



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2023

Economics

Assessment Unit AS 1
assessing
Markets and Market Failure



SEC11

[SEC11]
MONDAY 15 MAY, MORNING

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number on the Answer Booklet provided.
Answer **all** questions in Sections **A** and **B** and **one** question in Section **C**.
You are permitted to use a calculator in this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 80.

- Section A: 25 Marks
- Section B: 35 Marks
- Section C: 20 Marks

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

ADVICE TO CANDIDATES

You are advised to take account of the marks for each part question in allocating the available examination time. In questions involving calculations, you are advised to show your workings. Quality of written communication will be assessed in Questions **5**, **6(b)**, **(c)** and **(d)**, **7** and **8**. Quantitative skills will be assessed where appropriate.

Section A (25 marks)

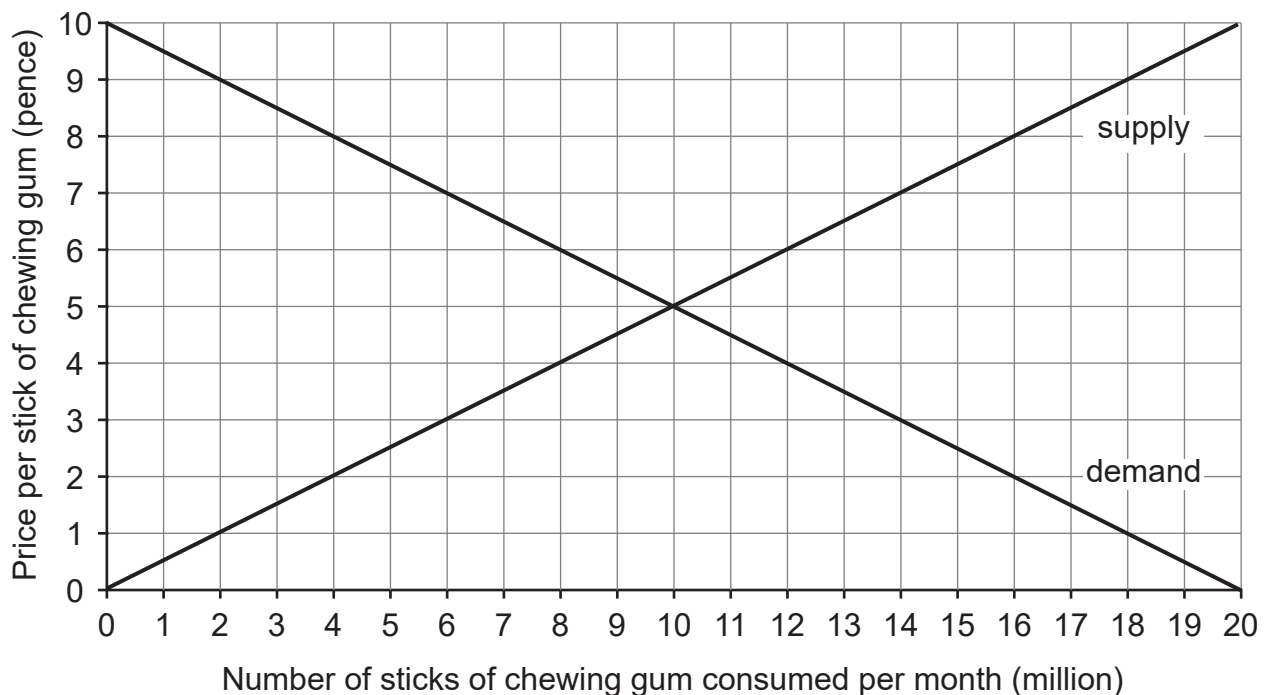
Answer all questions

- 1 Following Britain's exit from the European Union (EU), there were significant delays to some lorries transporting goods from the UK to the EU because they lacked the necessary customs documents. One Brexit-supporting MP said, "This confirms my opinion we were right to leave the EU."

With reference to the above statement, explain the difference between a positive and a normative statement.

[4]

- 2 The graph below shows the demand and supply per month for chewing gum in a certain country.



The government plans to impose a specific tax of 2 pence per stick on chewing gum.

