ANGLO-CHINESE JUNIOR COLLEGE
JC1 Economics 2025

H2 MARKET FAILURE AND GOVERNMENT INTERVENTION

WHAT IS THIS TOPIC ABOUT?

- Due to the central economic problem of scarcity, resources need to be allocated in ways that bring about the most efficient outcome.
- In the free market, the price mechanism is the primary means by which resources are allocated and this would bring about efficiency in resource allocation.
- However, these conditions must be present for the price mechanism to bring about efficiency:
    - There are price signals to 'direct' resource allocation.
    - No third-party effects (externalities) in consumption or production
    - The market is perfectly competitive.
    - Perfect information in the market.
    - Perfect factor mobility.
- When any of these conditions are not met, resource allocation becomes inefficient (market failure). Markets may fail in term of:
    - Non provision of public goods
    - Under or over-consumption/production due to externalities.
    - Underproduction due to market dominance (H2 only).
    - Collapse of market or under/over consumption/production due to information failure.
    - Inefficiencies due to factor immobility.
- Due to these market failures as well as the issue of inequity, the government has to step in to correct them in order to achieve an efficient and equitable allocation of resources.

However, due to various constraints, government intervention might fail, potentially leading to greater inefficiencies in resource allocation than those seen under free market forces.

LEARNING OUTCOMES

Enduring Understanding (students can explain and apply to real world):

- Price mechanism can fail to allocate resources efficiently and equitably.
  NOTE: Inequity is a distributional issue and not considered a source of market failure.
- Government has to make decisions on how to intervene in markets to correct market failure in order to achieve efficient and equitable allocation of resources.
- However, even with government intervention, the intended outcomes may not be achievable due to constraints in policy implementation, uncertainty of policy effects, and unintended consequences.

Essential question:

- To what extent should governments intervene in the free market?

1. EFFICIENCY IN MARKETS

Governments mainly want to achieve resource allocation which meets the following microeconomic objectives:

1) **EFFICIENT** and
2) **EQUITABLE** allocation of resources (to be discussed in section 3)

Understanding the concept of 'efficiency':

There are 3 types of efficiency[1] you will learn in economics:

i. Productive efficiency

This refers to a situation where goods are produced at the minimum average cost possible for the given output size, based on current technology.

ii. Dynamic efficiency

This refers to when firms invest in technology so that productivity and product quality will improve over time.

iii. Allocative efficiency

This refers to the situation where the current combination of goods produced and sold maximises society's welfare.

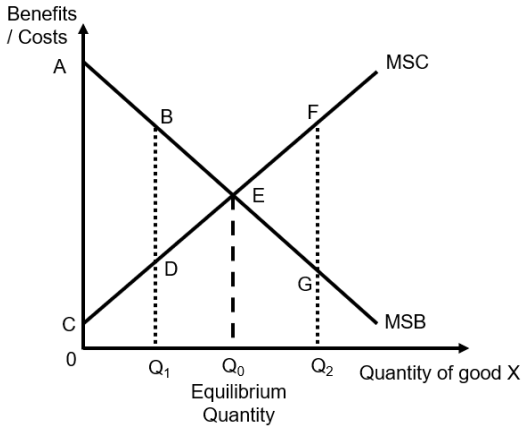
For this topic, we will be focusing on **social optimum** which refers to the level of output where society's welfare is maximised i.e. the outcome is allocative efficient.

In free markets, resource allocation takes place with the following characteristics:

- The economic agents (individuals and firms) base their decisions on the pursuit of self-interest (satisfaction, profits).
- Prices of goods and services (price signals) will direct the movement of resources and goods and services between markets.
- No government intervention in markets.

[1] *We will revisit these efficiency concepts when we learn about firms and decisions in Topic 4.*

Figure 1: Diagrammatic representation of Social Optimum



- In Figure 1 above, social optimum is at market equilibrium point **E**. At this point, Triangle **AEC** is the total welfare to society (i.e. the sum of consumer and producer surplus). At the social optimum, social welfare is maximised.
- At Q_1 (or any quantity below Q_0):
  - Marginal social benefit (MSB) is greater than marginal social cost (MSC), so there will be net benefit added to society's welfare if one more unit of the good is produced/consumed.
  - There is a loss of potential welfare when society consumes at Q_1. This loss of potential welfare is represented by the area of triangle BDE.
- At Q_2 (or any quantity above Q_0):
  - MSC is greater than MSB, so there will be a net cost to society's welfare if one more unit of the good is produced/consumed.
  - A deadweight loss is incurred when society consumes at Q_2. This deadweight loss is represented by the area of triangle EFG.
- Therefore, social optimum will be attained at Q_0 where: MSB = MSC.

The attainment of social optimum in markets requires the fulfilment of these conditions:

These conditions will be explained further in the next section of this topic.

1. **There are price signals** to enable consumption and production decisions through price mechanism. The market will fail to produce goods without price signals.
   - Thus, public goods (which are non-rival and non-excludable in consumption) leads to missing markets.

2. **No third-party effects** from the consumption/production of goods on others in the society (i.e. no externalities).
   - Firms and consumers base their decisions on the pursuit of self-interest. However, society's valuation of costs and benefits is based on the maximisation of society's welfare.
   - The presence of externalities means that the market-based valuation of costs and benefits will differ from that of society's. Thus, the free market equilibrium will not maximise social welfare.

3. **Perfect information**
   - This is where consumers are fully aware of the actual costs and benefits of consuming a good.
   - In addition, one party in the transaction (say firms) **does not** have more information than the other party (consumers).
   - Imperfect information will result in inefficiency.

4. **Market is perfectly competitive**
   - Firms do not have market power to influence the prices.
   - In the real world, markets are mostly imperfect → social optimum is not achievable.

5. **Perfect mobility of resources**
   - Resources can easily move from one use or industry to another.
   - If resources are immobile → leads to disequilibrium (shortage or surplus) which cannot be self-adjusted → social optimum not attained since the market is not able to adjust towards equilibrium.

Key Learning Points in Section 1:

- ✓ Social optimum is attained when the output in a market is where MSB=MSC (total net benefit to society is maximised).
- ✓ Social optimum will not be attained when certain conditions are not fulfilled.

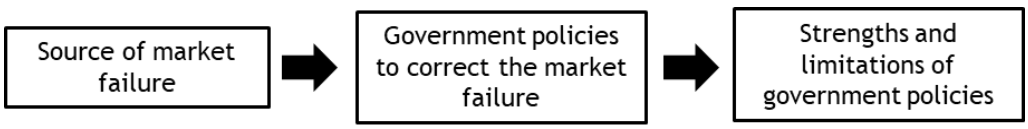
2. MARKET FAILURE AND GOVERNMENT INTERVENTION

Recall that to achieve social optimum, the markets should satisfy certain conditions. However, in the real world, such conditions are not easily present, leading to market failure.

Definition: Market failure occurs when the price mechanism, operating without any government intervention, fails to allocate scarce resources efficiently to maximise society's welfare.

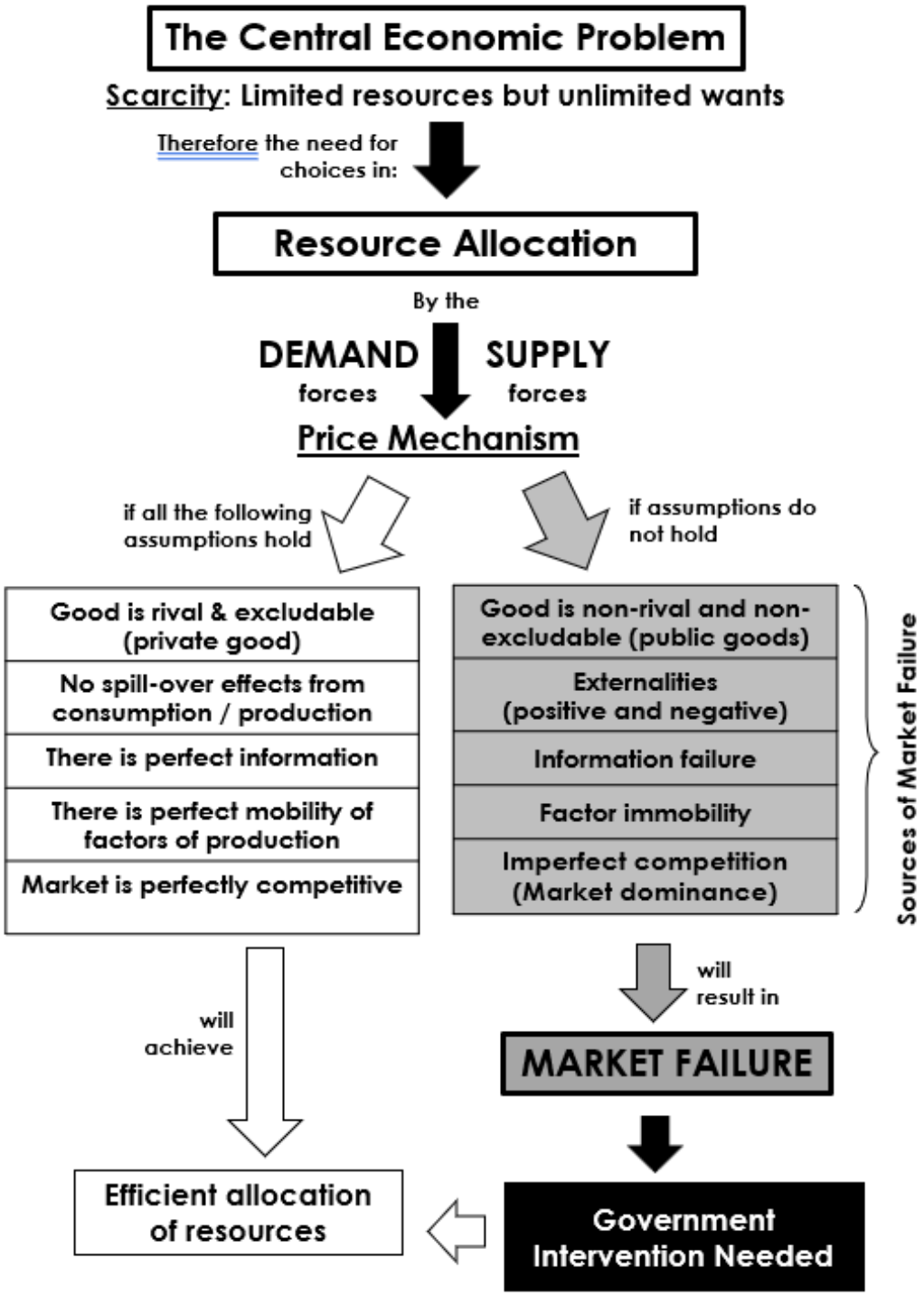
In this section, we will learn about the different sources of market failure and the various policies that governments may consider to solve them. As each measure has its strengths and limitations, it is important for governments to consider various factors before deciding and implementing the policy.

Each sub-section will be explained in the following manner:



Before we begin, the following flowchart provides an overview of the types of market failure that may occur.

