

Cambridge AS & A Level · Economics 9708 · Notes

Private costs and benefits, externalities and social costs and benefits

A2

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Read first: [Consumer and producer surplus](#), [Classification of goods and services](#), [Efficiency and market failure](#)

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What you need to know

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

1. **Define and calculate social cost.** Social cost (SC) is private cost (PC) plus external cost (EC). At the margin: $\text{marginal social cost (MSC)} = \text{marginal private cost (MPC)} + \text{marginal external cost (MEC)}$.
2. **Define and calculate social benefit.** Social benefit (SB) is private benefit (PB) plus external benefit (EB). At the margin: $\text{marginal social benefit (MSB)} = \text{marginal private benefit (MPB)} + \text{marginal external benefit (MEB)}$.
3. **Define a positive externality and a negative externality:** a benefit or a cost that falls on a third party, outside the market, and that nobody pays or is paid for.
4. **Explain positive and negative externalities of both consumption and production**, with examples, and show each on a diagram.
5. **Explain the deadweight welfare loss** each kind of externality causes, and show it as a triangle on the diagram.
6. **Explain asymmetric information and moral hazard.**
7. **Use costs and benefits to analyse decisions** (cost–benefit analysis): count every private and external cost and benefit, value them, and compare social benefit with social cost. Net present value is not required.

The policies that correct externalities (taxes, subsidies, regulation, permits) are a separate topic. Here you learn what externalities are, how big they are and why they cause a loss of welfare.

Understand it

Private, external and social

Every decision has costs and benefits. Some fall on the people making the decision; some spill over onto others.

- **Private costs** are paid by the producer or consumer who makes the decision: a pulp mill's wood, wages and energy; a driver's fuel and insurance.
- **Private benefits** go to the decision-maker: the mill's revenue; the driver's quicker journey.
- **External costs** fall on **third parties**, people outside the transaction, who are not compensated: the smell and river pollution from the mill; the congestion and fumes a driver adds for everyone else.
- **External benefits** go to third parties who do not pay for them: the neighbours of a vaccinated child are less likely to catch the disease.

Add them up and you get the cost and benefit to society as a whole:

$$SC = PC + EC \quad SB = PB + EB$$

The same holds for one extra unit: $MSC = MPC + MEC$ and $MSB = MPB + MEB$. Rearranging is often what a question needs: $PB = SB - EB$, or $EC = SC - PC$.

An **externality** is the gap between private and social: a cost or benefit to a third party that the market price leaves out. A **negative externality** is an external cost; a **positive externality** is an external benefit. The test is always **who bears it**. The mill's electricity bill is a private cost, however large; the cost to a fishing village downstream is external.

Why the market gets the quantity wrong

In a free market, producers and consumers look only at their **own** costs and benefits. Consumers buy up to where their marginal private benefit equals the price, so the demand curve is the **MPB** curve. Firms supply up to where price equals their marginal private cost, so the supply curve is the **MPC** curve. The free market settles where

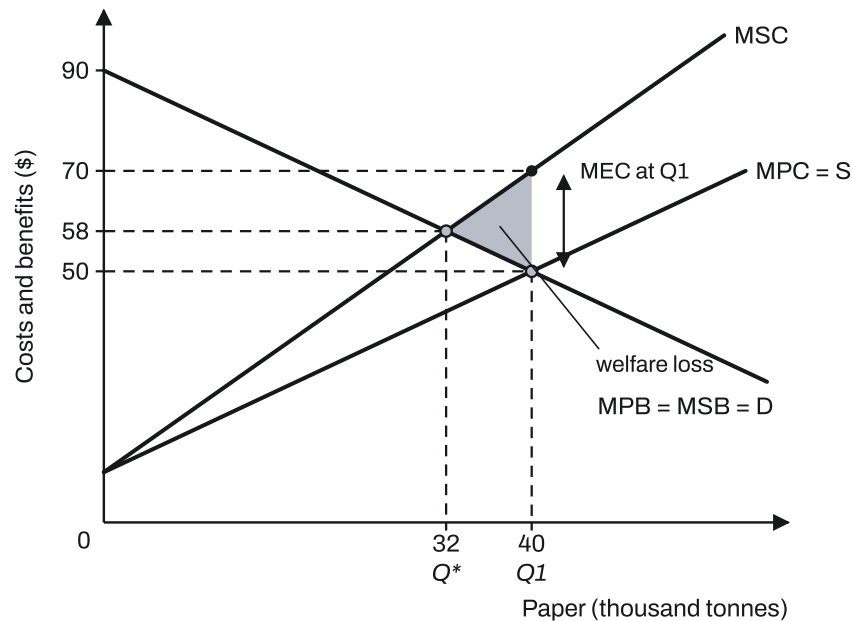
$$MPB = MPC.$$

Society would be best off (allocatively efficient) where every unit whose benefit to society exceeds its cost to society is produced, and no others:

$$MSB = MSC.$$

When there are no externalities, $MPB = MSB$ and $MPC = MSC$, so the two points are the same. When there are externalities they are not, and the market produces the wrong amount.