- (a) Using the information in the chart above, calculate how much tax revenue the government would collect each month if it imposed a 2 pence per stick tax on chewing gum.

[3]

- (b) Using the information in the chart above, calculate the change in consumer surplus that would result from the imposition of a 2 pence per stick tax on chewing gum.

[4]

- 3** Fastbus is a private company providing bus services in a small city. Its main competitor is Zoom Trains. Fastbus has calculated the Cross Price Elasticity of Demand for its services with respect to changes in the price of Zoom Trains to be +0.3.

Using the information above, calculate the likely change in the numbers of passengers carried by Fastbus if Zoom Trains increases its fares by 5%.

[4]

- 4** In August 2021, Infrastructure Minister Nicola Mallon announced that £8m would be invested in new LED street lights across Northern Ireland. These lights, which have a predicted lifetime of approximately 25 years, are energy efficient and will contribute to the Minister's green agenda.

With reference to the information above, explain why street lighting could be described as a public good.

[4]

- 5** Rare earth metals are essential in the manufacture of a range of devices such as batteries for electric vehicles and mobile phones. Over recent months, prices of "rare earths" have increased significantly. This is due to a number of factors, notably:

- Many governments have been promoting the use of electric vehicles.
- China, the world's most important producer of rare earth metals, has been restricting exports as part of its trade dispute with the USA.
- Increases in real income in developing countries have increased demand for luxury goods such as mobile phones.

With the aid of an appropriate diagram, explain the rise in the price of rare earth metals.

[6]

Section B (35 marks)

Answer all questions

The following passage was written in July 2021. Read it carefully and answer the questions which follow.

6 Aviation: A missed opportunity

The COVID pandemic had a significant impact on the airline industry. In spring 2020, over 80% of passenger flights were affected by restrictions. Even after that, recovery was slow, with nervous consumers and government restrictions severely reducing passenger numbers. Whilst there is some debate about how long it will take the airline industry to recover, there is little doubt that it will. Previously, the aviation industry had recovered from falls in demand due to terrorist attacks in 2001 and the financial crash of 2008. Economist Richard Williams said, “Income elasticity of demand varies between 0.8 for short-haul flights to 2.4 for long-haul ones. Assuming consumer incomes rise, we will see a rapid growth in passenger numbers.”

1

Whilst this may be good for the airline industry, it does generate external costs as airlines are increasingly major polluters. Between 2013 and 2018 the carbon emissions of airlines grew by 26.3% whilst emissions of other heavy polluters, such as coal and cement companies, fell. Climate change campaigner Carla Wilson said, “During the lockdown period, greenhouse gas emissions from flights fell by 60%. Governments are missing a golden opportunity to reset the airline industry on a more sustainable path.”

2

On the other hand, aviation sources argue the industry has become more efficient; for instance, the amount of fuel burned per passenger dropped by 24% between 2005 and 2017. However, these environmental benefits have been outpaced by sustained growth in air traffic. In comparison to other modes of travel, flying is very environmentally unfriendly, as illustrated in **Fig. 1** below.