OVERVIEW OF MARKET FAILURE:



2.1 Missing Markets: Public Goods

In this sub-section, we will look into goods which are collectively consumed by the consumers – termed as **public goods**. Due to the characteristics of public goods, there will be an absence of price signals for these goods which will lead to a missing market. Government will then need to intervene with direct provision.

Characteristics of Public Goods

Public goods are characterized by:

- Non-excudability
- Non-rivalry
- Non-rejectability

The characteristics of non-excludability and non-rivalry make it difficult for private firms to supply public goods, leading to a missing market where no resources are allocated to their provision. Essentially, public goods would not be provided by the free market.

Characteristic:	Definition:	Examples:
Non-excludable	Once the good is provided, it is **not possible nor economically feasible** to exclude a **non-payer** from using the good.	It is not possible to make all passers-by pay for the light from street lamps.
Non-Rival	The consumption of the good by one additional person **does not diminish** the **amount or quality of the good available** for another.	One person's usage of the street lamp does not diminish the light available for another person at the same time.
Non-rejectability	The **inability** of consumers **to refuse** consumption of a good once it has been produced.	The light emitted from the street lamp may shine into a resident's house, reducing their quality of sleep at night and yet residents cannot request for it to be switched off.

*Note: Students should prioritise explaining the characteristics of **non-excludability** and **non-rivalry**, as these are the primary features of public goods. The concept of **non-rejectability** should only be introduced when it is relevant—specifically, when a public good has already been provided, and individuals have no choice but to consume it.*

- *For example, a question like "Explain a situation where non-rejectability leads to unintended consequences." Students may discuss light pollution from streetlights or noise pollution from national defense.*

Why Public Goods Cause Market Failure?

Problems associated with the good being <u>non-excludable:</u>

- <u>It is not feasible to exclude non-payers[2] from benefitting from the use of a public good</u>.
    - For example, in the case of streetlamps, the provision of light cannot be confined to only paying consumers. Therefore, once it has been provided, producers cannot feasibly exclude those who did not pay from benefiting from the lighting of the streetlamps. This leads to producers not being able to assign property rights to paying consumers.
- Thus, paying consumers do not have the exclusive rights to street lighting and <u>non-payers can free ride</u> on those who paid for street lighting. The ability of non-payers to free ride on paying consumers is known as a <u>free rider problem</u>.
- Since consumers have no incentive to pay, they would not reveal their true demand. The lack of effective demand leads to an <u>absence of price signals</u>.
- <u>Without price signals, producers cannot charge a price for the goods produced</u> and hence would not earn any revenue and thus, profit. Hence, producers would not allocate any resources to produce these goods. This means that no public goods will be produced by private firms and there would be **complete market failure**.

Problems associated with the good being <u>non-rival</u> in consumption:

- The consumption of street lighting by one person does not reduce another person's ability to consume the same good.
    - This means that when a person enjoys the street lighting, it does not diminish the quantity or quality of street lighting available to another person.
- Since one person's consumption of the street lighting will not diminish the satisfaction derived by the next person, there is no additional cost incurred to provide street lighting for an additional person. <u>Thus, the cost of providing for one more person is zero (MC = 0)</u>.
- Allocative efficiency is achieved at the market equilibrium, where Price = Marginal Benefit = Marginal Cost (P = MB = MC)[3]. Therefore, the price that producers should charge should be zero to maximise society's welfare.
- However, producers would not be willing to price their goods at zero as there would be no revenue generated.
- Hence, if producers were to produce the good, they would price the good at P > 0. Therefore, when P > MC, the good would be **under produced**.

Due to the characteristics of non-excludability and non-rivalry, no producers would be willing to supply public goods. The market will fail completely as no resources would have been allocated to produce public goods. There would be a **missing market** leading to complete market failure. In cases where public goods are essential and beneficial to the society, governments will intervene to ensure efficient allocation of resources to the production of these goods. Hence, the government can do so by supplying them, e.g. national defence, streetlights, and traffic lights.

[2] Non-payers: refers to people who do not pay for the good directly.
[3] *Recall: the **Marginal Principle** explained in 'Price Mechanism and its Application'*
Equilibrium price is set when MB = MC. This concept will be re-visited in next topic as well.

Problems associated with the good being <u>non-rejectable</u>:

Since the government cannot fully account for consumer preferences, the level of consumption is not based on individual consumer valuations. As a result, the government may **overspend** on the provision of public goods, as consumers who place a lower value on these goods **cannot opt out** once they are provided. This could lead to an **overallocation** of resources toward public goods, causing unintended consequences such as:

1. **Psychological or Social Discomfort**
   - **Example:** In response to the rising global terrorist threat, the government has deployed more armed police officers to patrol crowded areas. While this measure helps maintain law and order, it may also **cause unnecessary anxiety** among citizens.
2. **Environmental and Aesthetic Concerns**
   - Some public infrastructure projects, such as street lighting or surveillance cameras, are **non-rejectable** but may have unintended **negative environmental** or **aesthetic** impacts.
   - **Example:** Brightly lit public spaces improve safety at night, but excessive street lighting contributes to **light pollution**, disrupting sleep patterns and harming wildlife.
3. **Misallocation of Public Funds**
   - Since individuals **cannot refuse** public goods, governments may invest in projects that **do not align with actual societal preferences**, leading to inefficient resource use.
   - **Example:** A government may build large public parks in every district, assuming widespread demand. However, if many residents prefer urban developments or alternative recreational spaces, the funds could have been **better allocated elsewhere**.

Take Note:
Public goods are NOT the same as goods (or services) provided by the public sector (the government).

2.1.1 Government Policies to Address Missing Markets

Missing Market Policy: Direct Provision

Direct provision refers to <u>the provision of a good by the government directly to the consumers</u>. These goods tend to be financed through taxation. It may be zero price or partial priced.

Public firms set up by the government or private firms engaged by the government could produce the goods.

- An example of direct provision by a government owned firm is national defence.
- In the case of street lighting, Singapore government agencies such as Land Transport Authority (LTA), National Parks (NParks) and Housing Development Board (HDB) engage contractors to build and manage street lamps.

Evaluation of Direct Provision	
Consideration	**Strengths**
Efficiency	Markets often fail to allocate public goods efficiently because they are non-excludable (everyone benefits) and non-rivalrous (consumption by one doesn't reduce availability for others). Direct provision allows the government to determine the optimal level of provision based on social welfare, not just individual willingness to pay.
Equity	Direct provision ensures everyone has access to essential public goods regardless of income. Moreover, public goods can suffer from a "free-rider" problem, where people might be tempted to avoid contributing and rely on others to fund the good. Direct provision, financed through taxation, ensures everyone shares the cost and benefits fairly.
Consideration	**Limitations**
High cost of financing	Direct provision of public goods requires significant government expenditure. This policy requires significant government funding to implement. If the government does not have the budget to finance the expenditure, it may have to either increase taxes, reallocate funds away from other public projects or accumulate debt, which can lead to negative unintended consequences. Increase in taxes: ● The government can increase income tax and corporate tax to finance the increased expenditure. This may reduce the level of consumption and investment in the country which can lead to a reduction in the real national output produced in the country, causing a slowdown in economic growth. With a slowdown in economic growth, the average income of citizens may increase at a slower rate which leads to a slowdown in the improvement of living standards for future generations. ● The government may also increase GST, which may increase the cost of production for firms, thereby increasing the price level of goods and services. This would increase the cost of living of citizens. Reallocation of funds: • The government can also reallocate funds away from other public projects to finance the subsidy. This can cause a reduction of spendings in other important public projects. Thus, a significant opportunity cost in the form of potential benefits of other public projects may be forgone.

Note: You will learn more about these impacts on the economy in a future topic.

Insufficient Information	Direct provision suffers from an information problem. Public goods lack market prices, making it difficult for the government to determine the optimal level of production (social optimum). This can lead to overproduction or underproduction, resulting in deadweight loss (loss of potential economic welfare). Furthermore, the government may misjudge the extent of market failure, further worsening the extent of deadweight loss.

Key Learning Points in Section 2.1:

- ✓ Public goods are non-excludable and non-rival in consumption.
- ✓ Non-excludability will lead to no price signals from consumers.
- ✓ Non-rivalry will lead to MC = 0, and therefore price = zero to achieve allocative efficiency, which firms are unwilling to set.
- ✓ The absence of price signals leads to there being no incentive for producers to produce these goods.
- ✓ Since there is a missing market, government intervention is necessary for the provision of public goods.
- ✓ Non-rejectable could lead to an over allocation of resources in the area of public goods when the government is doing direct provision.

2.2 Externalities

2.2.1 Overview of Externalities

An **externality** arises when:

- The production or consumption of a good affects the well-being of an external or third party (negatively or positively) who are not involved in the transaction of the good; and
- The affected third party neither receives compensation (for negative effects) nor pays (for positive effects) for the spillover effects.

Externalities may be in the form of:

a) **Negative externalities** (cost incurred by a third party)) or

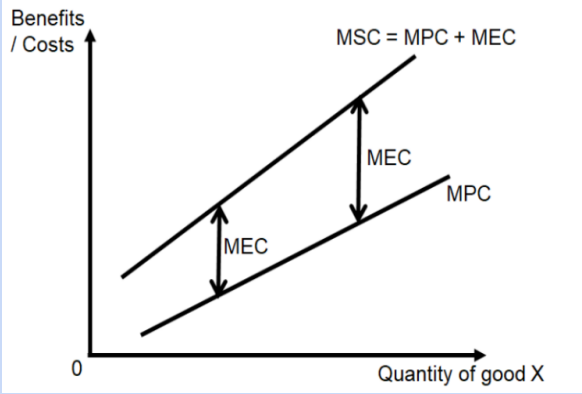
b) **Positive externalities** (benefit enjoyed by a third party)

Positive externalities are also known as **external benefits**, while negative externalities are also known as **external costs**.

These are key terms used when discussing markets with <u>negative externalities</u>:

Key Term	Definition	Example
Marginal Private Cost (MPC)	Additional cost incurred by **the consumer (or producer)** in the consumption (or production) of an additional unit of the good.	The cost of buying cigarettes incurred by a consumer.
Marginal External Cost (MEC)	Additional cost borne by **third parties** who are not directly involved in the consumption (or production) of an additional unit of goods and are not fully compensated for.	The healthcare cost incurred by non-smokers due to secondhand smoke exposure
Marginal Social Cost (MSC)	Additional cost incurred by society (including consumers producers, and third parties) from the consumption (or production) of an additional unit of the good. It is the sum of MPC and MEC. Where MEC is present (MEC > 0), MSC is higher than the MPC. The relationship can be expressed as: **MSC = MPC + MEC** Which also means: **MSC > MPC** This can be represented diagrammatically as shown in Figure 2 below. The divergence between MSC and MPC increases with quantity indicating that the extent of external costs increase with every additional unit consumed (or produced). For example, the likelihood of your neighbours falling ill is higher if you smoke more cigarettes, thus MEC increases as the quantity of cigarettes smoked increases.	