Negative externality of production



A pulp mill makes paper and releases waste into a river. Its private costs give the supply curve MPC. The damage downstream grows as output grows, so the marginal external cost gets bigger and the **MSC curve lies above MPC, further above at higher output**. Buyers of paper are the only people who benefit, so $MPB = MSB$.

- **Free market:** $MPB = MPC$ at **40 thousand tonnes, \$50 a tonne (Q_1)**.
- **Social optimum:** $MSB = MSC$ at **32 thousand tonnes, \$58 (Q^*)**.
- **Marginal external cost at the free-market output:** the vertical gap between MSC and MPC at Q_1 , $\$70 - \$50 = \$20$.

So a negative production externality means **over-production** (40 instead of 32) and **under-pricing** (\$50 instead of \$58): the price leaves out part of the true cost.

Deadweight welfare loss

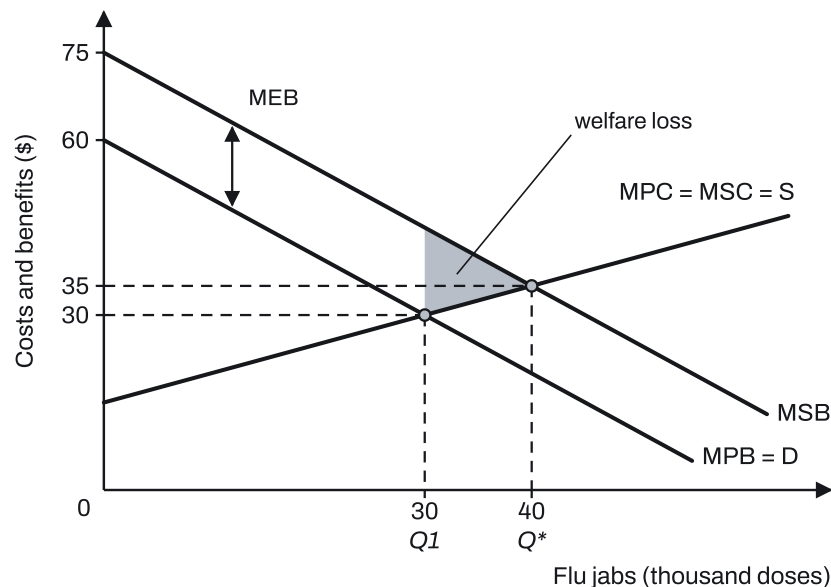
Each tonne between Q^* and Q_1 costs society more (MSC) than it is worth to buyers (MSB). The extra cost on all these units added together is the **deadweight welfare loss**, the shaded triangle between MSC and MSB from Q^* to Q_1 . Its point is at Q^* and its base is the vertical line at Q_1 , from $MPB = \$50$ up to $MSC = \$70$:

$$\text{welfare loss} = \frac{1}{2} \times (40 - 32) \times (70 - 50) = 80, \text{ that is } \$80\,000.$$

(Quantities are in thousands, so the area in dollars is multiplied by 1000.)

The triangle always **points at the optimum Q^*** and lies between the two "social" curves. If you are asked to name it on a diagram with letters, find Q^* and Q_1 first, then take the triangle between them that is bounded by MSC and MSB.

Positive externality of consumption



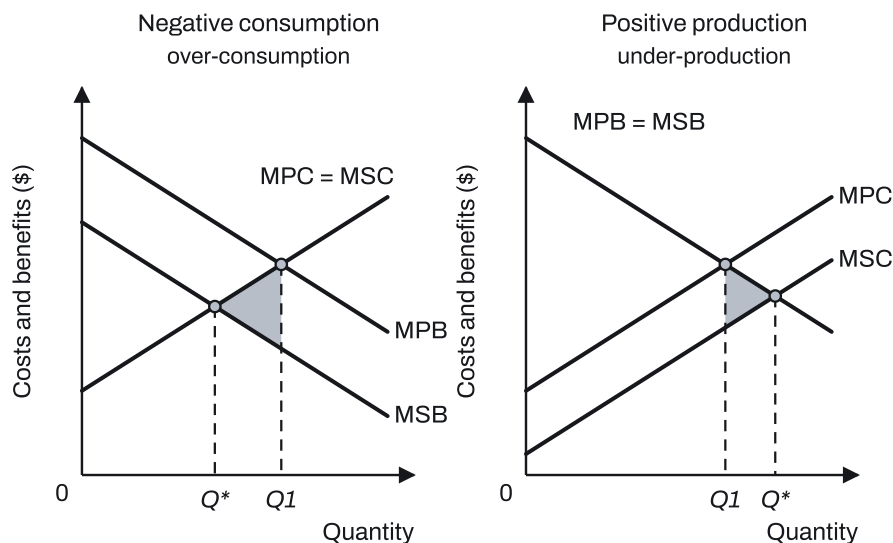
A flu jab protects the person who has it (private benefit) and also the people around them, who are less likely to catch flu, and the health service, which treats fewer patients (external benefits). Here each dose gives third parties \$15 of benefit, so **MSB lies \$15 above MPB**. Supplying a dose has no spill-overs, so $MPC = MSC$.