3

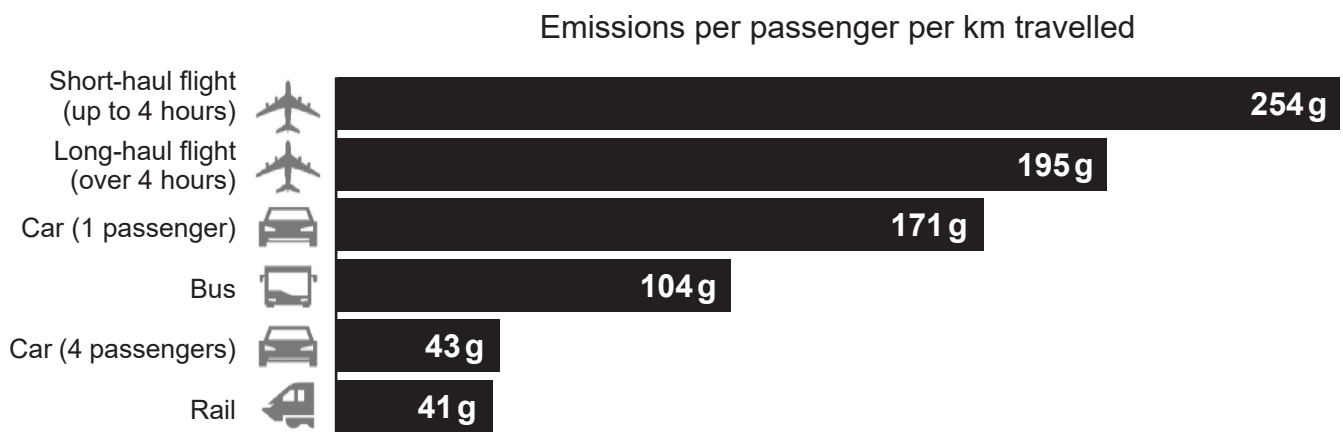


Fig. 1: Greenhouse gas emissions from transport

Despite this, and other considerations such as noise pollution near airports, the airline industry is treated more favourably by government than other forms of transport. Unlike train tickets, flight tickets are not subject to VAT and aviation fuel is not taxed. Environmental campaigner James Lawson said, “At a time of melting polar ice caps, extreme weather events and record temperature rises, it is vital that emissions are reduced. Governments need to take action now against an undertaxed, underregulated and out of control civil aviation industry.”

4

- (a) Using the information in **Fig. 1**, compare the emissions from short-haul flights with those from bus and rail travel. [5]
- (b) With reference to the concept of income elasticity of demand, explain why rising consumer incomes could cause a rapid growth in air passenger numbers. [6]
- (c) With the aid of an appropriate diagram, explain why the free market might lead to the airline industry supplying more flights than the socially optimal level. [9]
- (d) Critically evaluate the range of policies a government could pursue to reduce greenhouse gas emissions from the airline industry. [15]

Section C (20 marks)

Answer one question

- 7 In 2019 consumption of alcohol in Scotland fell by 3.6%. This was the first full year of implementation of a minimum price for alcohol of 50p per unit. The Chief Executive of Alcohol Focus Scotland said, “Even a small reduction in the amount of alcohol consumed will mean fewer lives damaged by, or lost to, drink. Increasing the price of alcohol is one of the best policy measures to reduce alcohol consumption and the harm it causes.”

Critically examine the view that imposing a minimum price is the most effective way to reduce the consumption of alcohol and the harm it causes.

[20]

- 8 In traditional economics, it is assumed that consumers are expert utility maximisers who will weigh up the costs and benefits of every decision. However, some economists argue that consumers may act irrationally because they are impulsive, ill-advised or ill-informed.

Critically examine the view that consumers do not always behave in a rational fashion. [20]

THIS IS THE END OF THE QUESTION PAPER

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Surname	<i>StemUp Model Solution</i>
Answer booklet	Write the question number in the left-hand margin at the start of each answer.

Question number	
1	<i>A positive statement is an objective statement of fact that can be tested, proved or disproved by reference to evidence. "There were significant delays to some lorries transporting goods from the UK to the EU because they lacked the necessary customs documents" is positive, as we could check the delays against data on waiting times.</i> <i>A normative statement is a value judgement or opinion that cannot be proved or disproved by facts, often containing words like "should" or "right". The MP's "we were right to leave the EU" is normative: it is his opinion, and others looking at the same delays would argue the opposite.</i>
2(a)	<i>The 2p tax shifts supply up vertically by 2p. The new equilibrium is where the demand price is 2p above the supply price: at 8 million sticks demand price = 6p and supply price = 4p.</i> <i>Tax revenue = tax per unit $\times$ new quantity = $\pounds 0.02 \times 8,000,000 = \pounds 160,000$ per month.</i>
2(b)	<i>Before the tax: $P = 5p$, $Q = 10$ million, demand meets the price axis at 10p. $CS = \frac{1}{2} \times (10p - 5p) \times 10,000,000 = \frac{1}{2} \times \pounds 0.05 \times 10,000,000 = \pounds 250,000$.</i> <i>After the tax: consumers pay 6p for 8 million. $CS = \frac{1}{2} \times (10p - 6p) \times 8,000,000 = \frac{1}{2} \times \pounds 0.04 \times 8,000,000 = \pounds 160,000$.</i> <i>Change in consumer surplus = $\pounds 160,000 - \pounds 250,000 =$ a fall of $\pounds 90,000$ per month.</i>
3	<i>$XED = \% \text{ change in quantity demanded of Fastbus} \div \% \text{ change in price of Zoom Trains}$. So $\% \text{ change in } Q_d = XED \times \% \text{ change in price} = +0.3 \times (+5\%)$</i>

= +1.5%.

