

# DP IB Economics: SL



## 2.8 Market Failure: Externalities & Common Pool (Access) Resources

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## 2.8.1 Market Failure



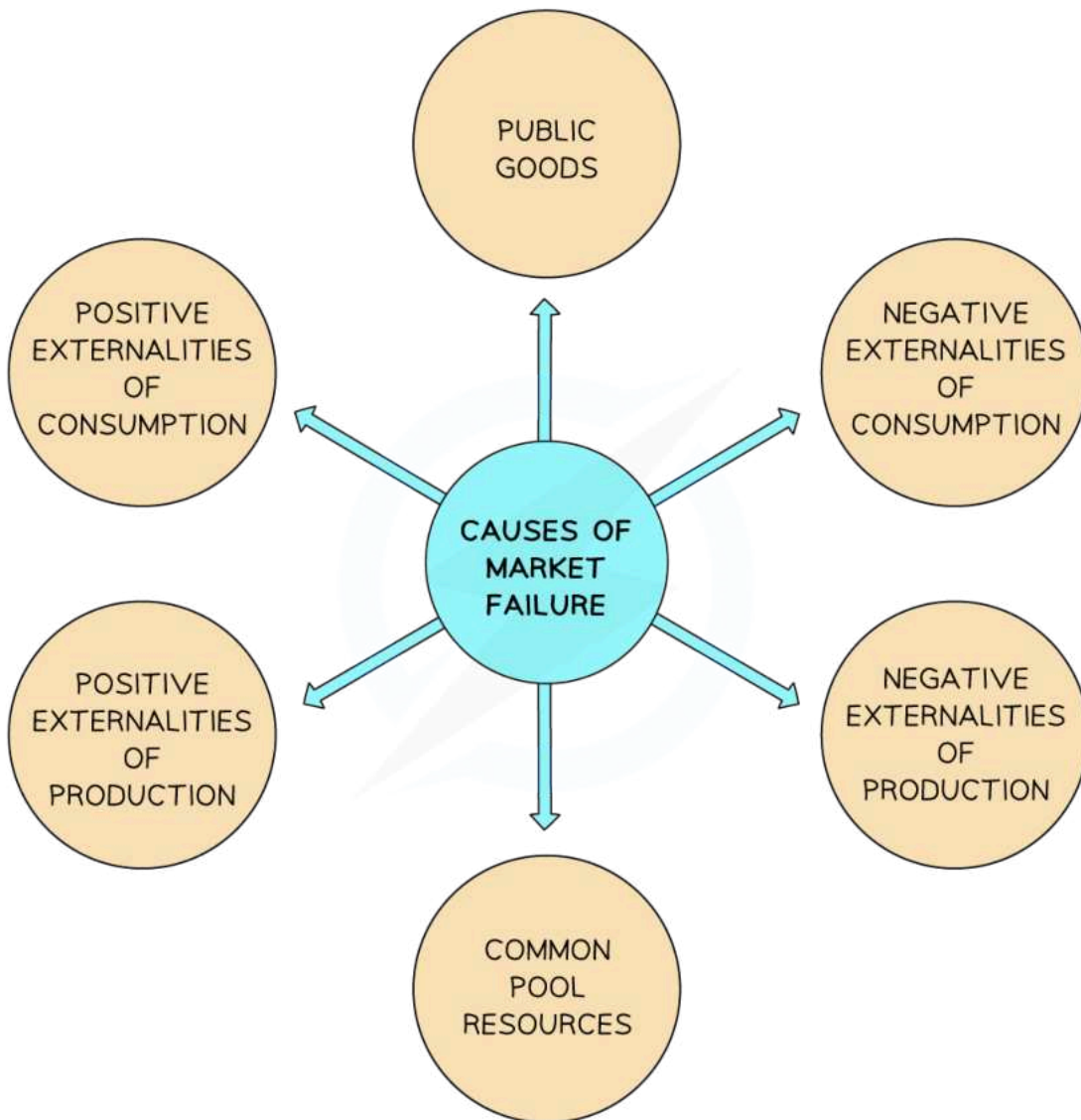
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# Understanding Market Failure

- In a **free market**, the price mechanism determines the most **efficient allocation** of scarce resources in response to the competing wants and needs in the marketplace
  - **Scarce resources** are the **factors of production** (land, labour, capital, enterprise)
- **Free markets** often work very well
- Sometimes they do not and there is then a **less-than-optimum** allocation of resources, from the **point of view of society**. This is called **Market Failure**



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***The causes of market failure which lead to a loss of allocative efficiency***

1. **Externalities** occur when there is an external impact on a third party not involved in the economic transaction between the buyer and seller e.g. passive smoking is considered to be a negative externality

- These impacts can be **positive or negative** and are often referred to as **spillover effects**



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- These impacts can be on the **production side** of the market (producer supply) or on the **consumption side** of the market (consumer demand)
- 2. **Public goods** are beneficial to society but would be **under-provided by a free market** e.g. flood defences
  - There is little opportunity for sellers to make profits from providing these goods/services as they are non-excludable and non-rivalrous in consumption
- 3. **Common pool resources are resources with no private ownership, they are collectively shared and are finite (used up) in consumption** e.g. fishing grounds off the coast of Maine
  - These resources are non-excludable
  - They are rivalrous (limited in supply)
- **From society's point of view**, in each of these cases, there is a **lack of efficiency in the allocation of resources**
  - Sometimes there is an **over-provision** of goods/services which are harmful (**demerit goods**) and therefore an **over-allocation** of the resources (factors of production) used to make these goods/services e.g. cigarettes
  - Sometimes there is an **under-provision** of the goods/services which are beneficial (**public goods** and **merit goods**) and therefore an **under-allocation** of the resources (factors of production) used to make these goods/services e.g. schools
  - In the case of common pool resources there is an **overuse** of a finite resource
- **Market failure** occurs when there is a **lack of allocative efficiency** from the **point of view of society**

## Socially Optimum Output & Allocative Efficiency

### Key terminology used to explain market failure diagrams

#### 1. Marginal private benefit (MPB)

The additional benefit received from the consumption or production (output) of one additional unit of output

#### 2. Marginal private cost (MPC)

The additional cost incurred through the consumption or production (output) of one additional unit of output

#### 3. Marginal social benefit (MSB)

The benefit to society received from the consumption or production (output) of one additional unit of output. It is the sum of the **private benefits plus the external benefits**

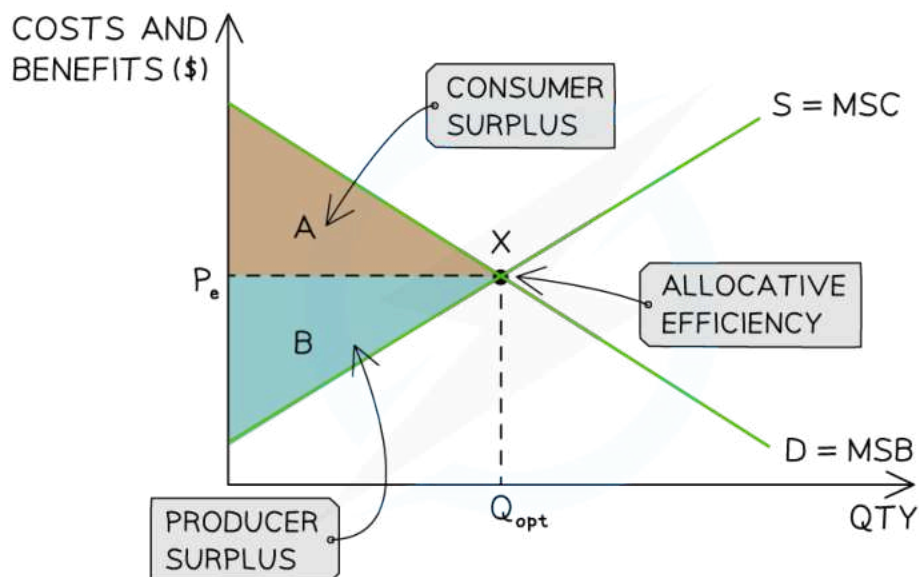
#### 4. Marginal social cost (MSC)

The cost to society incurred through the consumption or production of one additional unit of output. It is the sum of the **private costs plus the external costs**

### Socially optimum output

- The **socially optimum output** occurs at the level of output where the **marginal social benefit (MSB) = marginal social cost (MSC)**
  - This level of output considers where the market should be, if the market failures were accounted for
  - This level of output is desired as there is no market failure

### Allocative efficiency from society's point of view



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*At the point of allocative efficiency, community surplus is maximised*

### Diagram Analysis

- The Y-axis is labelled **costs/benefits** (instead of price)
- The supply curve is labelled **S=MSC** as it represents the **social cost**
- The demand curve is labelled **D=MSB** as it represents the **social benefit**
- The socially optimum level of output is at  **$Q_{opt}$**  - the point at which all external costs or benefits are accounted for
- There is **allocative efficiency** at  $Q_{opt}$  as this is where the **community surplus** (consumer + producer surplus) is maximised



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### Examiner Tips and Tricks

When we consider market failure, **our analysis focuses on the level of output and the resources used to generate that level of output**. It is less about the price of the product (high or low): although manipulating the price (e.g. taxes, subsidies) is one way of addressing the under-allocation or over-allocation of resources.

