

2.8 Market Failure – Externalities and Common Pool



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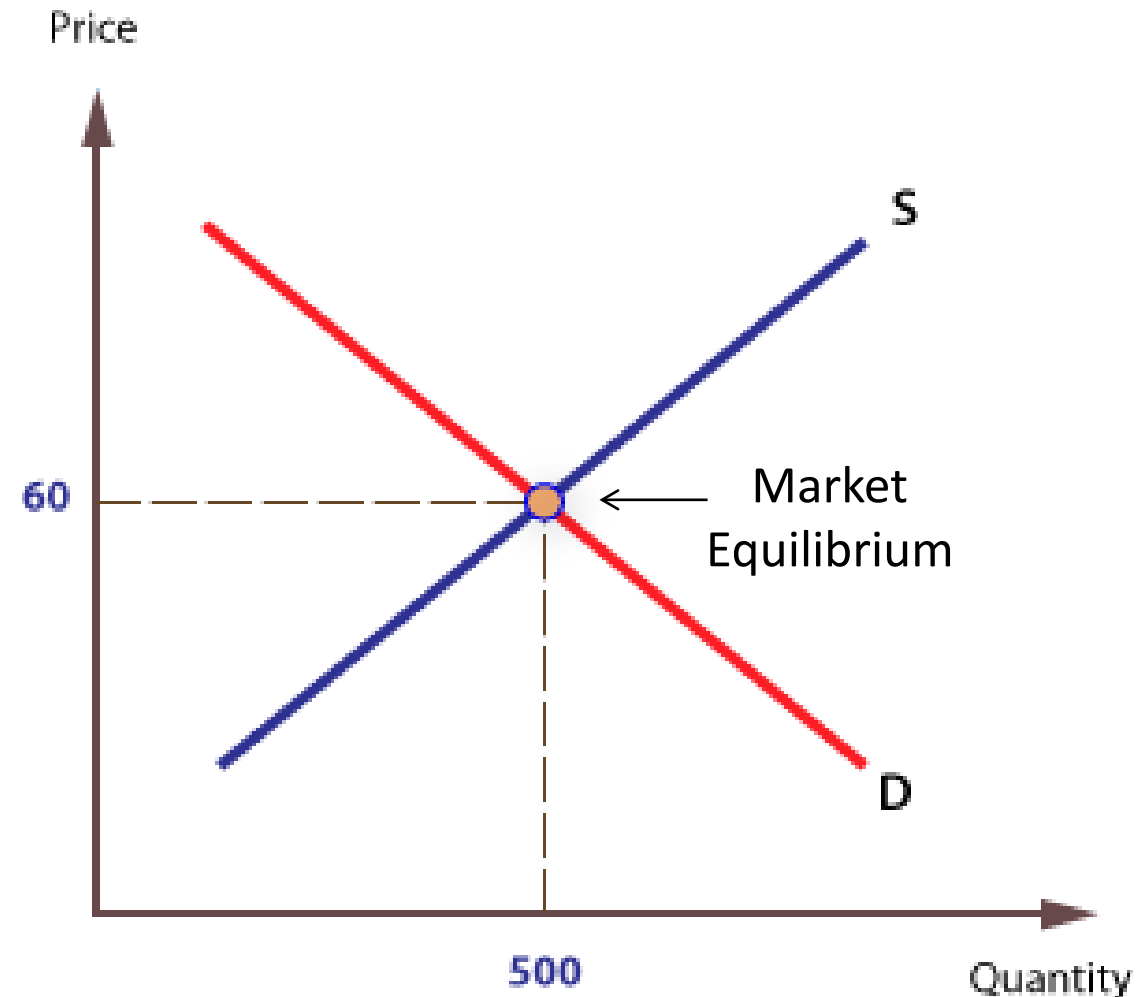
Price Determination

In a free market, forces of demand and supply interacts to establish the general level of price for a good or service.

Marginal Benefit = Marginal Cost

The market clears efficiently

These outcomes are based on *strict and unrealistic conditions* that relies on the help of government economic policies



2.8 Market Failure – Externalities and Common Pool

Market Failure: Allocative Inefficiency

Market failure refers to the failure of the market to allocate resources efficiently.

Too much or too little goods or services are produced and consumed from the point of view of what is *socially most desirable*.

Market failure can occur when:

- Allocative efficiency is not achieved
- Social surplus is not maximized
- $\text{Marginal Benefits} \neq \text{Marginal Costs}$



2.8 Market Failure – Externalities and Common Pool

Market Failure: Allocative Inefficiency

Market failure refers to the failure of the market to allocate resources efficiently.

Too much or too little goods or services are produced and consumed from the point of view of what is *socially most desirable*.

This may occur as a result of **externalities**.

Externalities occur when the actions of consumers or producers give rise to negative or positive spillover effects on third parties.



2.8 Market Failure – Externalities and Common Pool

Market Failure: Allocative Inefficiency

Market failure refers to the failure of the market to allocate resources efficiently.

Externalities occur when the actions of consumers or producers give rise to negative or positive spillover effects on third parties.

This can result either from:

- Consumption activities
- Production activities



2.8 Market Failure – Externalities and Common Pool

Consumption Externalities

Example: What are the possible externalities from cigarette consumption?

It poses enormous health- and non-health-related costs related costs to the affected individuals, employers, and the society at large.

The World Health Organization (WHO) estimates that, globally, smoking causes over US\$500 billion in economic damage each year.



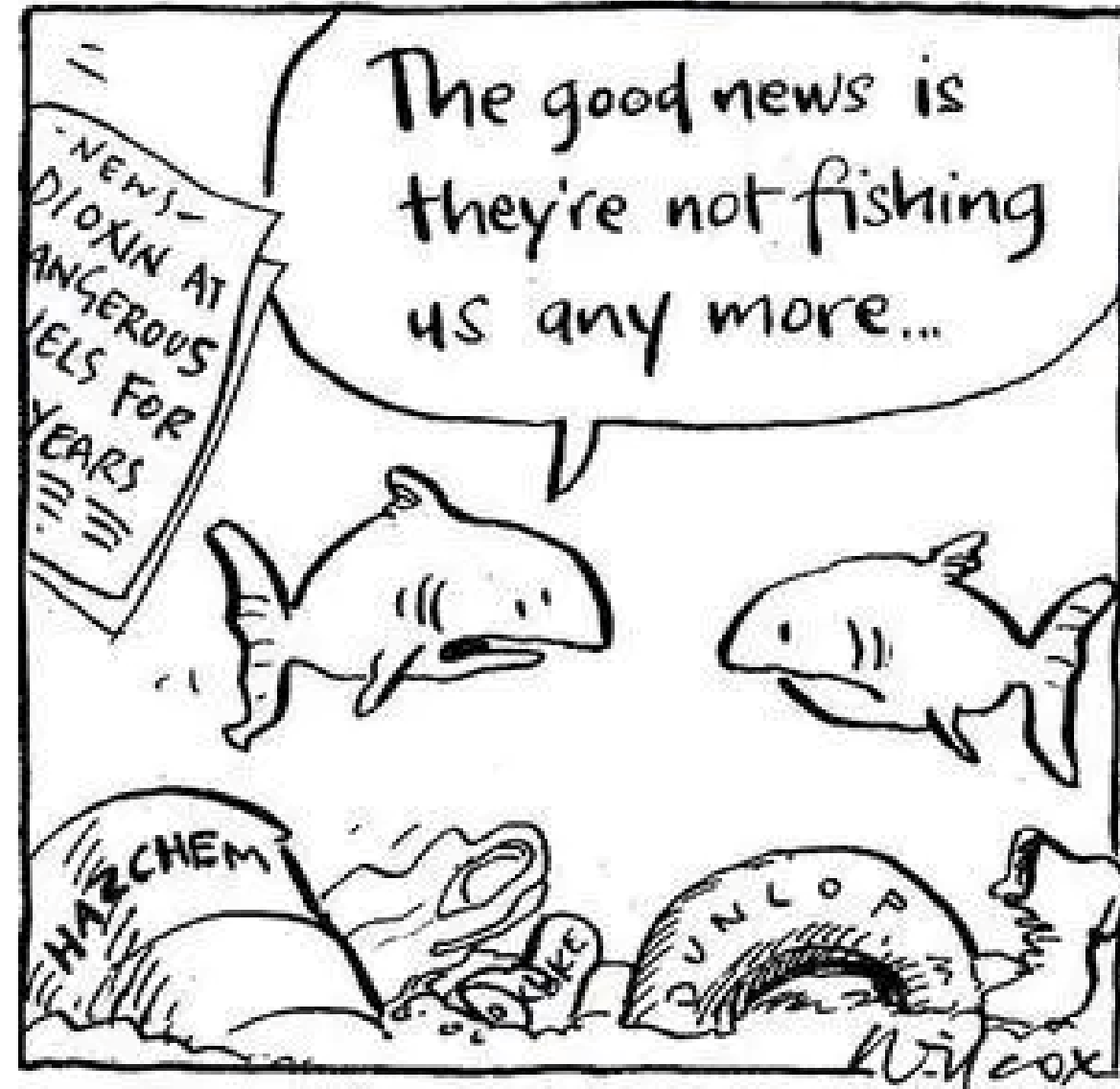
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Production Externalities

Example: What are the possible externalities from burning fossil fuels?

Our reliance on fossil fuels to provide 80% of our energy needs has exacted an enormous toll on humanity and the environment:

- Land degradation
- Water pollution
- Emissions



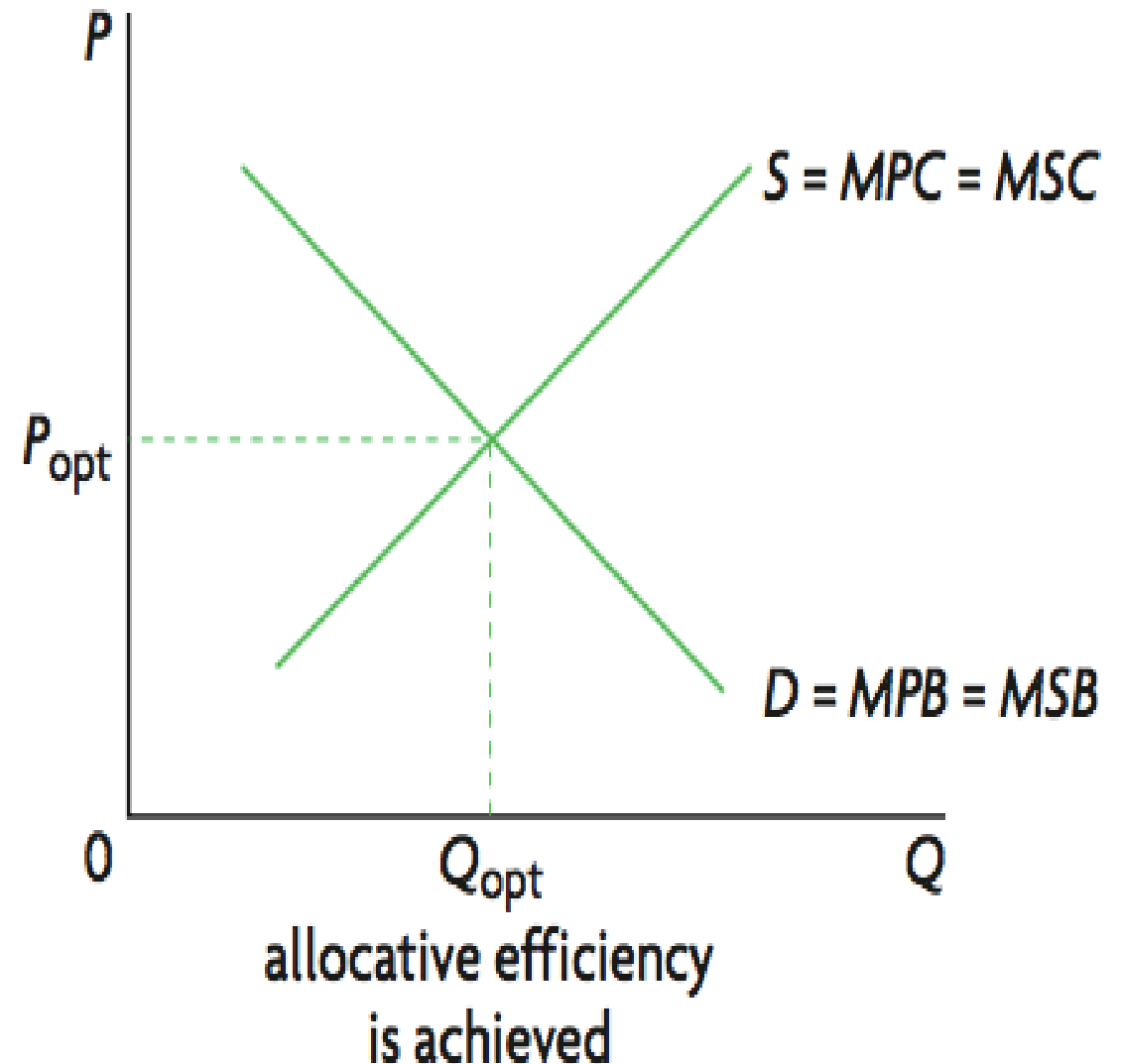
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Private Benefits and Costs

Marginal private benefit (MPB) refer to benefits to consumers from consuming one more unit of a good or service.

Marginal private cost (MPC) refer to the cost to producers of producing one more unit of a good.

If there are no externalities,
 $P_{opt} \times Q_{opt} = \text{Social Optimum}$



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Social Benefits and Costs

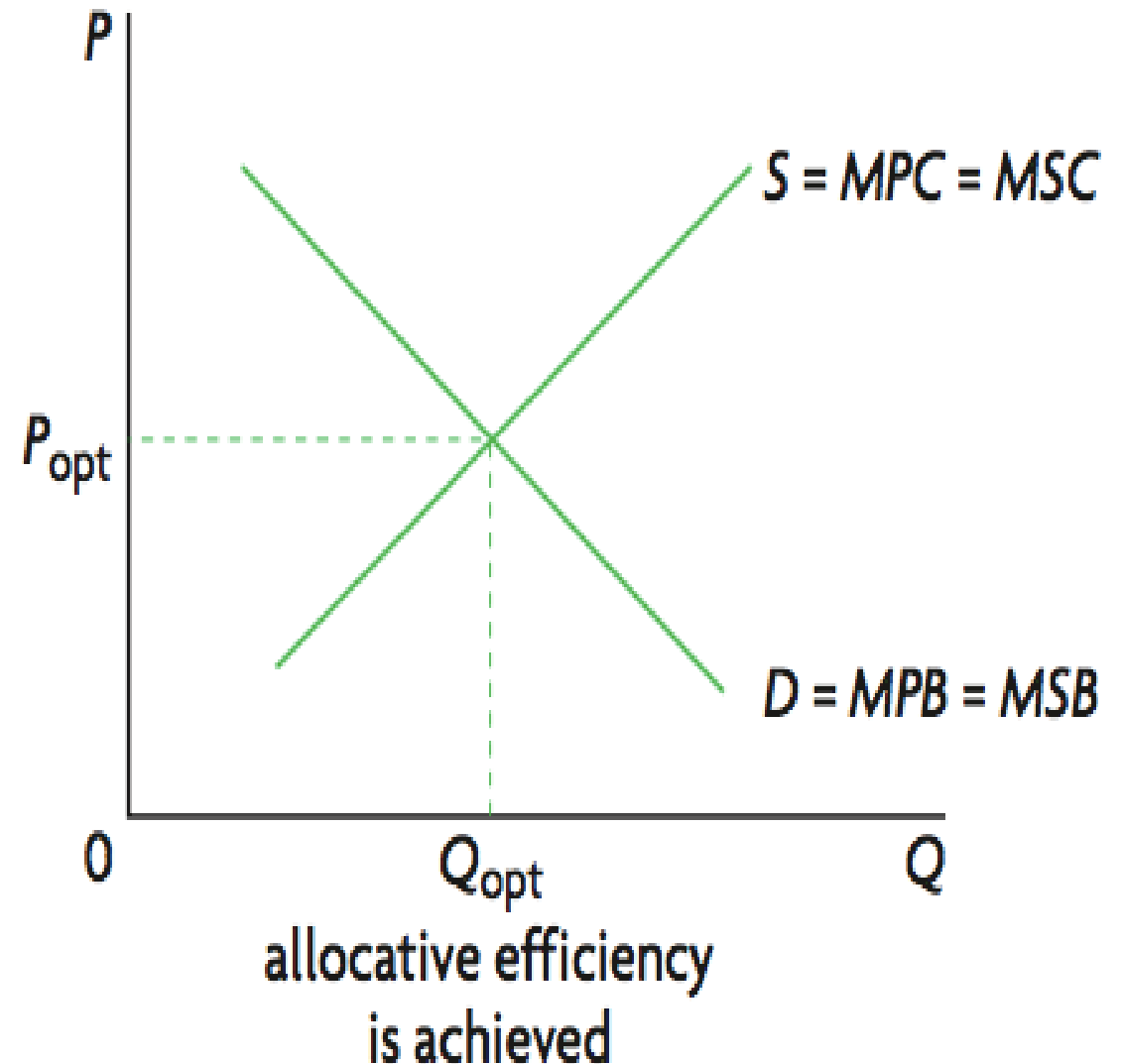
Marginal social benefit (MSB) refer to benefits to society from consuming one more unit of a good.

Marginal social cost (MSC) refer to costs to society from consuming one more unit of a good.

Under allocative efficiency,

$$D = MPB = MSB$$

$$S = MPC = MSC$$



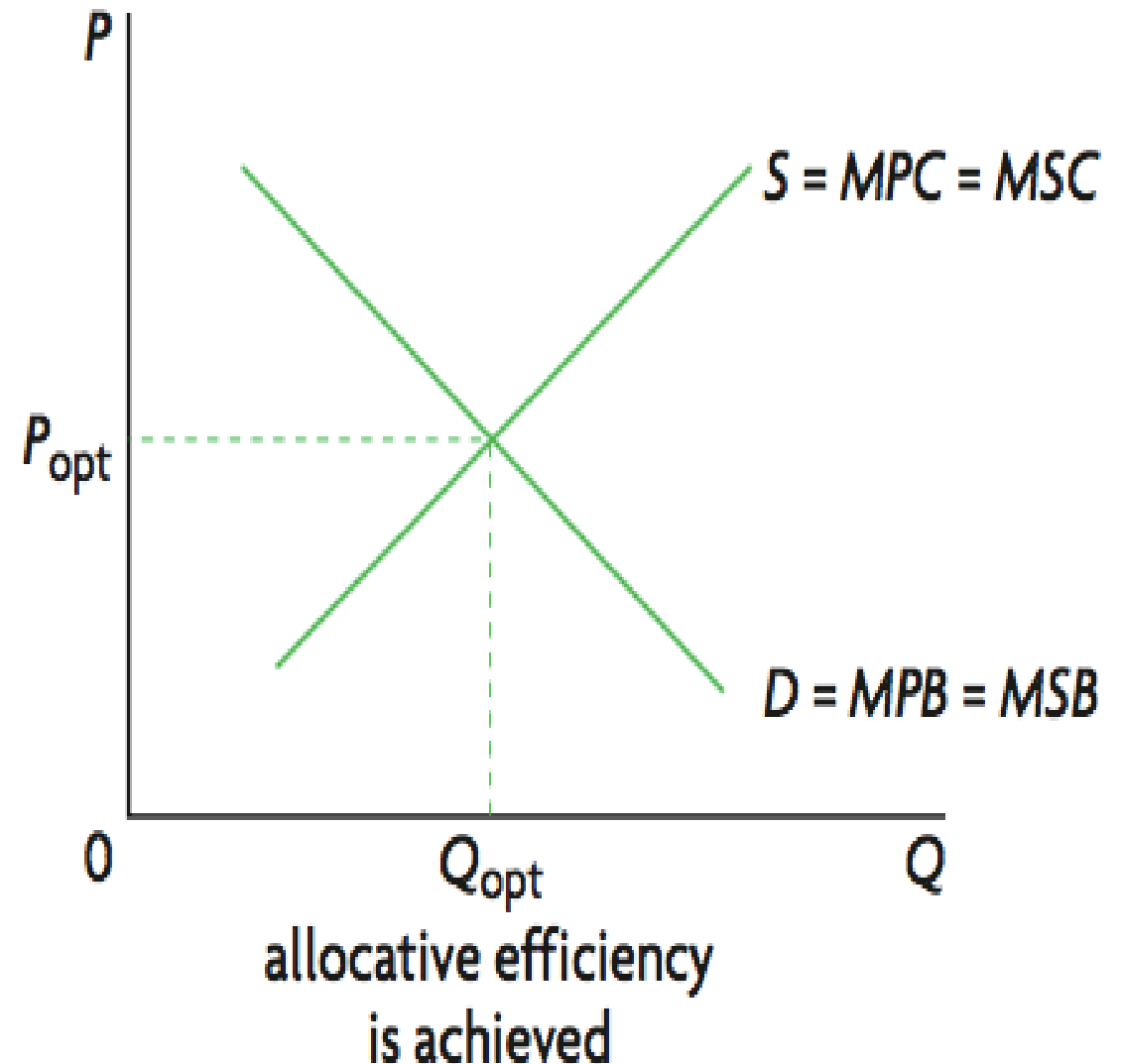
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Social Benefits and Costs

Marginal social benefit (MSB) refer to benefits to society from consuming one more unit of a good.

Marginal social cost (MSC) refer to costs to society from consuming one more unit of a good.

This is equivalent to **MC = MB**, which was covered in earlier topics.



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Negative Externalities

Negative externalities of consumption refer to external costs created by consumers.

Vehicle pollution

Household waste

Traffic congestion

Gambling addition



Negative externalities of production refer to external costs created by producers.

Air pollution from factories

Industrial waste

Noise pollution

Collapsing fish stocks

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Production Externalities

Example: What are the possible externalities from producing beef?

The livestock sector requires a significant amount of natural resources and is responsible for about 14.5% of total anthropogenic greenhouse gas emissions.