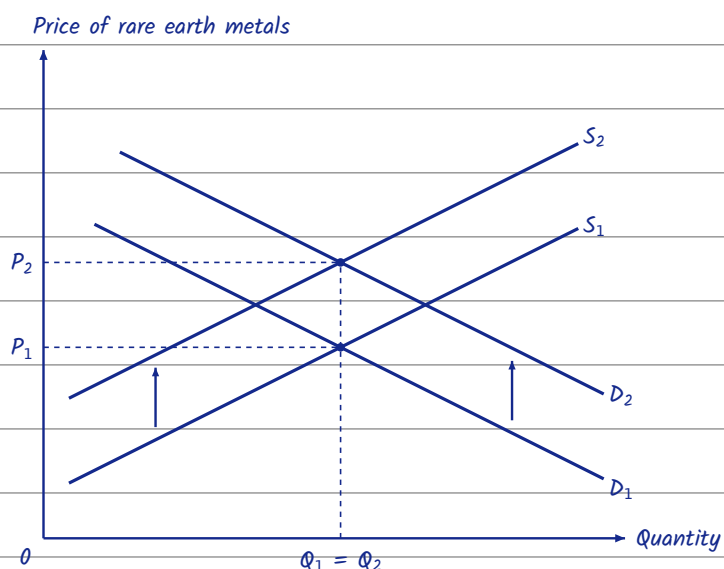
The number of passengers carried by Fastbus will rise by 1.5%, as the two are substitutes (positive XED): some rail passengers switch to the bus.

4

A public good is non-excludable (once provided, people cannot be prevented from benefiting, even if they do not pay) and non-rival (one person's consumption does not reduce the amount available to others). Once the new LED street lights are installed across Northern Ireland, anyone walking or driving along the street benefits from the light and cannot be excluded, and one more person using the light does not reduce the light for anyone else, so the marginal cost of an extra user is zero. Because of the free rider problem, no private firm could charge for street lighting, so it would not be provided by the free market (missing market), which is why the government, through the Infrastructure Minister, funds it with £8m of public money.

5

The price of rare earth metals is determined by the interaction of demand and supply, and here both have changed at the same time. Demand for rare earths is a derived demand: they are wanted because they are used to make batteries for electric vehicles and mobile phones. Governments promoting electric vehicles raises demand for EVs, which in turn increases the demand for rare earths. Rising real incomes in developing countries increase demand for mobile phones, a luxury (normal) good with a positive income elasticity of demand, which also increases the derived demand for rare earth metals. Demand therefore shifts right from D_1 to D_2 .



As the diagram shows, at the same time supply shifts left from S_1 to S_2 because China, the world's most important producer, has restricted exports as part of its trade dispute with the USA. This government policy cuts the quantity available on world markets at every price.

At the original price P_1 there is now excess demand, so the price is bid up to P_2 . Both shifts push price in the same direction, so the rise is large; the effect on quantity depends on the relative size of the shifts (here unchanged at $Q_1 = Q_2$). The rise is even greater because demand is price inelastic, as there are few substitutes for rare earths in batteries, and supply is price inelastic, since new mines take years to open, so the price rises significantly.

6(a)

Short-haul flights produce far more greenhouse gas emissions than bus or rail travel: 254 g per passenger per km, compared with 104 g for bus and 41 g for rail (Fig. 1).

Compared with the bus: $254 - 104 = 150$ g more. $254 \div 104 = 2.44$, so a short-haul flight emits more than twice as much (144% more), and bus emissions are only about 41% ($104 \div 254$) of those of a short-haul flight.

Compared with rail: $254 - 41 = 213$ g more. $254 \div 41 = 6.2$, so a short-haul flight emits more than six times as much (about 520% more), while rail emits only about 16% ($41 \div 254$) of short-haul emissions. Rail is the least polluting

mode and short-haul flying the most polluting.