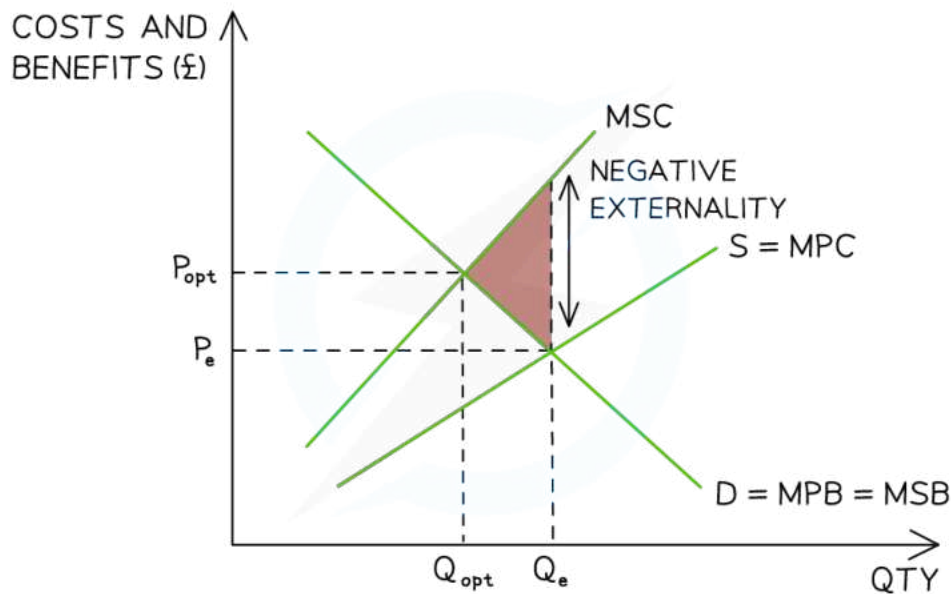


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## 2.8.2 Negative Externalities

### Negative Externalities of Production

- **Negative externalities of production** are often created during the production of a good/service
- The market is failing due to **over-provision** of these goods/services as only the **private costs are considered** by the producers and not the **external costs**
  - If the **external costs** were considered, the supply **would decrease** and they would be sold at a higher price
  - Common examples include air pollution, water contamination, health problems in local communities



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External costs of production (negative externality) result in an over-provision shown by the gap between  $Q_{opt}$  and  $Q_e$

### Diagram Analysis



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- The **marginal social benefit (MSB)** is assumed to be equal to the **marginal private benefit (MPB)** as the focus is on the **producer side** of the market
- The free-market equilibrium can be seen at  $P_e Q_e$ . This is where the **MPC = MSB**
- The larger the **external costs** in production, the larger the gap between the **MPC** and the **marginal social cost (MSC)**
- The optimum allocation of resources from **society's point of view**, would generate an equilibrium where **MSB = MSC**
  - This can be found at  $P_{opt} Q_{opt}$
  - There is **no market failure** at this equilibrium
- The free market is failing due to **over-provision** of this good/service equal to  $Q_e - Q_{opt}$
- The factors of production used to manufacture this **over-provision** represent a **welfare loss to society** (pink triangle)
- To be **socially efficient**, fewer factors of production should be allocated to producing this good/service
- There is an opportunity for **government intervention** (indirect taxes, legislation, regulation etc.), to force this market to be more **socially efficient**
- Any intervention that **reduces the welfare loss** will be beneficial

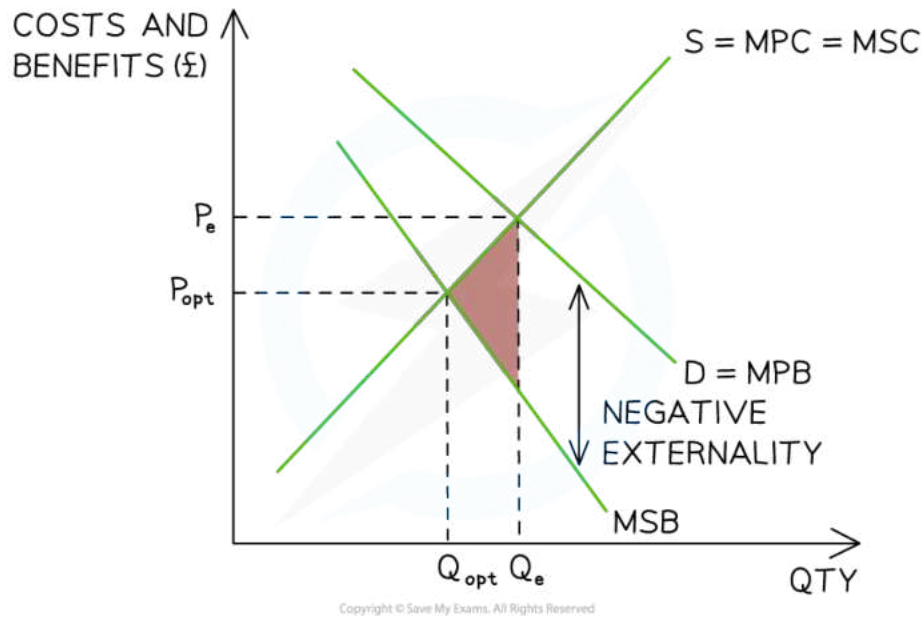
## Negative Externalities of Consumption

- **Negative externalities of consumption** are often created during the consumption of a good/service e.g. the waste generated outside fast food outlets often has to be cleaned up and paid for using taxpayers' funds
- The market is failing due to **over-consumption** of these goods/services as only the **private costs are considered** by the consumers and not the **external costs**
  - If the **external costs** were considered, demand **would decrease** and they would be sold at a lower price
  - Common examples include cigarettes, alcohol, fatty foods, single-use plastic products etc.





Your notes



**External costs of consumption (negative externality) result in an over-consumption shown by the gap between  $Q_{opt}$  and  $Q_e$**

## Diagram Analysis

- The **marginal social cost (MSC)** is assumed to be equal to the **marginal private cost (MPC)** as the focus is on the **consumer side** of the market
- The free-market equilibrium can be seen at  $P_e Q_e$ . This is where the **MPB = MSC**
- The larger the **external costs** in consumption, the larger the gap between the **MPB** and the **marginal social benefit (MSB)**
- The optimum allocation of resources from **society's point of view**, would generate an equilibrium where **MSB = MSC**
  - This can be found at  $P_{opt} Q_{opt}$
  - There is **no market failure** at this equilibrium
- The free market is failing due to **over-consumption** of this good/service equal to  $Q_e - Q_{opt}$
- The factors of production used to manufacture this **over-consumption** represent a **welfare loss to society** (pink triangle)



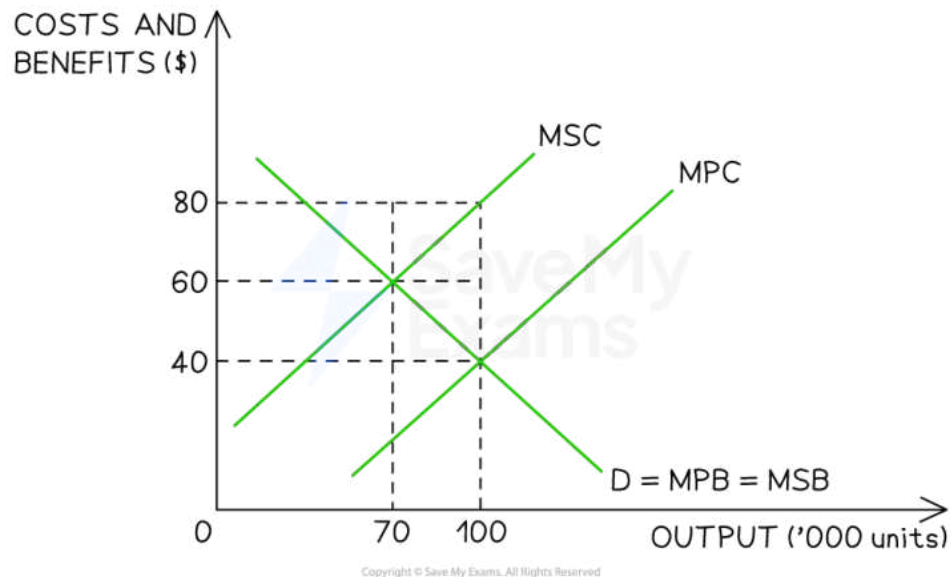
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- To be **socially efficient**, fewer factors of production should be allocated to producing this good/service
- There is an opportunity for **government intervention** (indirect taxes, legislation, regulation etc.), to force this market to be more **socially efficient**
- Any intervention that **reduces the welfare loss** will be beneficial



### Worked Example

Using information from the diagram below, calculate the welfare loss that is caused by the negative externality of production [2]

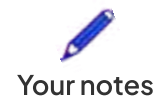


Answer:

#### Step 1: Identify the area of welfare loss

- This product is over produced - there should be less of it
- Welfare loss to society is the triangle formed by the arrowhead which points back towards the socially optimal quantity (70,000)

#### Step 2: Calculate the area of the triangle



$$\text{Welfare loss} = \frac{b \times h}{2}$$

$$\text{Welfare loss} = \frac{(100,000 - 70,000) \times (\text{£ } 80 - \text{£ } 40)}{2}$$

$$\text{Welfare loss} = \frac{30,000 \times 40}{2}$$

$$\text{Welfare loss} = \frac{30,000 \times 40}{2}$$

$$\text{Welfare loss} = \text{£ } 600,000$$

(2 marks)

## Demerit Goods

- **Demerit goods** are goods which have external costs in consumption
  - These goods are **usually addictive and harmful** for consumers e.g. gambling, alcohol, drugs, sugary foods/drinks
  - Governments often have to **regulate** these goods in such a way that they raise the prices and/or limit the quantity demanded
- The **activities of producers** can generate significant external costs e.g. pollution caused by coal-burning power stations during the production of electricity
  - However, electricity is considered to be a **merit good**
  - The smoke is a by-product and not a good/service
- For this reason, economists usually consider **demerit goods** to be goods used in **consumption**

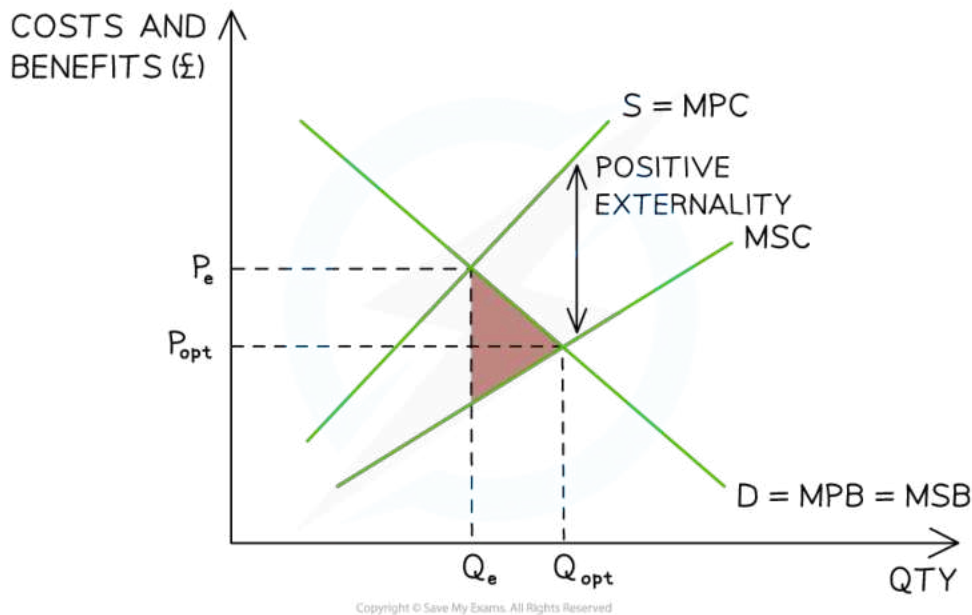


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## 2.8.3 Positive Externalities