- **Free market:** $MPB = MPC$ at **30 thousand doses, \$30**.
- **Social optimum:** $MSB = MSC$ at **40 thousand doses, \$35**.
- **Welfare loss:** at Q_1 , MSB is \$45 and MSC is \$30, so the triangle is $\frac{1}{2} \times 10 \times 15 = 75$, that is \$75 000.

So a positive consumption externality means **under-consumption**: people ignore the benefit to others, so the 10 thousand doses between Q_1 and Q^* , each worth more to society than it costs, are never bought. Notice that the market price (\$30) is also **below** the price at the optimum (\$35), because the supply curve slopes up.

Education, training, health checks and public transport use are other common examples. Many **merit goods** have positive consumption externalities; many **demerit goods** (cigarettes, alcohol) have negative ones.

The other two kinds



- **Negative consumption externality:** using the good harms others. Loud music, cigarette smoke, litter such as discarded chewing gum, the congestion and emissions from driving or flying. Here it is the **benefit** curve that moves: **MSB lies below MPB**. The market over-consumes ($Q_1 > Q^*$).
- **Positive production externality:** making the good helps others. A firm trains workers who later move to other firms; a beekeeper's bees pollinate nearby orchards; a firm builds a road to its new factory that local people can use. Here **MSC lies below MPC**. The market under-produces ($Q_1 < Q^*$).

The rule for drawing: **production externalities move the cost curve; consumption externalities move the benefit curve**. Negative ones push "social" to the wrong side for society (MSC above MPC, or MSB below MPB); positive ones put it on the good side (MSC below MPC, or MSB above MPB). Air travel and driving are **consumption** externalities: the March 2023 report said many candidates drew a production diagram for air travel and lost analysis marks.

When a good has **two** externalities at once, the optimum depends on both. A negative production externality pulls Q^* below Q_1 ; a positive consumption externality pushes it above. Which wins depends on their sizes, so you cannot say whether the market over- or under-produces until you know them.

Asymmetric information and moral hazard

Markets work well when both sides know what they are trading. Two information problems stop that.

- **Asymmetric information:** one side of a transaction knows more than the other. A dentist or car mechanic knows far more than the customer about what work is needed, so they can sell treatment or repairs the customer does not need. A seller of a used car may know about a fault the buyer cannot see. Because the less-informed side cannot judge value, too much (or too little) is traded, and resources are misallocated.
- **Moral hazard:** someone takes **more risk because another party bears the cost** if things go wrong. Once insured against theft, a driver may park in a riskier street. People with free dental care may care for their teeth less well. Banks that expect to be rescued by the government may lend more recklessly.

Moral hazard grows out of asymmetric information: the insurer cannot see how carefully the insured person behaves after signing. It is reduced by making the risk-taker **share the loss**, for example with an **excess** (the first part of any claim is paid by the customer), no-claims discounts, or conditions on the payout.

A consumer who **underestimates** the private cost of a good (for example the health cost to themselves of a sugary diet) has their own information failure: they consume where MPB meets the cost they think they face, not the true MPC, so they over-consume.

Cost–benefit analysis

Governments deciding on a road, a dam, a hospital or a new railway use **cost–benefit analysis (CBA)**:

1. **Identify** every cost and benefit: private ones (building costs, fares or tolls paid) and external ones (noise, lost homes or habitat, pollution, time saved by other road users, fewer accidents, jobs created).
2. **Value** each one in money, using market prices where they exist and estimates ("shadow prices") where they do not, such as the value of travel time saved or a life saved.
3. **Compare**: work out social benefit minus social cost, the **net social benefit**. Go ahead if $SB > SC$; when choosing between projects, prefer the one with the largest net social benefit.

A private firm would compare only PB with PC, so it may reject a project that is good for society (large external benefits) or accept one that is bad for it (large external costs). That gap is the reason governments use CBA.