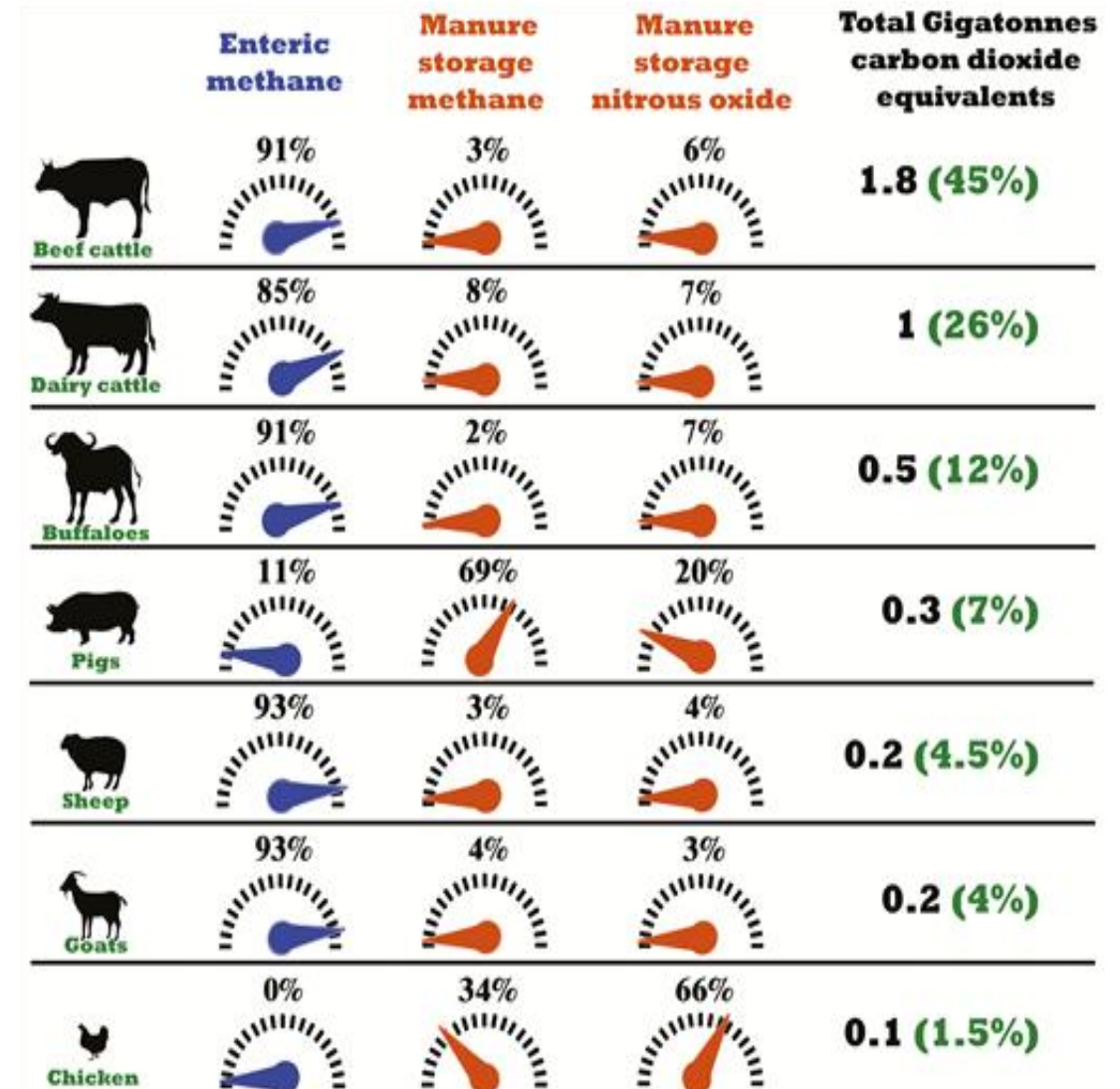
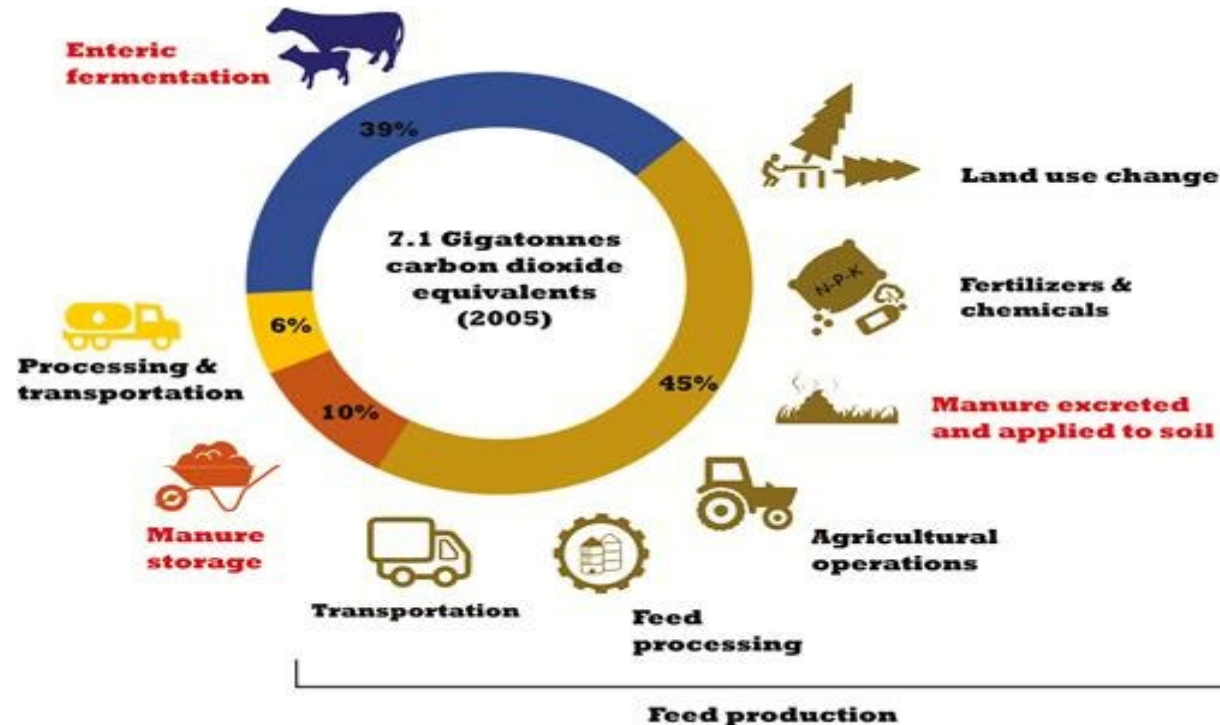
Nitrous oxide, arising from manure storage and the use of organic/inorganic fertilizers, is a molecule with a global warming potential 265 times higher than carbon dioxide.



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Production Externalities

Example: What are the possible externalities from producing beef?



2.8 Market Failure – Externalities and Common Pool

Negative Externalities of Production

Watch the following video and answer the questions below:

1. Explain why meat production is claimed to be an *inefficient allocation of resources*.
2. Identify *social costs* which may arise from the production of meat.
3. Identify the type of meat which imposes the greatest *social cost* when produced.
4. Suggest solutions that can correct this market failure.



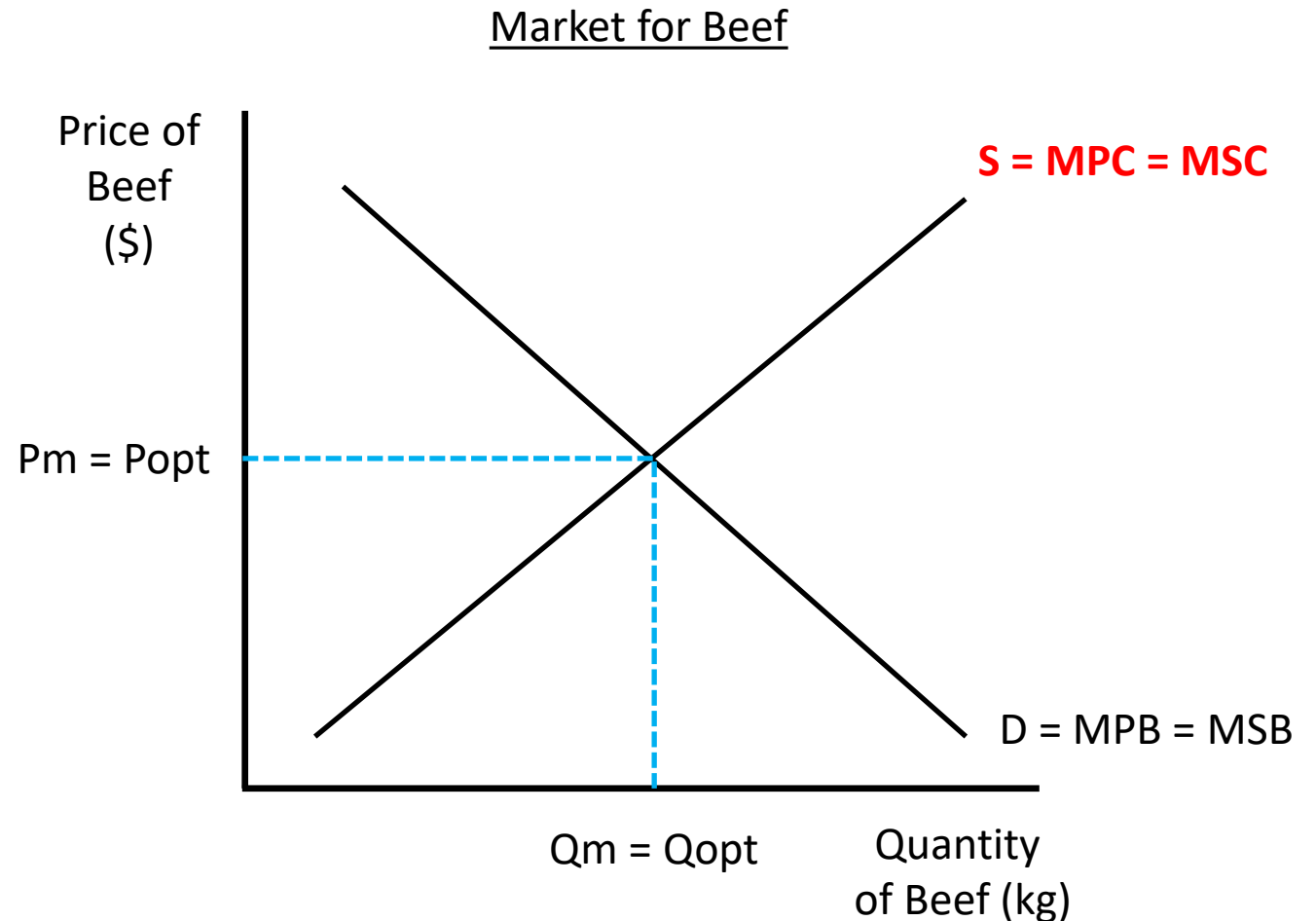
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Market Efficiency

Diagram

If there were no externalities, the private costs and social costs from consumption should be equal

- i.e. **$MSC = MPC = S$**



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Negative Externalities

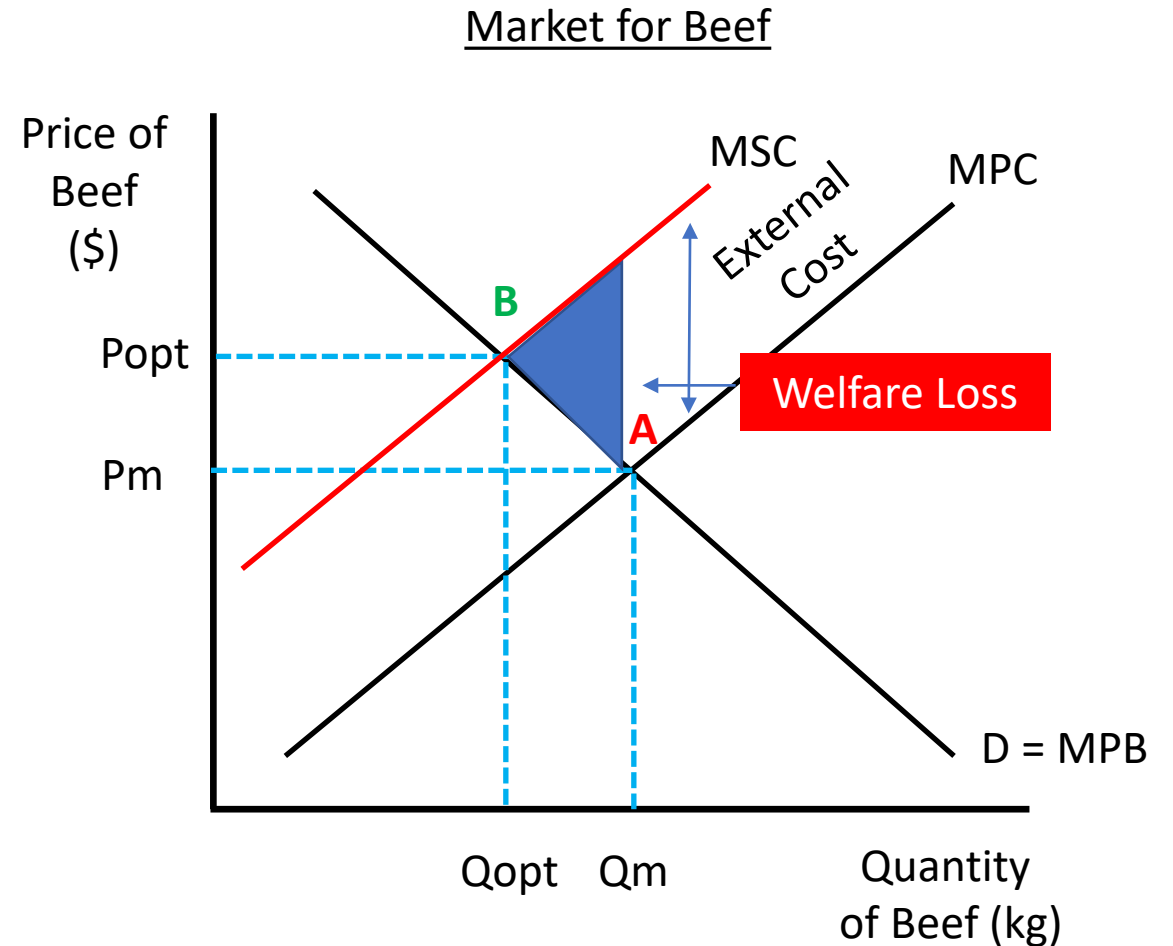
Production of Beef

Negative externalities of production occur when $MSC > MSB$ upon production.

MPC = Market Supply

MSC = Socially Optimal Market Supply

For each level of output, the social costs of producing beef given by **MSC** are greater than the firm's private costs (**MPC**).



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Negative Externalities

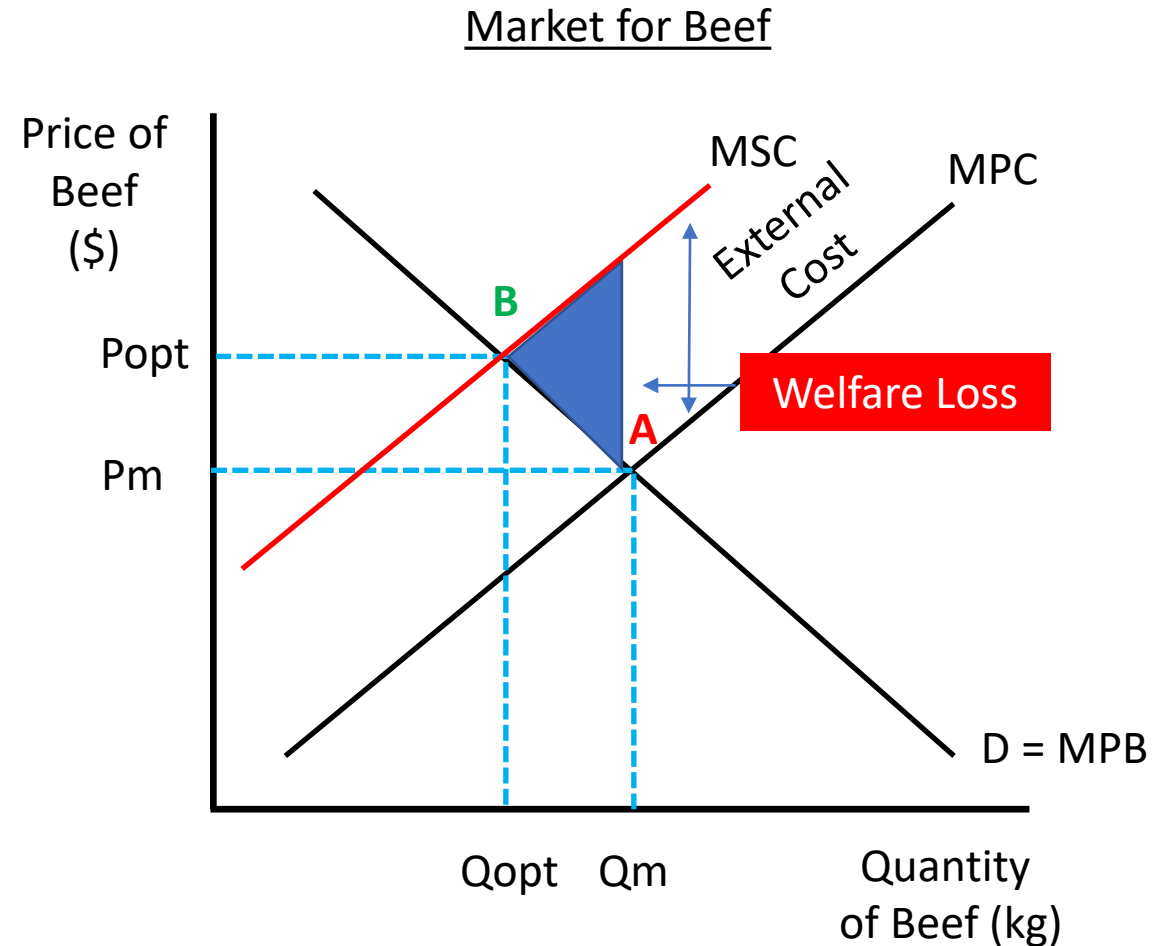
Production of Beef

A = Market Equilibrium

B = Socially Optimal Equilibrium

Welfare loss always lies at Q_{opt}

In this situation, beef is overproduced as $Q_m > Q_{opt}$ (social optimum output)



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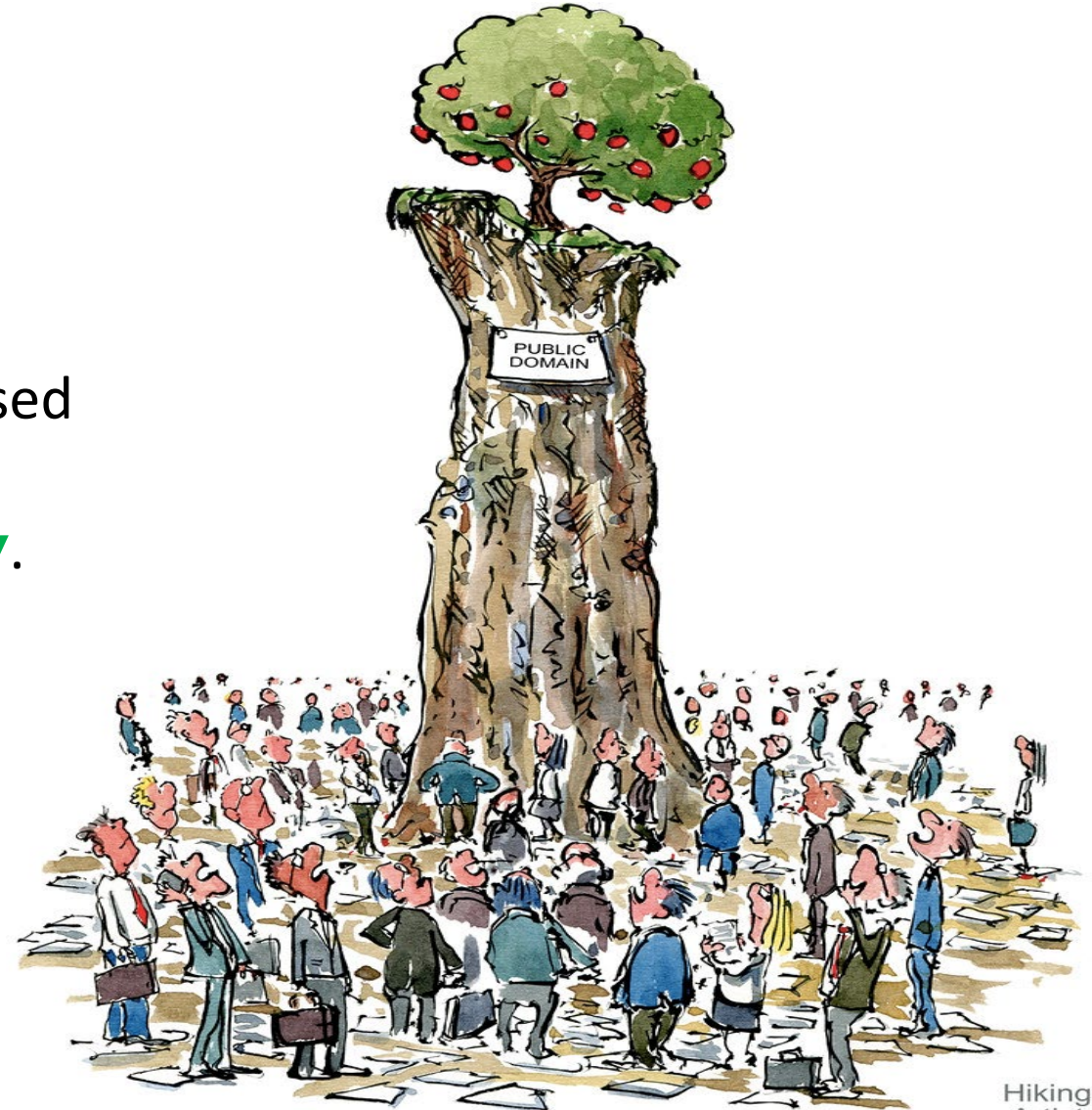
Negative Externalities

Overuse of common pool resources

The concept of **negative externalities** can be used to illustrate the problem of overuse of **common pool resources** and its effects on **sustainability**.

Common pool resources are not owned by anyone, do not have a price and are available for anyone to use without payment or restrictions.

 **In a pair or small groups...**
Brainstorm some examples



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Wildlife



Fish in the sea



Lakes and forests

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Negative Externalities

Overuse of common pool resources

Common pool resources are not owned by anyone, do not have a price and are available for anyone to use without payment or restrictions.

This means the resources are:

- Rivalrous
- Non-excludable



Do you remember...

The characteristics of **private goods**?



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Negative Externalities

Overuse of common pool resources

Common pool resources are not owned by anyone, do not have a price and are available for anyone to use without payment or restrictions.