6(b)

Income elasticity of demand (YED) measures the responsiveness of quantity demanded to a change in consumer income. $YED = \% \text{ change in quantity demanded} \div \% \text{ change in income}$. A positive YED means the good is a normal good; a YED between 0 and 1 means it is income inelastic (a necessity), while a YED above 1 means it is income elastic (a luxury).

Richard Williams says YED is 0.8 for short-haul flights and 2.4 for long-haul flights (paragraph 1). Both are positive, so all flights are normal goods and demand rises as incomes rise. For short-haul flights a 10% rise in income would raise passenger numbers by $0.8 \times 10 = 8\%$, a slightly smaller proportion.

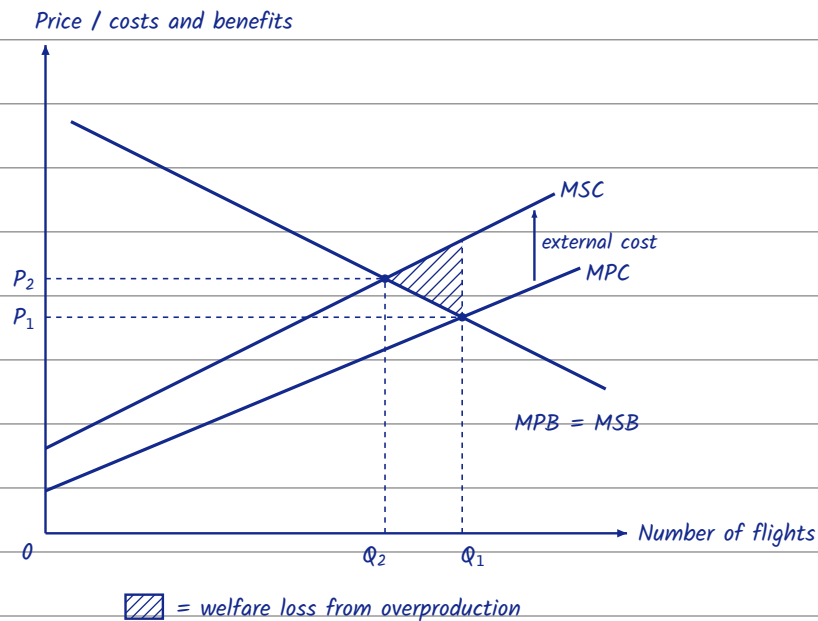
Long-haul flights are a luxury, so a 10% rise in income raises demand by $2.4 \times 10 = 24\%$, more than twice the income rise. Higher incomes shift the demand curve for flights to the right, so more flights and seats are sold.

As economies recover from COVID and consumer incomes rise, possibly quickly after lockdown savings, demand will grow, with passenger numbers for long-haul travel rising more than proportionately. This is why there could be "a rapid growth in passenger numbers", as happened after the falls in 2001 and 2008.

6(c)

A negative externality (external cost) is a cost of production or consumption borne by a third party who is not involved in the transaction and is not compensated. Airlines pay their private costs, such as fuel, wages and landing fees, but flights also create external costs: greenhouse gas emissions that contribute to climate change, noise pollution for people living near airports and particulates that damage health. Airline carbon emissions grew by 26.3% between 2013 and 2018, and a short-haul flight produces 254 g of emissions per passenger per km (Fig. 1). These costs are met by third parties, for example governments paying for flood defences and the effects of extreme weather.

So marginal social cost ($MSC = MPC + \text{marginal external cost}$) is above marginal private cost (MPC). Assuming no external benefits, $MPB = MSB$.



As the diagram shows, in the free market airlines and passengers only take account of private costs and benefits, so the number of flights is Q_1 at price P_1 , where $MPB = MPC$. The socially optimal level is Q_2 , where $MSB = MSC$, at the higher price P_2 . Because the external cost is ignored, flights are too cheap and the industry overproduces by $Q_1 - Q_2$. For every flight between Q_2 and Q_1 the marginal social cost is greater than the marginal social benefit, so there is a welfare loss, shown by the shaded triangle. This is market failure, as resources are misallocated and the outcome is allocatively inefficient.