### Positive Externalities of Production

- **Positive externalities of production** are sometimes created during the production of a good/service
- The market is failing due to **under-provision** of these goods/services as only the **private benefits are considered** by the producers and not the **external benefits**
  - If the **external benefits** were considered, the supply **would increase** and they would be sold at a lower price
  - E.g. The production of honey increases the amount of bees in an area which **increases pollination** potentially helping other food producers in the area



*External benefits of production (positive externality) result in an under-provision shown by the gap between  $Q_{opt}$  and  $Q_e$*

### Diagram Analysis

- The **marginal social benefit (MSB)** is assumed to be equal to the **marginal private benefit (MPB)** as the focus is on the **producer side** of the market

- The free-market equilibrium can be seen at  $P_e Q_e$ . This is where the **MPC = MSB**
- The larger the **external benefits** in production, the larger the gap between the **MPC** and the **marginal social cost (MSC)**
- The optimum allocation of resources from **society's point of view** would generate an equilibrium where **MSB = MSC**. This can be found at  $P_{opt} Q_{opt}$ . There is **no market failure** at this equilibrium
- The free market is failing due to **under-provision** of this good/service equal to  $Q_{opt} - Q_e$
- There is a **welfare loss to society** (pink triangle) as the external benefits could be further maximised
- To be **socially efficient**, more factors of production should be allocated to producing this good/service
- There is an opportunity for **government intervention** (indirect taxes, legislation, regulation etc.), to force this market to be more **socially efficient**
- Any intervention that **reduces the welfare loss** will be beneficial

## Positive Externalities of Consumption

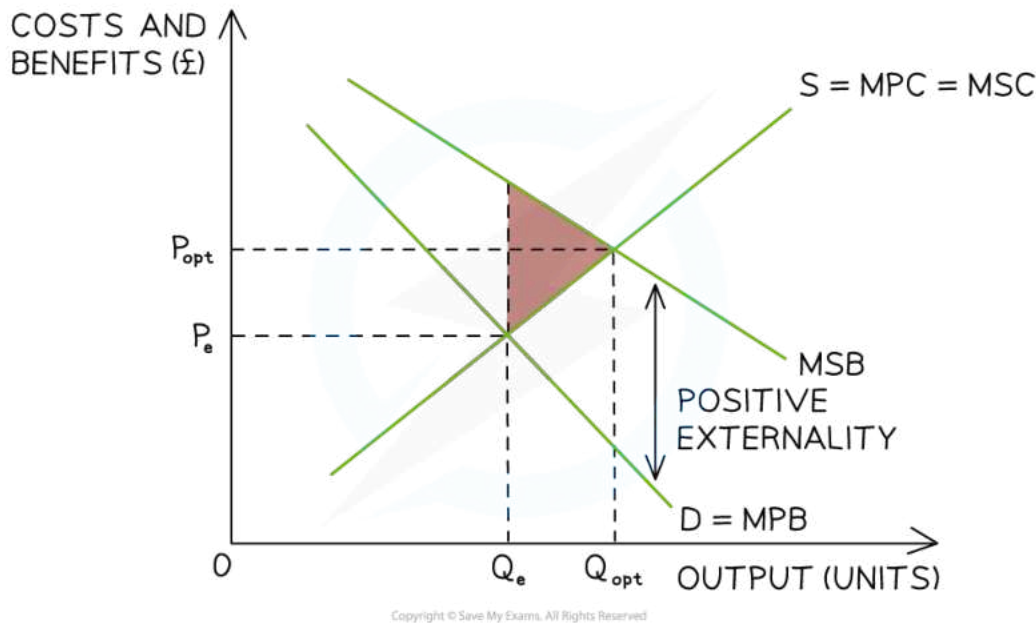
- **Positive externalities of consumption** are created during the consumption of a good/service (merit goods)
- The market is failing due to **under-consumption** of these goods/services as only the **private benefits** are considered by the consumers and not the external benefits
  - If the **external benefits** were considered, the demand **would increase** and they would be sold at a higher price
  - E.g. Vaccinations protect those who receive them, but also prevent the spread of disease to others around them



Your notes



Your notes



*External benefits of consumption (positive externality) result in an under-consumption represented by the gap between  $Q_e$  and  $Q_{opt}$*

## Diagram Analysis

- **MSC** is assumed to be equal to the **MPC** as the **focus is on the consumer** side of the market
- The free-market equilibrium can be seen at  $P_e Q_e$ . This is where the **MPB = MSC**
- The larger the external benefits in consumption (**positive externality**), the larger the gap between the MPB and MSB
- The **optimal allocation** of resources from society's point of view would generate an equilibrium where **MSB = MSC**. This can be found at  $P_{opt} Q_{opt}$ . There is no market failure here
- The free market is failing due to an **under-consumption** of this good/service equal to  $Q_{opt} - Q_e$
- **More factors of production** should be allocated to producing the optimal quantity as **societal welfare will be gained** (pink triangle)
- There is an opportunity for **government intervention** (subsidies, partial provision etc.) to force this market to be more **socially efficient**
- Any intervention that **gains welfare** will be beneficial





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## Examiner Tips and Tricks

Memorise this distinction and it will help you to draw the correct diagram and to provide appropriate analysis.

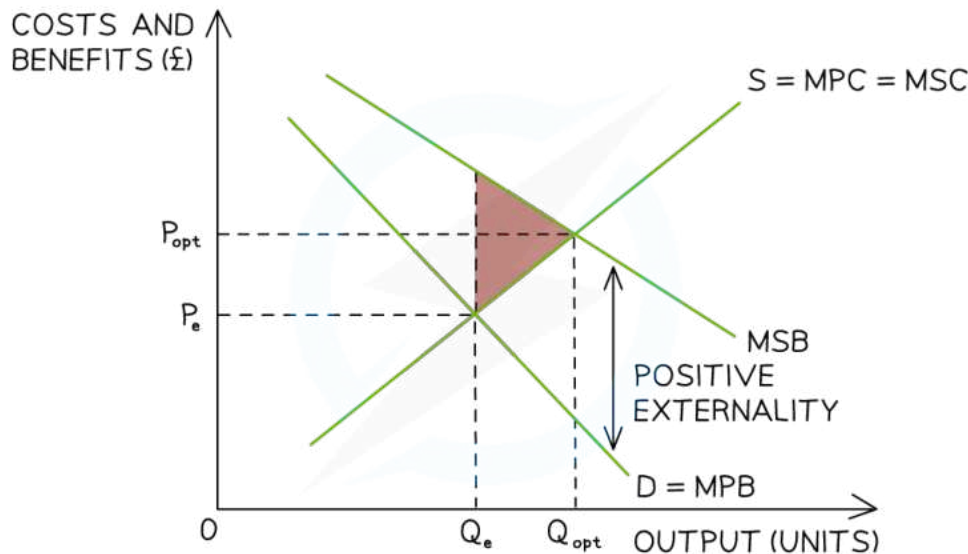
When the external benefit or cost is on the producer side, there will be two supply curves.

When the benefit or cost is on the consumer side, there will be two demand curves.



## Worked Example

Using information from the diagram below, calculate the welfare loss that is caused by the positive externality of consumption [2]



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Answers:

### Step 1: Identify the area of welfare loss (potential welfare gain)

- This product is under consumed - there should be higher levels of consumption
- Welfare loss to society is the triangle formed by the arrowhead which points forwards towards the socially optimal quantity (70,000)

### Step 2: Calculate the area of the triangle



Your notes

$$\text{Welfare loss (potential welfare gain)} = \frac{b \times h}{2}$$

$$\text{Welfare loss (potential welfare gain)} = \frac{(100,000 - 70,000) \times (£80 - £40)}{2} \text{ (1 mark)}$$

$$\text{Welfare loss (potential welfare gain)} = \frac{30,000 \times 40}{2}$$

$$\text{Welfare loss (potential welfare gain)} = \frac{30,000 \times 40}{2}$$

$$\text{Welfare loss (potential welfare gain)} = £600,000 \text{ (1 mark)}$$

## Merit Goods

- **Market Failure** occurs when free market activity results in a **less than optimum allocation of resources** from the point of view of society
- Merit goods are **beneficial to society** but consumers **under-consume** them as they do not fully recognise the **private or external benefits**. E.g. Vaccinations, education, electric cars
- They are **under-provided** in a market and their consumption generates both **private and/or external benefits**
- Governments often have to **subsidise** these goods in order to lower the price and/or increase the **quantity demanded**





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## 2.8.4 Common Pool (Access) Resources

### Definition & Characteristics

- **Common pool (access) resources** are those that are **non-excludable** but **rivalrous** in consumption
- **Non-excludable** means that anyone can access these resources without having to pay for them
  - This usually occurs because no one owns the resource (no private ownership)
- **Rivalrous** means that these resources can be used up
  - As one individual or firm uses them, it reduces the opportunity for others to use them
  - They are finite in supply
- The **tragedy of the commons** (as explained by Garret Hardin in 1968) occurs when common pool resources are used in production in an **unsustainable** way
  - This creates **negative externalities of production**
  - The **external costs** of production often include pollution, environmental damage and **resource depletion** which prevents future generations from benefitting in the same way
- Typical **examples of common pool resources** include
  - Ocean fishing (especially in international waters)
  - Communal grazing land
  - Water sources such as rivers
  - Natural forests and rainforests

### Real World Example of the Tragedy of the Commons

- **The Darién Gap** is in Panama and is located on the border with Columbia
- This area is one of the most impregnable rainforests on the planet and is **inhabited by indigenous tribes**, drug traffickers, and para-military organisations



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*The Darién Gap is a common pool resource*

