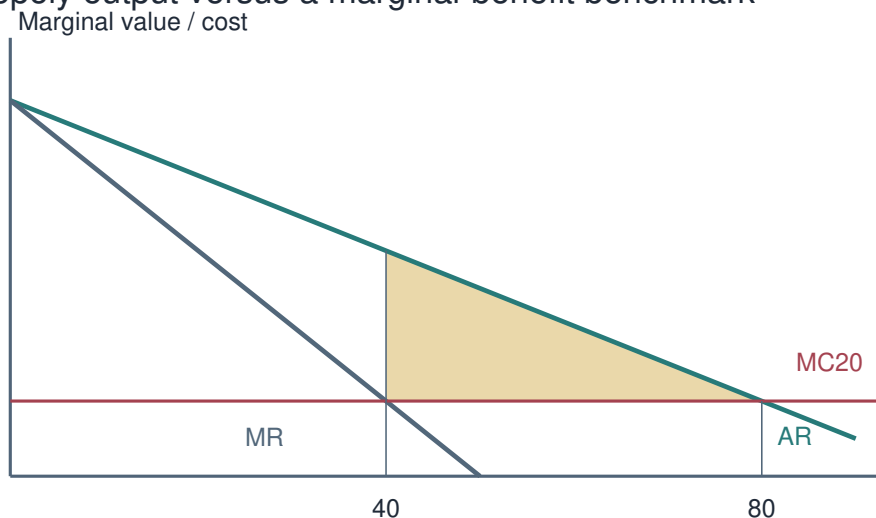
Restricted output and a price markup can transfer surplus to the firm and reduce allocative efficiency in a no-externality benchmark. Scale can lower costs, and profits may fund research or better service; weak rivalry may instead permit X-inefficiency or slow innovation. Productive and dynamic efficiency need evidence of attainable cost and actual improvements. Consumers may gain reliable integrated provision or lose choice, surplus and access; neither outcome follows from ownership alone.

Checked example

A fictional monopoly has $P=100-Q$, $MR=100-2Q$ and $TC=200+20Q$, including the required normal return. $MR=MC$ gives $Q=40$, price 60, TR 2400, TC 1000 and economic profit 1400. Consumer surplus $=0.5 \times (100-60) \times 40 = 800$.

The same-demand marginal-benefit/MC benchmark gives $Q=80$ and price 20. The unproduced net benefit between 40 and 80 is $0.5 \times 40 \times 40 = 800$. Fixed cost 200 is unchanged between these two output comparisons, so net welfare rises $2200 \rightarrow 3000$ if the extra output can be financed and delivered. However, selling all 80 at price 20 gives revenue 1600 against cost 1800: marginal-cost pricing does not cover fixed cost 200. This is an allocative benchmark, not an automatic viable competitive long-run outcome. At $Q=40$, AC 25 exceeds MC 20; profit is calculated from $TR-TC$, not from the price/MC margin alone. AC falls to 22.5 at $Q=80$, showing further scale-cost reductions in this toy schedule, not a universal monopoly result; demand and finance still need evaluation.

Monopoly output versus a marginal-benefit benchmark



Monopoly uses $MR=MC$; shaded forgone net benefit 800.

The welfare triangle assumes unchanged demand/cost, no external effects and feasible extra output. It measures lost net benefit, not all monopoly profit or a transfer between consumers and owners. This particular fixed-cost schedule has declining AC; it does not imply every monopoly has that technology.

Monopoly can make losses if demand is weak or costs high. Entry barriers can protect research incentives yet obstruct new ideas; profits alone do not prove dynamic efficiency. Compare alternatives, resource costs, quality, innovation and regulation. Social cost/benefit and equity may alter the evaluation. A monopoly's supply choice depends on demand and MR, so it has no unique demand-independent supply curve like a competitive firm's standard marginal-cost segment.

3.3.3.6e • Natural monopoly and financing efficient provision

Duplicating a network can duplicate its fixed costs without improving service. Keeping one network can also give its owner substantial power.

Low-cost provision and a fair, sustainable price are separate policy questions.

Natural monopoly occurs when one provider can supply the relevant market at lower total cost than multiple providers, often because large fixed costs and scale economies persist across market demand. The condition is technological and demand-dependent, not simply state ownership or any sole supplier. Test the relevant cost comparison and feasible capacities.

Marginal-cost pricing can expand access and allocation but fail to cover fixed costs, requiring an explicit financing arrangement. Average-cost pricing can cover economic costs and normal returns but leave price above MC and output below the simple allocative benchmark. Public ownership, regulated private provision or competition for a service contract can address different concerns; each still needs cost information, investment, quality standards and accountability. Avoid pretending that duplicated networks are always the best way to create rivalry.