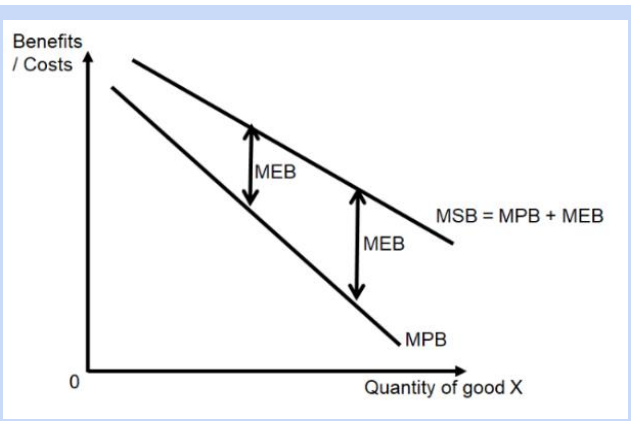
Figure 2: Marginal Costs



These are key terms that are used when discussing markets with <u>positive externalities</u>:

Key Term	Definition	Example
Marginal Private Benefit (MPB)	Additional benefit enjoyed by **the consumer (or producer)** involved in the consumption (or production) of an additional unit of the good.	Higher future income earned by the consumer because of completing higher education.
Marginal External Benefit (MEB)	Additional benefits enjoyed by **third parties** who are not directly involved in the consumption (or production) of the good and do not pay for the benefits received.	Higher level of productivity enjoyed by firms because of a more highly educated workforce.
Marginal Social Benefit (MSB)	Additional benefit enjoyed by **all (producers, consumers and third parties)** in society in the production (or consumption) of an additional unit of the good. It is the sum of MPB and MEB. Where MEB is present (MEB > 0), MSB is higher than the MPB. The relationship can be expressed as: **MSB = MPB + MEB** Which also means: **MSB > MPB** This can be represented diagrammatically as shown in Figure 3 below. The divergence between MSB and MPB increases with quantity indicating that the extent of external benefits increases with every additional unit produced (or consumed). An example is that the level of production by the country is higher when more workers are educated, thus MEB increases as the quantity of education increases.	

Figure 3: Marginal Benefits



2.2.2 Negative Externalities

Definition: Negative externalities arise when the production or consumption of a good affects the well-being of a third party negatively and the affected-party does not receive any compensation for bearing the negative effect.

If the production or consumption of a good generates negative externalities, then the cost to the society is greater than the cost which the consumer or producer incurs.

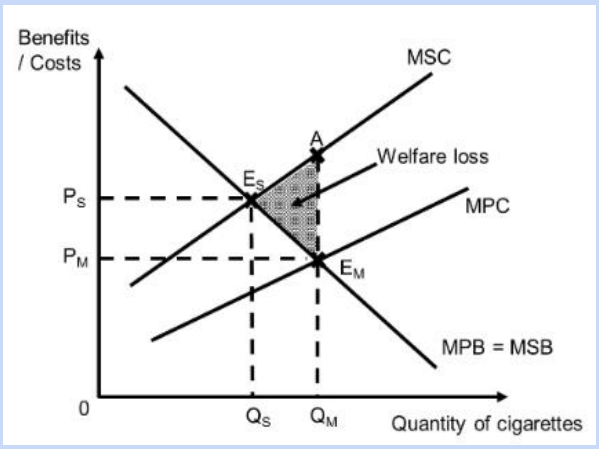
Negative Externalities in the Market for Cigarettes

Step 1: Explain the free market equilibrium.

- Smokers only consider their self-interests when choosing whether to smoke or not to smoke. This involves looking at their marginal private cost (MPC) and marginal private benefit (MPB) when making their decision:
  - MPC: The additional cost of buying additional cigarettes (i.e. price paid for the cigarettes) and the additional medical cost incurred by the smoker from additional cigarette consumption
  - MPB: The additional satisfaction gained from consuming additional cigarettes
- To maximise their own satisfaction, they will choose to consume the number of cigarettes at Q_m where their MPC = MPB. (Recall that this is the condition for which economic agents maximise their well-being as they can do no better by consuming more or fewer cigarettes) Thus, Q_m is the market equilibrium consumption level. Refer to the diagram below:

*Note: Since the externalities arise from consumption, the analysis of MPC and MPB is from the point of view of **consumers**.*

Figure 4: Market Failure in market for cigarettes due to negative externalities from consumption



Step 2: Explain marginal external cost and marginal social cost of smoking.

- However, these smokers do not take into account the impact of second-hand smoke on third parties around them. Thus, in this instance, there is a negative externality generated through their action of smoking. This implies that marginal external cost (MEC) of smoking is greater than zero.

- MEC: Medical costs incurred by third parties as a result of breathing in second-hand smoke. These medical costs could be due to respiratory illness, lung or mouth cancer. These third parties are not compensated.
- Since MEC is positive, this implies that the MSC is greater than MPC (**MSC > MPC)** as MSC = MPC + MEC. This is illustrated above where the MSC curve is higher than the MPC curve.

Step 3: Explain the social optimum.

- To society, the social optimum consumption level is at Q_S where MSB = MSC, as this maximises society's welfare.
- Since $Q_M > Q_S$, there is an **overconsumption** of cigarettes by Q_SQ_M.

Step 4: Explain the deadweight loss:

- Deadweight loss is incurred for every additional unit consumed from Q_S to Q_M as MSC > MSB. The deadweight loss is represented by area E_SE_MA. Societal welfare could have been increased by reducing the consumption of cigarettes from Q_M to Q_S.
- Thus, the market fails as there is an over allocation of resources to the production and consumption of cigarettes.

Negative Externalities in Production vs Consumption
In the analysis of the problem, it is important to identify whether the negative externality comes from production or consumption of the good. This will determine whether the analysis of MPB and MPC is from the consumers or producers' point of view.

	Negative externality in **PRODUCTION**	Negative externality in **CONSUMPTION**
Economic agent causing externality	Producers	Consumers
Example	Market for palm oil in Indonesia	Market for cigarettes
Marginal private benefit (MPB) incurred	Additional revenue earned from an additional unit of palm oil sold	Additional satisfaction gained from an additional cigarette smoked.
Marginal private cost (MPC) incurred	Additional cost of clearing land, labour, and machinery to produce an additional unit of palm oil.	Additional cost of buying an additional cigarette and their own healthcare costs from smoking it.
Third party affected by production / consumption	Residents who live near the palm oil plantations	Neighbours, friends and passers-by who inhale second hand smoke
Marginal external cost (MEC) incurred by third party	Slash and burn methods of clearing the land to produce additional unit of palm oil lead to haze, causing people (third parties) around the affected	When smokers consume additional unit of cigarettes, third parties fall sick from breathing in secondhand smoke and incur healthcare costs

	areas to fall sick and incur healthcare costs	
Marginal social cost (MSC)	Since MEC > 0, MSC > MPC	Since MEC > 0, MSC > MPC
Consequence	Welfare of society is not maximised; palm oil is being **overproduced**	Welfare of society is not maximised; cigarettes are being **overconsumed**

2.2.3 Government Policies to Address Negative Externalities

The objective of government intervention is to achieve an **efficient allocation of resources.** In the case of negative externalities, it can be done by reducing production or consumption of the good to social optimum where MSB=MSC.

The following are the various ways *(list is not exhaustive)* the government can intervene. Governments can consider intervening in the market by influencing either the consumer or producer.

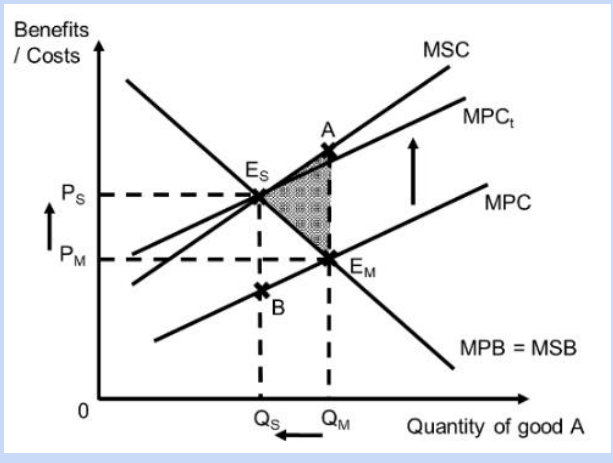
Negative Externality Policy: Indirect Tax

Taxes are compulsory payments made by firms or individuals to the government with no goods or services received in return.

Taxes force households and firms to **internalise** the external cost in their consumption and production through the influence on the market price. This will make external costs become part of their private cost. In this way, the MPC will increase to MPC_t as shown in Figure 5 below.

Examples of taxes to correct negative externalities include taxes on cigarettes and road tax

Figure 5: Taxes to correct market failure due to negative externalities



Per unit tax could be imposed either on the consumers or producers.

- **Per unit tax (or specific tax) to address negative externality in consumption**
  - Initially, the market equilibrium is at E_M, determined by MPC=MPB, with the quantity at Q_M.

- The amount of tax (tax = E_SB) imposed is equal to the marginal external cost incurred at socially optimum output Q_s.
- The tax will increase the cost of production. Producers will pass on this cost to consumers in the form of higher price.
- As a result, consumers' MPC of purchasing the goods increase thus shifting MPC to the left to MPC_t.
- With higher costs, consumers' are not maximising their satisfaction at Q_M as MPC_t > MPB.
- Rational consumers will lower consumption until MPC_t = MPB. Thus, the new market equilibrium is at E_S, determined by MPC_t = MPB.
- The new quantity consumed will be reduced from Q_m to Q_s.
- The imposition of the tax has caused the market output to be reduced to coincide with the socially optimal output, Q_s, via the increase in price, thereby eliminating the deadweight loss of area E_SAE_M.

- **Per unit tax (or specific tax) to address negative externality in <u>production</u>**
  - Initially, the market equilibrium is at E_M, determined by MPC=MPB, with the quantity at Q_M.
  - The amount of tax (tax = E_SB) imposed is equal to the marginal external cost incurred at socially optimum output Q_s.
  - The tax will increase the cost of production. Producers' MPC of producing the goods will increase thus shifting MPC to the left to MPC_t.
  - With higher costs, producers are not maximising their profits at Q_M as MPC_t > MPB.
  - Rational producers will lower production until MPC_t = MPB. Thus, the new market equilibrium is at E_S, determined by MPC_t = MPB.
  - The new quantity produced will be reduced from Q_m to Q_s.
  - The imposition of the tax has caused the market output to be reduced to coincide with the socially optimal output, Q_s, via the increase in price, thereby eliminating the deadweight loss of area E_SAE_M.

- **Lump-sum Tax**
  - A lump sum tax is a one-time tax payment and the amount paid is fixed. Example of a lump sum tax would be pollution tax.
  - At output Q_m, a lump-sum tax equal to the deadweight loss (area E_SAE_M) can be imposed.
  - The tax revenue collected can then be used to compensate those who were affected by the negative externalities.