This means the resources are:

- Rivalrous
- Non-excludable

Leading to serious **environmental degradation and depletion of resources.**



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Negative Externalities

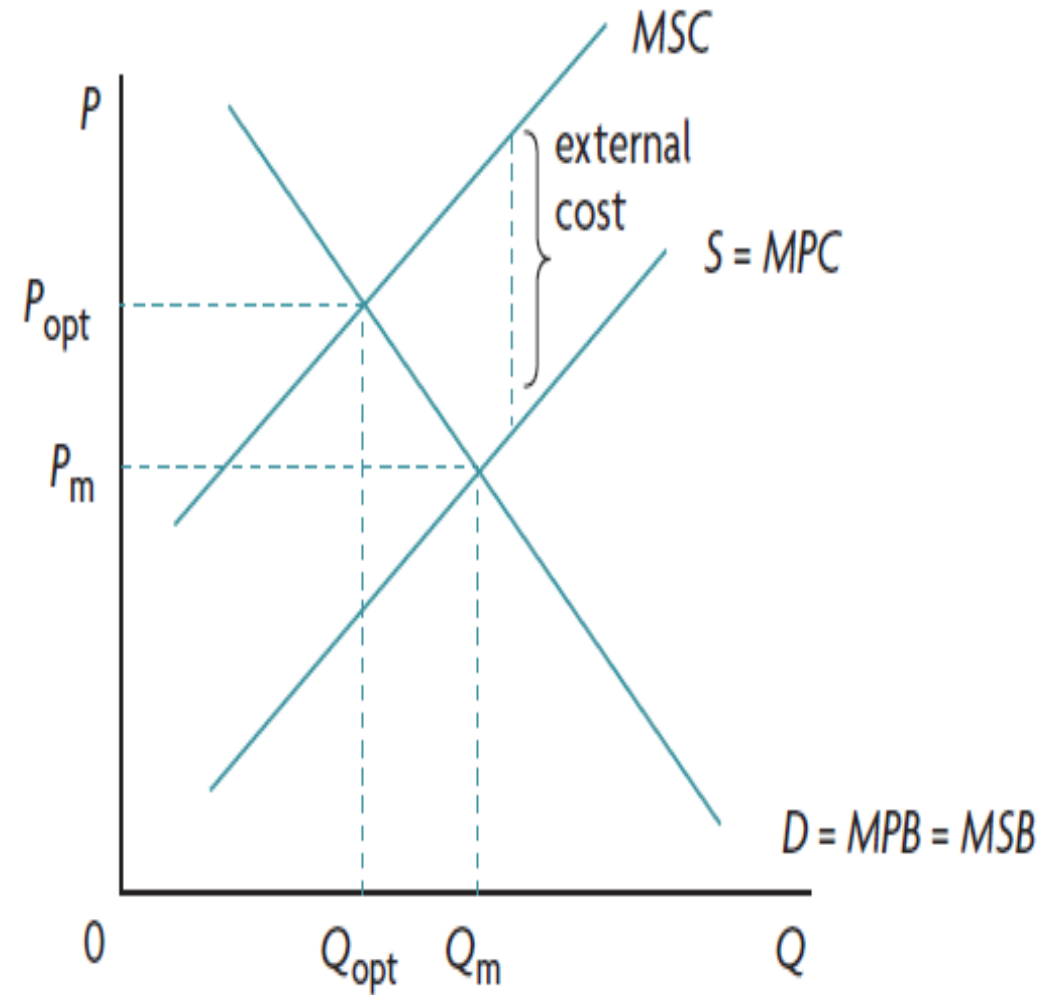
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Tragedy of the Commons

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Tragedy of the Commons

The **tragedy of the commons** is an economic problem in which every individual has an incentive to consume a resource at the expense of every other individual with no way to exclude anyone from consuming.

This results in...

- overconsumption,
- under investment and
- depletion of the resource



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Environmental Sustainability

Sustainability refers to the ability of something to be preserved and maintained over time.

The problem of sustainability arises because of conflicts between **environmental and economic goals**.

Environmental goal: Preservation of the environment.

Economic goal: Efforts to increase quantities of output produced and consumed.

Societies should pursue economic growth that does not deplete or degrade natural resources.



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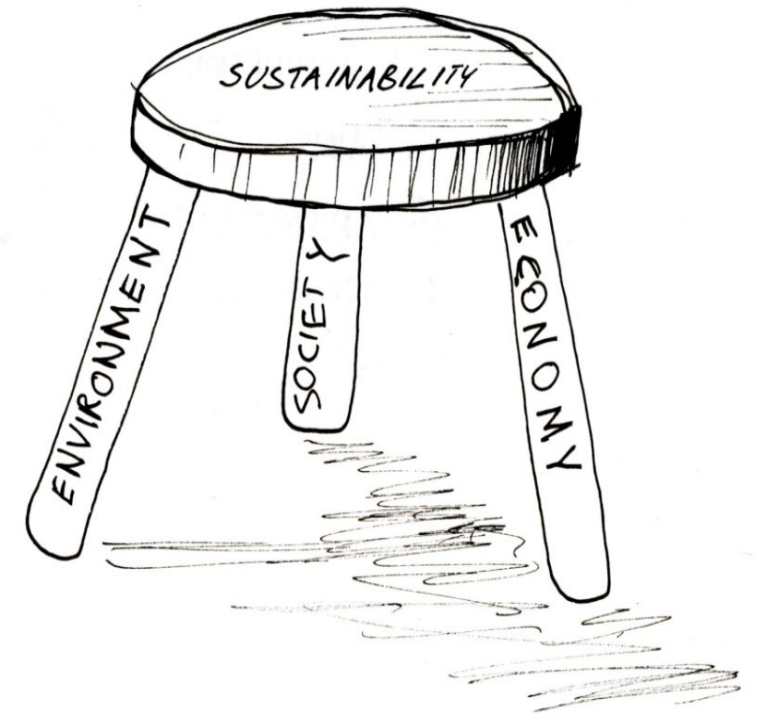
Environmental Sustainability

Sustainability refers to the ability of something to be preserved and maintained over time.

The problem of sustainability arises because of conflicts between **environmental and economic goals**.

Sustainability refers to maintaining the ability of the environment and the economy to continue to produce and satisfy needs and wants of the society in the future.

Sustainability is crucially dependent on preservation of the environment over time.



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Palm oil and Orangutans

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Environmental Sustainability

Fossil fuels are non-renewable resources as they take millions of years to form and accelerating overuse is leading to their rapid depletion.

Economical Concerns

Crop yields are expected to drop significantly in Africa, the Middle East and India

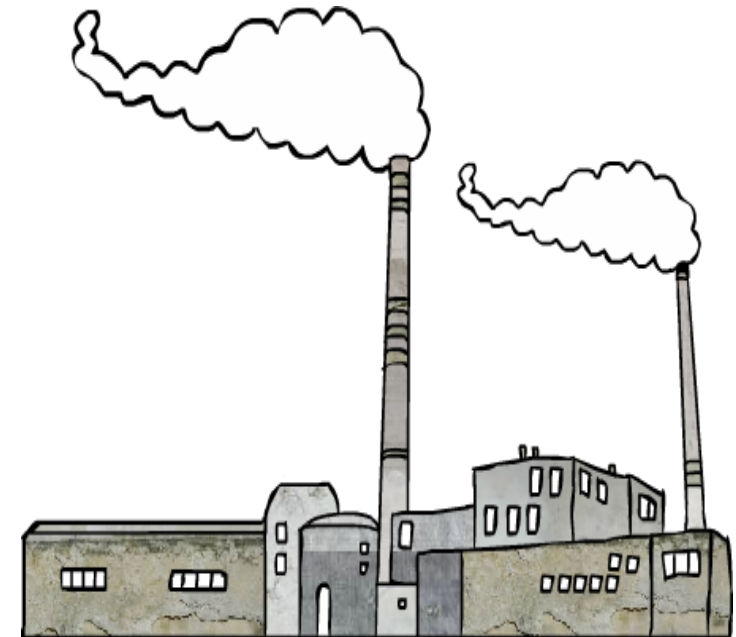
World food prices are increasingly volatile

Environmental Concerns

Temperatures increase and rainfall patterns change

Increase water shortage

Air and water pollution



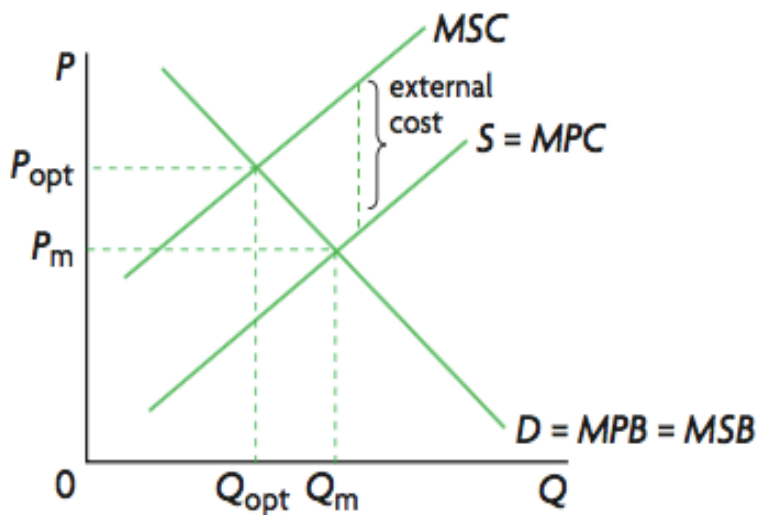
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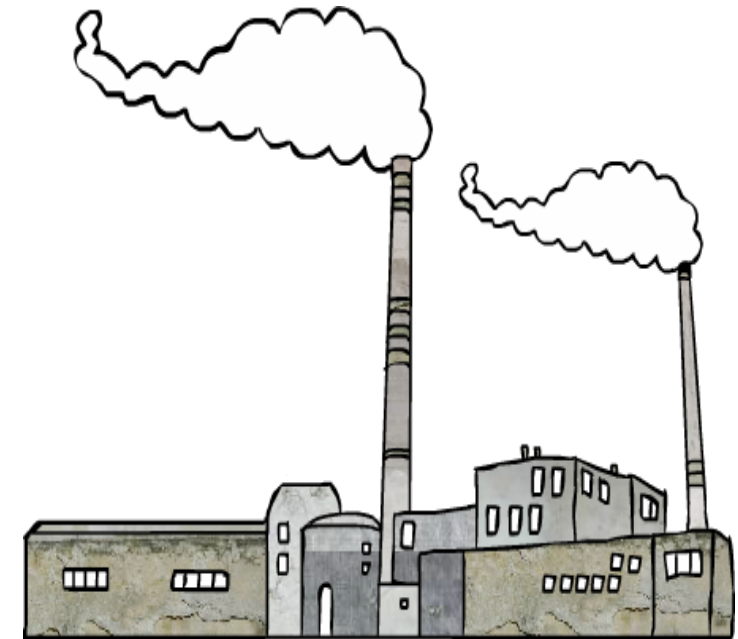
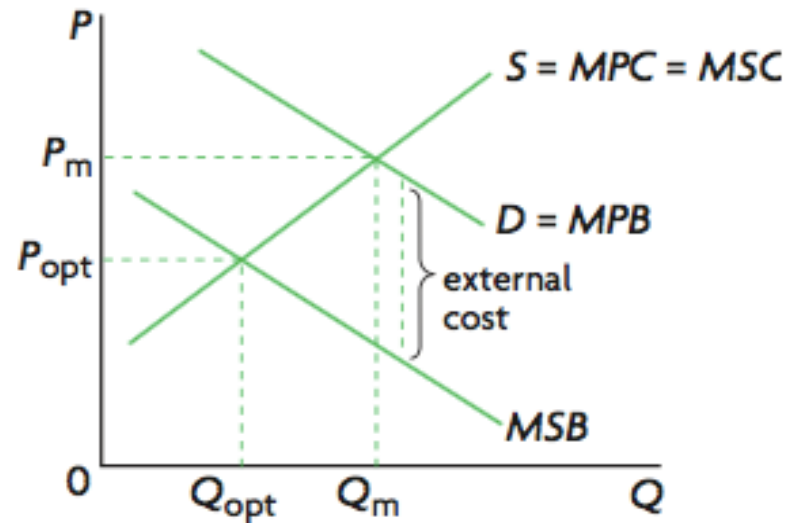
Production

Market for Fossil Fuels



Consumption

Market for Fossil Fuels



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Environmental Sustainability

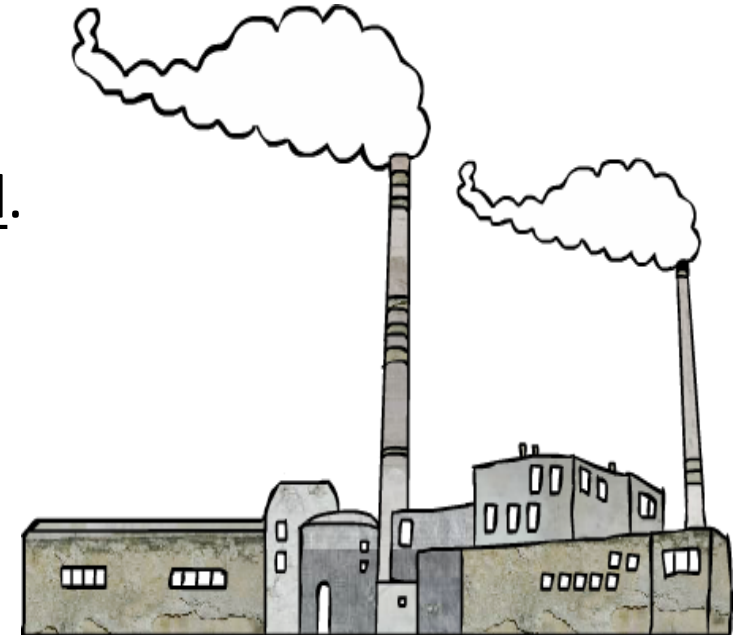
Fossil fuels are non-renewable resources as they take millions of years to form and accelerating overuse is leading to their rapid depletion.

Sustainable resource use does not apply to non-renewable resources like fossil fuels.

They can only be used sustainably only if they were not used at all.

Cleaner sources of energy includes:

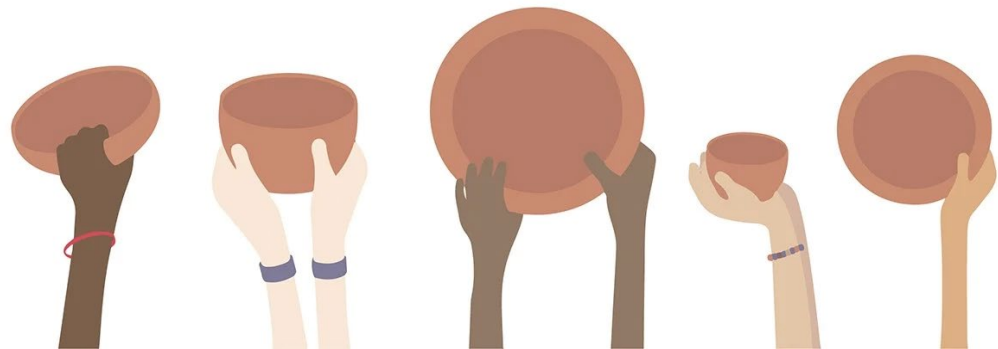
- Wind and solar power
- Hydropower



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Environmental Sustainability

The threat to sustainability lies in the *increased scale of economic activities around the world*, which may be due to economic growth based on the use of fossil fuels; or it may be due to the increasing numbers of very poor people who engage in environmentally destructive activities in an effort to survive.



Why do you think...

Poverty acts as a threat to sustainability?

- Overuse of common access resources – lowers fertility of farmlands
- High birth rates
- High population growth
- Expansion, deforestation, overgrazing and general depletion of resources

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Negative Externalities

Policies

Market-based solutions:

- Indirect (Pigouvian) taxes
- Carbon taxes
- Tradeable permits

These policies work by changing the incentives faced by producers.



2.8 Market Failure – Externalities and Common Pool

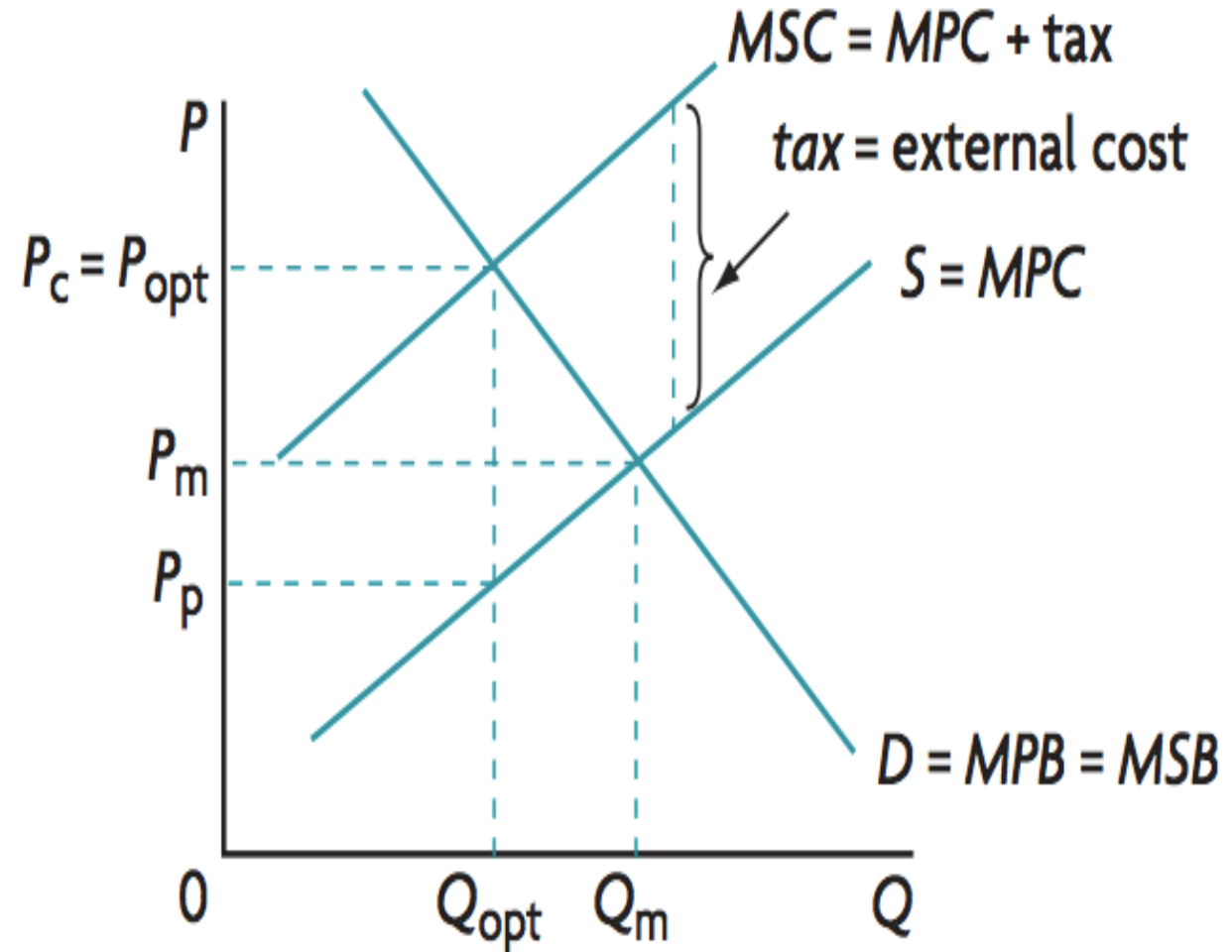
Negative Externalities

Indirect (Pigouvian) Taxes

Taxation can be used where a per-unit tax on a good is imposed to reduce the supply.

This is known as **Pigouvian Tax** after the economist Arthur Pigou who was the first to propose the idea of imposing a tax to correct a **negative externality**.

In this situation, **indirect taxes** are intended to lead to **allocative efficiency**.



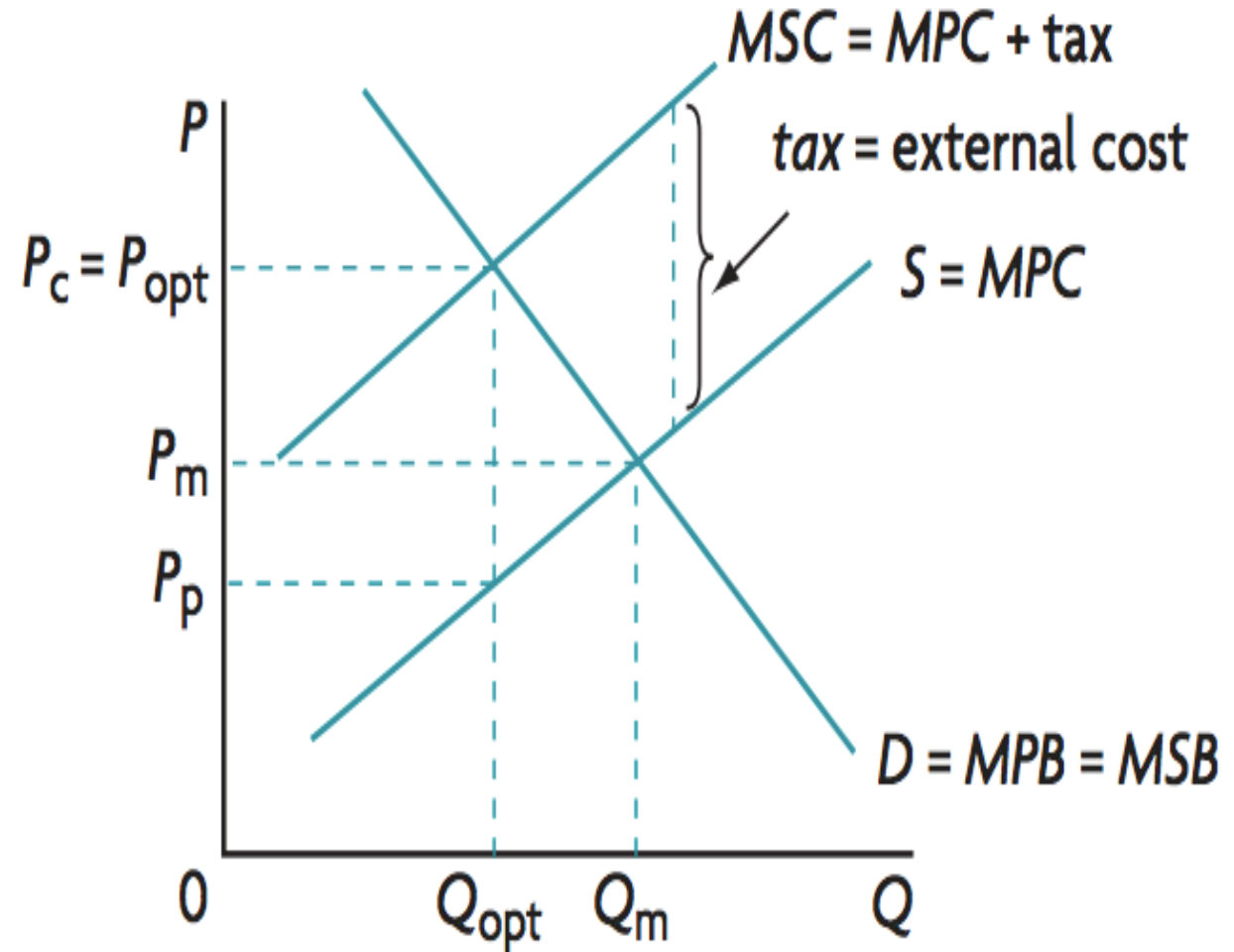
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Negative Externalities

Indirect (Pigouvian) Taxes

- MPC shifts **upwards** towards $MSC = MPC + \text{Tax}$
- Optimal tax policy imposes a tax that is exactly equal to the external cost.
- Market price increases (**P_m to P_{opt}**)
- Market quantity decreases (**Q_m to Q_{opt}**) to the socially optimal quantity

Overproduction is eliminated and
market failure is corrected



2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Gravel Tax in Sweden

The Swedish gravel tax was introduced in July 1996. The rationale for introducing the gravel tax was primarily environmental, with concerns about resource scarcity, water quality and preserving the landscape.