CBA has well-known problems:

- **Valuing the intangible**: how much is a quiet street, a view, a species, or national pride worth?
- **The future**: benefits that arrive over 30 or 50 years are uncertain, and a dollar later is worth less than a dollar now. The more of the costs and benefits that are **external** and in the **future**, the less accurate the result.
- **Whose costs count**: people far away, or not yet born, are easy to leave out; the losers are not always compensated.
- **Opportunity cost**: a project with a positive net social benefit may still not go ahead if government funds are limited and another project offers more.
- **Bias**: estimates can be pushed towards the answer politicians want.

Key facts and formulas

There is no formula list in the 9708 exam, so everything here is "Learn it".

Formula	Status
Social cost: $SC = PC + EC$	Learn it
Social benefit: $SB = PB + EB$	Learn it

Formula	Status
Marginal social cost: $MSC = MPC + MEC$	Learn it
Marginal social benefit: $MSB = MPB + MEB$	Learn it
Marginal value from totals: marginal cost (or benefit) of a unit = change in the total when that unit is added	Learn it
Free-market output: $MPB = MPC$ (demand meets supply)	Learn it
Socially optimal (allocatively efficient) output: $MSB = MSC$	Learn it
Marginal external cost at the free-market output: the vertical gap $MSC - MPC$ at Q_1	Learn it
Deadweight welfare loss = $\frac{1}{2} \times Q_1 - Q^* \times (\text{gap between } MSC \text{ and } MSB \text{ at } Q_1)$	Learn it
Net social benefit = $SB - SC$; cost-benefit rule: go ahead if $SB > SC$	Learn it

Rules to learn:

- Negative production externality: MSC above $MPC \rightarrow$ over-production, under-pricing.
- Positive production externality: MSC below $MPC \rightarrow$ under-production.
- Negative consumption externality: MSB below $MPB \rightarrow$ over-consumption.
- Positive consumption externality: MSB above $MPB \rightarrow$ under-consumption.
- Moral hazard: more risk taken because someone else bears it. Asymmetric information: one side knows more than the other.

How to do it

We tagged 84 questions for this topic, from 2021 to 2026 (74 different ones; 10 are repeats across paper variants): 65 Paper 3 multiple choice and 19 Paper 4 data-response and essay questions. For Paper 4 we count only the parts about externalities. No question is counted under two types.

Question type	Questions
Identify or classify an externality, cost or benefit (multiple choice)	20
Read an $MPC/MSB/MPB/MSB$ diagram (multiple choice)	19
Use $SC = PC + EC$ and $SB = PB + EB$ (multiple choice)	10
Use cost-benefit analysis to make or judge a decision (multiple choice)	10

Question type	Questions
Externality analysis in a 20- or 25-mark policy essay	10
Explain an externality with a diagram (data-response or essay part)	7
Asymmetric information and moral hazard (multiple choice)	6
Explain cost–benefit analysis for a government decision (essay)	2

1. Identify or classify an externality, cost or benefit (20 questions)

A real scenario (motorbike helmets, vaccines, chewing gum, a railway, an airport, a cruise terminal) and a choice of effects.

1. **Who bears it?** The decision-maker → private. Someone outside the transaction, uncompensated → external.
2. **Good or bad for them?** Benefit → positive; cost → negative.
3. **Where does it come from?** From making the good → production; from using it → consumption.

Variants:

- **"Positive consumption externality of compulsory helmets"**: the benefit to third parties, such as **less pressure on health services**; not the rider's longer life (private) or helmet makers' profits.
- **Private benefit vs external benefit in a transport change**: the time saved by the people who switch is private; the time saved by those who stay in their cars, and cleaner air for pedestrians, are external.
- **External cost in a CBA**: the cost to a third party, such as a fishing fleet forced to move or residents' noise; not the ticket price, fuel bills or construction cost (all private).
- **"Example of a negative externality"**: a harmful effect on a third party. Not monopoly power, not missing public goods, not a tax.
- **"Who bears the external cost of electricity generation?"**: the people living near the power station.
- **"What usually follows?"**: firms do not bear external costs on their own, so **government intervention** is likely.
- **Tax on sugary drinks**: it targets over-consumption of a demerit good and negative consumption externalities (health costs falling on others), not production externalities.

2. Read an externality diagram (19 questions)

1. **Label the four curves**: demand = MPB, supply = MPC; MSC and MSB are the "social" ones.
2. **Free market**: where MPB crosses MPC. The March 2026 report said a common wrong answer used a social curve here; a free market looks only at private costs and benefits.
3. **Optimum**: where MSB crosses MSC.
4. **Answer what is asked**:
 - **over- or under-production**: compare Q_1 with Q^* ; the amount is the distance between them;
 - **change needed**: from Q_1 to Q^* (and the price change along the supply curve: up if output falls);

- **MEC at the free-market output:** the vertical gap $MSC - MPC$ at Q_1 , not at Q^* (in November 2022 nearly half the candidates chose the gap at the wrong output);
- **deadweight welfare loss:** the triangle between MSC and MSB from Q^* to Q_1 ;
- **net social benefit at an output:** the area under MSB minus the area under MSC up to that output (in June 2023 only a third found it).