## Background

- The Darién Gap is the only area where the 19,000km **Pan American highway** from Ushuaia (Argentina) to Prudhoe Bay (Alaska) is interrupted: a 62-mile gap
- **Illegal logging** has been steadily increasing
- The most valuable resource in the forest is the **Rosewood Cocobolo tree** which sells in Panama for \$4,000 per m<sup>3</sup> but in China for \$12,000 per m<sup>3</sup>: this **scarce resource** is rapidly being depleted
- Loggers use the **river system** to penetrate deep into the forest
- Once the forest canopy is thinner, they bring in bulldozers and create **illegal roads** to speed up the extraction



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- When they have left, palm oil entrepreneurs move in and plant palm oil trees
- Despite laws in place to protect the forest, there is **no enforcement and corruption is common**
- Hundreds of tons are shipped each year to China
- The indigenous tribes are **waging war with the illegal loggers** and there are frequently violent clashes and deaths

## Solutions

- Several solutions have already been attempted by the **indigenous community**, including
  - **Collective self-governance** of the area
  - Forest mapping using drones
  - Using drones to gather video footage of the identity of the illegal loggers
  - Appeal to the government by the three indigenous tribes for **legal ownership rights** to the land
  - Appealing for the creation and enforcement of **international agreements** on the sale of illegal timber

## Evaluating Solutions to Common Pool Resources (in the Darién Gap)

### An Evaluation of the Solutions used to Address The Tragedy of the Commons in the Darién Gap

Solution	Advantages	Disadvantages
<p><b>Collective self-governance</b> The tribes can come together and attempt to govern the land which they consider to be their homeland. They can work together to stop illegal activity</p>	<ul style="list-style-type: none"> <li>▪ Working together can provide a common purpose and build a community</li> <li>▪ The tribes understand the land best and know how and where to best restrict the activities of the illegal loggers</li> <li>▪ This activity can provide employment within the tribes</li> </ul>	<ul style="list-style-type: none"> <li>▪ The illegal loggers are violent and armed with automatic weapons so violence is almost a certainty</li> <li>▪ The tribes have fewer resources (weapons, machinery, money) than the illegal loggers so struggle to limit their activity</li> <li>▪ Attempts to slow down extraction may actually increase the pace of extraction as the illegal loggers are feeling more pressure to get the job done</li> </ul>



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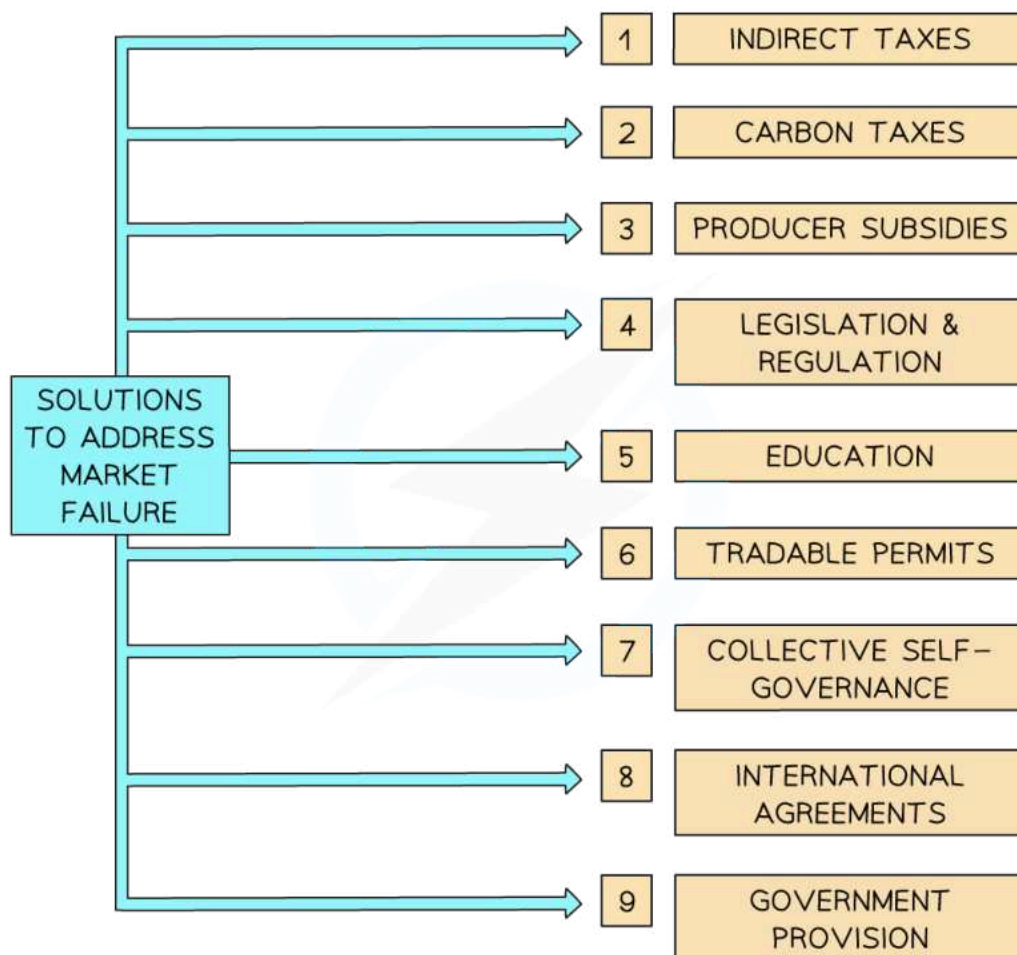
	<ul style="list-style-type: none"> <li>▪ The resources can be protected and sued in a sustainable way</li> </ul>	
<p><b>Appeal to the government for legal ownership rights of tribal land</b></p> <p>So far, about 40% of the land has been granted to the tribes</p>	<ul style="list-style-type: none"> <li>▪ The owners are legally entitled to defend their land</li> <li>▪ <b>Legal rights of property ownership</b> can be enforced by law</li> <li>▪ Illegal logging is now <b>theft</b> and the tribes have hired lawyers to prosecute individuals and firms involved</li> <li>▪ Some illegal loggers have been imprisoned</li> </ul>	<ul style="list-style-type: none"> <li>▪ <b>Corruption</b> remains high. The profits from illegal logging are so high that firms and individuals involved easily <b>pay bribes</b> to officials who are meant to represent the legal process</li> <li>▪ The illegal loggers ignore the land owners and <b>violent clashes</b> continue to occur</li> </ul>
<p><b>International Agreements</b></p> <p>A global solution, enforceable by law helps to reduce illegal behaviour</p>	<ul style="list-style-type: none"> <li>▪ Global agreements to <b>protect indigenous flora and fauna</b> exist</li> <li>▪ In 2018 Interpol seized 200 m<sup>3</sup> of wood headed for Hong Kong which were violating these agreements</li> </ul>	<ul style="list-style-type: none"> <li>▪ Loggers up their game and <b>avoid detection</b></li> <li>▪ Not all countries follow <b>the law</b> and in this case, China actively ignore it so as to get their hands on this resource</li> <li>▪ Only really effective when all countries sign up for it and when the <b>law enforcement agencies</b> in each country are active and free from corruption</li> </ul>



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## 2.8.5 Government Intervention to Address the Market Failure

### Common Types of Intervention to Address Market Failure



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#### Methods used to address market failure

##### 1. Indirect (Pigouvian) taxes

A Pigouvian tax is a tax placed on a product with harmful side effects (named after Arthur Pigou), so as to increase its price and reduce the quantity demanded or the supply. Useful to address market failure

where goods are over-provided

## 2. Carbon taxes

A tax that producers who emit greenhouse gases have to pay. It sets a price on the carbon content forcing producers to pay for each ton of emissions. This raises their costs of production and should reduce supply. Useful to address market failure in markets where there's high a carbon footprint

## 3. Producer subsidies

The government gives firms a fixed amount of money per unit produced in order to lower production costs and/or increase output of the product. Useful to address market failure where goods are under-provided or consumed

## 4. Legislation and regulation

The government creates new laws (e.g. no single-use plastic bags) and then creates an agency (e.g. environment agency) to regulate those laws. Useful to address market failure where goods are over-provided or consumed

## 5. Education

The government funds advertising and education programs to educate the public on the dangers (or sometimes the benefits) of certain products e.g. anti smoking campaigns. Useful to address market failure caused by the existence of merit and demerit goods

## 6. Tradable permits

A mechanism which provides firms who emit greenhouse gases the option to buy a **permit to pollute** when it is required. This increases their costs of production and should reduce supply. If firms have permits that are no longer needed they are able to sell them to other firms

## 7. International agreements

These are useful for issues which are global in nature and require a globally coordinated response e.g. COP 27 agreements on climate change. Useful to address market failure where the tragedy of the commons is occurring and the global trade in demerit goods

## 8. Collective self-governance

Occurs when communities come together to take control of common pool resources in an attempt to deal with the negative externalities associated with their use

## 9. Government provision

Governments will often choose to directly provide certain goods/services (merit goods) in order to ensure that everyone in society has the same access. Useful to address market failure where goods are under-provided



## Examiner Tips and Tricks

Market Failure is one of the most frequently examined topics in your exams. Expect 10 and 15-mark essays in Paper 1. Paper 2 may include definition questions, short explanations, diagram-only



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questions, diagrams with explanations: and/or an essay question.

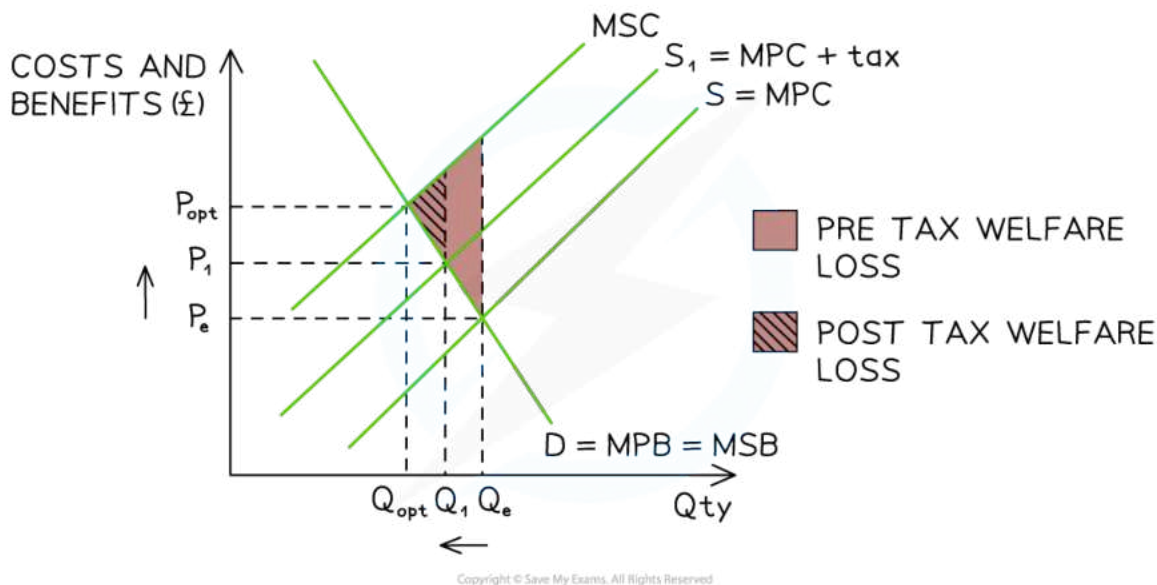
Take your time working through this sub-topic ensuring you understand each diagram. If you can draw and explain the diagrams (solutions included), then you are fairly well prepared. If you can also evaluate each solution using a real-world example, then you are very well prepared.