The overproduction is made worse because aviation is treated favourably by government (paragraph 4): flight tickets have no VAT and aviation fuel is untaxed, which lowers prices even further below social cost. Consumers may also lack information about the environmental damage, so demand is higher than it would be.

6(d)

Because flights create negative externalities, the free market overproduces them (6(c)). Governments have a range of policies to reduce greenhouse gas emissions, each with strengths and weaknesses.

First, a Pigovian tax, such as a carbon tax or a tax on aviation fuel, which is currently untaxed (paragraph 4). If the tax equals the marginal external cost,

MPC rises to MSC, internalising the externality: in my 6(c) diagram the price rises from P_1 to P_2 and flights fall from Q_1 to Q_2 , removing the welfare loss and making the polluter pay. Charging VAT on flight tickets, as on train tickets, would also raise prices. A fuel tax gives airlines an incentive to use more fuel-efficient planes, continuing the 24% fall in fuel per passenger since 2005, and the revenue could fund cleaner transport. However, the external cost of carbon is very hard to value, so the tax may be set at the wrong level, causing government failure. Demand for flights, especially business and long-haul travel, is fairly price inelastic, so a tax may cut emissions only a little. It is regressive, hitting poorer families' holidays, and for international flights it is unclear which country should tax the fuel; if one country acts alone, airlines may refuel abroad.

Second, regulation: governments could set emission standards for engines, cap the number of flights or refuse permission for new runways. This gives certainty about the outcome. However, regulation is costly to monitor and enforce, it gives no incentive to cut emissions beyond the standard, and there is a risk of regulatory capture by the powerful airline industry, making it ineffective.

Third, a system of tradable pollution permits (emissions trading), as in the EU and UK Emissions Trading Schemes. The government caps total carbon emissions and airlines must buy a permit for each tonne. Firms that can cut emissions cheaply do so and sell spare permits, so emissions fall at the lowest cost, and the cap can be cut over time. However, the right number of permits is hard to judge: if too many are issued, the permit price is low and there is little incentive to reduce pollution, as happened in the early EU scheme.

Fourth, subsidies. Governments could subsidise less polluting transport such as rail, which emits only 41 g per passenger km against 254 g for short-haul flights, encouraging consumers to switch, and subsidise research into hydrogen or electric aircraft and sustainable fuels. However, subsidies have an opportunity cost, as the money could be spent on health or education, and rail is not a realistic substitute for long-haul or overseas flights. New technology may take decades to develop. Governments could also use information campaigns about the carbon cost

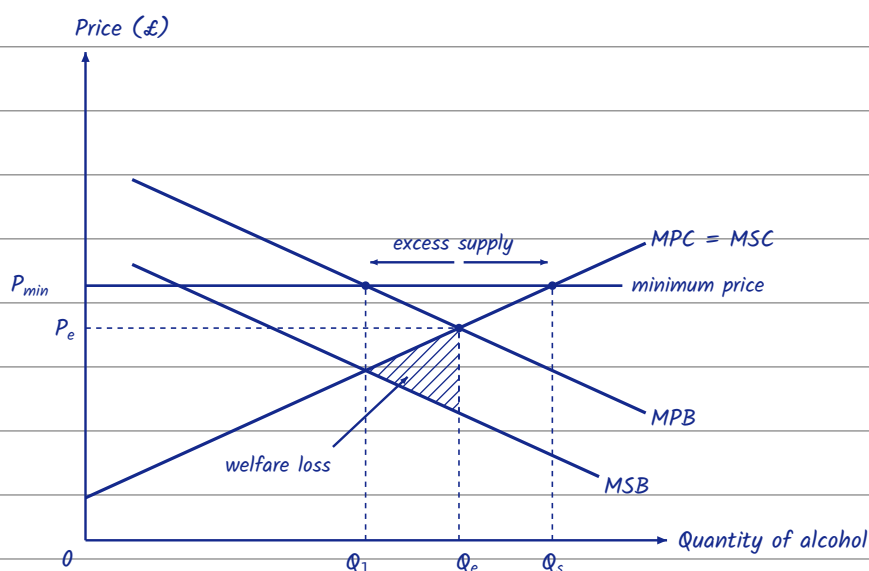
of flying, but these work slowly.