Evaluation of Tax	
Consideration	**Strengths**
Effectiveness (Loss Aversion) *Note: Loss aversion describes how economic agents make decisions based on avoidance of losses rather than making gains*	Taxes tend to be an effective policy in reducing consumption and production of goods with negative externalities. This is because human beings experience losses asymmetrically, meaning they feel losses more severely than equivalent gains. As a result, a tax on goods with negative externalities can be a more successful strategy in altering consumers' and producers' behaviour compared to providing equivalent subsidies for using alternatives, such as nicotine patches instead of cigarettes.
Enforcement Costs	When taxes are implemented, the government can simply allow market forces to operate to achieve the socially efficient outcome without much enforcement. This translates to lower administrative costs compared to policies that require direct government intervention.
Revenue Generation	Taxation provides revenue for the government that could be used to finance additional projects or policies. This can include encouraging the adoption of greener technology that further reduces negative externalities, such as pollution caused by traditional energy sources.
Consideration	**Limitations**
Price Elasticity of Demand	The effectiveness of tax in reducing production level is also constrained by price elasticity of demand. In the case of cigarettes where demand for cigarettes is price inelastic, tax is less effective in reducing consumption since consumers would be less responsive to an increase in price. This means that a large amount of tax is needed to reduce consumption to Q_S, and this may not be a politically viable option. Demand may also be more price inelastic due to cognitive biases like the sunk cost fallacy. For example, high COE prices substantially raise the costs of owning a car in Singapore. To better spread the high fixed costs of owning a car over its lifespan, drivers in Singapore tend to utilise their cars more often. This lowers the price elasticity of demand for car usage, thus making drivers less responsive to a rise in ERP rates and petrol tax. This reduces the effectiveness of taxes as a measure to control road usage and hence traffic congestion *Note: The sunk cost fallacy describes our tendency to follow through on an endeavour if we have already invested time, effort, or money into it, whether the current costs outweigh the benefits.*
Optimal Tax Level	It is difficult for the government to measure or value the external cost incurred at the socially optimal level (indicated by E_SB in Fig 5). External costs are the costs of production that are not borne by the producer but rather by society. For example, it's challenging to accurately value the loss in productivity of those who fall sick

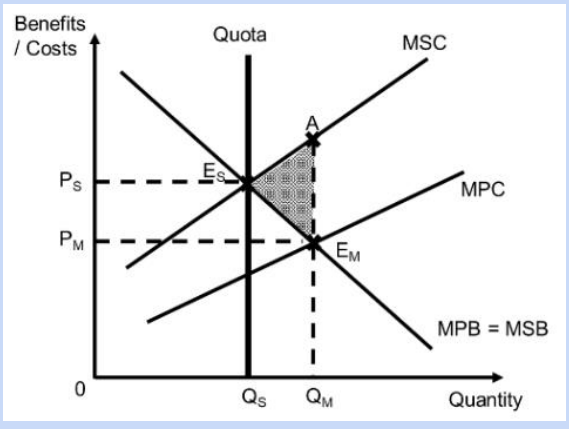
	from second-hand smoke. If the external cost were over-valued, this would cause the quantity consumed to be below the socially optimal level, meaning society is not getting the maximum benefit. Conversely, if the external cost were under-valued, the reduction in quantity consumed due to the tax would not be enough to bring output to the socially optimal level, again resulting in a less-than-ideal outcome for society. The extent of this inefficiency depends on how close the new quantity is to the socially optimal level.
Economic Growth and Standard of Living	While taxes raise revenue for the government, they also raise the cost of production for firms. If taxes, such as a carbon tax, are too high, firms might relocate their businesses abroad to avoid the higher costs. This can lead to a contraction of the domestic economy and a decrease in overall economic growth which can reduce the growth of standard of living. Furthermore, taxes increase the prices of goods and services, which can disproportionately affect low-income households. This can exacerbate income inequality and reduce the standard of living for these households.

Negative Externality Policy: Quotas

Quotas are restrictions on the quantity of a particular good/service in the market by the government to limit its sale or purchase. There will be a **fixed quantity** of a particular good which can be produced under official regulations.

The quota would be determined by the government and set at the socially optimal output level Q_s, as shown in Figure 6.

Figure 6: Quota to correct market failure due to negative externalities



Thus, producers can only sell up to Q_s units of the good, solving the problem of overproduction/overconsumption. The deadweight loss of E_SAE_M is thus eliminated.

Evaluation of Quota	
Consideration	**Strengths**
Predictability of Outcome	Quotas are clear and predetermined limitations on quantity. This characteristic makes them easy to follow and understand for both producers and consumers. As a result, quotas can achieve the socially optimal quantity (Qs) with greater certainty compared to some other policy instruments.
Immediacy of Effect	Once the quota rules are implemented and become law, it is mandatory for all parties to comply. This characteristic allows quotas to achieve their intended outcome immediately, without waiting for market forces to adjust prices and behaviour over time. As such, quota is an essential policy tool for certain negative externality issues which demand immediate solutions due to the potential for irreversible or rapidly escalating harm.
Consideration	**Limitations**
High Cost of Monitoring and Enforcement	Enforcing quotas effectively requires a significant manpower base to monitor markets and ensure compliance. These administrative costs can be substantial, and a limited government budget may hinder the effectiveness of the policy.
Insufficient Information for Optimal Quota Setting	Determining the socially optimal quantity (Qs) can be challenging for governments. Imperfect knowledge about factors like production costs, consumer demand, and technological advancements can lead to inaccurate quota setting. If the quota is set too high above Qs, it may not be effective in reducing production or consumption. Conversely, a quota set too low below Qs will not achieve the desired reduction and may create shortages. Additionally, the socially optimal quantity itself may change over time, making it even more difficult to set an effective quota. For example, new technologies that reduce pollution could increase the socially optimal level of production.

Negative Externality Policy: Ban

When the negative externalities are significant enough, consumption of the good could be banned or prohibited within the country. However the appropriateness of the ban depends on the relative levels between MSB and MSC. Ban is most appropriate if MSC>MSB at all output levels.

For example, e-cigarette, shisha-smoking and the selling of chewing gum are completely banned in Singapore.

Figure 7: Ban to correct market failure due to negative externalities.

Figure 7a: When MSC > MSB at all quantities

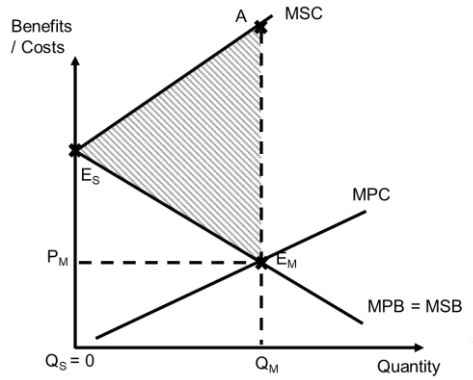
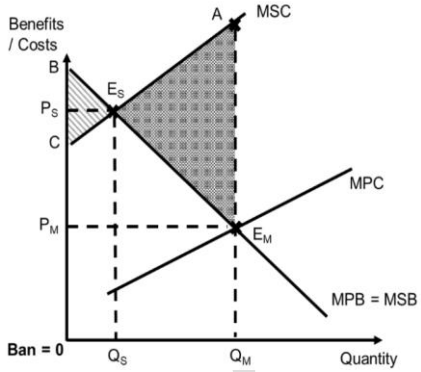


Figure 7b: When MSC > MSB for most quantities



- As seen from Figure 7a, bans are used when externalities are very large (illustrated by a large divergence between MSC and MPC). The deadweight loss is large as demonstrated by area E_SAE_M.
- A ban is effectively a quota at the quantity of 0. In cases with very significant negative externalities, this achieves the social optimum.
- In some cases, such as in Figure 7b, a ban may result in underproduction and underconsumption of the goods below Q_S. However, the resulting welfare loss area BCE_S is significantly smaller than the initial deadweight loss area E_SAE_M.
- For activities that generate a high level of negative externality such that the social optimal quantity is at or close to zero, a ban is more economically viable to enforce than a quota or tax.
- If MSC>MSB at all levels, a ban would maximise social welfare.

Evaluation of Ban	
Consideration	**Strengths**
Clear Signal	By enacting a ban, policymakers are sending a clear and unambiguous signal: the negative externality caused by the banned activity is completely unacceptable and must be eliminated. This ban signifies the government's firm commitment to protecting public health, safety, or the environment.
Immediacy of Effect	Bans can lead to a quick and significant reduction in the negative externality. Some negative externalities, like pollution or unsustainable resource use, pose a significant threat to public health or the environment. Delays in addressing them can lead to irreversible damage. A ban acts as a fast track, stopping the harmful activity immediately and preventing further negative consequences.
Consideration	**Limitations**
Inflexible	Bans can be inflexible and may not account for situations where some level of the activity might be acceptable.

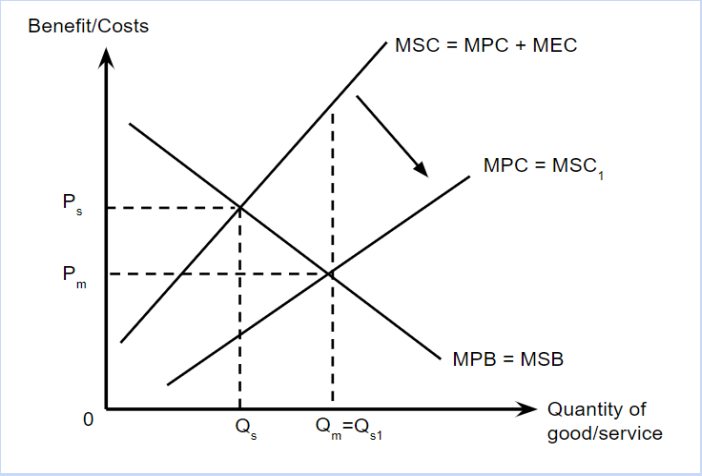
Black Market Creation	Bans can create black markets for the banned good or service, making it harder to control the negative externality. This is especially a challenge for countries with weak law enforcement.

Policy to Address Negative Externality: Rules & Regulations

Government may control business activities by ensuring compliance through licenses, setting quality standards and/or other administrative rules. Non-compliance usually leads to punitive measures such as fines or revoking of licenses on the offenders.

- Such standards could limit or lower the external costs produced by the production or consumption of the good.
- If the intervention can result in elimination of MEC, the new marginal social cost (MSC_1) will now be equal to MPC as seen from Figure 8.
- At the original socially optimal output level, MSB>MSC_1, thus the socially optimal output level will increase to the level where MSB = MSC_1 in order to maximize social welfare.
- This will coincide with the original market output level Qm which is now also the socially optimal output level. Therefore, the deadweight loss will be completely eliminated.