Variants:

- **Which externalities put the optimum at a given point?** Work out which way each curve has moved: positive production moves MSC down (more output), negative consumption moves MSB down (less). Match the combination to where Q^* sits compared with Q_1 .
- **Shift or movement?** A fall in fuel cost **shifts** MPC down; quieter engines **shift** the MEC curve down. A movement along a curve needs a change in quantity, not in costs.
- **A consumer misjudges private cost:** if the true MPC is higher than they think, they consume where MPB meets the lower, imagined MPC , so they **over-consume** by the gap between the two crossing points.
- **No diagram, positive consumption externality:** output is **below** the allocatively efficient level.

3. Use $SC = PC + EC$ and $SB = PB + EB$ (10 questions)

1. Write the two identities, and rearrange: $EC = SC - PC$, $PB = SB - EB$.
2. **From totals to marginal values:** the marginal value of a unit is the change in each total; add the private and external changes.
3. **Total externalities** in a CBA table: $(SC - PC) + (SB - PB)$.

Variants:

- **"Which statement is correct?":** only the rearrangements of the identities; social benefit minus external benefit equals private benefit.
- **Deducing a relation:** if $PB > PC$ but $SB < SC$, the externalities must reverse the sign, so $EB < EC$.
- **Which change raises net social cost?** Net social cost $= SC - SB$. Check each row: falls in benefits or rises in costs raise it.
- **Net social benefit definitely exists** when SB minus SC is positive.
- **A firm made to repair the damage it causes** now pays private costs plus the external costs: the externality has been **internalised**.

4. Use cost-benefit analysis to decide (10 questions)

1. **Decision rule:** approve if social benefits exceed social costs; the optimal level of an activity (including pollution) is where $MSC = MSB$.
2. **Numbers:** add $PB + EB$ and $PC + EC$, then compare. If the question gives its own criterion (for example social benefit per dollar of private cost), use it exactly.
3. **What goes in:** every effect on anyone, including jobs lost elsewhere, travel time, incomes and emissions.

4. **Why it may be inaccurate:** many external items and many effects far in the future; intangibles such as national pride.
5. **Why a project with positive net social benefit may not go ahead:** limited government funds and the opportunity cost of other projects.

5. Externality analysis in a 20- or 25-mark policy essay (10 questions)

Traffic congestion, air travel, smoking, climate change, electric cars, the fashion industry, training. The policy evaluation is marked under its own topic; this topic gives you the **analysis** that every one of these essays needs.

Answer plan (20 marks: Table A 14 for knowledge and analysis, Table B 6 for evaluation)

1. **Define** the externality (a cost or benefit to a third party, not reflected in price), market failure and allocative efficiency ($MSB = MSC$).
2. **Classify it:** production or consumption, negative or positive. Congestion and flying are **consumption** externalities (MSB below MPB); a factory's emissions are production (MSC above MPC); training creates external benefits for future employers and the government.
3. **Draw** the right diagram, fully labelled: axes, MPC , MSC , MPB , MSB , Q_1 , Q^* , the welfare-loss triangle. From 2023, **no diagram (or a wrong one) caps the answer at Level 2** of Table A.
4. **Explain the chain:** decision-makers ignore the external cost $\rightarrow$ private cost is below social cost $\rightarrow$ output Q_1 above Q^* $\rightarrow$ too much produced, price too low $\rightarrow$ welfare loss. Refer to the letters on your diagram.
5. **Then** analyse and evaluate the policies (tax, subsidy, regulation, permits, information). Evaluation points that come from this topic: the **size of the externality is hard to measure** (so the right tax is unknown), information failure, and whether the benefits of correcting it outweigh the costs (a CBA judgement).
6. **Conclude** in the question's own words ("only", "to what extent").

The March 2021 report criticised answers to a negative-externality essay that drifted into positive externalities.

6. Explain an externality with a diagram (7 questions)

Data-response parts of 2 to 10 marks and 12-mark essay parts.