Overall, no single policy is enough. A carbon tax or fuel duty is probably the most effective, because it directly corrects the price signal and ends the industry's favourable tax treatment, but its success depends on the size of the tax, the price elasticity of demand and international agreement, since aviation is a global industry. In the short run, removing the tax exemptions and tightening emissions trading caps would cut emissions fastest, while in the long run subsidies for clean aircraft technology and better rail links are needed to make lasting cuts. A combination of taxes, permits and subsidies is the best approach.

7

Alcohol is a demerit good: a good whose consumption is more harmful than consumers realise, so it is overconsumed in a free market. There are two reasons. First, information failure: drinkers underestimate the long-term damage to their health, such as liver disease, so their marginal private benefit (MPB) is overstated. Second, alcohol consumption causes negative consumption externalities, such as NHS treatment costs, crime, violence, drink driving and lost productivity, so marginal social benefit (MSB) lies below MPB. In the free market consumption is Q_e where $MPB = MPC$, but the socially efficient level is Q_1 where $MSB = MSC$. The overconsumption creates a welfare loss, shown by the shaded triangle in the diagram: market failure.

A minimum price is a legal price floor, set above the market equilibrium, below which alcohol cannot be sold. In Scotland it is 50p per unit of alcohol.



As the diagram shows, if the minimum price is set at P_{min} , above the equilibrium P_e , the quantity demanded falls from Q_e to Q_1 , the socially efficient level, and the welfare loss is removed. The evidence supports this: in 2019, the first full year of the policy, consumption of alcohol in Scotland fell by 3.6%, and as Alcohol Focus Scotland says, even a small fall in consumption means fewer lives damaged or lost to drink. A key strength is that a minimum price is targeted. It only raises the price of the cheapest, strongest drinks, such as supermarket own-brand vodka and strong white cider, which are bought mainly by heavy and binge drinkers and young people, and it ends discounted promotions. A moderate drinker buying wine or a pint in a pub, already above 50p a unit, is largely unaffected. A tax, by contrast, raises the price of all alcohol.

However, there are several limitations. Demand for alcohol is price inelastic, especially for dependent drinkers, because it is habit-forming and addictive. A higher price may cause only a small fall in consumption, and the heaviest drinkers, who create most of the harm, may keep drinking and cut spending on food, heating or their children instead. The policy is regressive, taking a larger share of the income of poor households, and it penalises responsible low-income drinkers who generate no external costs. Unlike a tax, which raises revenue that could fund the NHS or treatment services, the extra revenue from a minimum price goes to supermarkets and producers as higher profit, a windfall for the

industry. At P_{min} there is also excess supply ($Q_s - Q_d$), and drinkers may cross the border to England, buy online, or turn to illegal, unregulated alcohol, which may be more harmful. Finally, it is very difficult to value the external costs, so the 50p level may be set too high or too low, a form of government failure. The 3.6% fall may also have been partly caused by other factors, such as changing attitudes to drinking among young people, so we cannot be sure of the impact. Other policies could be more effective. An indirect tax (alcohol duty) set equal to the external cost internalises the externality and raises revenue that can fund health care, though it does not target cheap, strong drinks so well and firms may absorb some of the tax. A complete ban, as in US prohibition, would cut legal consumption but creates a black market, crime and dangerous products, so it is likely to fail. Regulation, such as shorter licensing hours, fewer licensed premises, a higher legal drinking age, bans on advertising and strict drink-driving laws, targets harmful behaviour directly but is costly to enforce. Education and information campaigns, such as health warnings and the 14 units a week guideline, tackle the root cause, information failure, and shift MPB towards MSB, but they work slowly and addicted drinkers may ignore them. Some economists argue the government should not intervene at all, since adults should be free to choose and intervention may lead to government failure.

In conclusion, a minimum price is an effective way to reduce the consumption of alcohol and its harm because it targets the cheap, strong alcohol consumed by the heaviest drinkers, as the 3.6% fall in Scotland suggests. However, its effectiveness depends on the price elasticity of demand of harmful drinkers, the level at which it is set, and whether cross-border buying and illegal sales undermine it. It is unlikely to be the most effective policy on its own. The best approach is a minimum price combined with alcohol duty to raise revenue, regulation of sales and advertising, and long-term education and treatment for dependent drinkers.