Figure 8: Rules & regulations to correct market failure due to negative externalities



Examples of rules and regulations that decrease MEC:

- Industrial wastewater in Singapore must be treated to specified standards before being discharged into a sewer or watercourse to prevent water pollution. Industries generating large quantities of acidic effluent are required to install a pH monitoring and shut-off control system to prevent the discharge of acidic effluent into public sewers.
- The Singapore government is progressively extending the Smoking (Prohibition in Certain Places) Act to more public places. Smoking is prohibited in areas such as all common areas of the resident block including walkway, void deck, corridors, and linkways to bus stops and overhead bridges.

Evaluation of Rules & Regulations	
Consideration	**Strengths**
Predictability and Immediacy	Rules and regulations offer predictability because they establish clear boundaries for behaviour. This allows for immediate outcomes, as adherence or violation is easily identified. It is important to immediately address negative externalities. Pollution, for example, can build up in the environment, causing escalating damage. The longer the externality persists, the greater the harm inflicted.
Consideration	**Limitations**
High Cost of Monitoring and Enforcement	There are costs involved in maintaining a large manpower base capable of enforcing the regulations and monitoring the markets. This may result in a strain on the government's budget. If the government is in a budget deficit, then the government may not be able to implement this policy in the long run. ***Refer to "high cost of financing" on page 10 for the full explanation of this limitation.***
Blunt weapon that discourages Innovation	Rules and regulations may simply focus on meeting a specific standard without encouraging companies to find more efficient or innovative ways to reduce negative externalities. Firms have little incentive to go beyond the minimum requirements set by the regulations, potentially leading to a greater long-term investment in compliance rather than seeking solutions to address the root causes of the problems. This can lead to a situation where more time, resources, and effort are required in the long run to truly address the issue. For example, a simple cap on pollution levels may not incentivize firms to develop cleaner technologies.
Increased Costs of Production	Rules and regulations may increase the cost of production that may deter small enterprises from setting up in the country. For example, firms may be required to have multiple licenses or to comply with stricter standards of production which incurs higher costs before they can set up and manufacture their products. These multiple licenses may increase the cost of production of firms. Thus, firms may not be receptive to the policy, or may not have the ability to compete in the international market once the regulations are imposed. This could dampen a country's export revenue which could have a negative impact on economic growth. With a slowdown in economic growth, the average income of citizens may increase at a slower rate which leads to a slowdown in the improvement of living standards for future generations.

Policy to Address Negative Externality: Tradable Permits

Tradable permits offer a market-based solution to address negative externalities, such as pollution. Here is how they work:

Setting the Cap:
- A governing body establishes a limit, or "cap," on the total allowable pollution. This cap is then divided into individual permits.

Permit Allocation:
- These permits, each granting the right to emit a specific amount of pollution, are distributed to firms. This initial allocation can occur through various methods, such as auctions or predetermined allotments.

Market Dynamics:
- Firms that can reduce their pollution levels at a lower cost than the market price of permits will do so. They can then sell their excess permits to other firms.
- Conversely, firms facing higher costs for pollution reduction will find it more economical to purchase permits, allowing them to continue their current level of emissions.

Internalizing External Costs:
- By requiring firms to either reduce emissions or purchase permits, the system forces them to incorporate the cost of pollution into their production expenses. This process, known as internalizing the external cost, effectively increases their marginal private cost (MPC).

Achieving Optimal Output:
- The increased production cost resulting from permit purchases incentivizes firms to reduce their output, aligning it with the socially optimal level.

Efficiency and Similarity to Taxes:
- This mechanism mirrors the effect of a per-unit tax in that it discourages excessive pollution (see Figure 9a). However, tradable permits achieve this outcome through a flexible market mechanism, ensuring that pollution reduction occurs at the lowest possible cost.
- By allowing the market to set the price of pollution, the system finds the most efficient polluters to reduce their output.

In essence, tradable permits create a market for pollution rights, enabling efficient pollution reduction while providing firms with flexibility in their compliance strategies."

Figure 9: Tradable permits to correct market failure due to negative externalities

Figure 9a: Impact of tradable permits on firms if they are unable to reduce pollution.

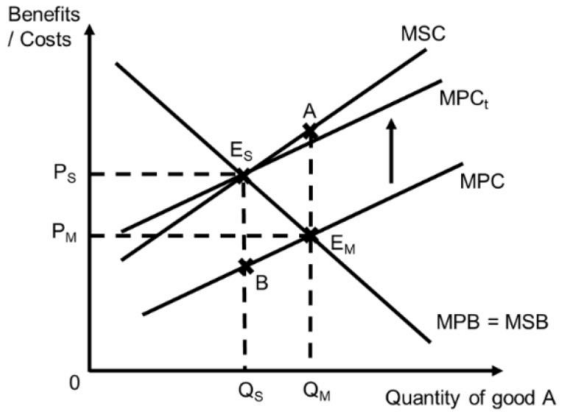
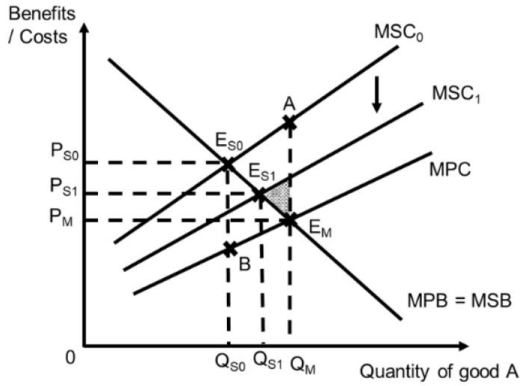


Figure 9b: Long term impact of tradable permits if firms adopt new technology to reduce pollution.



Firms also have an incentive to lower their levels of pollution because they can sell their permits if these are unused. The selling of unused permits generates revenue and increases profits for firms.

If firms can adopt cleaner methods of production, this would reduce the marginal external cost (MEC). In Figure 9b, this is shown by a decrease in the marginal social cost (MSC) to be closer to the MPC. When this happens, the socially optimal quantity (MSC = MSB) increases to Q_{S1}. The deadweight loss to society is reduced as shown by the smaller shaded area.

Evaluation of Tradable Permits	
Consideration	**Strengths**
Incentives Long-term Solutions	Tradable permits are clear and predetermined limitations on quantity. This characteristic makes them easy to follow and understand for both producers and consumers. As a result, tradable permits can achieve the socially optimal quantity (QS) with greater certainty compared to some other policy instruments.
Consideration	**Limitations**
High Cost of Monitoring and Enforcement	Enforcing tradable permits effectively requires a significant manpower base to monitor markets and ensure compliance. These administrative costs can be substantial, and a limited government budget may hinder the effectiveness of the policy.
Imperfect Information	Determining the socially optimal quantity (Qs) can be challenging for governments. Imperfect knowledge about factors like production costs, consumer demand, and technological advancements can lead to inaccurate quota setting. If the trade permit amount is set too high such that the number of goods/services produced are above Qs, it may not be effective in reducing production. Conversely, a tradable permit amount that is set too low such that the number of goods/services produced are below Qs will not achieve the desired reduction and may create shortages.

	Additionally, the socially optimal quantity itself may change over time, making it even more difficult to set an effective tradable permit amount. For example, new technologies that reduce pollution could increase the socially optimal level of production.
Potential for Inequity	Tradable permit systems may disadvantage smaller firms. Larger companies typically have greater financial resources and can more easily afford to purchase additional permits when needed. This can create a disincentive for larger polluters to invest in pollution reduction strategies knowing they can simply buy their way out of compliance. The disparity in the ability to acquire permits could exacerbate market concentration, potentially leading to the domination of larger firms as smaller rivals struggle to compete under the financial burden of permit purchases.

Exam Tips:
Tradable permits can only be used when the external cost is easily measured. It is most often used in the context of air pollution where the pollution by firms can be measured by installing filters. Using tradable permits in the context of problems like smoking cigarettes would be incorrect.

Negative Externality Policy: Public Education

The government can use public campaigns to educate the public about the harmful effects of certain consumption/production activities on third parties. While economic agents are typically self-interested, such policies can influence them to be more socially conscious and act more responsibly.

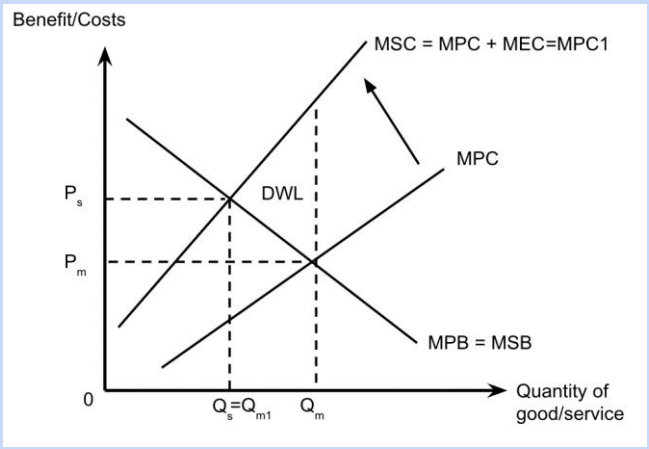
For example, campaigns highlighting the damage plastic waste causes to marine life may encourage consumers to reduce their use of single plastic bags or bottles.

As a result, consumers/producers may begin to internalise the MEC, effectively incorporating it into their MPC. As a result, MPC increases from MPC to MPC_1, represented by a leftward shift of the MPC curve as seen from Figure 10.

At the original market equilibrium output level Q_M, MPC is now more than MPB. Rational consumers will decrease consumption till the point where $MPB=MPC_1$ to maximise their personal utility/satisfaction.

Therefore, the market equilibrium output decreases from Q_M to Q_{M1} which coincides with the socially optimal output level. This eliminates the deadweight loss and achieves an efficient allocation of resources.

Figure 10: Public education to correct market failure due to negative externalities



Evaluation of Public Education	
Consideration	**Strengths**
Cost Effectiveness	Depending on the type of public education, the cost of financing may vary. However, once the initial effort has been created, the content used could be reused or tweaked to achieve the same outcome in the long run. Hence, this policy may be less costly as compared to other policies like subsidies which require constant financing as well as rules and regulations which incur monitoring costs. Furthermore, the knowledge of cognitive biases can be exploited by the government to enhance the effectiveness of public education without incurring significant additional costs. The government may be aware of salience biases in consumers. Salience bias describes our tendency to focus on items or information that are more noteworthy, while ignoring those that do not grab our attention. As such, the government can include information in the public education campaign that can more easily capture the attention of the public without incurring additional cost. This ensures that the messaging from the education campaign will be more effective. For example, obesity is a more visible problem as compared to other issues like diabetes. Thus, public education campaigns aimed at reducing sugar consumption are likely to be more successful than if they were to focus on how sugar can help weight loss rather than how it can help prevent diabetes.
Improved Public Receptivity	Public education is a softer approach compared to other policies such as rules and regulations which force consumers/producers to comply or risk running afoul of the law. As such, public education is likely to be more well received by the target audience and would be less likely to lose political support from the citizens.