1. **Definition** (2 marks): a cost (1) borne by a third party, not the producer or consumer (1). The June 2023 report said few candidates even stated this.
2. **Identify** from the extract (1 mark each): quote the actual external effect (noise, dirt, polluted air, lost wildlife), not a private cost.
3. **Diagram** (usually 3 marks): correct axes, labelled curves, and the externality shown (the gap between MPC and MSC).
4. **Explain the result:** "taking the external cost into account" means producing where $MSB = MSC$, so output **falls** from Q_1 to Q^* and price **rises**. Explain the welfare loss on the units in between.
5. **For "discuss whether ... allocative efficiency"** (10 marks): add definitions of private, external and social cost and allocative efficiency, use a figure from the extract, then conclude that the efficient output is Q^* , not Q_1 , so allocative efficiency is not reached.

A 12-mark part asking for **both** a positive consumption and a negative production externality needs two diagrams, each with its own example.

7. Asymmetric information and moral hazard (6 questions)

1. **Moral hazard**: someone takes more risk because another party pays for it. Spot the **non-example**: a person who trains **because** they face a high risk of unemployment is reducing their own risk, not passing it on.
2. **Reducing it**: make the risk-taker **share the loss** (an excess, co-payment, conditions). Charging everyone the same premium or giving unconditional rescues does the opposite.
3. **Asymmetric information**: one side knows more. Dentists or mechanics selling unneeded treatment is the standard example.

8. Explain cost–benefit analysis for a government decision (2 questions)

25-mark essays from 2022 (a new hospital; how much of a public good to provide).

1. **Explain CBA**: list, value and compare all private and external costs and benefits; go ahead if $SB > SC$; choose the project with the largest net social benefit.
2. **Apply it**: name the real items for that project (building and staffing costs; shorter journeys to treatment, a healthier workforce, congestion during building).
3. **Explain why government needs it**: a private firm counts only PB and PC, and a public good cannot be sold, so its value must be estimated.
4. **Evaluate**: valuing intangibles, predicting the future, whose costs count, opportunity cost, political pressure. The November 2022 report said few candidates mentioned how hard it is to put a money value on externalities, and that answers needed to use the context.
5. **Conclude**: CBA improves decisions by making the trade-offs explicit, but its answer is only as good as its estimates.

Worked examples

Example 1

A factory produces chemicals in batches. The table shows its total private cost and the total external cost of pollution.

Batches	Total private cost (\$)	Total external cost (\$)
1	40	4
2	70	10
3	95	18

Batches	Total private cost (\$)	Total external cost (\$)
4	125	29
5	160	44

What is the marginal social cost of the fourth batch?

A \$11 B \$30 C \$41 D \$154 [1]

The marginal private cost of the fourth batch is $125 - 95 = 30$, and its marginal external cost is $29 - 18 = 11$. So $MSC = 30 + 11 = 41$. A is only the MEC, B only the MPC, and D is the total social cost of four batches ($125 + 29$). The answer is **C** (1).

Example 2

A town council is choosing a site for a recycling centre. The table shows the estimated costs and benefits of each site, in \$ million.

Site	Private cost	Private benefit	External cost	External benefit
North	12	10	3	9
East	9	11	6	2
West	14	13	2	8

Which site would cost–benefit analysis recommend, and which would a private firm choose if it built the centre?

	Cost–benefit analysis	Private firm
A	North	East
B	West	East
C	West	North
D	East	West

[1]

Social cost and social benefit for each site: North 15 and 19 (net social benefit +4); East 15 and 13 (−2); West 16 and 21 (+5). CBA picks the largest net social benefit: **West**. A private firm compares only private benefit and private cost: North −2, East +2, West −1, so it picks **East**, the site with the largest external costs. The answer is **B** (1).

Example 3

Extract: Industrial fishing boats drag heavy nets along the sea floor. This catches large amounts of fish cheaply, but it destroys the seabed where young fish grow, so catches for small coastal fishing communities fall in later years. The fishing companies pay nothing for this damage. Fish caught this way are sold at low prices in supermarkets.

(a) With the help of a diagram, explain why the free market for fish caught in this way does not achieve allocative efficiency. [5]

(b) Discuss whether the external costs described in the extract mean that the government should reduce this type of fishing. [7]

(a) The damage to the seabed is a negative production externality: a cost that falls on third parties, the coastal fishing communities, and not on the companies that cause it (1).

Diagram to draw: like the first diagram in this note, with quantity of fish on the horizontal axis and costs and benefits on the vertical axis: $MPB = MSB$, MPC , and MSC above MPC ; the market output Q_1 where $MPB = MPC$ and the optimum Q^* where $MSB = MSC$, with the welfare-loss triangle between them (axes and labels (1); MSC above MPC showing the externality (1)).

The companies catch fish up to where their private benefit equals their private cost, Q_1 . Because the external cost is left out, the price is too low and more fish are caught than the allocatively efficient Q^* , where $MSB = MSC$ (1). Every unit between Q^* and Q_1 costs society more than it is worth to consumers, so there is a deadweight welfare loss (the shaded triangle) and resources are misallocated (1).