In Sweden, the tax was raised a second time in 2006 to EUR 1.38 (or SEK 13) per tonne

Gravel is regarded as an invaluable resource in Sweden, since it is an important groundwater reservoir material; and in certain parts of Sweden, gravel beds are essential for drinking water supply where natural gravel is used as a filter for purification of drinking or sewage water.

The Geological Survey of Sweden estimated that natural gravel in Sweden, given the 1996 production level, would run out in 40 municipalities within 20 years. Thus, conservation of natural gravel and material substitution to preserve the landscape were the main reasons for introducing the tax.

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Negative Externalities

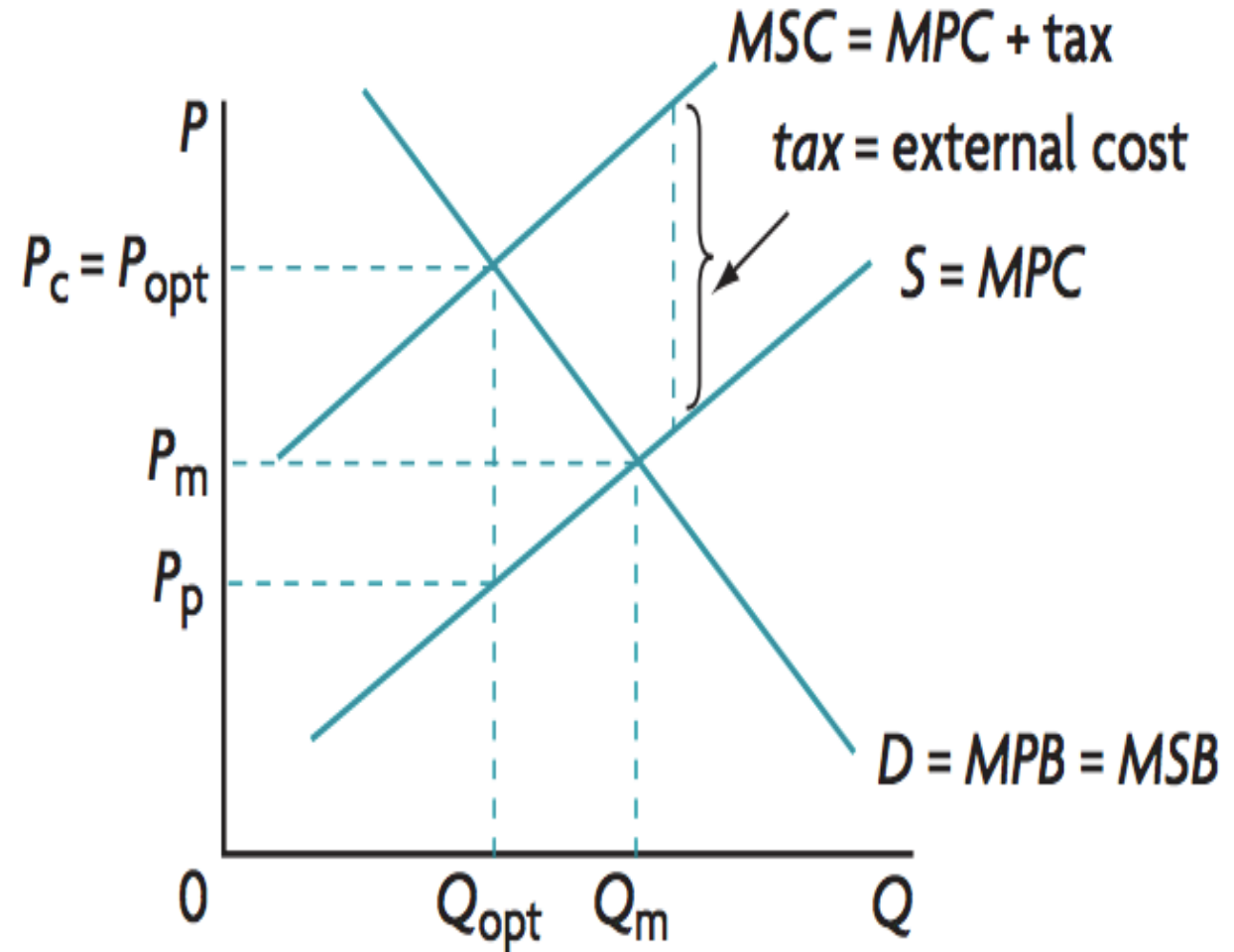
Carbon Tax

The **carbon tax** is a tax per unit of carbon emissions of fossil fuels.

This means that the more carbon emitted by the firm, the higher the tax.

Superior compared to taxes on output.

This has further consequences compared to the indirect (Pigouvian) taxes.

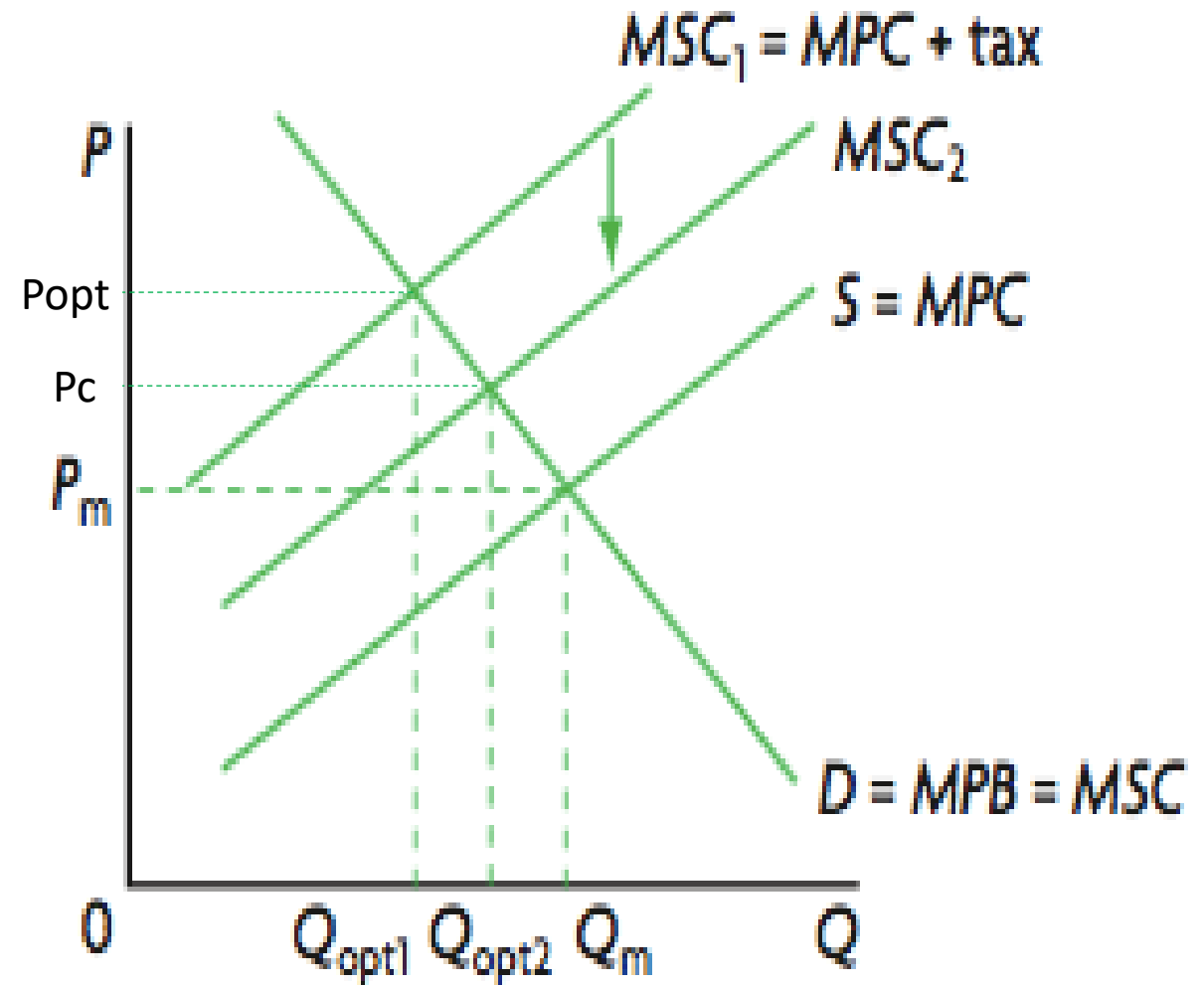


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Negative Externalities

Carbon Tax

- Similar to tax per output where **MPC moves upwards towards MSC**
- Firms switching to alternative (less polluting resource) will reduce external cost by **MSC1 downwards to MSC2**
- Optimum quantity increases from **Qopt1 to Qopt2**



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Negative Externalities

Tradeable Permits

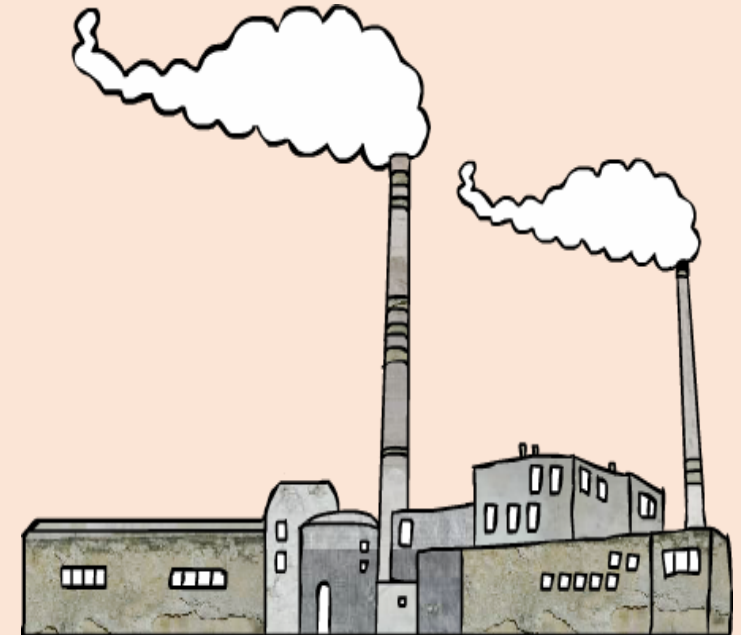
Tradeable permits are a policy involving permits to pollute issued to firms by a government or an international body.

Also known as cap and trade schemes

The government grants each firm a particular number of permits to produce a particular level of pollutants over a given time period.

These permits can be traded in a market (determined by demand and supply).

Less polluting firms can potentially earn by selling their permits.



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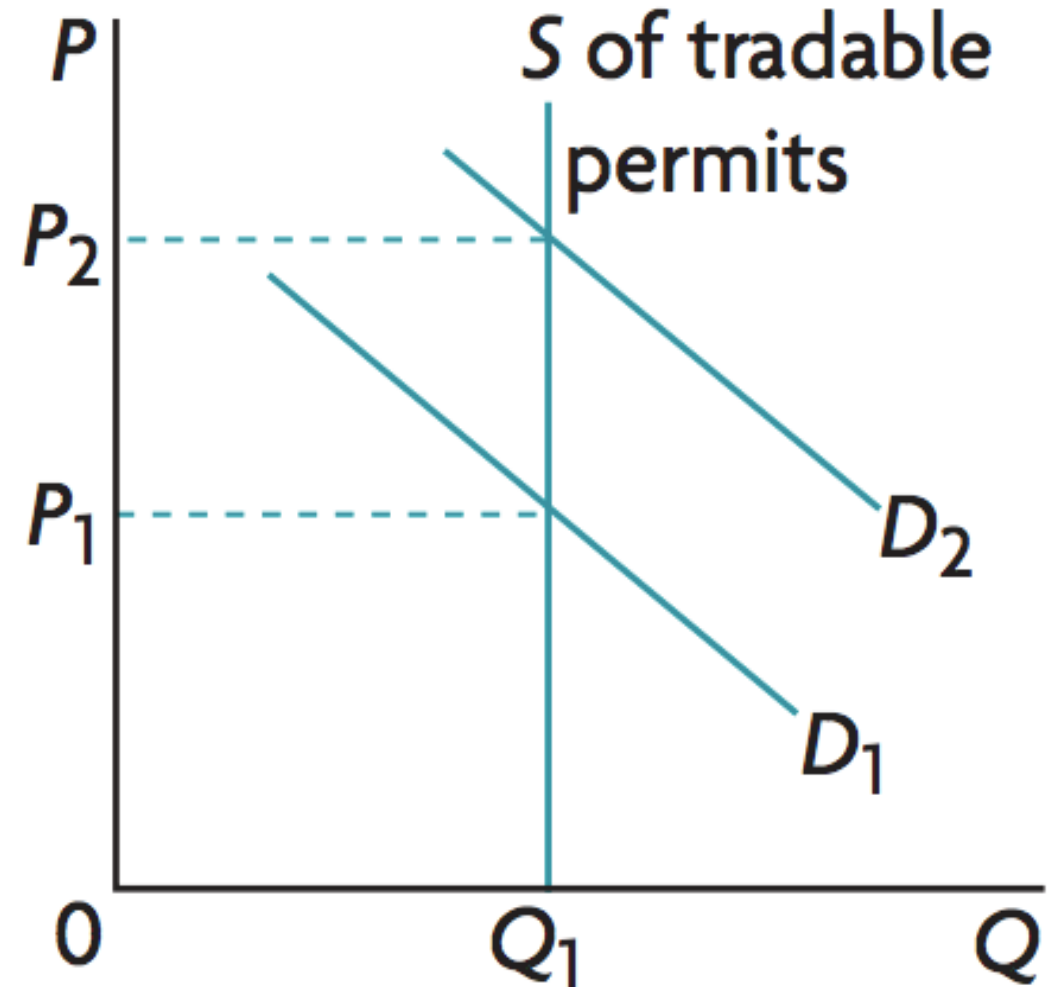
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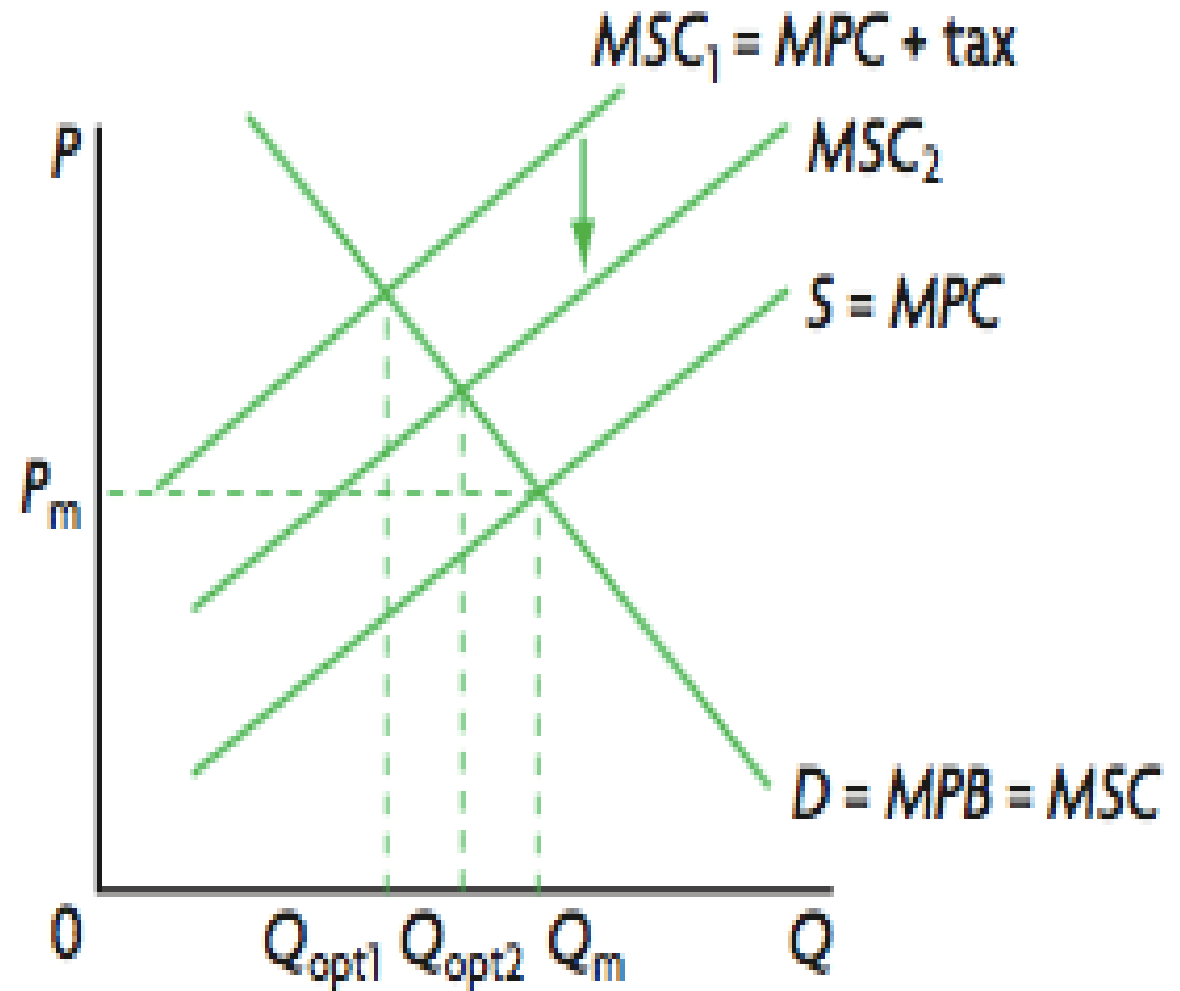
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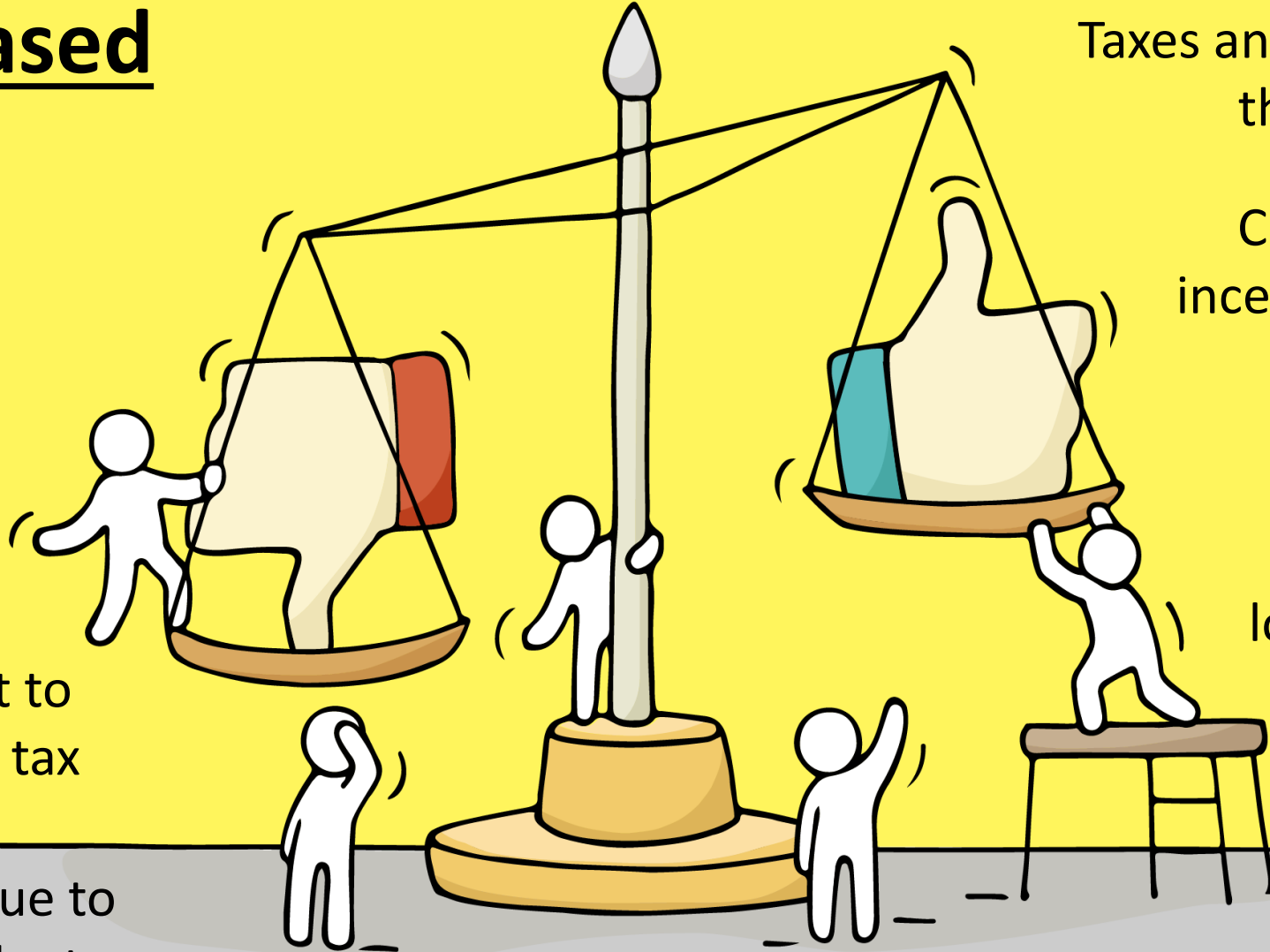
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Market-Based Policies