## Indirect (Pigouvian) Taxes

- A **Pigouvian tax** is a tax placed on a product with harmful side effects (named after Arthur Pigou), so as to increase its price and reduce the quantity demanded or the supply
- The aim of this tax is to make the individual or firm causing the externality to pay for it - the so-called **polluter pays principle**
- An **indirect tax** can be either **ad valorem** or **specific**

### 1. Specific Tax on a Negative Externality of Production

- Governments frequently tax firms that pollute or create external costs in production



*A diagram that shows the impact of a tax on a product that is over-provided in society. The tax reduces the welfare loss and moves production closer to the optimum level of production*

## Diagram Analysis

- The **free-market** equilibrium is at  $P_e Q_e$  - where **MSB = MPC**
  - Market failure exists as **MSC > MSB** at equilibrium
  - Optimum level of output is at  $Q_{opt}$
  - There is **over-provision** of this product equal to  $Q_e - Q_{opt}$
- A **specific tax** shifts the supply curve left from **S** → **S<sub>1</sub>** as it increases the costs of production
  - The tax does not completely eradicate the welfare loss but **moves the market closer** to the optimum level of output ( $Q_{opt}$ )
  - The **welfare loss has been reduced** as shown in the diagram
- The **new** market equilibrium is at **P<sub>1</sub>Q<sub>1</sub>**
  - This is a **higher price** and **less output**
  - There is less **over-provision** and so less market failure
  - The **external costs** have been reduced



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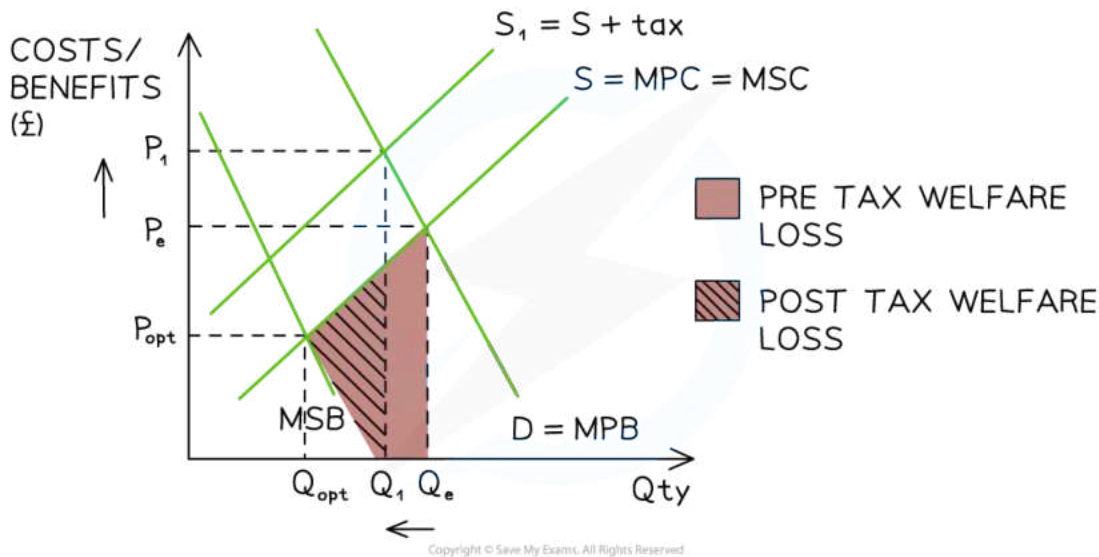
## 2. Specific Tax on a Negative Externality of Consumption

- Governments frequently tax **demerit goods** such as cigarettes, alcohol, fatty foods, and polluting vehicles





Your notes



*A diagram that shows the impact of a tax on a product that is over-consumed in society. The tax reduces the welfare loss and moves consumption closer to the optimum level of production*

## Diagram Analysis

- The **free-market** equilibrium is at  $P_e Q_e$  where  $MPB = MSC$ 
  - Market failure exists as  $MSC > MSB$  at equilibrium
  - The optimum level of consumption is at  $Q_{opt}$
  - There is **over-consumption** of this product equal to  $Q_e - Q_{opt}$
  
- A **specific tax** shifts the supply curve left from  $S \rightarrow S_1$  as it increases the costs of production
  - The tax does not completely eradicate the welfare loss but **moves the market closer** to the optimum level of output ( $Q_{opt}$ )
  - The **welfare loss has been reduced** as shown in the diagram
  
- The **new** market equilibrium is at  $P_1 Q_1$ 
  - This is a **higher price** and **lower output**
  - There is less **over-consumption** and so less market failure

- The **external costs** have been reduced and the market is closer to the **socially optimum level of output  $Q_{opt}$**



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## Evaluating the use of Indirect Taxes to Address Market Failure

### The Advantages & Disadvantages of Indirect Taxes

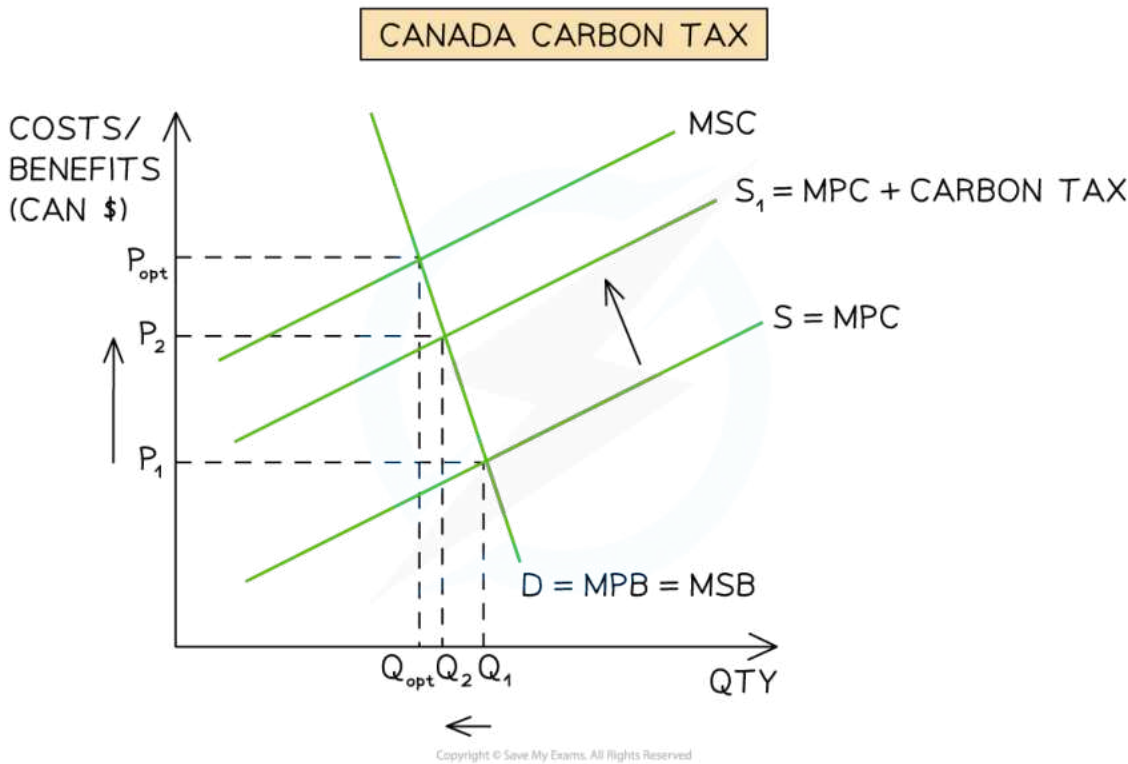
Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▪ Those causing the external costs pay for them - this is fair</li> <li>▪ The taxes raise the price &amp; reduce the quantity demanded of demerit goods creating a <b>more efficient allocation of resources</b></li> <li>▪ They reduce the <b>external costs</b> of consumption &amp; production</li> <li>▪ <b>Raises revenue</b> for government programs</li> </ul>	<ul style="list-style-type: none"> <li>▪ The <b>effectiveness of the tax</b> in reducing the use of demerit goods depends on the price elasticity of demand (PED)                             <ul style="list-style-type: none"> <li>▪ Many consumers who purchase products that are price inelastic in demand will <b>continue to do so</b></li> </ul> </li> <li>▪ It may help <b>create illegal markets</b> as consumers seek to avoid paying the taxes</li> <li>▪ Producers may be forced to <b>lay off some workers</b> as output falls due to the higher prices</li> </ul>

## Carbon Taxes

- A **carbon tax** is a tax on producers who emit greenhouse gases
- The tax sets a price on the carbon content forcing producers to pay for each **ton of carbon dioxide (CO<sub>2</sub>) emissions**
- The tax raises their **costs of production** and should reduce the supply
- This tax is useful in addressing market failure associated with atmospheric pollution



Your notes



Canada has the highest carbon tax rates per ton of CO<sub>2</sub> emissions in the world. The tax ranges from \$15–\$38 per ton of CO<sub>2</sub> released – and is levied on all fossil fuels

## Diagram Analysis

- The **free-market** equilibrium is at  $P_1Q_1$  where **MSB = MPC**
  - Market failure exists as **MSC > MSB** at equilibrium
  - The optimum level of output is at **Q<sub>opt</sub>**
  - There is **over-provision** of this product equal to  $Q_1 - Q_{opt}$
  