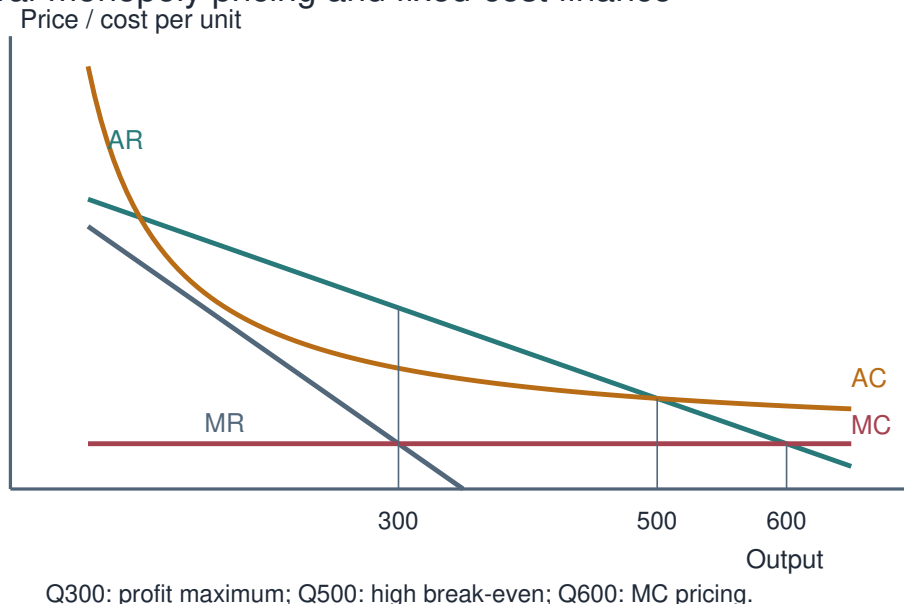
Checked example

A fictional network has $TC=1000+2Q$. Serving 400 units with one network costs 1800; two identical networks each serving 200 cost 1400 each, total 2800. The extra 1000 is duplicated setup cost, assuming the same quality, technology and capacity. Average cost at 100/200/400 is 12/7/4.5.

With demand $P=14-0.02Q$, $MR=14-0.04Q$ and $MC=2$, monopoly output 300 gives price 8, $TR=2400$, $TC=1600$ and profit 800. Marginal-cost price 2 implies $Q=600$: receipts 1200 versus cost 2200, a funding shortfall 1000. For zero economic profit, set $P=AC: 14-0.02Q=1000/Q+2$. The break-even roots are $Q=100/P=12$ and $Q=500/P=4$. The higher-output feasible comparison $Q=500$ covers cost 2000 with receipts 2000, but

P4 still exceeds MC2. A regulator must justify the chosen output and finance, not treat every AR/AC crossing as the best policy.

Natural-monopoly pricing and fixed-cost finance



The example excludes congestion, quality differences, capacity limits and alternative network technology. A technological change can undermine a natural-monopoly condition; distribution access and service activities may have different competitive possibilities. A cheap single network does not imply every associated activity must be monopolized.

Subsidies need revenue and can weaken incentives; average-cost rules can reward inflated costs if monitoring is weak. Contract competition needs credible bidders and enforcement; public ownership needs governance and investment discipline. Evaluate service continuity, access, quality, consumer price, normal financing and regulatory information costs together. Natural monopoly is a cost proposition, not proof of efficient management or a universal choice of ownership.

3.3.3.6f–g · Third-degree discrimination and who gains

Two identifiable customer groups may face different prices for the same service. Different production costs can also cause price differences.

Test the mechanism before calling every price difference discrimination.

Third-degree price discrimination sets different prices for identifiable markets/groups for reasons beyond corresponding unit-cost differences. It needs enough market power, workable segmentation, limited resale/arbitrage and different demand responses to

make differentiated pricing worthwhile. With common MC and separable markets, an interior profit optimum allocates output so MR in each market equals MC; the less price-elastic group tends to pay the higher markup under the model. Price is read from each demand curve, not set equal to MR.

Higher receipts may cover fixed provision costs, serve a new group or finance quality; some consumers may gain lower prices/access while others pay more. Profit gains do not prove greater total output or welfare. Compare feasible uniform pricing, affected groups, resource costs, segmentation costs and output before judging. Discounts explained entirely by different costs are a different case.

Checked example

A fictional supplier has demands $PA=100-QA$ and $PB=60-QB$, common MC20 and fixed economic cost200. Separate MR conditions give $QA40/PA60$ and $QB20/PB40$: total output60, receipts $2400+800=3200$, cost1400 and profit1800. Point PED is -1.5 in A and -2 in B at these choices; the less elastic group A pays more.

Under a common price50, $QA50$ and $QB10$ give the same total60, receipts3000, cost1400 and profit1600. This is the best uniform-price choice when both groups buy: aggregate $Q=160-2P$ gives the profit maximum at P50; serving only A gives at most profit1400 in this case. Consumer surplus under uniform pricing is $1250+50=1300$; discrimination gives $800+200=1000$. Profit rises200 but combined firm-profit/consumer-surplus falls100, from2900 to2800, because output is reallocated between groups. Total quantity alone therefore does not settle welfare.

Same total output, different group allocation

Uniform price50

A: Q50, CS1250

B: Q10, CS50

Separate prices60/40

A: Q40, CS800

B: Q20, CS200

Both total Q60; profit1600→1800; total CS1300→1000.

Combined profit + CS falls100 in this stated no-externality case.

The welfare comparison assumes common costs, truthful demand curves, no externalities and no extra segmentation/enforcement cost. Another case can expand total output or keep a high-fixed-cost service viable, so this numerical loss is not a universal result. Resale barriers may be costly, incomplete or ethically contested; school examples should not pretend group labels automatically identify willingness to pay.

Fixed costs and normal return are included; consumer surplus is not a measure of equal access or every aspect of wellbeing. Group B benefits here while A loses, illustrating distribution. Explain whether price differences reflect cost, product quality or discrimination before applying the MR rule. The hypothetical prices are teaching cases, not advice to implement real group-based pricing.