Difficult to designing a tax equal in value to the amount of the pollution

Politically difficult to set a high carbon tax

Firms may continue to pollute and pay the tax



Taxes and permits *internalises* the costs or externality

Carbon tax provides an incentive to switch to less polluting resource

Carbon tax and permits leads to lower pollution levels *at a lower overall cost to society*

2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Market-Based Policies

An effective tax policy requires answers to the following questions:

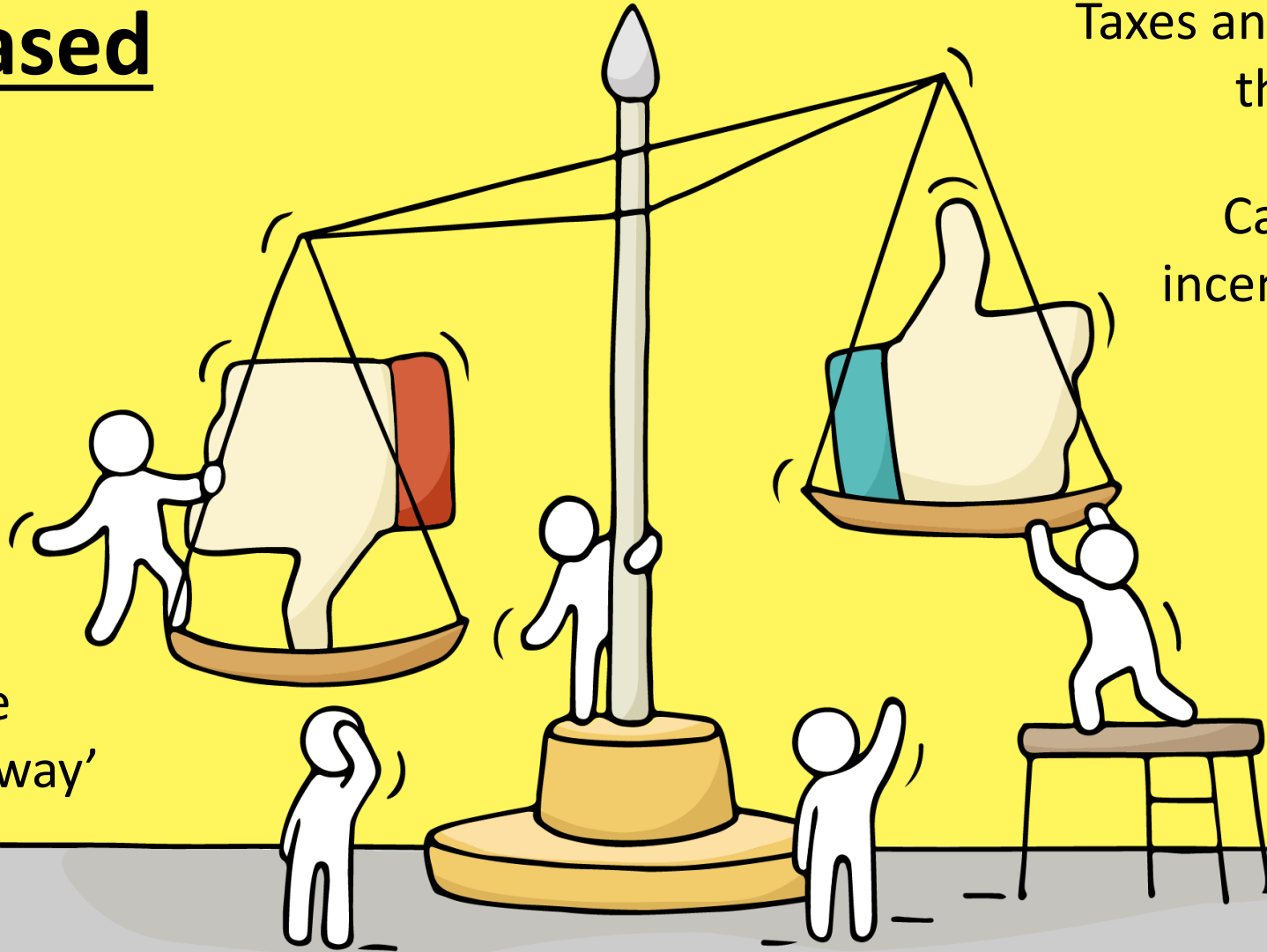
1. What production methods produce pollutants?
2. Which pollutants are harmful?
3. What is the value of the harm?
4. What is the appropriate amount of tax?
5. How will consumers be affected?

2.8 Market Failure – Externalities and Common Pool

Market-Based Policies

Difficult to set a maximum acceptable level for each type of pollutant

Hard to distribute permits in a 'fair way'



Taxes and permits *internalises* the costs or externality

Carbon tax provides an incentive to switch to less polluting resource

Taxation leads to lower pollution levels *at a lower overall cost to society*

2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Policies

- Legislation and regulation
- Collective self-governance
- Education and awareness creation
- International agreements



2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Legislation and regulation

To reduce production externalities, the following policies might be used:

- Emissions standards
- Quotas
- Licences and permits
- Outright restrictions

Examples includes:

- Restrictions on emissions of pollutants from factories and industrial production by setting a maximum level of pollutants permitted.
- Requirements for steel mills and electricity generating plants to install smokestack scrubbers to reduce emissions.
- Banning the use of harmful substances
- Issuing licences or permits for particular activities (such as hunting)

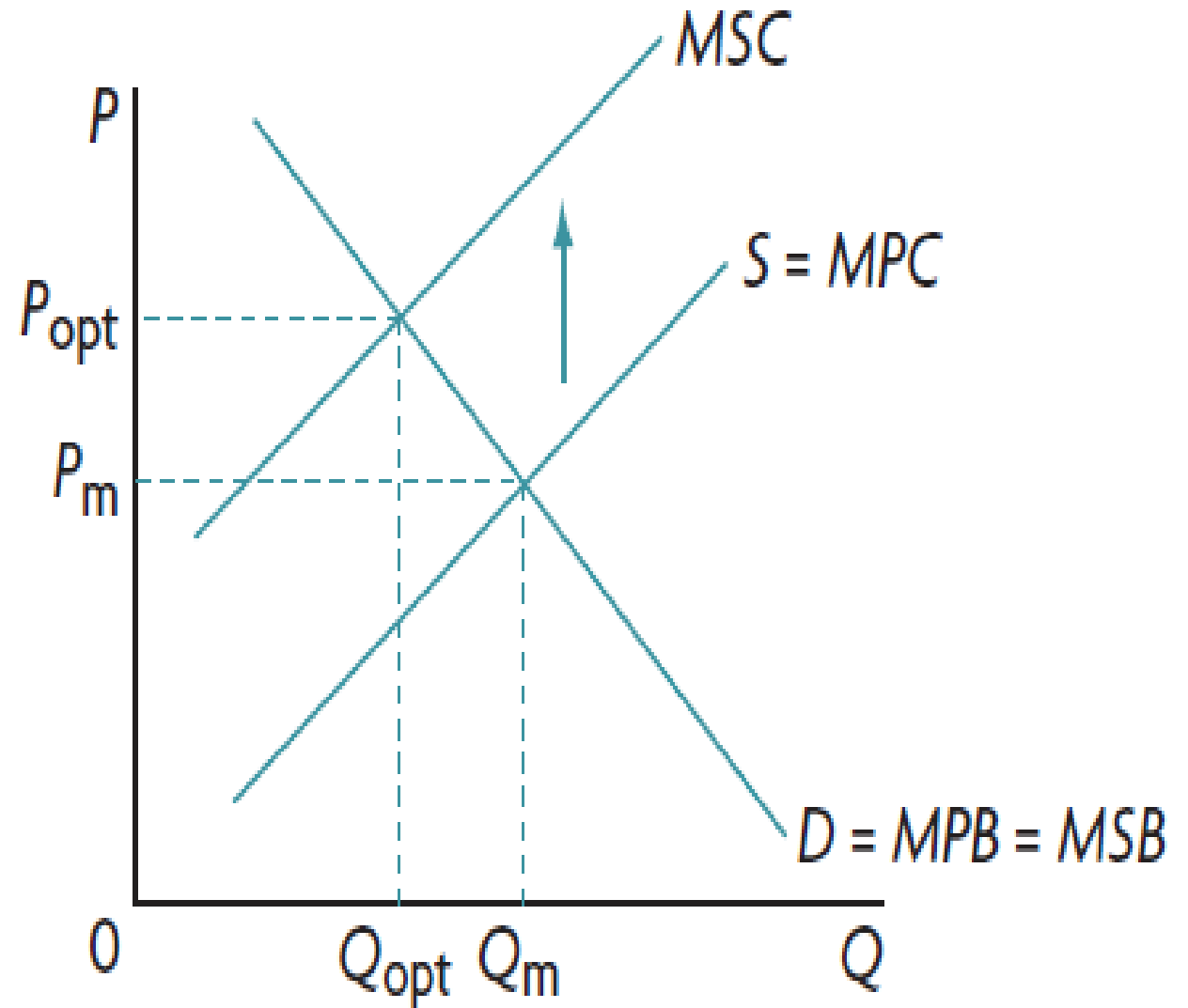
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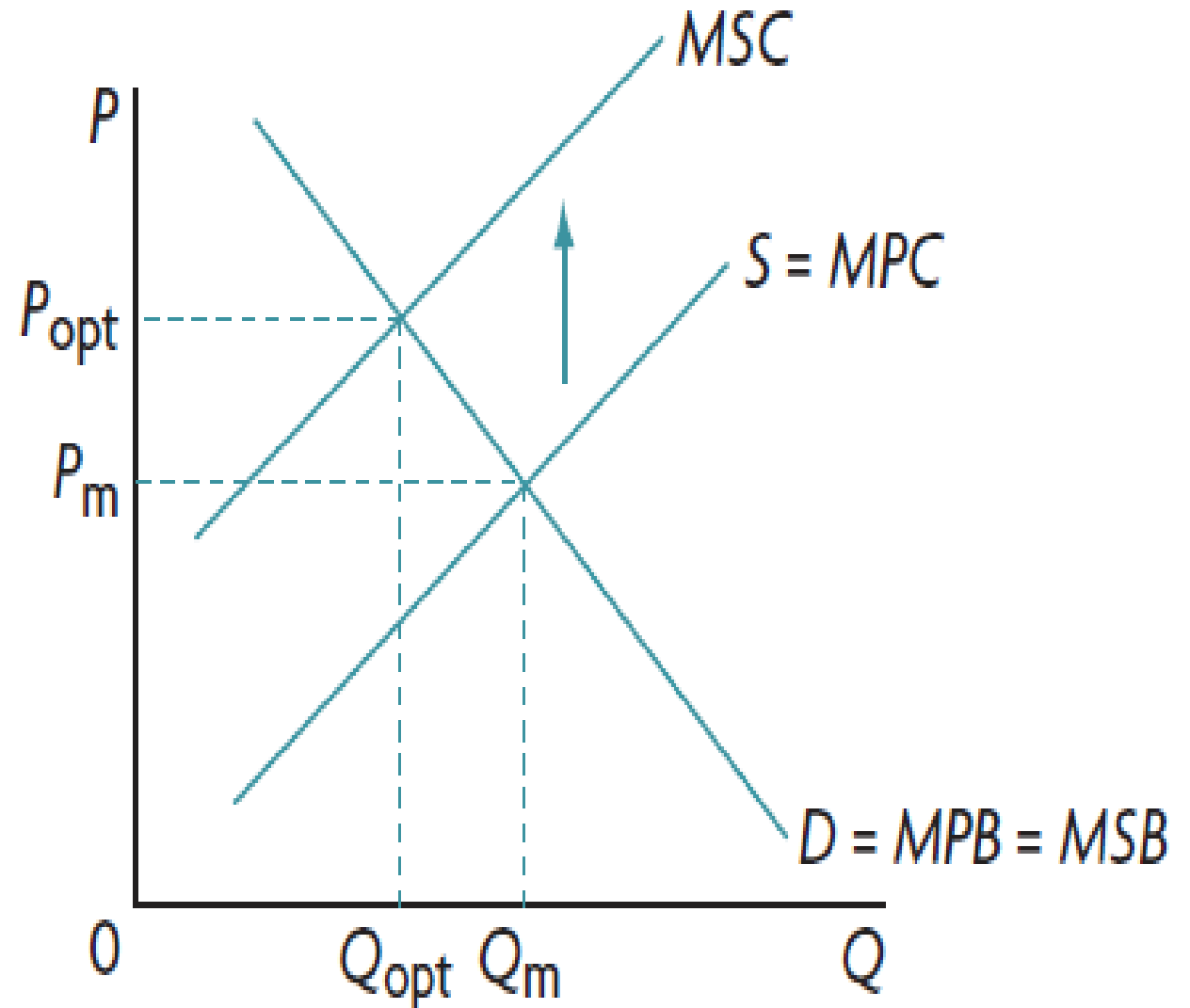
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Negative Externalities

Legislation and regulation

- Policies impose higher costs of production which will shift **MPC upwards towards MSC**.
- Quantity reduces from **Q_m to Q_{opt}**
- Price increases from **P_m to P_{opt}**

Overproduction is eliminated and
market failure is corrected



2.8 Market Failure – Externalities and Common Pool

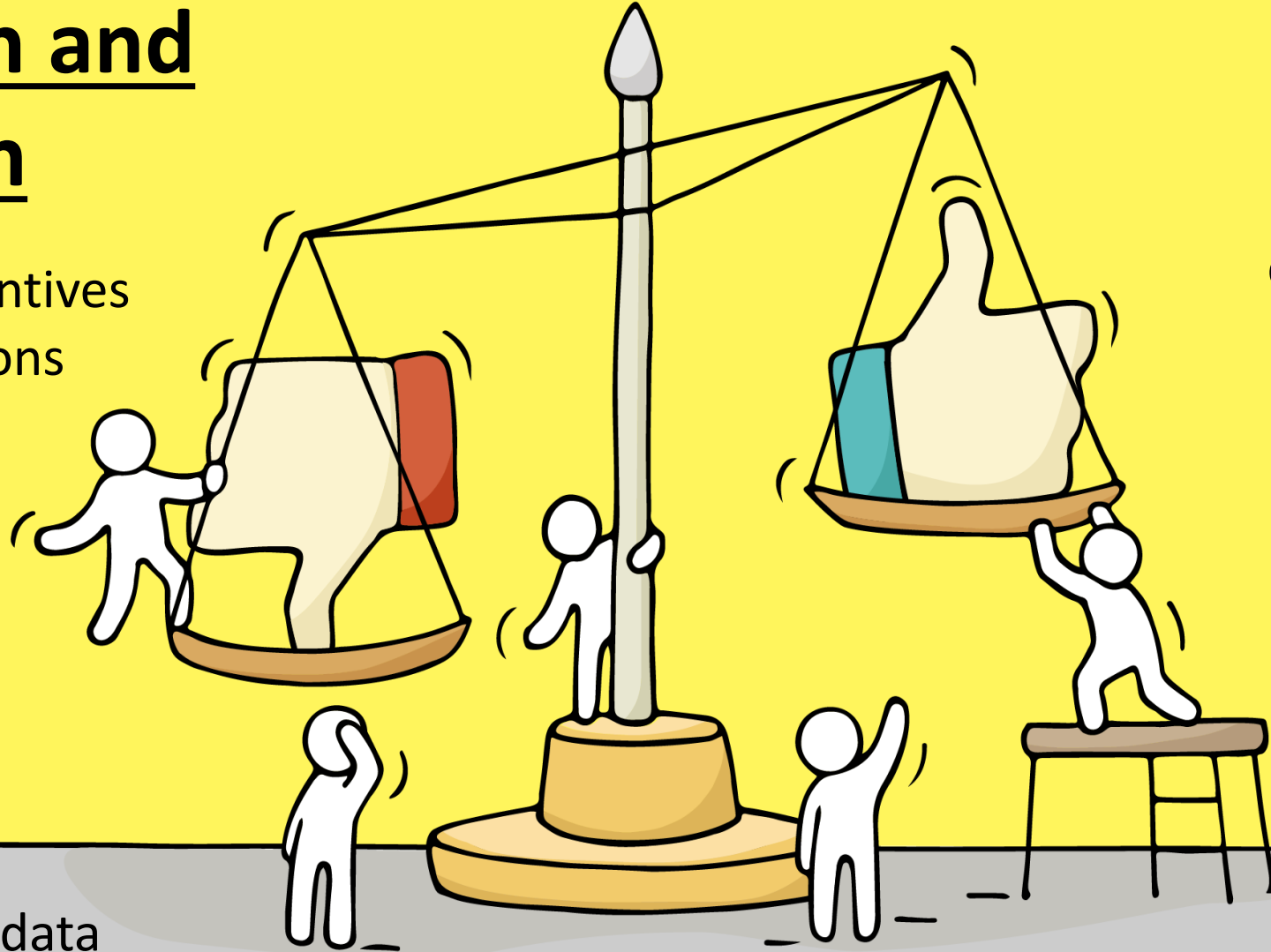
Legislation and Regulation

Do not offer incentives to reduce emissions

Pollution may be reduced at a *higher overall cost*

Monitoring costs

Lack of technical data



Simple to put into effect and oversee

Easier to implement compared to market-based policies

Can be effective

Force firms to comply and reduce harmful activities

2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Collective Self-governance

Collective self-governance refers to a solution to the use of common pool resources where the users take control of the resources and use them in a sustainable way.

- Runs counter to the idea of the **tragedy of the commons**
- An approach to manage resources undertaken by communities of resource users by themselves rather than the government.
- Users are often able to find solutions on how to manage it sustainably provided there is good communication between them.

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Negative Externalities

Collective Self-governance

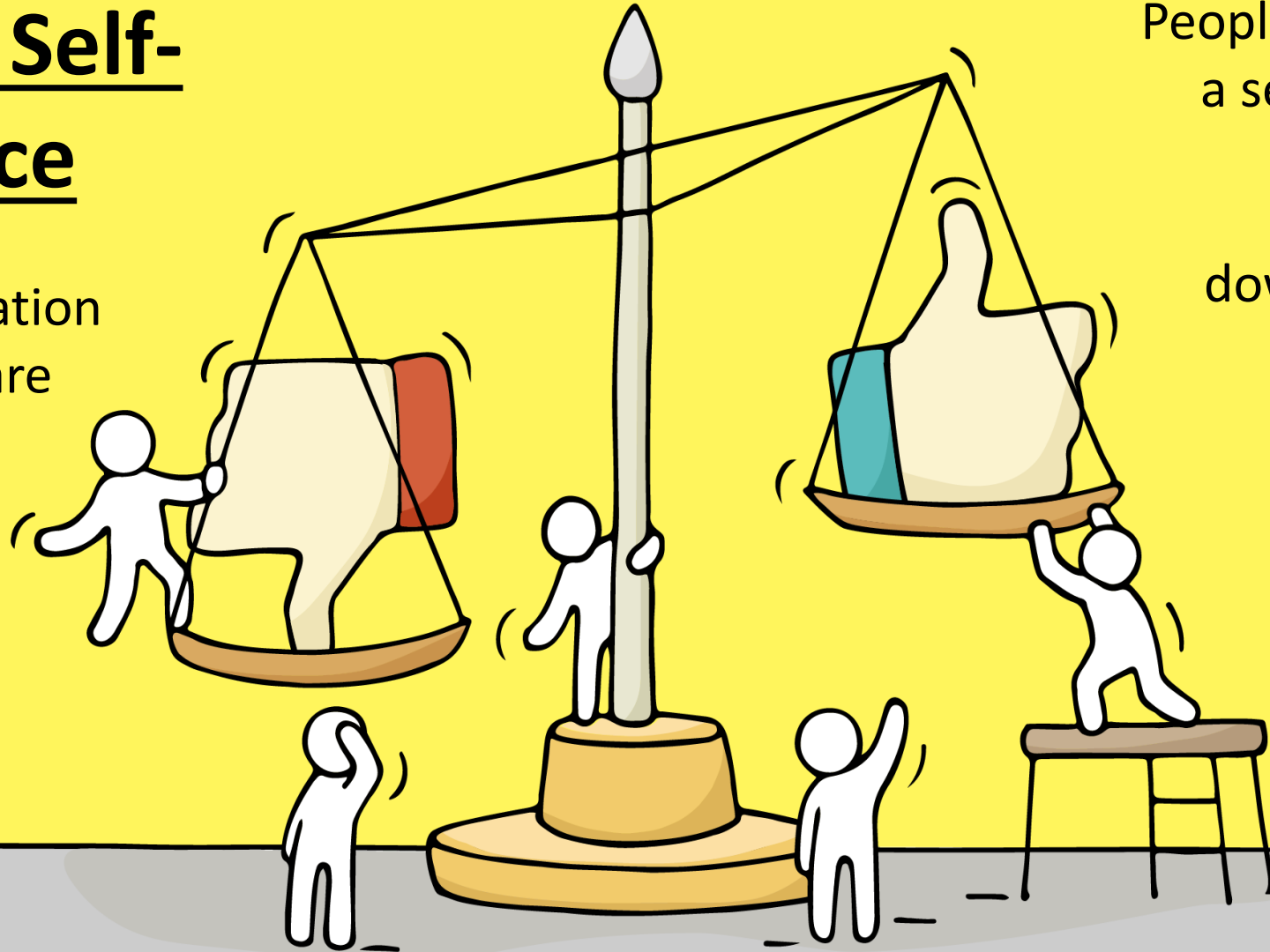
Collective self-governance refers to a solution to the use of common pool resources where the users take control of the resources and use them in a sustainable way.