- **The carbon tax raises the cost of production for producers**
  - This causes the supply curve to shift left from  $S \rightarrow S_1$ , reducing the level of supply
  - The tax does not completely eradicate the welfare loss but **moves the market closer** to the optimum level of output ( $Q_{opt}$ )



Your notes

- The **welfare loss to society has been reduced**
- The **new** market equilibrium is at  $P_2Q_2$ 
  - This is a **higher price** and **lower output**
  - There is less **over-provision** and so less market failure
  - The **external costs** have been reduced

## Evaluating the use of Carbon Taxes to Address Market Failure

### The Advantages and Disadvantages of Carbon Taxes

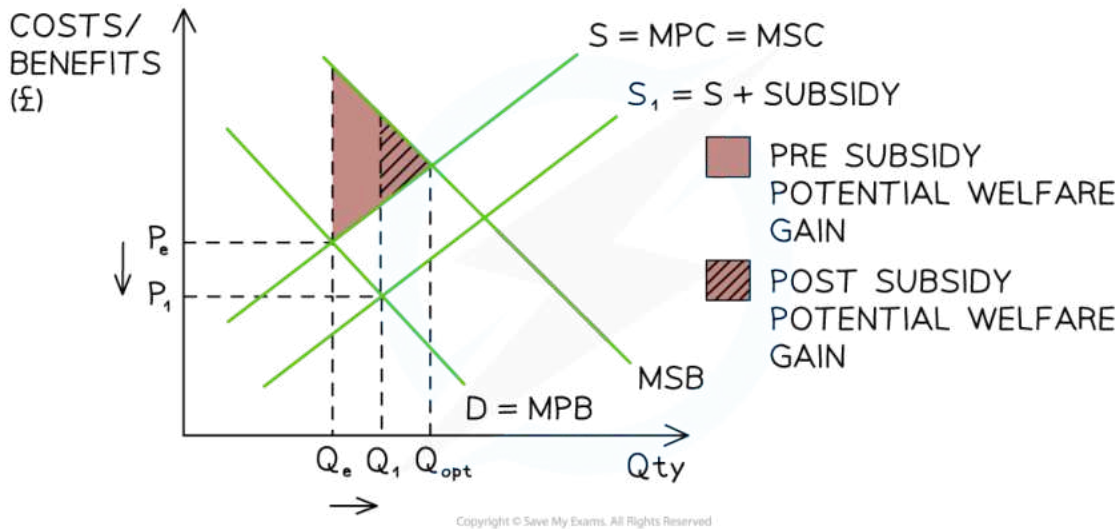
Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▪ <b>Raises the costs of production</b> for carbon emitting firms and reduces the supply of goods produced in a way that is harmful to the environment</li> <li>▪ Reduces <b>external costs</b> of fossil fuel production</li> <li>▪ This tax will <b>encourage firms to consider investing in pollution abatement technology</b>: if the cost of new technology is lower than the price of the tax then the investment is likely to go ahead</li> <li>▪ <b>Raises revenue</b> for government programs</li> </ul>	<ul style="list-style-type: none"> <li>▪ The <b>effectiveness of the tax</b> in reducing the supply depends on the price elasticity of demand (PED) for goods produced using fossil fuels (e.g. electricity)</li> <li>▪ If the good is <b>inelastic in demand</b>, consumers will continue to purchase it at high prices and the <b>reduction in quantity supplied will be relatively small</b> <ul style="list-style-type: none"> <li>▪ This can be seen on the diagram above where a <b>large increase in price</b> from <math>P_1 \rightarrow P_2</math> resulted in a <b>small decrease in quantity supplied</b> from <math>Q_1 \rightarrow Q_2</math></li> </ul> </li> <li>▪ Some firms may be <b>unable to pay the increased tax</b> and may go out of business</li> <li>▪ Producers may be forced to <b>lay off some workers</b> as output falls due to the higher prices</li> </ul>

## Subsidies

- Governments frequently use **subsidies** to encourage production/consumption of **merit goods** such as energy-efficient products, electric vehicles, healthcare, and education



Your notes



*A diagram that shows the impact of a subsidy on a product that is under-consumed in society. The subsidy reduces the welfare loss and moves consumption closer to the optimum level*

## Diagram Analysis

- The **free-market** equilibrium is at  $P_e Q_e$  where **MPB = MSC**
  - Market failure exists as **MSB > MSC** at equilibrium
  - The optimum level of output is at  $Q_{opt}$
  - There is **under-consumption** of this product equal to  $Q_{opt} - Q_e$
  
- A **subsidy** shifts the supply curve right from  $S \rightarrow S_1$  as it lowers the costs of production
  - It does not completely eradicate the potential welfare gain but **moves the market closer** to the optimum level of output ( $Q_{opt}$ )
  - The welfare loss **has been reduced** as shown in the diagram
  
- The **new** market equilibrium is at  $P_1 Q_1$ 
  - This is a **lower price** and **higher output**
  - There is less **under-consumption** and so less market failure
  - Some of the **external benefits available have been realised**



Your notes

# Evaluating the use of Subsidies to Address Market Failure

## The Advantages and Disadvantages of Producer Subsidies

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▪ Can be <b>targeted</b> so as to help specific domestic industries</li> <li>▪ <b>Lowers prices</b> and increases demand for merit goods</li> <li>▪ Helps to <b>change destructive consumer</b> behaviour over a longer period of time e.g. subsidising electric cars makes them affordable and helps motorists to see them as an option for the masses, not just the wealthy</li> <li>▪ Can be used to help domestic firms <b>compete internationally</b></li> </ul>	<ul style="list-style-type: none"> <li>▪ Distorts the <b>allocation of resources</b> in markets e.g. it often results in excess supply when used in agricultural markets</li> <li>▪ There is an <b>opportunity cost</b> associated with the government expenditure - could the money have been better used elsewhere?</li> <li>▪ Subsidies are <b>prone to political pressure</b> and lobbying by powerful business interests e.g. most oil companies receive subsidies from their respective governments (despite making \$billions in profits each year)</li> <li>▪ Subsidies can disincetivise firms from becoming more efficient or competitive. They provide extra funds which reduce the need to be more competitive</li> </ul>



### Examiner Tips and Tricks

When **evaluating any solution** to market failure always consider the following points as each one could provide the framework for an evaluation paragraph in a 15–mark essay:

1. **The challenges involved in measuring externalities** e.g. how is the monetary value of the external costs associated with smoking calculated? What should be included and what should be excluded in the calculation?
2. **The degree of effectiveness of the solution** e.g. even though the data tells us that raising indirect taxes on demerit goods is the single most effective method, often the problem is so big that it requires a multi-faceted approach which includes taxation, legislation, regulation and education.
3. **The impacts on different stakeholders:** the specific groups of people that any solution often impacts are young consumers, older consumers, rich consumers, poorer consumers, workers,

firms, society, the environment and governments

## Legislation & Regulation

- Governments create **laws (legislation)** to limit the harm caused by the **external costs** of consumption or production
- **Regulatory agencies** are then created to **enforce the law** and monitor that they are not broken
  - **Examples of regulators** in the USA include *The Environment Agency*, *The Food and Drug Administration (FDA)*, and *The State Bank Regulators*
- **Legislation** can aim to influence the **consumer side** of the market (demand) or the **producer side** (supply) or both

### 1. Legislation aimed at the consumer side

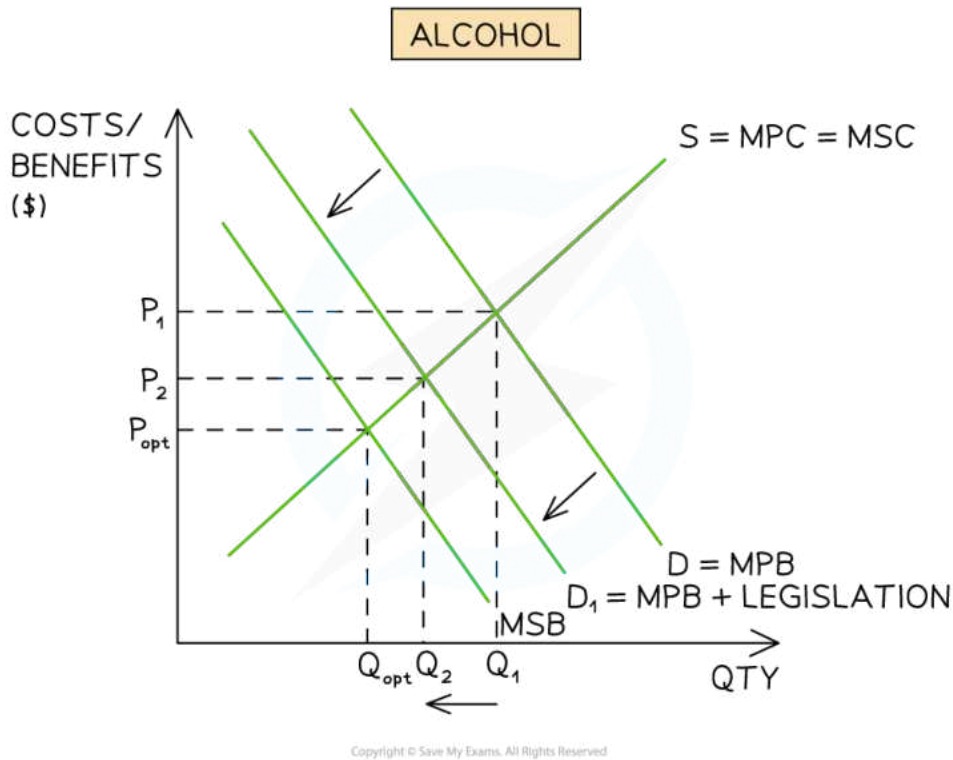
- The legal age for drinking alcohol in the USA is 21 while it is only 18 in the UK
- The UK Government could **change the legal age of alcohol consumption** in order to reduce demand and the external costs associated with excessive alcohol consumption



Your notes



Your notes



**Legislation that changes the legal age of alcohol consumption will reduce the demand for alcohol thus decreasing the external costs of excessive drinking**

## Diagram Analysis

- The **free-market** equilibrium is at  $P_1Q_1$  where  $MPB = MSC$ 
  - Market failure exists as  $MSC > MSB$  at equilibrium
  - The optimum level of consumption is at  $Q_{opt}$
  - There is **over-consumption** of this product equal to  $Q_1 - Q_{opt}$
  