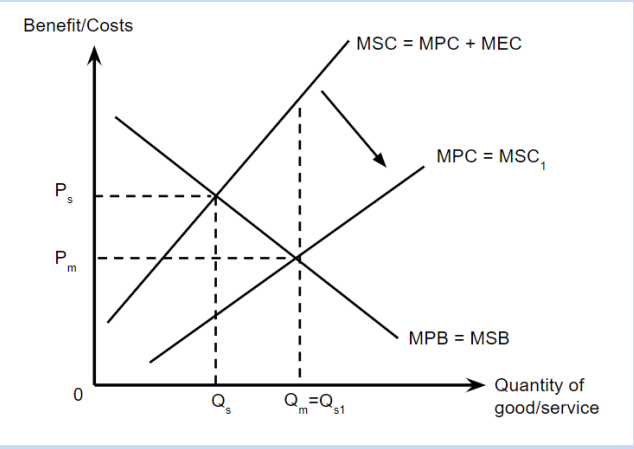
Consideration	Limitations
Delayed Impact	Consumers or producers may take a long time to understand or be convinced by the public education effort. The consumption habits for some types of goods, especially addictive goods like cigarettes and alcohol, would take some time to be changed.
Uncertainty of Outcome	The funds spent may not achieve the desired results. The outcome is uncertain as it depends on how receptive the public is to the campaigns. As such, public education may not be suitable to resolve serious problems that require certainty in outcomes. For example, drivers often continue to drink excessively despite knowing that drunk driving may cause harm to third parties.

Negative Externality Policy: Publicly Funded R&D

The government can invest directly in R&D or to subsidise firms by reducing the costs of innovation to encourage them to do R&D to source for new ways to mitigate the external costs that are involved in the production of the goods.

Assuming that the R&D can result in elimination of MEC, the new marginal social cost (MSC_1) will now be equal to MPC as seen from Figure 11. At the original socially optimal output level, $MSB>MSC_1$, thus the socially optimal output level will increase to the level where $MSB = MSC_1$ in order to maximise social welfare. The original market output level Qm is now also the socially optimal output level. Therefore, the DWL will be completely eliminated.

Figure 11: R&D to correct market failure due to negative externalities



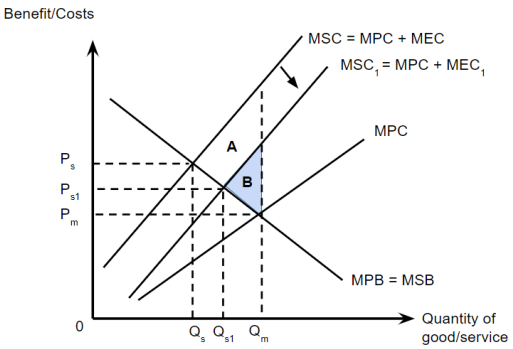
Examples:

- **Energy market**: The development of renewable sources of energy such as commercially viable solar panels help to reduce the demand and usage of fossil fuel which decreases the amount of carbon emission and slows down the effect of global warming.

- **Transport market:** The continual improvement in the functionalities of electric vehicles will increase the consumer's demand for electric vehicles. With more electric vehicles on the road, this will help to reduce negative externalities from carbon emissions.
    - Note: EVs do not solve negative externalities from traffic congestion as if all existing vehicle owners switch to electric vehicles, the number of vehicles on the road would still be similar.
- **Red Meat Market**: The R&D into plant-based meat helps to make plant-based meat a viable alternative to red meat. The fall in demand for red meat will reduce the need to rear so much cattle. This will reduce the carbon emissions from the belching of cows.

Evaluation of Research & Development	
Consideration	**Strengths**
Addresses the Root Cause	Investment into R&D targets the root cause of the problem which is the removal of the negative externality. By identifying and addressing the root cause, the issue is effectively resolved which ensures that the problem is unlikely to persist or recur. This saves time, resources, and effort that would otherwise be spent repeatedly dealing with the same issue.
Consideration	**Limitations**
Long Development Time Frame	Many R&D projects involve tackling complex problems or developing innovative solutions. These require extensive research, experimentation, and testing to ensure success. Therefore, the effects of R&D may take a very long time to be seen, and it might not be a viable policy to tackle urgent problems. In using R&D to address market failure for externalities, it is more likely for the technology to reduce MEC on a gradual basis rather than all at once. The MSC will decrease and shift right to MSC1 as seen from Figure 12. The new socially optimal output level increases from Q_S to Q_{S1}. The new socially optimal output level is now closer to the market output level Q_M. Rather than the complete removal of the deadweight loss, it is more likely that R&D will reduce the degree of market failure as the deadweight loss reduces from area A to B in the short run.

Figure 12: Time lags in R&D



High Initial Production Costs	During the initial stages, the production costs associated with adopting new technologies can be prohibitively high for firms. This is primarily due to the challenges of scaling up nascent technologies to achieve cost-effectiveness on a commercial scale. Consequently, firms may hesitate to embrace these innovations until they reach a level of maturity where their implementation becomes feasible at lower costs.
Uncertainty and Opportunity Costs	Investment into new technology will require a lot fundings but the results are not guaranteed. This is because innovation requires numerous rounds of trials and errors and even so, there may not always be a successful outcome. As such, there can be significant opportunity costs incurred by the government as funds could be used on other areas or policies that bring about more certainty in outcomes.

2.2.4 Positive Externalities

Definition: Positive externalities arise when the production or consumption of a good generates benefits to a third party not involved in the production or consumption of the good, and the third party does not pay for the benefit enjoyed.

If the consumption or production of a good generates positive externality, then the benefit to society is greater than the benefit which the consumer or producer enjoys.

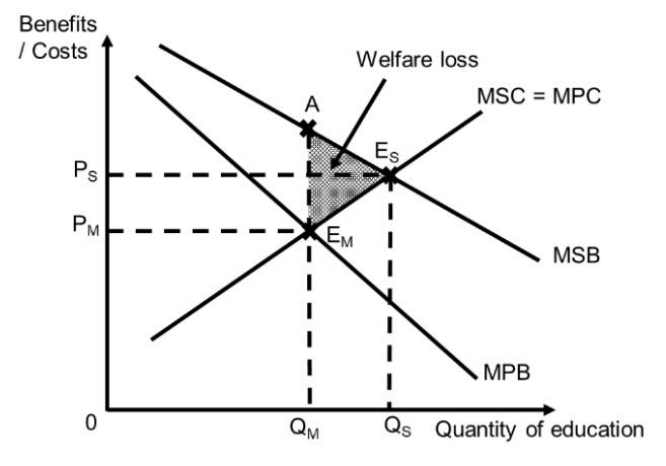
Positive Externalities in the Market for Education

Step 1: Explain the free market equilibrium.

- Students only consider their self-interests when choosing whether to pursue a higher level of education or not. This involves looking at their marginal private cost (MPC) and marginal private benefit (MPB) when making their decision:
  - MPC: Additional fees for enrolling in additional unit of education
  - MPB: The additional satisfaction gained from additional education; higher expected wages and more job opportunities arising from pursuing additional education
- To maximise their own satisfaction, they will choose to consume the level of education Q_m where their MPC = MPB. (Recall that this is the condition at which economic agents maximise their well-being as they can do no better by consuming more or less education) Thus, Q_m is the market equilibrium consumption level. Refer to the diagram below:

Note: Since the externalities arise from consumption, the analysis of MPC and MPB is from the point of view of

Figure 13: Market Failure in market of education due to positive externalities in consumption



Step 2: Explain marginal external benefits of education.

- However, these students do not take into account the impact of their education on third parties. Thus in this instance, there is a positive externality generated through their action of pursuing higher education. This implies that the marginal external benefit (MEB) is greater than zero.
    - MEB: a more productive workforce contributes to higher outputs generated in the workplace, benefiting employers.
- Since MEB is positive, this implies that MSB is greater than MPB **(MSB > MPB)** as MSB = MPB + MEB. This is illustrated above.

Step 3: Explain the social optimum.

- To society, social optimum is at Q_S where MSB = MSC, as this maximises society welfare.
- Since $Q_M < Q_S$, there is an **underconsumption** of education by Q_MQ_S.

Step 4: Explanation of deadweight loss.

- Deadweight loss is incurred for every additional use of education not consumed from Qm to Qs as MSB > MSC. The deadweight loss is represented by area **E_SE_MA.** In the context of positive externality, the deadweight loss represents the potential gain in total net benefit to society with the additional consumption of Q_SQ_M.
- Society's welfare can be increased by increasing the consumption of education.
- Thus, the market fails as too few resources are allocated towards the production and consumption of education.

Positive Externalities in Production vs Consumption:

In the analysis of the problem, it is important to identify whether the positive externality comes from production or consumption of the good. This will determine whether the analysis of MPB and MPC is from the consumers' or producers' point of view.

	Positive externality in **PRODUCTION**	Positive externality in **CONSUMPTION**
Economic agent causing externality	Producers	Consumers
Example	Market for mangoes	Market for vaccinations
Marginal private benefit (MPB) incurred	Additional revenue earned from an additional mango sold	Additional gain in protection from illnesses and better health from an additional vaccine taken
Marginal private cost (MPC) incurred	Additional cost of land and labour to produce an additional mango	Additional cost of buying an additional vaccine
Third party affected by production / consumption	The neighbouring beekeeper *(assuming neighbour is running a honey-production business)*	Those who are not vaccinated and firms who hire vaccinated employees
Marginal external benefit (MEB) incurred by third party	The flowers of the mango trees provide a good source of nectar for the bees, allowing the beekeeper to harvest a healthy level of honey	Less spread of diseases resulting in lower healthcare cost incurred even by those who were not vaccinated. Firms enjoy higher productivity as employees are less likely to take sick leave
Marginal social benefit (MSC)	Since MEB > 0, MSB > MPB	Since MEB > 0, MSB > MPB
Consequence	Mangoes are being **under produced**; welfare of society is not maximised	Vaccines are being **under consumed**; welfare of society is not maximised

2.2.5 Government Intervention for Positive Externalities

The objective of government intervention in the case of positive externalities is to increase the production/consumption levels to the socially optimal levels where MSB=MSC. Like the policies addressing negative externalities, governments can consider intervening in the market by influencing either the consumer or producer.

As with previous explanations, the government must go through decision-making processes before implementing the measures.

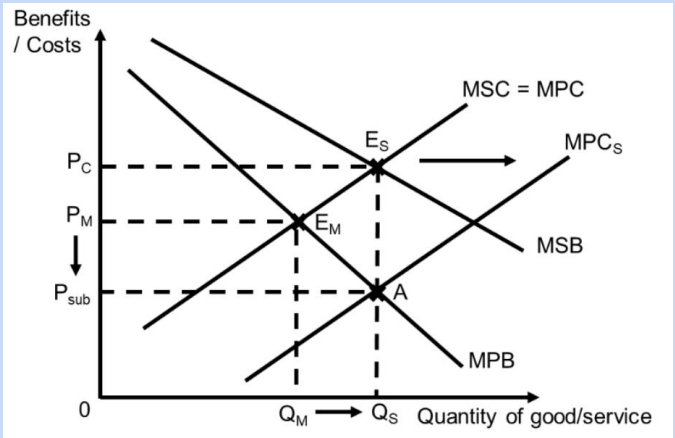
Positive Externality Policy: Subsidy

There are two broad types of subsidies, one given to producers and the other for consumers. Most of the time, subsidies on goods and services are given to producers, but consumers may still benefit if a portion of this subsidy is passed onto them in the form of lower prices.