- Requires boundaries of an area corresponding to the area users are managing.
- May not be suitable for dealing with global problems - e.g. oceans and climate change.
- Important to have a legal system of land rights in place

2.8 Market Failure – Externalities and Common Pool

Collective Self-Governance

Good communication and boundaries are difficult to put in place in reality



People do not always act in a self-interested manner

Do not require top-down solutions imposed by the government

Works in absence of private ownership or government owned resources

2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Policies

- Legislation and regulation
- Collective self-governance
- **Education and awareness creation**
- International agreements



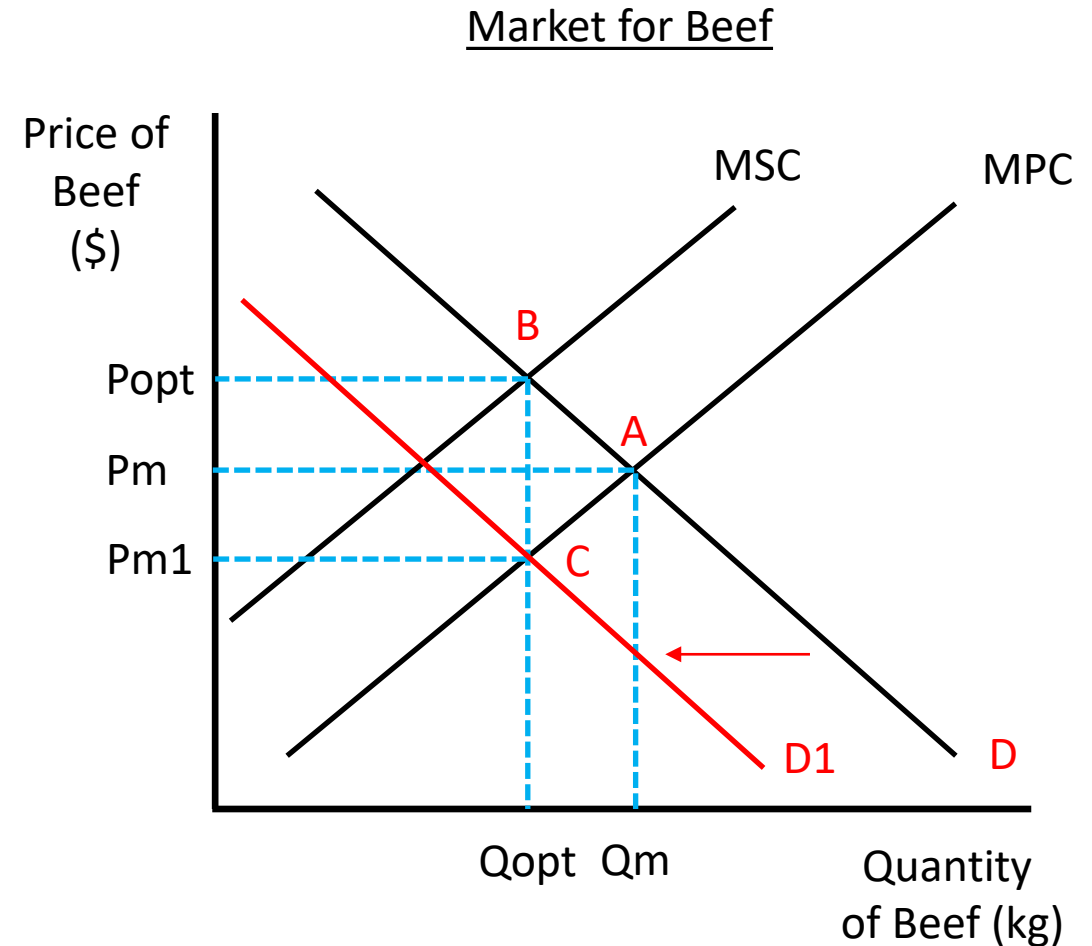
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Negative Externalities

Education and awareness creation

- Demand shifts inwards (**D to D1**)
- Market price falls (**P_{opt} to P_{m1}**)
- Market quantity decreases (**Q_m to Q_{opt}**) to the socially optimal quantity

Overproduction is eliminated and
market failure is corrected



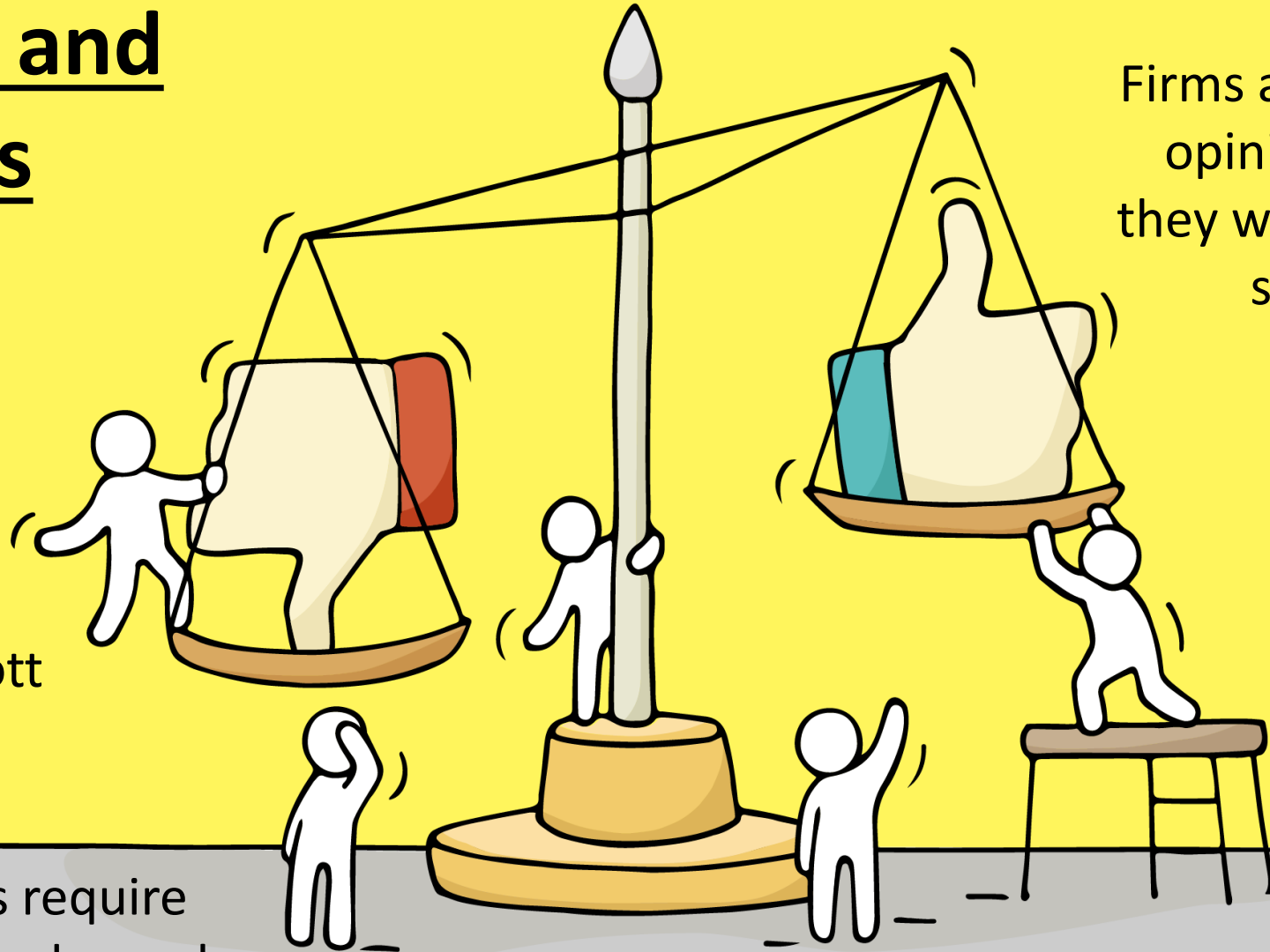
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Education and Awareness

Can only make a small difference

Effect may be short-term as consumers boycott only for awhile

Broader problems require solutions on a broader scale



Firms are influenced by the opinions of consumers as they want to maintain their sales and profits level

2.8 Market Failure – Externalities and Common Pool

Negative Externalities

International Agreements

Co-operation among governments is crucially important as a method of controlling and preventing negative consequences on certain resources.

Examples of international collaboration for the environment:

- **Montreal Protocol 1987:** Phase out substances that deplete ozone layer
- **Kyoto Protocol 2005:** Reduce emissions of CO₂ and greenhouse gasses
- **European Union Emissions Trading System:** Tradable permits

2.8 Market Failure – Externalities and Common Pool

Environmental Sustainability

Case Study: Indonesia Live Reef Fish Trade

1. To what extent is Indonesia live reef fish a “common pool resource”?
2. Define externality.
List two examples of externality associated with current live reef fish trade practices.
3. Suggest one method of government response to address the use of cyanide in live reef fishing. Use a diagram to illustrate the impact of this type of government intervention.
4. What are some limitations of the government response suggested in Q4?

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Negative Externalities

Negative externalities of consumption refer to external costs created by consumers.

Vehicle pollution

Household waste

Traffic congestion

Gambling addition



Negative externalities of production refer to external costs created by producers.

Air pollution from factories

Industrial waste

Noise pollution

Collapsing fish stocks

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Negative Externalities

Demerit goods are products where $\text{MSB} < \text{MPB}$ upon consumption.

Alcohol Consumers (MPB)

- + Satisfaction
- + Entertainment
- Injuries
- Diseases

Society (MSB)

Non-Alcoholic Consumers (Third Parties)

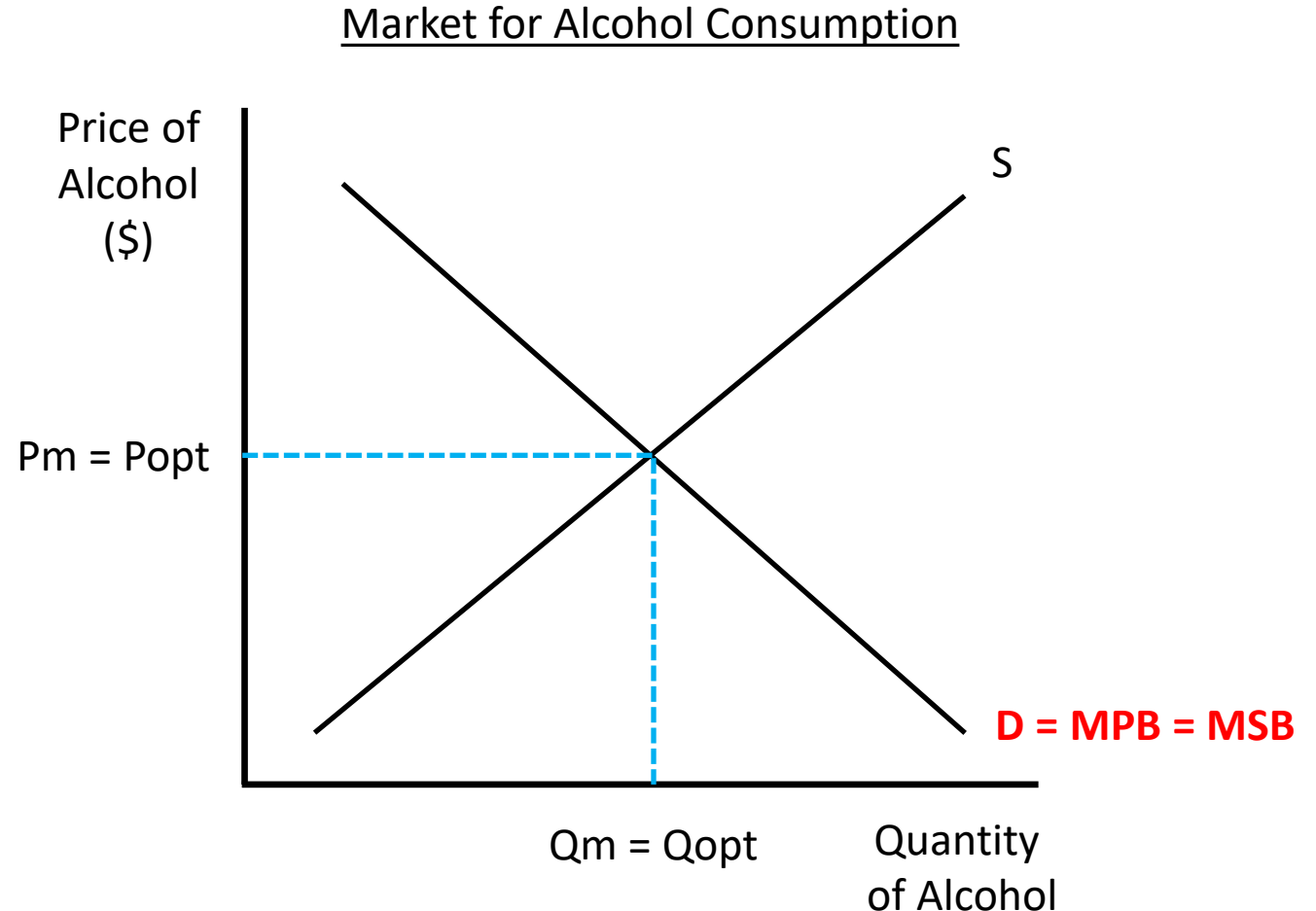
- Increased resources allocated from the police, hospital and emergency services.
- Accidents from DUIs
- Increased domestic violence
- Increased absenteeism
- Lower labour productivity

2.8 Market Failure – Externalities and Common Pool

Market Efficiency

Diagram

If there were no externalities, the private benefits and social benefits from consumption should be equal - i.e. **$MSB = MPB = D$**



2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Consumption of Alcohol

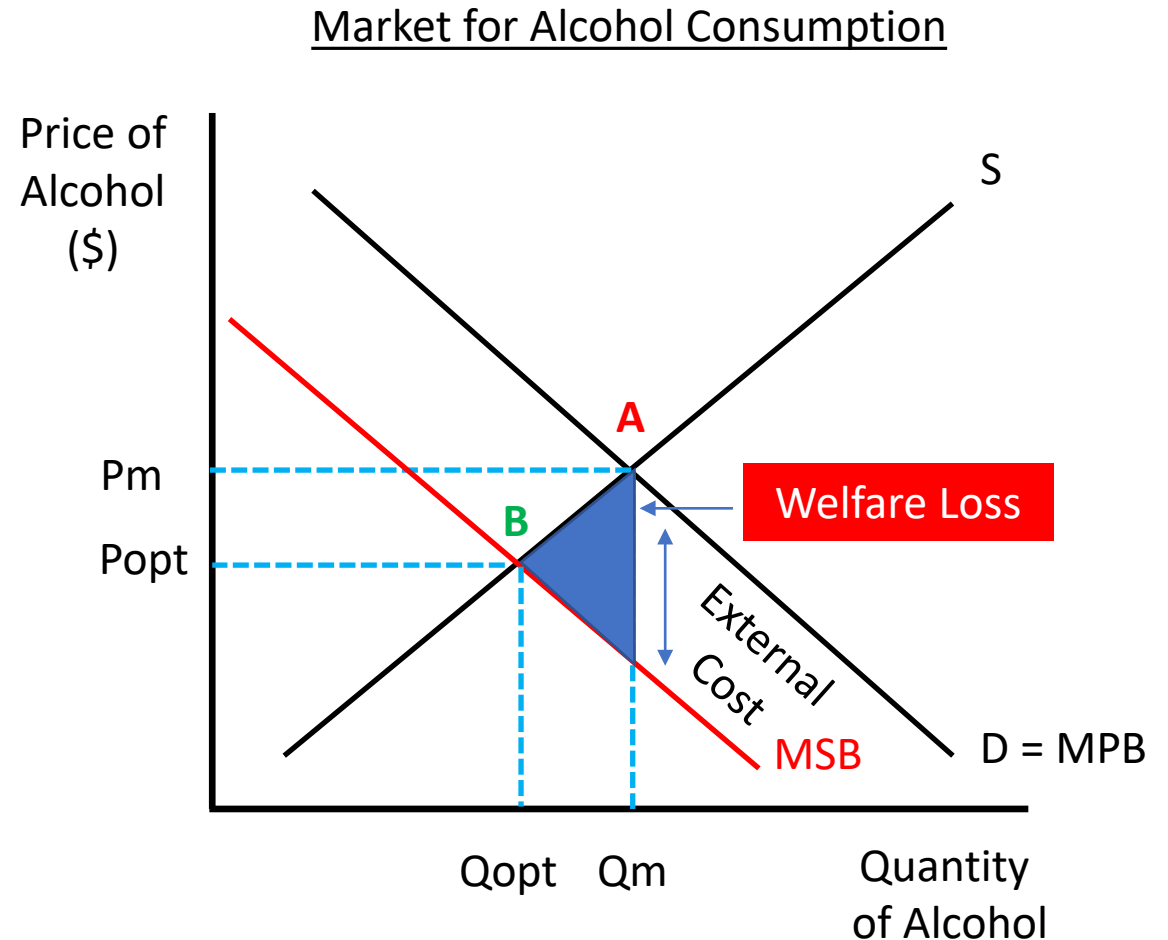
Negative externalities of consumption occur when $MSC > MSB$ upon consumption.

MPB = Market Demand

MSB = Socially Optimal Market Demand

Welfare loss always lies at Q_{opt}

Goods are overconsumed by $Q_m - Q_{opt}$



2.8 Market Failure – Externalities and Common Pool

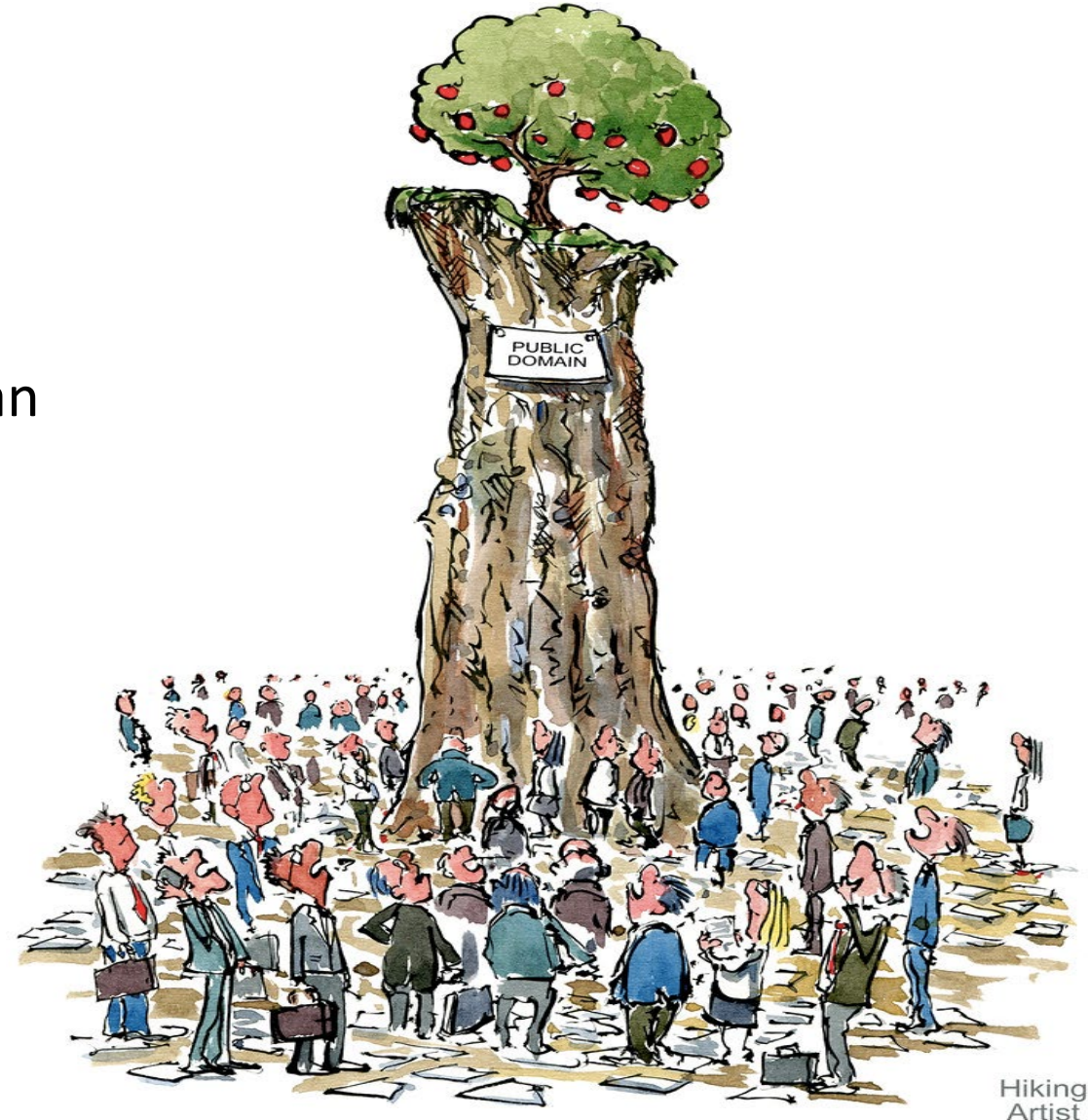
Negative Externalities

Overuse of common pool resources

This relates more to negative production rather than **consumption externalities**.