- The introduction of **legislation** that changes the legal age for alcohol consumption from 18 to 21 shifts the demand curve left from  $D \rightarrow D_1$  as it reduces the effective population able to consume alcohol
  - The legislation **does not completely eradicate the welfare loss** but moves the market closer to the optimum level of output ( $Q_{opt}$ )



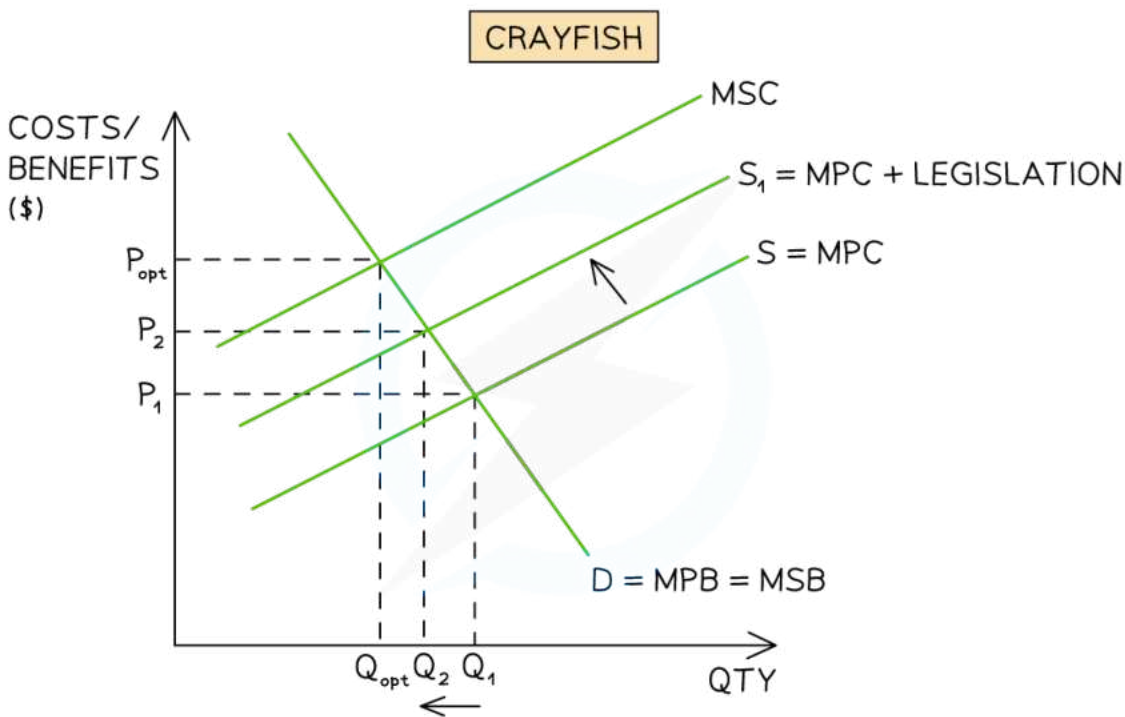


Your notes

- The **welfare loss has been reduced**
- The **new market equilibrium is at  $P_2Q_2$** 
  - This is a **lower price** and **lower output**
  - There is less **over-consumption** and so less market failure
  - The **external costs** have been reduced and the market is closer to the **socially optimum level of output  $Q_{opt}$**

## 2. Legislation aimed at the producer side

- Crayfish have been overfished off the coast of New Zealand (NZ)
- The **NZ Minister of Fisheries** (the regulator) is planning on closing certain crayfishing areas for a period of three years in order to allow the **external costs (possible extinction in some areas)** to be reduced



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Your notes

**Legislation that reduces the potential supply of crayfish will help alleviate the external costs of overfishing**

## Diagram Analysis

- The **free-market** equilibrium is at  $P_1Q_1$  where  $MSB = MPC$ 
  - Market failure exists as  $MSC > MSB$  at equilibrium
  - The optimum level of supply is at  $Q_{opt}$
  - There is **over-supply** of this product equal to  $Q_1 - Q_{opt}$
  
- The **introduction of legislation** which stops crayfish from being caught in certain areas for 3 years will shift the entire supply curve left from  $S \rightarrow S_1$ 
  - The legislation **does not completely eradicate the welfare loss** but moves the market closer to the optimum level of output ( $Q_{opt}$ )
  - The **welfare loss has been reduced**
  
- The **new** market equilibrium is at  $P_2Q_2$ 
  - This is a **higher price** and **lower output**
  - There is less **over-supply** and so less market failure
  - The **external costs** have been reduced and the market is closer to the **socially optimum level of output**  $Q_{opt}$

## Evaluating the use of Legislation & Regulation to Address Market Failure

### The Advantages and Disadvantages of Legislation and Regulation

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▪ The new laws can be <b>targeted</b> on specific markets</li> <li>▪ Individuals or firms may be <b>fined/imprisoned</b> for breaking the rules e.g. selling cigarettes to minors is a punishable offence</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enforcing laws requires the government to <b>hire more people</b> to work for the regulatory agencies</li> <li>▪ Enforcing laws can be difficult as it is a complex process to determine if</li> </ul>

- They help to reduce **the external costs** of demerit goods or harmful production activities
- Fines can generate extra **government revenue**

- **firms/consumers** are breaking the laws
- The regulation may create **underground (illegal) markets** which could generate even higher external costs on society
- Some of the laws may be **unpopular with large corporations** who wield political power
- Some of the laws may be **unpopular with voters** to the point where it may influence their vote in the next election



Your notes

## Education

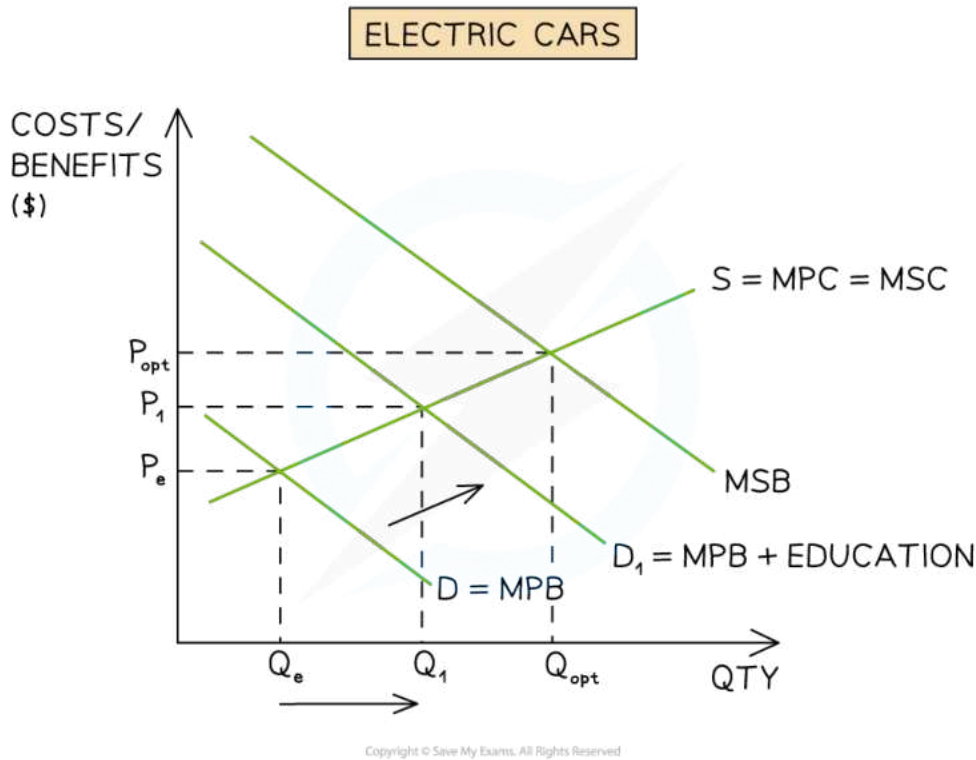
- Raising awareness of the **external benefits or costs** associated with the consumption of a good/service is an effective long-term method of changing consumer behaviour
- Education campaigns happen in many different ways including social media advertising, television, newspaper and radio advertising, provision of brochures at Government-owned buildings (e.g. libraries)

### 1. Educating consumers on the benefits of merit goods

- **Educating consumers** on the benefits of merit goods will **increase consumption of goods with external benefits** (e.g. electric cars, energy-efficient heating systems)



Your notes



*Educating consumers on the external benefits of electric cars will increase their marginal private benefit and demand will increase*

## Diagram Analysis

- The **free-market** equilibrium is at  $P_e Q_e$  where **MPB = MSC**
  - Market failure exists as **MSB > MSC** at equilibrium
  - The optimum level of consumption is at  $Q_{opt}$
  - There is **under-consumption** of electric cars equal to  $Q_e - Q_{opt}$
  
- The **introduction of an education campaign** which promotes the external benefits of using electric cars (less CO<sub>2</sub> pollution) shifts the demand curve right from  $D \rightarrow D_1$  as consumers want to **act positively** towards emissions levels and climate change
  - The education does not completely eradicate the **welfare loss** but moves the market closer to the optimum level of output ( $Q_{opt}$ )