(5 marks.)

(b) *Marked like a data-response "discuss" part: up to 3 marks for each side and 1 for a conclusion.*

For reducing it. The external cost is large and falls on people who receive none of the benefit: coastal communities lose future income, and the cost grows over time as the seabed is destroyed (1). Because the market output is above Q^* , cutting the catch towards Q^* removes the welfare loss and moves the market towards allocative efficiency (1). The damage also harms future generations, whose costs no market today counts, so without action fish stocks may not recover (1).

Against, or not without more evidence. The extract gives no figures: the external cost has to be valued (lost future catches, lost habitat) before the government knows how far to cut output, and an estimate that is too high would cut fishing below Q^* and create a new welfare loss (1). Reducing this fishing also has costs: higher fish prices for consumers and lost jobs on the boats, which a cost–benefit analysis would have to weigh against the gains (1). And the coastal communities may gain only if fishing is reduced across a whole area; if boats simply move elsewhere, the external cost moves with them (1).

Conclusion. The extract shows a real external cost that the market ignores, so some reduction in this fishing is justified; how large the cut should be depends on valuing the seabed damage against the lost private benefits, so the government should measure it before choosing how far to go (1).

(7 marks.)

Example 4

Rooftop solar panels reduce households' electricity bills and also cut the pollution from coal-fired power stations.

Evaluate, with the help of a diagram, whether the positive externalities of solar panels mean that a free market will always lead to too few panels being installed. [20]

Model answer (outline of each paragraph):

1. **Definitions.** A positive externality is a benefit to third parties that the buyer does not take into account and is not paid for. Social benefit = private benefit + external benefit; allocative efficiency is where $MSB = MSC$. (AO1.)
2. **The externality.** A household that installs panels gains lower bills (private benefit). Others gain cleaner air and less carbon released, because less electricity comes from coal (external benefit). So MSB lies above MPB: a positive consumption externality. (AO1/AO2: *applied to the context*.)
3. **Diagram and chain.** With a diagram like the second one in this note (panels installed on the horizontal axis): households install up to Q_1 , where $MPB = MPC$, but the optimum is Q^* , where $MSB = MSC$. The panels between Q_1 and Q^* are worth more to society than they cost, but no household gains enough to buy them, so there is under-consumption and a welfare-loss triangle. (AO2: *developed analysis with an explained diagram, Table A Level 3*.)
4. **But private benefits may already be large.** Panel prices have fallen and electricity prices have risen, so for many households MPB has shifted right on its own. If MPB is close to MSB, Q_1 is close to Q^* and the under-consumption is small. (AO3: *questions the size of the gap*.)
5. **There are negative externalities too.** Making panels uses mining and energy, and old panels create waste. These raise MSC above MPC, which pulls Q^* back down. With externalities on both sides, the free market may install about the right number, or even too many, depending on their sizes. (AO3: *challenges "always"*.)
6. **Information failure works in both directions.** Some households underestimate their savings and install too few; others overestimate them, for example by ignoring cloudy weather or the cost of replacing batteries, and install too many. And the external benefit is hard to measure, because it depends on what power the panels replace. (AO3: *further developed point*.)
7. **Conclusion.** The external benefit of cleaner air means that, on its own, the free market tends to install too few panels. But "always" is too strong: if private savings are large, the gap is small, and the external costs of making and disposing of panels can offset the benefit. Whether there are too few panels depends on the size of the net external benefit, which has to be estimated before government acts. (*Justified conclusion that answers "always", Table B Level 2*.)

(Table A Level 3: 14; Table B Level 2: 6; **20/20**.)

Common mistakes

- **Using the wrong output for the external cost.** The marginal external cost at the free-market equilibrium is measured at Q_1 , not at Q^* . In November 2022 almost half the candidates took the gap at the wrong output.
- **Finding the free market with a social curve.** A free market only counts private costs and benefits: $MPB = MPC$. The March 2026 report said this was a common wrong answer.
- **Drawing a production diagram for a consumption externality.** Air travel, driving and smoking are consumption externalities, so the benefit curves split (MSB below MPB). The March 2023 report said this error stopped many candidates reaching Level 3 for analysis.
- **Leaving out "third party".** The June 2023 report said few candidates explained that a negative externality is a cost borne by a third party, or gave an example from the extract.
- **Calling a large private cost an externality.** Fuel, wages and building costs are paid by the decision-maker, so they are private however big they are.
- **Getting the identities backwards.** Social = private + external. Social benefit minus external benefit is private benefit; it is not "external minus private".
- **Drifting off the question.** In March 2021, answers to a negative-externality essay spent too long on positive externalities. In November 2022, answers to "do externalities explain all market failure?" that repeated part (a) scored little; the good ones brought in monopoly and public goods.
- **Ignoring how hard CBA is.** The November 2022 report said few candidates saw the difficulty of putting a money value on externalities, and weaker answers ignored the context (a hospital).
- **No conclusion.** The November 2021 report said a conclusion was needed for full marks on a data-response part about social costs.