However, overuse clean air from the following activities may result in consumption externalities:

- Heating oil
- Use of cars (run gasoline)
- Air travel



2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Policies

- Indirect (Pigouvian) taxes
(Market-based policies)
- Legislation and regulation
- Education and awareness creation
- Nudges



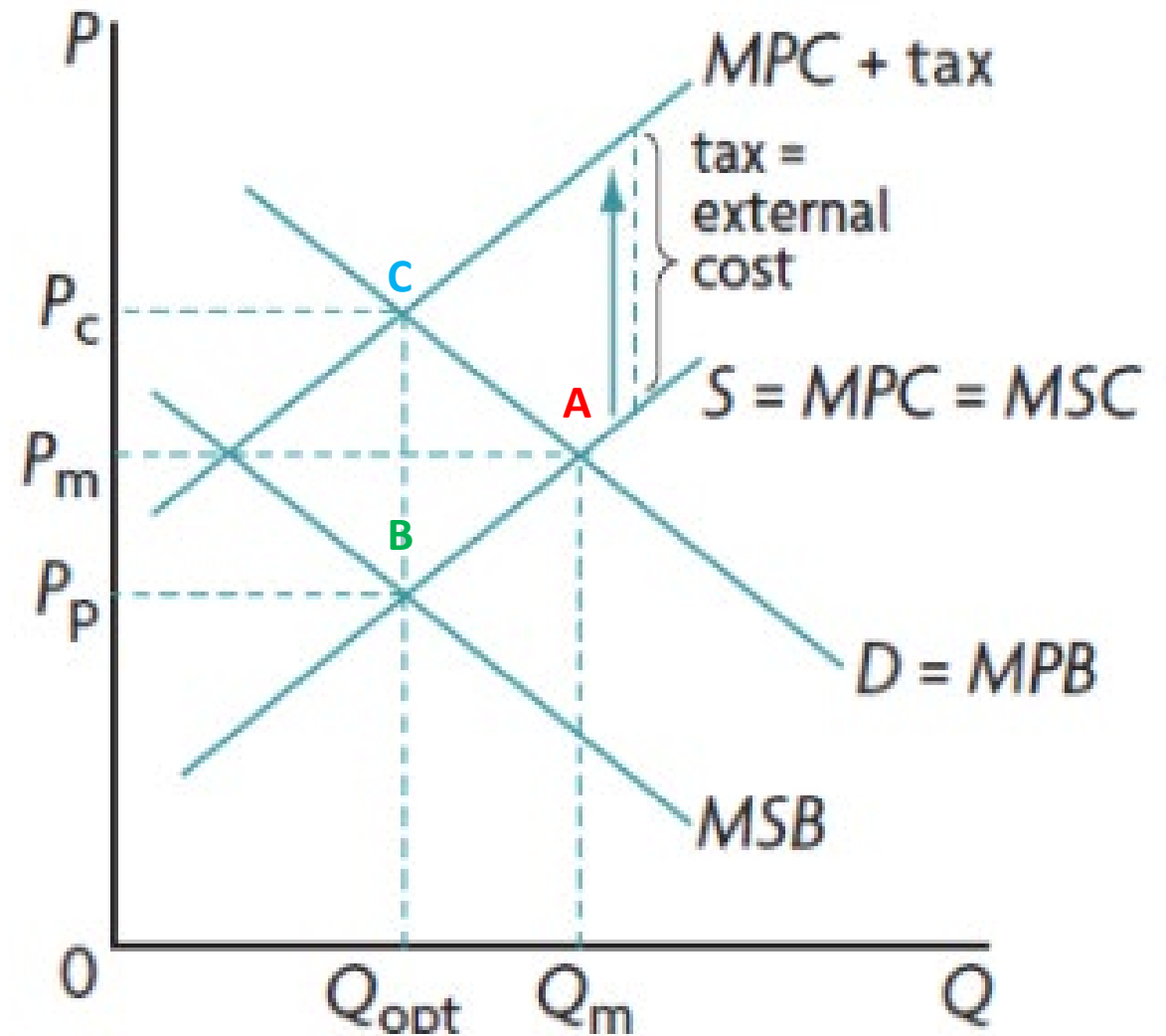
2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Indirect (Pigouvian) Taxes

- Supply shifts **inwards** from **S** to **S + Tax**
- Market equilibrium moves from **A** to **C**
- Market price increases (**P_m** to **P_c**)
- Market quantity decreases (**Q_m** to **Q_{opt}**) to the socially optimal quantity

Overconsumption of alcohol is eliminated and
market failure is corrected

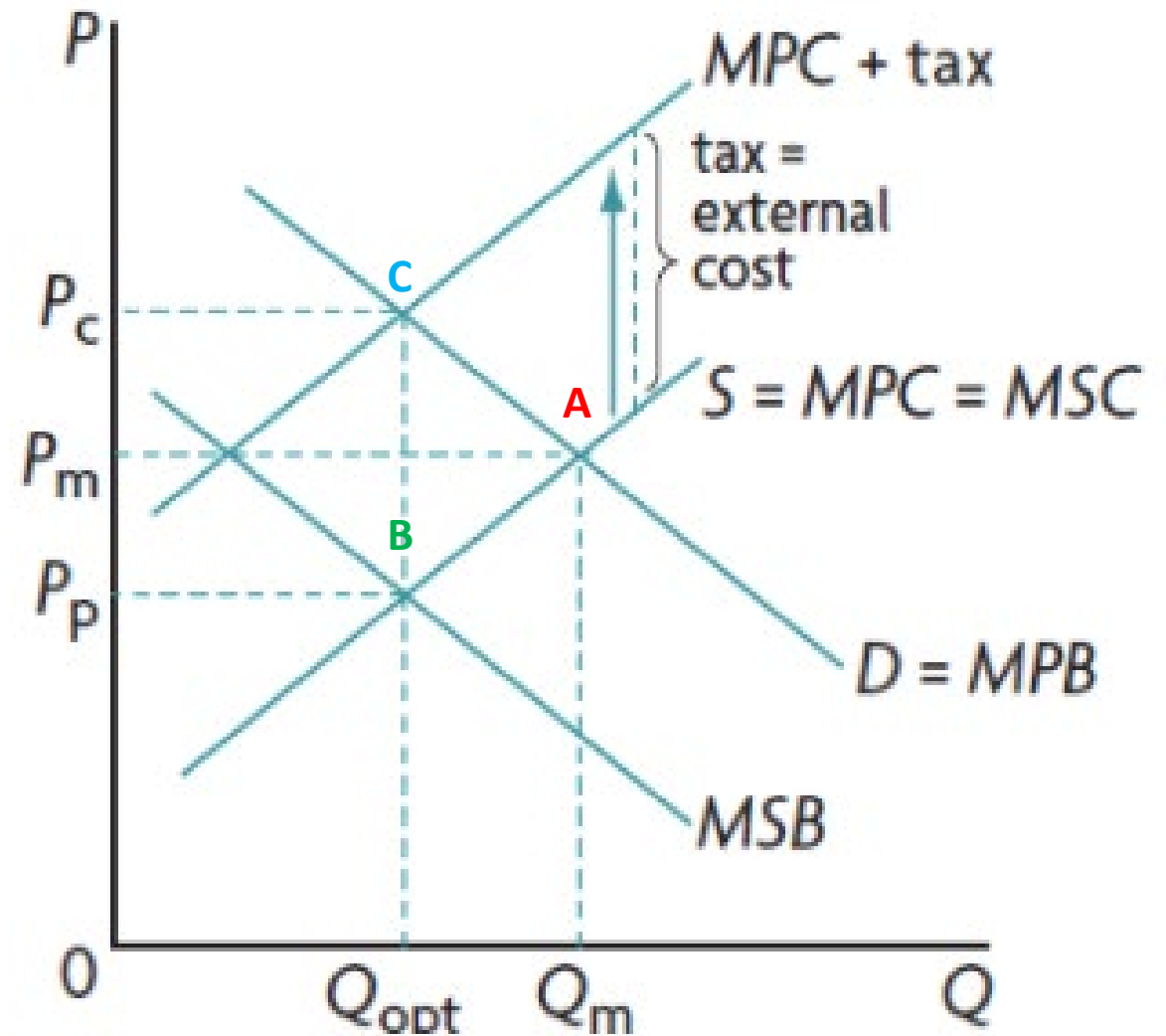
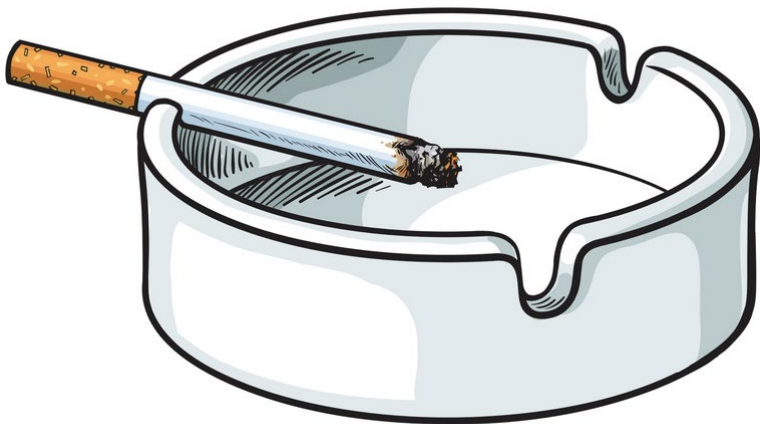


2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Indirect (Pigouvian) Taxes

Real world example: In Hong Kong taxes \$1,906 for every 1000 cigarettes or \$38.12 per pack of 20 cigarettes.



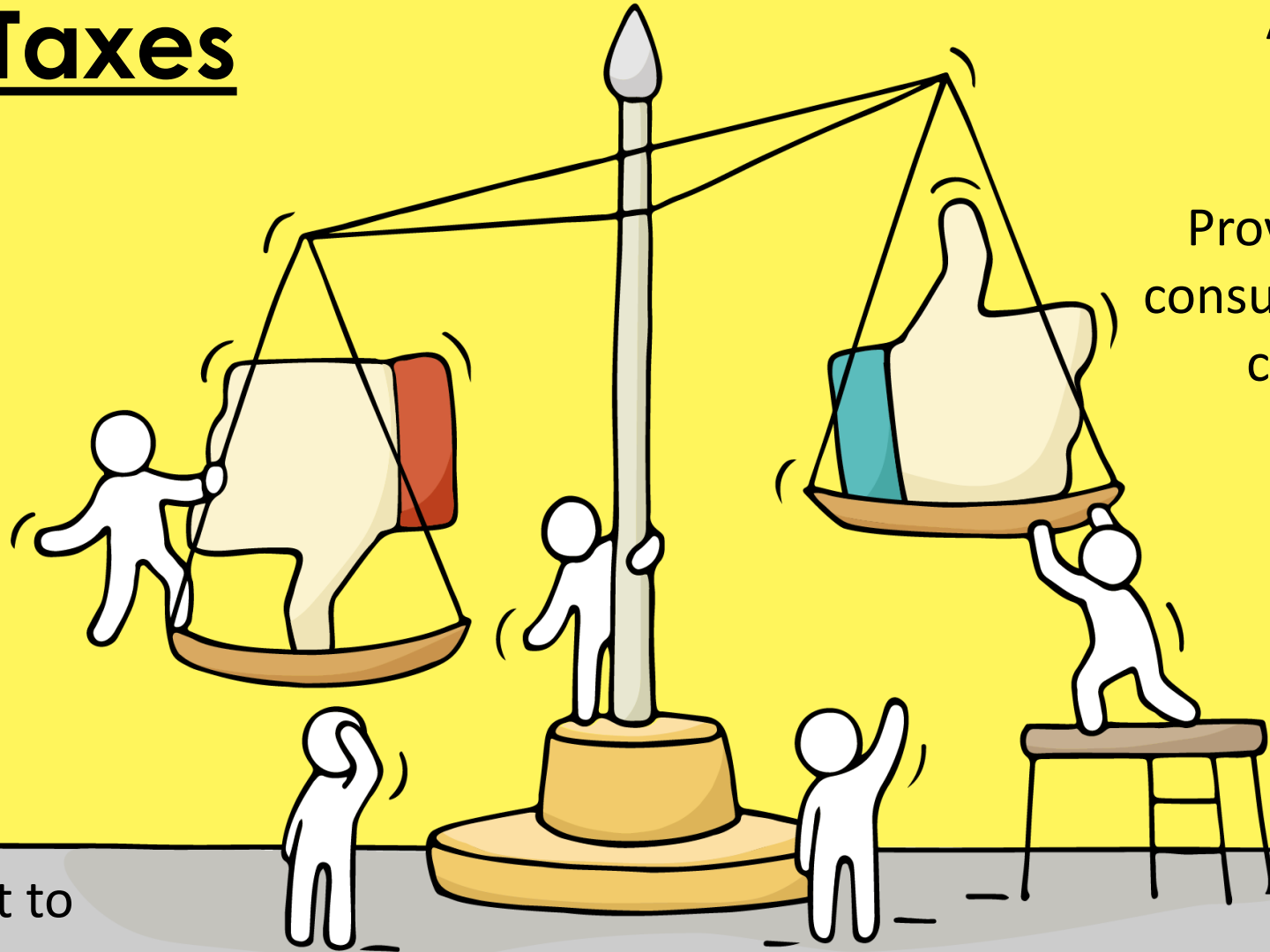
2.8 Market Failure – Externalities and Common Pool

Indirect Taxes

Difficult to designing a tax equal in value to the amount of the external cost

Demand of demerit goods tend to be price inelastic

Politically difficult to set a high tax



Allows the externality to be internalised

Provides an incentive for consumers to change their consumption patterns

Can help to raise government revenue to fund education programme

2.8 Market Failure – Externalities and Common Pool

Hawaii may increase legal smoking age to 100

🕒 5 February 2019

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Hawaii could raise the legal smoking age to 100, effectively banning cigarettes for the vast majority of people in the state.

www.bbc.co.uk

“In a new bill, proposed by Democrat Richard Creagan, the smoking age would increase rapidly between 2020 and 2024.

It will need to pass through the state legislature and weather a potentially strong backlash from tobacco companies in order to become state law.

E-cigarettes, chewing tobacco and cigars are not included in the bill. Dr Creagan, who was an emergency room physician before he was elected as state representative in 2014, calls the cigarette “the deadliest artefact in human history” in the bill.

In January 2017, Hawaii became the first US state to raise its smoking age to 21. In other US states the legal age is usually 18 or 19”.

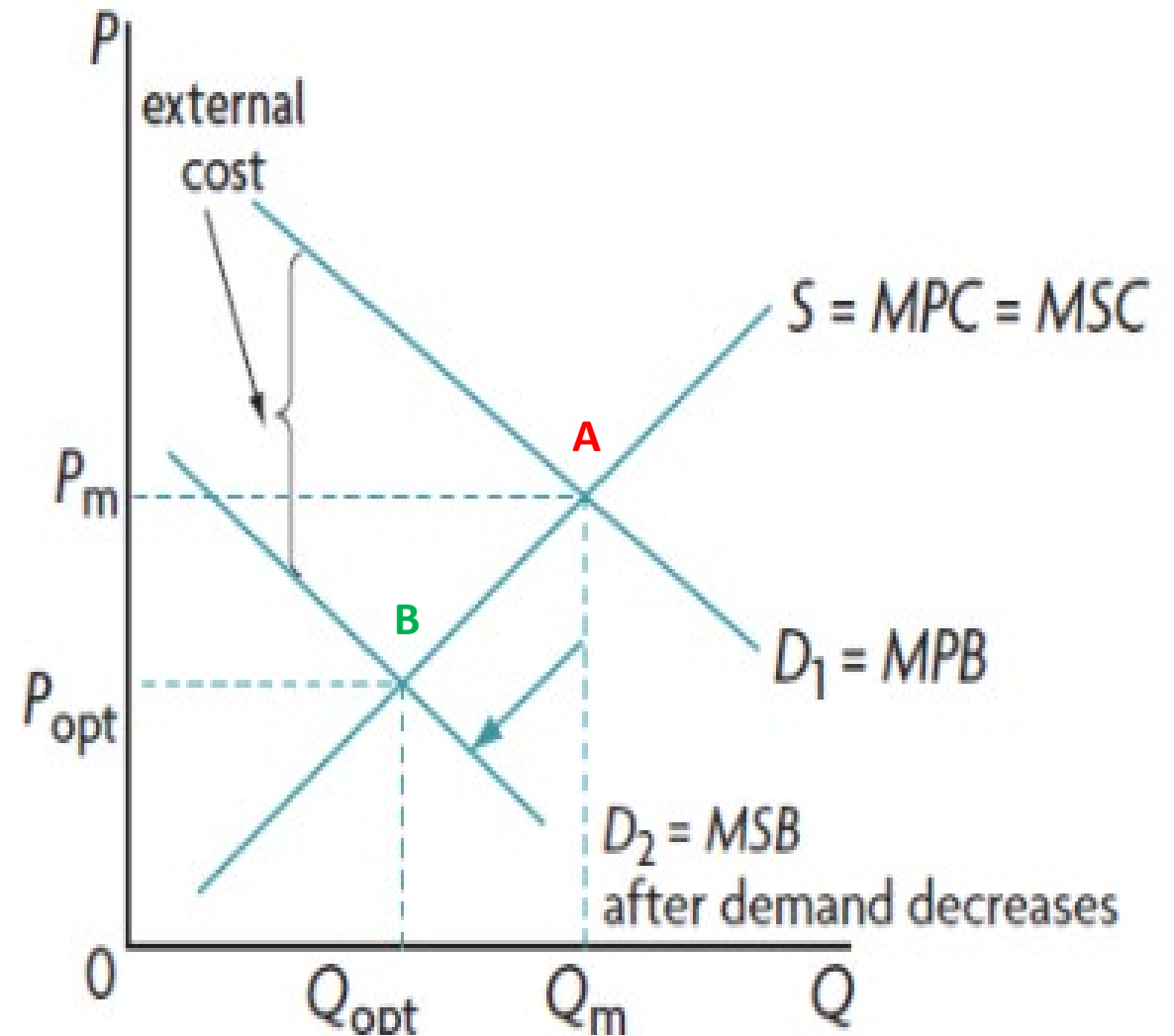
2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Legislation and regulation

The government can **impose legislation** to reduce the demand for alcohol and cigarettes such as increasing the minimum age for purchasing and consuming.

- Demand shifts inwards from **MPB to MSB**
- The market equilibrium moves from **A to B**



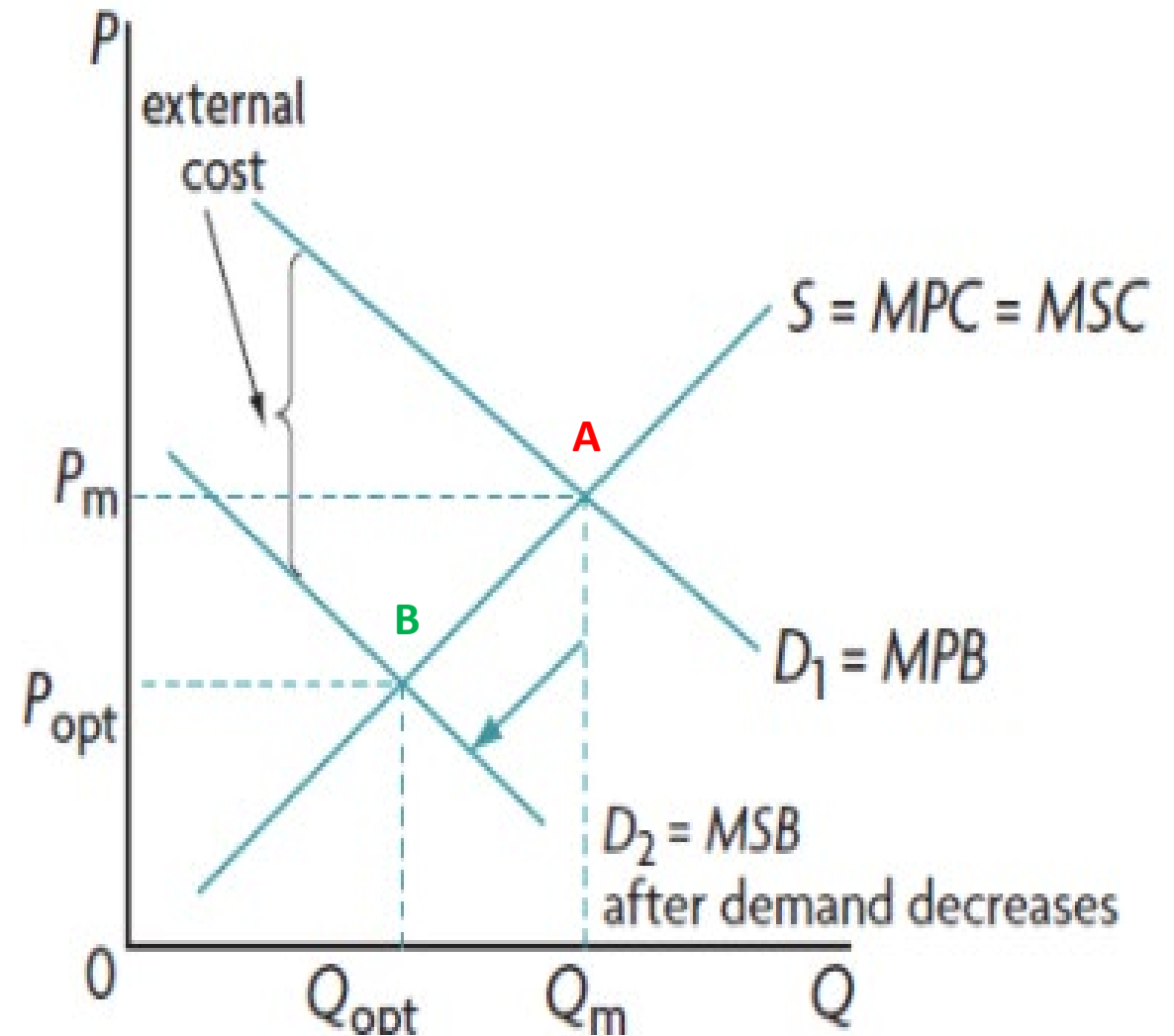
2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Legislation and regulation

- Market price decreases (**P_m to P_{opt}**)
- Market quantity decreases (**Q_m to Q_{opt}**) to the socially optimal quantity

Overconsumption of alcohol and cigarettes are eliminated and market failure is corrected