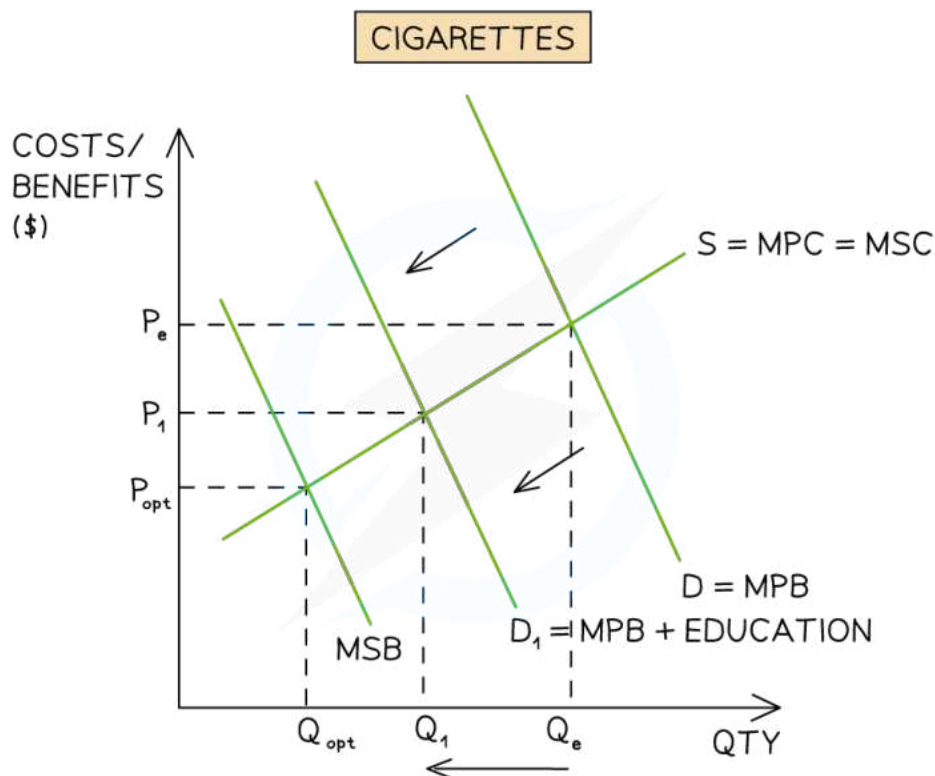


Your notes

- The **welfare loss** has been reduced
- The **new** market equilibrium is at  $P_1Q_1$ 
  - This is a **higher price** and **output**
  - There is less **under-consumption** and so less market failure
  - The **external benefits** have been recognised and the market is closer to the **socially optimum level of output**  $Q_{opt}$

## 2. Educating consumers on the dangers of consuming demerit goods

- **Educating consumers** on the dangers of consuming **demerit goods** will decrease the consumption of goods with external costs (e.g. cigarettes, alcohol, drugs, single-use plastics)
- Demerit goods are usually addictive but even small decreases in consumption are still worthwhile



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**Educating consumers on the external costs of demerit goods will decrease their marginal private benefit and demand will decrease**



Your notes

## Diagram Analysis

- The **free-market** equilibrium is at  $P_e Q_e$  where  $MPB = MSC$ 
  - Market failure exists as  $MSC > MSB$  at equilibrium
  - The optimum level of consumption is at  $Q_{opt}$
  - There is **over-consumption** of cigarettes equal to  $Q_e - Q_{opt}$
  
- The **introduction of an education campaign** which raises awareness of the external costs of smoking (e.g. passive smoking, cigarette stump pollution) shifts the demand curve left from  $D \rightarrow D_1$  as consumers weigh their actions more carefully
  - The education does not completely eradicate the **welfare loss** but moves the market closer to the optimum level of output ( $Q_{opt}$ )
  - The **welfare loss** has been reduced
  
- The **new** market equilibrium is at  $P_1 Q_1$ 
  - This is a **higher price** and **output**
  - There is less **under-consumption** and so less market failure
  - The **external benefits** have been recognised and the market is closer to the **socially optimum level of output**  $Q_{opt}$

## Evaluating the use of Education to Address Market Failure

### The Advantages and Disadvantages of using Education

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▪ Changing the <b>marginal private benefit</b> associated with the consumption of a product is one of the most powerful ways to influence quantity demanded in the long term</li> </ul>	<ul style="list-style-type: none"> <li>▪ It takes a long time to change behaviour through education</li> <li>▪ There is an <b>opportunity cost</b> associated with the government spending on the education program</li> </ul>

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| <ul style="list-style-type: none"><li>▪ The amount governments spend in raising awareness is usually far less than <b>the savings</b> they generate in the long term e.g. reduced State healthcare costs for cancer sufferers as a result of having fewer smokers</li><li>▪ Education can create positive cultural changes e.g. an anti smoking culture or an anti single plastic use culture</li><li>▪ Education can, over time, help improve the <b>economic development</b> within a country</li></ul> | <ul style="list-style-type: none"><li>▪ <b>Demerit goods</b> are often addictive and as a result, the change in behaviour takes longer</li><li>▪ <b>Merit goods</b> are often more expensive than consumers would like and so the change in behaviour may take longer (combining education with a subsidy has proven very effective)</li></ul> |
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Your notes



### Examiner Tips and Tricks

Market Failure is one of the most frequently examined topics in your exams. Expect 10 and 15–mark essays in Paper 1. Paper 2 may include definition questions, short explanations, diagram–only questions, diagrams with explanations and an essay question.

Take your time working through this section ensuring you understand each diagram. If you can draw and explain the diagram, then you are fairly well prepared. If you can evaluate solutions using a real-world example, then you are very well prepared.



Your notes

## 2.8.6 Other Interventions to Address the Market Failure

### Tradable Pollution Permits

- Governments calculate an optimum (or preferable) level of pollution
- They then create a **pollution permit market** and issue permits to polluting firms
  - This is also known as a **Cap and Trade Scheme (CATs)**
  - Each permit is typically valid for the emission of **one ton of pollutant**
  - Firms that pollute more have to **buy additional permits** from less-polluting firms
  - The **price of the permit** represents an additional cost of production **which reduces the supply**
  - This helps to reduce **negative externalities** of production
  - The price of the permit changes as it is determined by **demand and supply**
- If the cost of additional permits is more than the **cost of investing** in new pollution abatement technology, firms will be incentivised to switch to **cleaner technology**
  - Firms can then **sell their spare permits** and gain additional revenue

#### Evaluating the use of Tradable Permits

Evaluation Point	Explanation
Challenges involved in the measurement of externalities	<ul style="list-style-type: none"> <li>▪ Is extremely difficult to <b>calculate the level of CO<sub>2</sub> emissions</b> in an economy and this level constantly changes</li> <li>▪ The initial <b>number of permits</b> is based on this calculation and should ideally be significantly less</li> <li>▪ If the calculation is too high then the permits will have <b>no impact</b> on emissions whatsoever</li> </ul>
Degree of effectiveness	<ul style="list-style-type: none"> <li>▪ It still provides a <b>permit to pollute</b></li> <li>▪ When the calculations are correct, it can be <b>effective in decreasing emissions</b> and reducing the welfare loss</li> </ul>





Your notes

	<ul style="list-style-type: none"> <li>▪ Larger firms have the resources to buy all the permits while smaller firms struggle. Over time this can effectively create monopolies in polluting industries</li> <li>▪ If the <b>demand for the end product</b> is price inelastic in demand, then firms will pass on the cost of this permit to their consumers in the form of <b>higher prices</b></li> </ul>
<b>Consequences for stakeholders</b>	<ul style="list-style-type: none"> <li>▪ Increased costs of production for firms</li> <li>▪ Some firms may invest in <b>new technology</b> so that the permits are not required</li> <li>▪ Some firms may no longer be able to compete</li> <li>▪ Some firms may <b>switch their production</b> to countries with no pollution permit scheme</li> <li>▪ Higher prices for consumers</li> </ul>

## International Agreements

- International Agreements aim to address the **negative externalities of production and consumption** that are global in nature. These agreements typically focus on:
  1. **Common pool resources** such as international fishing waters e.g. the North East Atlantic Fisheries Commission (NEAFC) is representative of member countries and sets annual limits on fishing in the North East Atlantic
  2. **Environmental and climate change challenges** e.g. Cop 27 ( the United Nations Framework Convention on Climate Change) has 165 countries working together to reduce global warming
  3. **Global trade in demerit goods** e.g. the United Nations Office on Drugs and Crime has 27 countries working together to combat organised crime

### Evaluating the use of International Agreements

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▪ Many problems require a globally co-ordinated response and the <b>reduction in welfare loss</b> is greater when countries work together</li> </ul>	<ul style="list-style-type: none"> <li>▪ More economically developed countries (MEDCs) have developed using '<b>dirty technologies</b>'. Less economically developed countries (LEDCs) are under pressure to accept agreements which reduce the use of 'dirty</li> </ul>



Your notes

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|---|--|
| <ul style="list-style-type: none"> <li>Resources can be pooled and used for the greatest good</li> <li>Levels of international cooperation and <b>interdependence</b> can increase</li> </ul> | <p>technology' and this may not be realistic as it would decrease their economic growth</p> <ul style="list-style-type: none"> <li>There are usually <b>no legal consequences</b> to withdrawing from international agreements</li> <li>When new political parties come to power they may seek to <b>change agreements or withdraw from them</b> e.g. President Trump withdrew USA support for the Paris Climate Change agreement</li> </ul> |
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## Collective Self-governance

- Collective self-governance** occurs when the stakeholders in a community work together to combat the negative externalities of production usually associated with **common pool resources**

### Evaluating the use of Collective Self-governance

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>Working together can provide a <b>common purpose</b> and build a community</li> <li>The community knows how to <b>best manage scarce resources</b> in a sustainable way and it is in their best interests to do so</li> <li>Communities can create <b>employment opportunities</b> related to managing the scarce resources</li> <li>A powerful strategy that has been beneficial to promoting <b>eco (sustainable) tourism</b> in many areas e.g. Borneo rain forests</li> <li>The welfare loss is reduced</li> </ul>	<ul style="list-style-type: none"> <li>There can be <b>disagreement</b> about how to best manage the resources</li> <li><b>Taking back control</b> of common pool resources from multinational corporations or organised crime gangs can be highly confrontational/violent</li> <li>This strategy works better when <b>private property ownership rights</b> are given to the communities for the natural resources around them</li> </ul>

## Government Provision

- Merit goods** and **public goods** are under-provided thus causing market failure



Your notes

- Public goods are **beneficial for society** and are **not provided by private firms** due to the **free rider problem**
  - They are usually provided **free at the point of consumption** but are paid for through **general taxation**
  - Examples include roads, parks, lighthouses, national defence
  
- Merit goods are **beneficial to society** but consumers cannot always access them as they are priced out of the market (e.g. private education or healthcare)
  
- One of the final ways to address the **under-provision** of goods and services is for governments to provide them

#### Evaluating the use of Government Provision

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>▪ Essential /valuable goods and services are usually provided <b>free at the point of consumption</b></li> <li>▪ They are accessible to everyone regardless of income</li> <li>▪ These usually provide both <b>private and external benefits</b> to society</li> </ul>	<ul style="list-style-type: none"> <li>▪ Paid for through <b>general taxation</b></li> <li>▪ There is an opportunity cost associated with their provision</li> <li>▪ Products which are free may result in <b>excess demand</b> and long waiting times e.g. procedures at Public hospitals</li> </ul>