Subsidy given to Producers:

- A subsidy to producers is meant to lower the cost of production to producers (by the government absorbing part of the cost) so as to encourage a higher production level.
- The amount of subsidy (subsidy = E_SA) is based on the value of the marginal external benefits generated at the socially optimal output level Q_S.
- With a lower cost of production, producers' MPC of producing the good decreases thus shifting MPC to the right to MPC_S.
- With lower cost of production, producers are not maximising their profits as MPC_S < MPB At Q_M
- Rational producers will increase production until MPC_s = MPB. Thus, the new market equilibrium is at A, determined by MPC_S = MPB. The market quantity will be increased from Q_M to Q_S.
- The subsidy has caused the market output to be increased to coincide with the socially optimal output, Q_s, via the decrease in cost of production in price, thereby eliminating the deadweight loss.

Figure 14: Subsidies to correct market failure due to positive externalities



Subsidy given to Consumers:

- Subsidies to consumers make goods and services more affordable to the consumers directly.
  - For example, in 2019, the Singapore government announced a top-up of $150 to be provided to the Edusave accounts of Singaporean children aged 7 to 16, on top of the annual contributions that they currently receive. Students above the age of 16 who are still in a MOE-funded secondary school will also receive the top-up. This brings the amount received by the primary school students to $380 and secondary school students to $440 by mid-2019.
- The amount of subsidy is based on the value of the marginal external benefit generated at the socially optimal output level, indicated by E_SA in Figure 14 above.
- A subsidy that is received directly by consumers will shift the MPC curve to the right to MPC_S, as their cost of consuming that good is now lower with the subsidy.

- **Consumer's MPC of consuming the good decreases thus shifting MPC to the right to MPC_S.**
- **With lower costs, consumers are not maximising their satisfaction as MPC_S < MPB at Q_M**
- **Rational consumers will increase consumption until MPC_S = MPB**. Thus, the new market equilibrium is at A, determined by MPC_s = MPB.
- The new quantity consumed will be increased from Q_M to Q_S.
- The subsidy has caused the market output to be increased to coincide with the socially optimal output, Q_s, via the decrease in out-of-pocket expenses, thereby eliminating the deadweight loss.

Evaluation of Subsidy	
Consideration	**Strengths**
Flexibility	Subsidies offer more flexibility to respond to different conditions. This allows for a more effective and accurate response in addressing positive externalities. Subsidies are often more flexible than regulatory approaches. Subsidies can be more easily adjusted and tailored for specific industries, regions, or circumstances, allowing policymakers to target positive externalities precisely (assuming perfect information) compared to regulatory approaches that often adopt a one-size fits all approach. This flexibility enables a more effective and accurate response in addressing the market failure that arises from positive externalities as the deadweight loss can be more precisely targeted.
Lower Monitoring Costs	Subsidies can be a cost-effective way to address market failures as it requires less monitoring needed by the government. Firms and households continue to freely pursue their self-interests through the consumption and production decisions made. Since market forces operate based on the new valuations of MPB and MPC, the social optimal level can be achieved without much monitoring by the government. By reducing the costs of intervention, it helps the government to better manage its expenditure. This reduces the risk of the government running into a budget deficit. Furthermore, it ensures that the government has more budget to finance other developmental needs that can benefit the country.
Reduced Market Distortions	When designed appropriately, a market-based policy[4] like subsidies can minimize market distortions compared to other intervention methods. Subsidies work within the existing market framework by influencing consumers' and producers' valuations of MPB and MPC. This ensures that along with addressing market failure, market equilibrium is also achieved. In contrast, to price control policies and rules and regulations which may lead to unintended consequences such as market

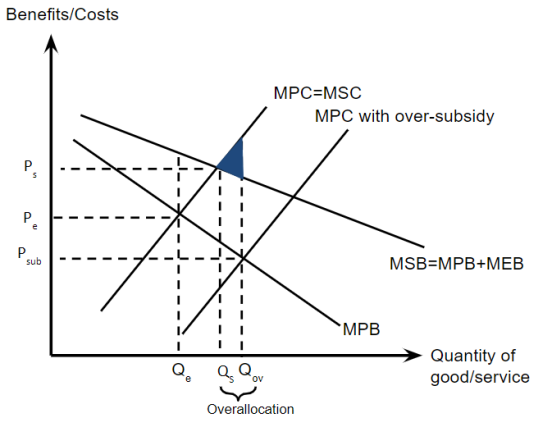
[4] A market-based policy is a type of economic or regulatory measure that relies on market forces to achieve certain objectives or address specific issues. Instead of direct government intervention, market-based policies harness the dynamics of supply and demand, prices, and competition to influence behaviour and outcomes in the economy.

	disequilibrium (shortage or surplus) which can worsen allocative inefficiency.
Political Feasibility	Subsidies often involve reducing consumption and production costs to specific industries or groups, which may garner more support and acceptance from affected stakeholders compared to measures perceived as restrictive or punitive such as compulsory consumption (rules and regulation). Therefore, it's crucial to consider political feasibility, as the governing party is less inclined to implement a policy if it jeopardises its chances of re-election in the upcoming election
Reduced Inequity	The government can subsidise the production or consumption of essential goods and services which the poor need but may not be able to afford, e.g. education and housing. With a reduction in consumption costs, subsidies provide more equal opportunities for the poor to access the goods and services which helps to reduce inequity.
Consideration	**Limitations**
Price Elasticity of Demand	The effectiveness of subsidies in increasing consumption levels is also dependent on **price elasticity of demand**. If the demand for the good is price inelastic, consumers are less responsive to a change in price. As such, the decrease in price due to a subsidy would lead to a less than proportionate increase in quantity demanded. Therefore, the increase in quantity consumed may be insufficient to eliminate the deadweight loss. The government will need to provide a larger subsidy to the producer to reduce the cost of production of the good in order to lower the price significantly so that consumers will respond sufficiently to consume at the socially optimal level. In addition, providing a large subsidy may also result in a larger financing and opportunity cost incurred which will also bring about negative consequences. (see next point below).
High Cost of Financing	High government expenditure is required to finance subsidies and the government may not have the financial capability to finance it. ***Refer to "high cost of financing" on page 10 for the full explanation of this limitation.***
Over Reliance on Government	Subsidies may lead to an overreliance on the government and the public may expect the government to provide larger subsidies in the future. Furthermore, once a subsidy is given, it is difficult for the government to remove the subsidy without creating unhappiness among the residents. This may be a risk that the government is unwilling to take as it may not want to risk losing political support from the citizens. As a result, with general costs for services likely to be trending upward (especially for healthcare), the government will face a situation of having to spend an increasingly larger amount on subsidies in the coming

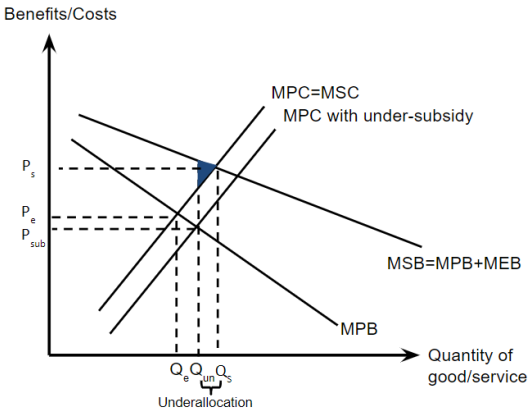
	years and this represents a significant opportunity cost. As such, the issue of sustainability of the policy will be a growing concern for the government.
Potential for Waste	The public may abuse these subsidies by cheating the government through false claims. This will lead to the government spending more on subsidies than necessary. This incurs an opportunity cost as these extra funds could have been better allocated to other public development projects that could bring about more improvement in social welfare. For example, SkillsFuture Singapore was cheated of $40 million through bogus claims in the biggest case of a government agency being defrauded in 2017 where claims were made for courses that were not conducted. Subsidies may help inefficient firms survive leading to wastage of resources. Inefficient firms may have higher cost of production and are likely to make losses and exit the industry. However, subsidies help these inefficient firms cover their cost of production, allowing these firms to survive. There is a wastage of resources as the resources could be better allocated to other public development projects that could bring about more improvement in social welfare.
Imperfect Information	It may be difficult to measure or value the exact external benefit of consuming a good that generates positive externalities at the socially optimal output level Qs. This is because many of the external benefits may only be enjoyed in the future, and it may be hard to forecast and estimate the valuation of the external benefits. For example, it is difficult to measure the increase in productivity and hence economic growth due to higher levels of education when the returns to education for individuals will only take place many years down the road. As such, the government may misestimate the value of subsidy to be imposed to remove the deadweight loss. If there is an overestimation of MEB, it will result in an over subsidization that may cause an inefficient allocation of resources as there is now an overconsumption of the good/service (Refer to Figure 15a). In fact, if the over subsidization is severe, the DWL from the over subsidization may be greater than the original DWL due to positive externalities. If there is an underestimation of MEB, this will result in an under subsidization. As such, the deadweight loss may be reduced but it is not eliminated completely (Refer to Figure 15b).

Figure 15: Misestimation of MEB

15a: Overestimation of MEB



15b Underestimation of MEB

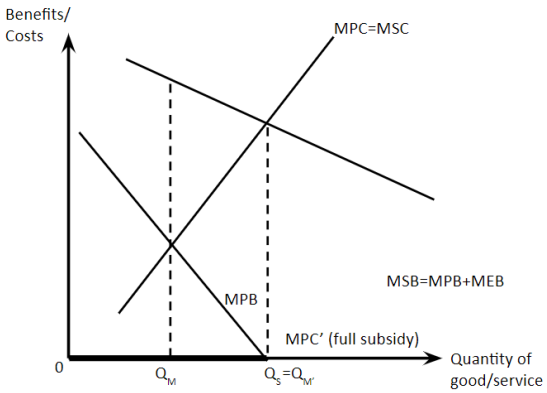


Special Case: Full Subsidies

For some good/service with significant positive externalities (i.e. there is a large divergence between MSB and MPB), the government may choose to subsidize it fully. In other words, the good/service will be provided for free to consumers. One example was COVID-19 vaccinations. However, do take note that a full subsidy is only justified when the MEB is significantly large. Otherwise, implementing a full subsidy could result in an even greater inefficient allocation of resources.