How to get the marks

- **Multiple choice:** write $MPB = MPC$ and $MSB = MSC$ in the margin and mark Q_1 and Q^* on the diagram before reading the options. For classification, ask: who bears it, cost or benefit, production or consumption?
- **Definitions** that earn AO1 marks: private cost/benefit (borne or received by the decision-maker), external cost/benefit (falls on a third party, not reflected in price), social = private + external, allocative efficiency ($MSB = MSC$), moral hazard (more risk because someone else bears it), asymmetric information (one side knows more).
- **"Identify from the extract":** quote the effect itself. One correct example per mark; extra examples earn nothing.
- **"Explain, with the aid of a diagram":** marks go for correct axes, labelled curves, the externality shown, the change in output and price, and the welfare loss explained. Draw it large, use the curve names the mark scheme uses (MPC , MSC , MPB , MSB), and refer to Q_1 and Q^* in your writing.
- **"Discuss" or "consider" parts** (6 to 10 marks): points on both sides, each a point plus its development, using the extract's facts or figures, then a conclusion. Mark schemes usually cap each side, so a one-sided answer cannot reach full marks.

- **20-mark essays:** Table A (14) needs accurate definitions, a correct and explained diagram, and developed chains of reasoning; without a relevant diagram it stops at Level 2. Table B (6) needs developed evaluation (measurement problems, offsetting externalities, costs of acting) and a conclusion that answers the question's exact words ("always", "only", "to what extent").
- **Apply to the context:** name who the third parties are (pedestrians, residents, coastal fishers, the health service). Generic answers about "a good" score less well.

Quick check

1. A family keeps a dog that barks most of the night, waking the neighbours. What is this? **A** a negative consumption externality **B** a negative production externality **C** a positive consumption externality **D** a private cost
2. A ferry company is considering a new route. Its private costs are \$8 million and private benefits \$9 million. The route would cause \$3 million of external costs (noise and fumes in a harbour town) and \$1 million of external benefits (shorter commutes for people who do not use the ferry). Find the net social benefit. Would a private firm go ahead? Should society want it to?
3. In a market with a negative production externality and no consumption externality, the free market produces 500 units. At 500 units, MPC is \$20 and MSC is \$32. The socially optimal output is 420 units. Find (a) the marginal external cost at the free-market output, (b) the overproduction, and (c) the deadweight welfare loss.
4. Explain, with an example of each, the difference between asymmetric information and moral hazard. **[4]**
5. A good creates a negative externality in production and a positive externality in consumption. Can you tell whether the free market produces more or less than the socially optimal output? Explain.

Answers

1. **A.** The barking comes from the family's use (consumption) of something they own, and the cost falls on third parties (the neighbours), who are not compensated. (1)
2. Social cost = $8 + 3 = 11$ and social benefit = $9 + 1 = 10$, so the net social benefit is $-\$1$ million. A private firm compares only 9 with 8, a profit of $\$1$ million, so it would go ahead. Society should not want it: the route costs society $\$1$ million more than it is worth, because the external costs outweigh the external benefits.
3. (a) $\$32 - \$20 = \$12$. (b) $500 - 420 = 80$ units. (c) With no consumption externality, $MSB = MPB$, which equals MPC ($\$20$) at the free-market output, so the gap between MSC and MSB at 500 units is $\$12$.
Welfare loss = $\frac{1}{2} \times 80 \times 12 = 480$, that is $\$480$.
4. Asymmetric information is when one side of a transaction knows more than the other (1), for example a car mechanic who knows the car needs only a small repair but can charge for a large one because the owner cannot check (1). Moral hazard is when someone takes more risk because another party will bear the cost if it goes wrong (1), for example a person with insurance against phone theft who stops being careful where they leave their phone (1).
5. No, not without knowing the sizes. The production externality puts MSC above MPC , which on its own makes the optimum lower than the market output. The consumption externality puts MSB above MPB , which on its own makes the optimum higher. Which effect is bigger decides whether the market over- or under-produces; if they are equal, the market output could even be optimal.

Past questions to try

- 9708/32/F/M/24 Q3: marginal social benefit from a table of totals.
- 9708/32/O/N/22 Q2: the marginal external cost at the free-market output, with both kinds of externality on one diagram.
- 9708/32/M/J/23 Q7: how to reduce moral hazard.
- 9708/43/O/N/24 Q2: a 20-mark essay on negative production externalities and indirect taxes.