2.8 Market Failure – Externalities and Common Pool

Legislation and Regulation

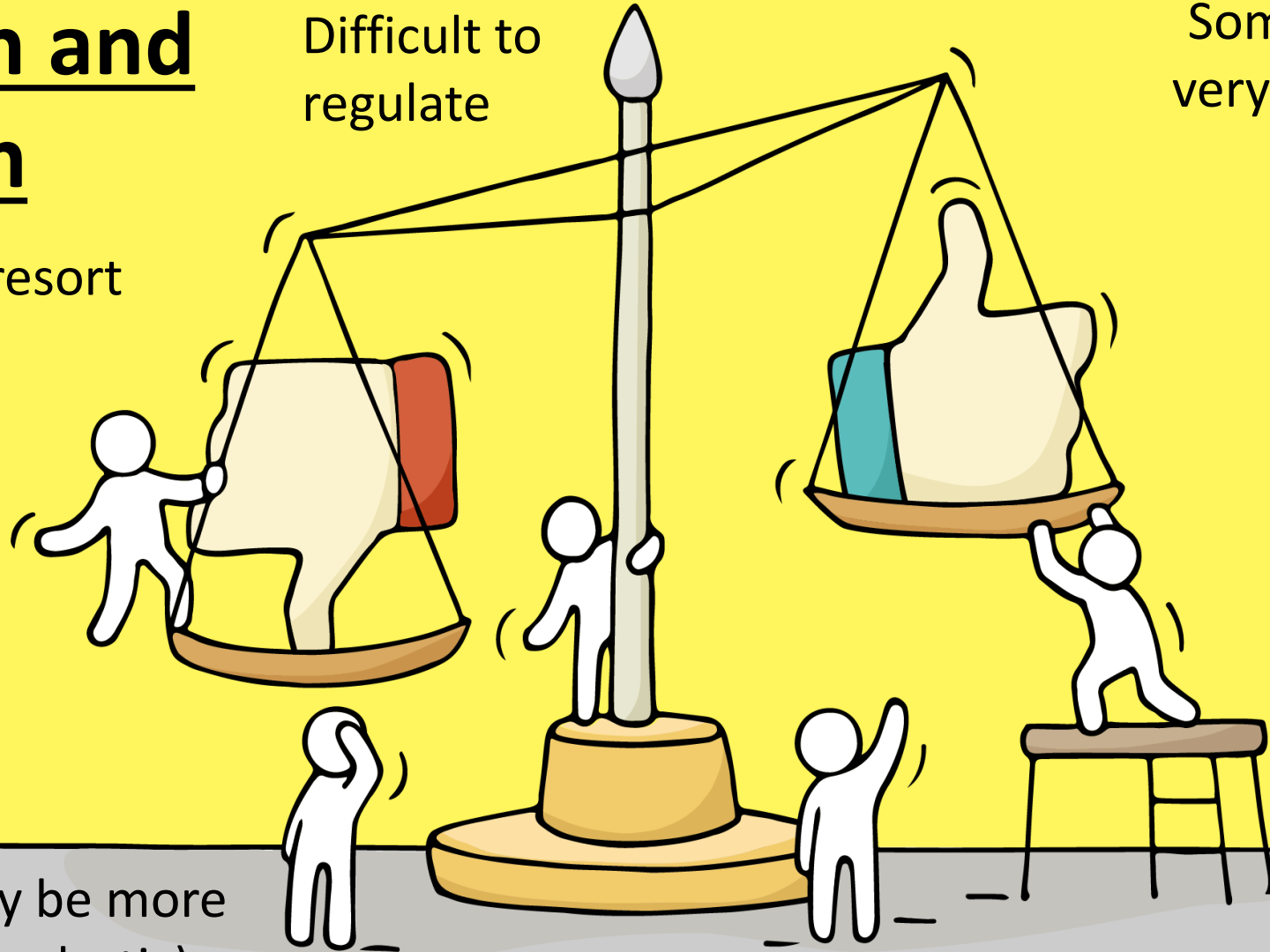
Consumers may resort to black markets

Cannot be used to deal with other kinds of negative consumption externalities

Indirect taxes may be more effective (if PED is elastic)

Difficult to regulate

Some regulations can be very effective in reducing the external costs



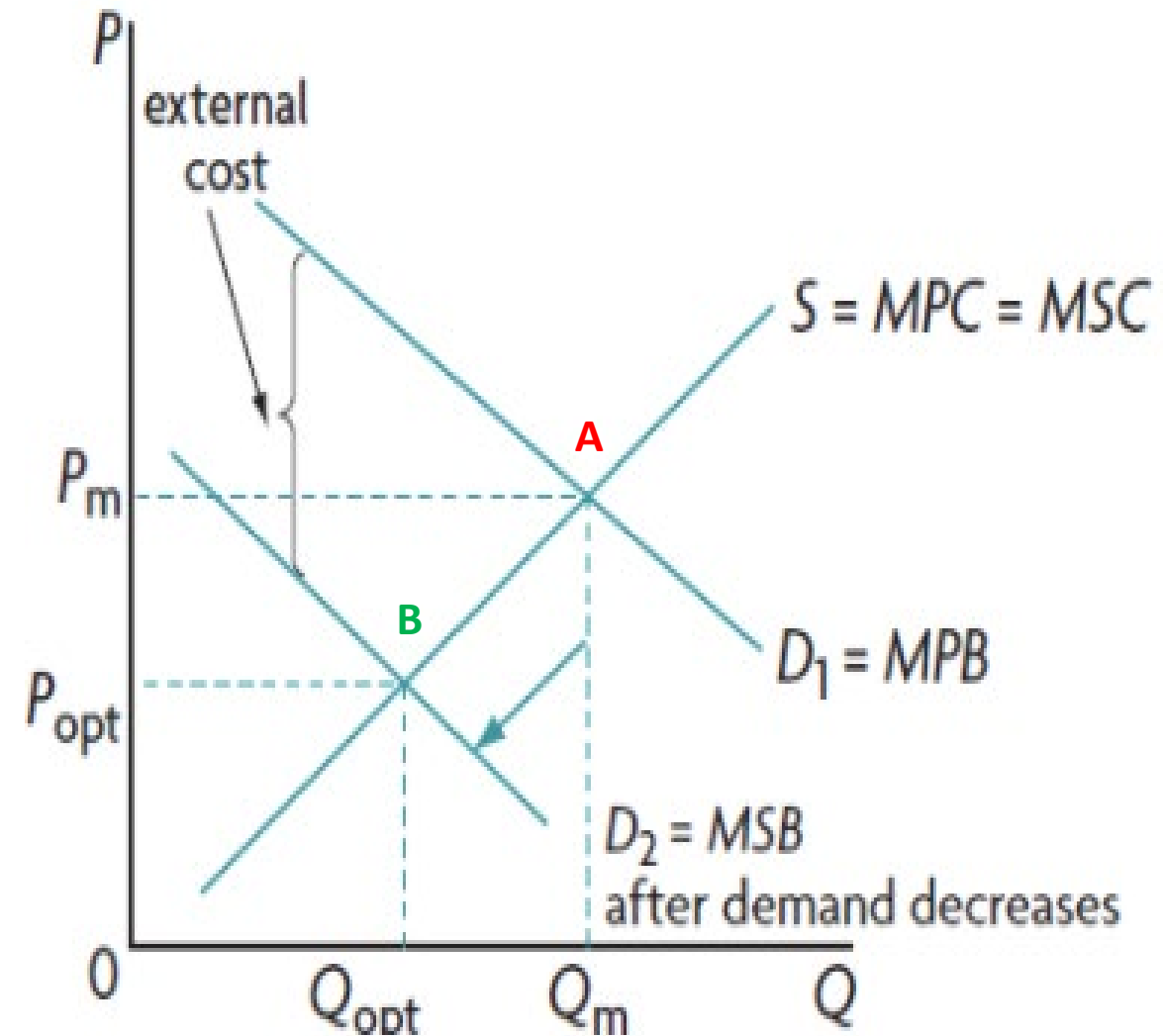
2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Education and awareness creation

Educating the public and creating awareness by the government can persuade consumers to buy fewer **demerit goods**.

The effects are the same as with **government regulations** where demand decreases.



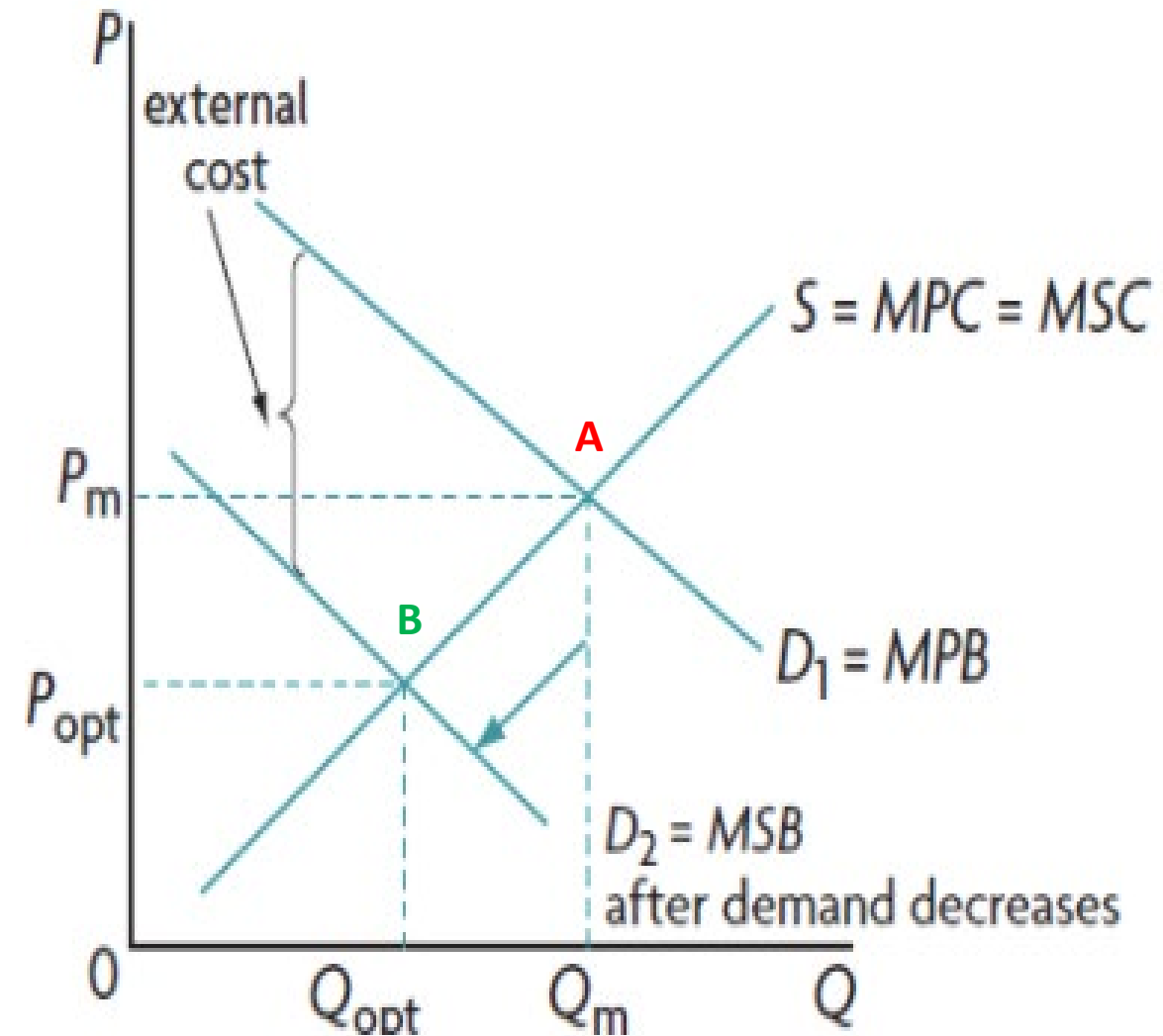
2.8 Market Failure – Externalities and Common Pool

Negative Externalities

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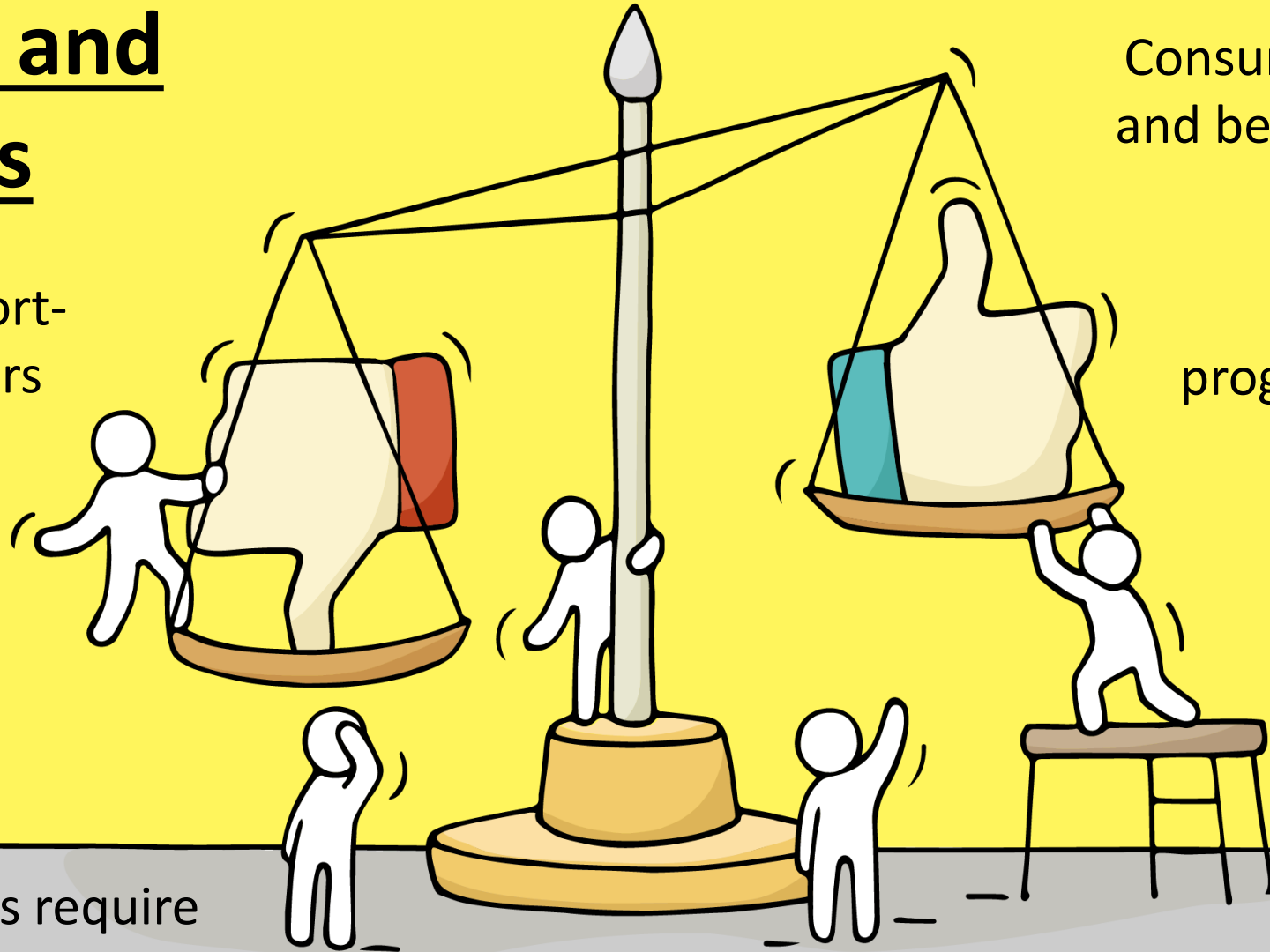
2.8 Market Failure – Externalities and Common Pool

Education and Awareness

Effect may be short-term as consumers may relapse

Opportunity cost of the education programmes

Broader problems require solutions on a broader scale



Consumers will understand and become more aware of the external costs.

Through education programmes, consumers may learn to quit

2.8 Market Failure – Externalities and Common Pool

Negative Externalities

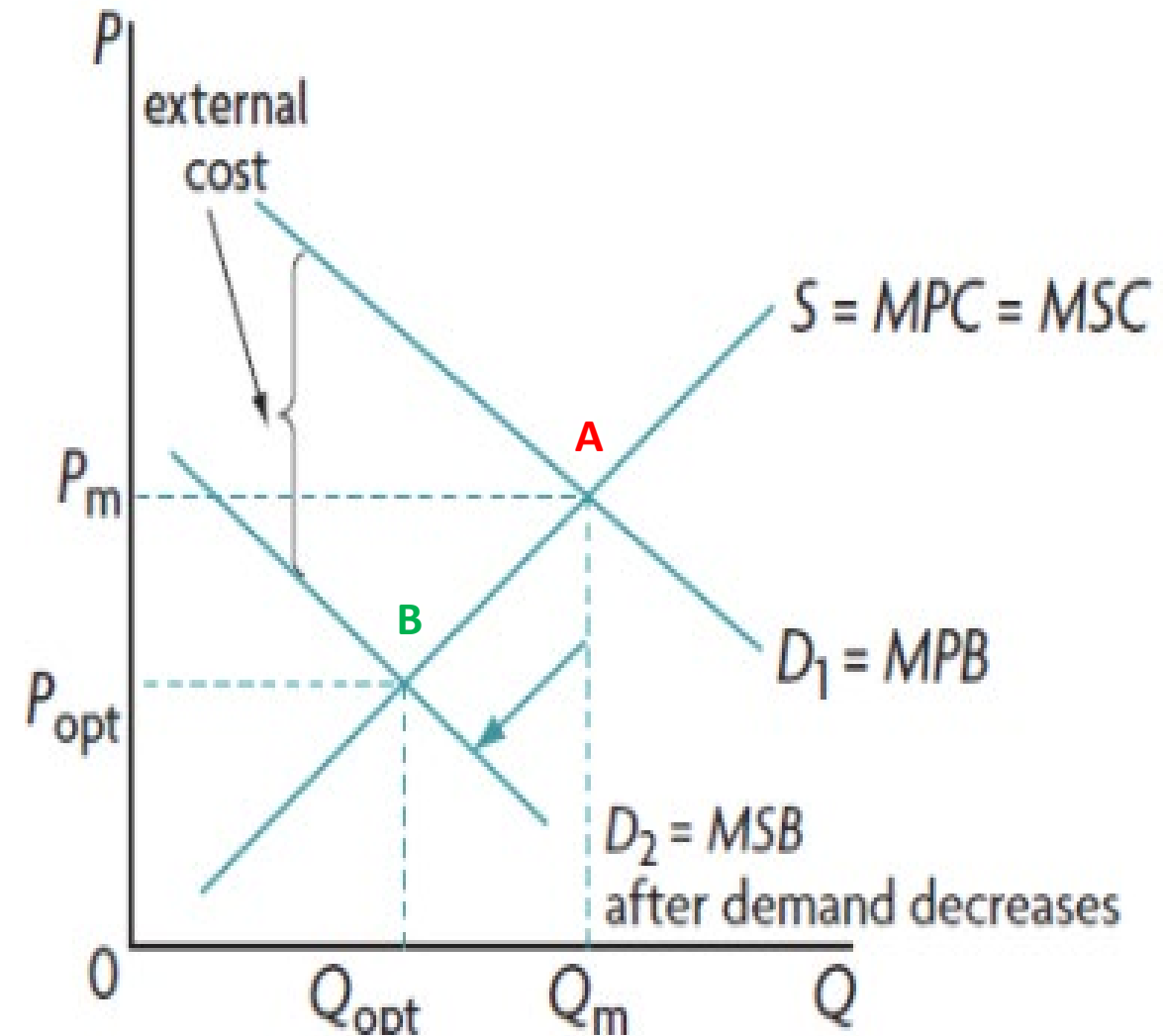
Nudges

This involves the design of methods to influence consumers' behaviour.

Used in ways similar to education and consumer awareness to encourage consumers to rely less on **demerit goods**.

 **In a pair or small group...**

Brainstorm nudge ideas to discourage consumers from smoking.



2.8 Market Failure – Externalities and Common Pool

Negative Externalities

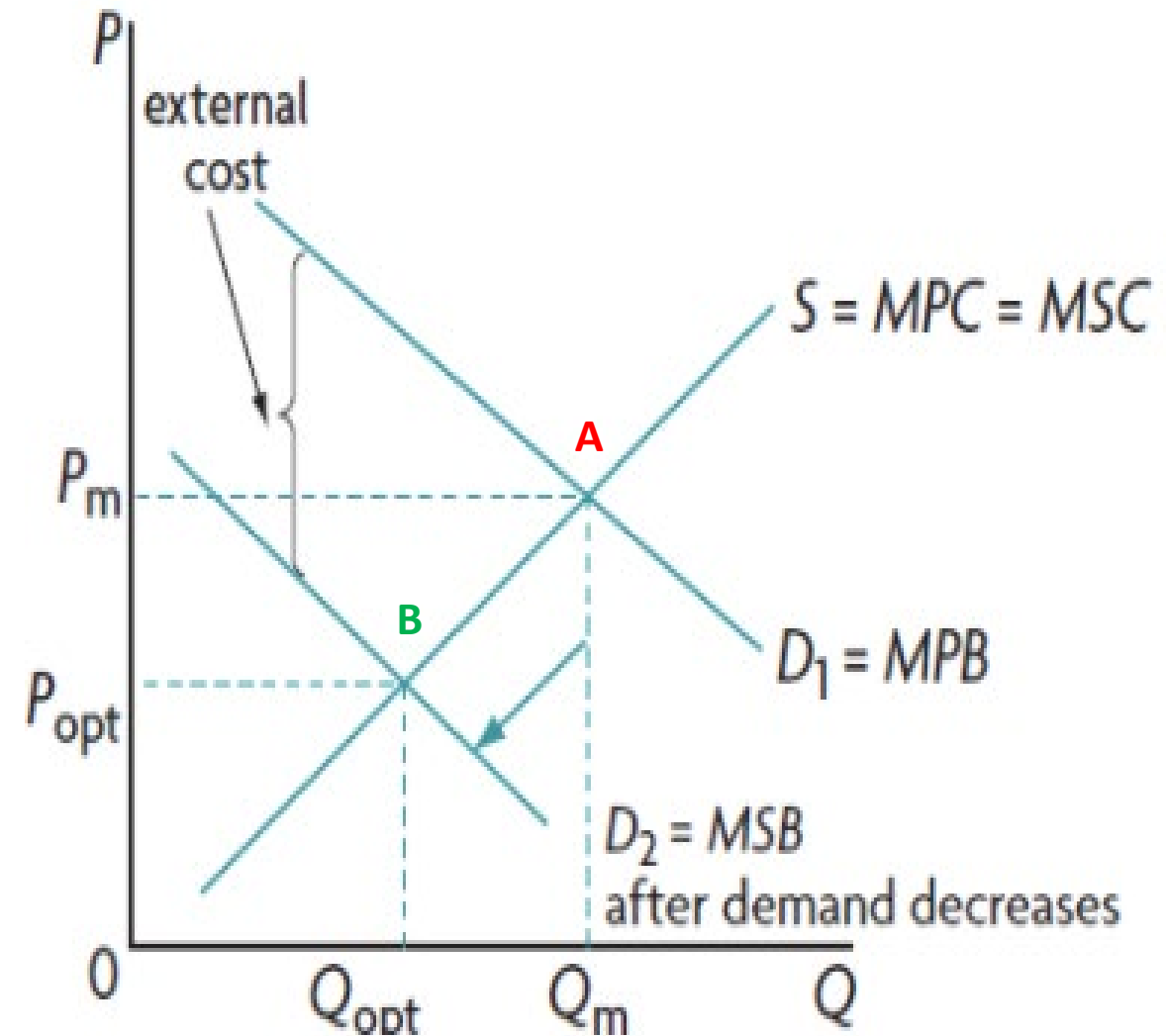
Nudges

This involves the design of methods to influence consumers' behaviour.

Used in ways similar to education and consumer awareness to encourage consumers to rely less on **demerit goods**.

 **In a pair or small group...**

Discuss the potential benefits and drawbacks of using nudges



2.8 Market Failure – Externalities and Common Pool

Negative Externalities

Policies

It is only possible to move the economy in a direction towards correction rather than achieving a precise allocation of resources.

Often, several policies are used together.

Example: Taxes can be used to finance education and awareness programmes.