Let us now look at the different cases:

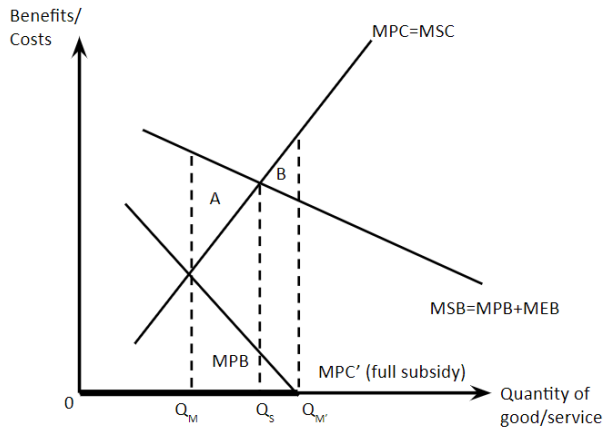
Case 1: Implementation of full subsidy is fully justified (Figure 16a)



Since the good/service is provided for free, the MPC of consumers is now zero as there is no longer any private costs to the consumers. This is represented by the line MPC' which is a horizontal line on the X axis as shown on the diagram.

With lower costs (in fact the cost is now zero), consumers are not maximising their satisfaction as MPC' < MPB At Q_M. To maximise their utility, consumers will now increase their consumption and consume at the new market equilibrium output level of consumption at Q_M' where MPC'=MPB which coincides with Qs where MSB=MSC. This eliminates the DWL, thereby achieving social optimum.

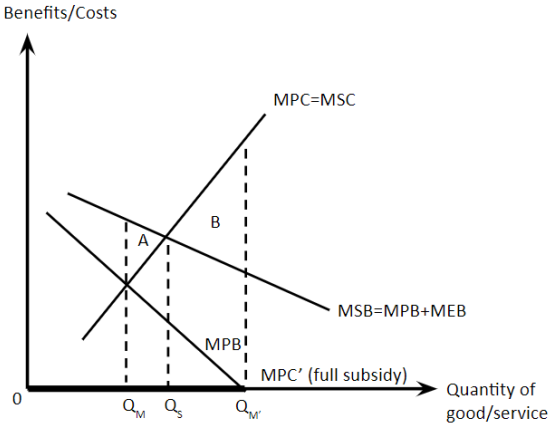
Case 2: Implementation of full subsidy is justified despite causing deadweight loss (Figure 16b)



The government may still choose to implement a full subsidy despite the fact that the MEB is not large enough.With a full subsidy, the consumers increase consumption from Q_M to $Q_{M'}$ where MPC'=MPB.

However, $Q_{M'}$ is higher than the social optimal output Qs, implying an overallocation of resources. As such, there is a DWL after the intervention as MSC is actually higher than MSB for the units between Qs and $Q_{M'}$, This causes a net loss to the society. However, the DWL after intervention (Area B) is smaller than the DWL before intervention (Area A). This implies that the society is better off with the implementation of full subsidy. Therefore, the use of full subsidy is still justified.

Case 3: Implementation of full subsidy is not justified (Figure 16c)



The government may misperceive the extent of the benefit and actual MEB may not be as large. In this case, a full subsidy is not justified as the government has caused a situation of overallocation of resources where the output of good/service consumed after the full subsidy $Q_{M'}$ is higher than the social optimal output Qs.

As such, there is a DWL after the intervention as MSC is actually higher than MSB for the units between Qs and $Q_{M'}$, This causes a net loss to the society.

In fact, due to the government over subsidising, the DWL after intervention (Area B) is larger than the DWL before intervention (Area A). This implies that the society is better off without the intervention.

Positive Externality Policy: Joint Production

Joint production (also referred to as joint provision) means that the good/service is jointly provided by **both** the **public and the private sector**.

The government allows the private sector to provide OQ_M and it will supplement the rest of the output (Q_MQ_S) to ensure consumption is raised to the social optimum. (Refer back to Figure 13)

- Examples: presence of government schools, hospitals and clinics co-existing with privately-supplied medical services.

Evaluation of Joint Production	
Consideration	**Strengths**
Greater Variety and Quality	Joint production can lead to a wider variety of services and potentially higher quality provision. The private sector can cater to niche markets with premium services, while the public sector focuses on essential services for lower-income populations. This creates a competitive dynamic that can improve overall service quality.
Reduced Inequity	Public provision allows for essential goods and services to be offered at lower costs or with subsidies, making them more accessible to low-income earners. This promotes greater equity in access to these necessities.
Consideration	**Limitations**
High Cost of Financing	The public's expectation of free or heavily subsidised services creates a significant financial burden on governments. ***Refer to "high cost of financing" on page 10 for the full explanation of this limitation.***
Imperfect Information	Difficulties in estimating the value of external benefits can make it challenging to determine the optimal level of public provision. The government may misjudge the extent of market failure, leading to overproduction or underproduction of essential services and a potential loss of social welfare. The public sector may lack the efficiency and responsiveness of private firms, potentially leading to higher production costs and lower service quality compared to private providers.

Positive Externality Policy: Rules & Regulations

Rules and Regulations aim to achieve efficient allocation of resources by increasing consumption to the socially optimal level through correction of behaviour. One example of rules and regulations to address positive externalities is compulsory consumption.

Compulsory consumption:

- This is where consumption of a good may be made compulsory by legislation.
- For example, under the Compulsory Education Act, a child of compulsory school age who is:
  (a) born after 1st January 1996;
  (b) a citizen of Singapore; and
  (c) residing in Singapore,

  Shall attend regularly as a pupil at a national primary school. Where a child of compulsory school age fails to attend regularly as a pupil at a national primary school as required, each parent of the child shall be guilty of an offence.

Evaluation of Rules & Regulations	
Consideration	**Strengths**
Guaranteed Social Optimum (Limited Cases	For activities that generate a high level of positive externality e.g. primary education, rules and regulations would more likely ensure that society consumes at the socially optimal level. Rules and regulations are clear and easy to follow and more likely to achieve the government's objective
Clarity, Predictability, and Immediate Effects	Rules and regulations are clear and easy to follow and thus, it is more likely to achieve the government's aims quickly. Once the rules are implemented, it is mandatory for all to abide by the law and the intended outcome can be achieved immediately. As such, the external benefits such as the gain in productivity from higher consumption of education and healthcare can be realised at a much quicker pace.
Consideration	**Limitations**
High Monitoring and Enforcement Costs	There are costs involved in maintaining a large manpower base capable of enforcing the regulations and monitoring the markets. ***Refer to "high cost of financing" on page 10 for the full explanation of this limitation.***
Burden on Low-income Households	Rules and regulations such as compulsory primary school education may place a financial burden on the lower income families if no or little subsidies are given to help the families pay for the education. As a result of having to comply with the rules and regulations, they may have less to spend on other necessities such as healthcare and food which may negatively impact their health, thereby reducing their non-material standard of living.

Positive Externality Policy: Public Education

The government can use public campaigns to educate the public and inform them about the positive benefits of certain consumption/production activities on third parties. While economic agents are typically self-interested, such policies can influence them to be more socially conscious and act more responsibly.

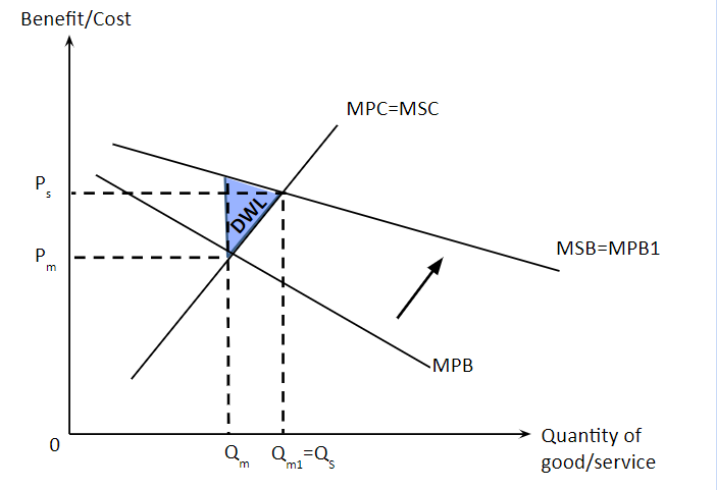
For example, there could be campaigns to share about the external benefits of annual health check-ups or vaccinations.

As a result, consumers/producers may begin to internalise the MEB, effectively incorporating it into their MPB. As a result, MPB increases from MPB to MPB_1, represented by a rightward shift of the MPB curve as seen from Figure 17.

At the original market equilibrium output level Qm, MPB is now more than MPC. Rational consumers will increase consumption till the point where MPB_1=MPC to maximise their personal utility/satisfaction.

Therefore, the market equilibrium output increases from Qm to Qm1 which coincides with the socially optimal output level. This eliminates the DWL and achieves an efficient allocation of resources.

Figure 17: Public education to correct market failure due to positive externalities



Evaluation of Public Education	
Consideration	**Strengths and Limitations**

Refer to Section 2.2.3: Strengths and limitations of public education to address negative externalities (page 27). The strengths and limitations of public education to address positive externality are similar.

Positive Externality Policy: Publicly Funded R&D

R&D can occur in a wide range of markets and depending on the market and the technology involved, it could impact either the MPC or MPB of consuming/producing a good/service.

Examples that increase MPB:

- Healthcare market:
  - The advancement in medical technology that helps to detect illnesses earlier, reduce recovery time and discomfort.
  - Telemedicine that increases the convenience of going for medical consultations.
  - The above two examples would then increase the MPB of the healthcare market.

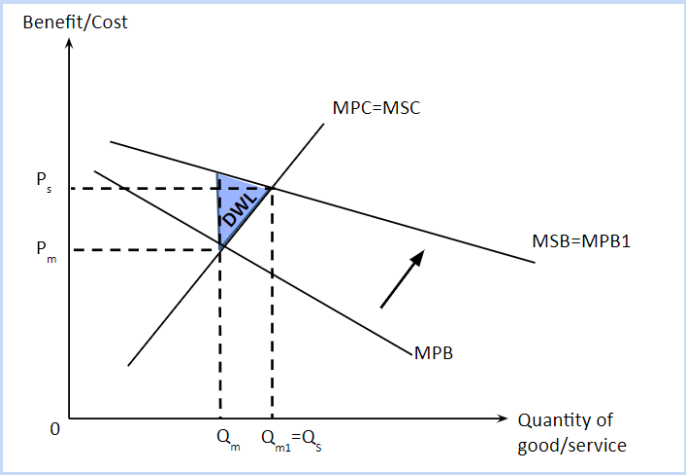
Examples that reduce MPC:

- The use of automation and advanced robotics to increase productivity. One example is the use of robots to deliver meals and medicines to help cut labour costs in hospitals.

For R&D efforts that increase MPB:

- Government can directly invest in R&D or provide subsidies to firms who are researching new technology that can be used to increase the quality of the good/service or the improvement in methods/processes which increases the MPB of the good/service.
- With reference to Figure 18, The MPB curve will shift to the right to MPB_1, cutting the MPC curve at a new market equilibrium. At the original market output level Qm, MPB_1 is now more than MPC.
- Rational consumers will increase consumption till the point where MPB_1=MPC to maximise their personal utility/satisfaction.
- Therefore, the market equilibrium output increases from Qm to Qm_1 which coincides with the socially optimal level. This eliminates the DWL and achieves an efficient allocation of resources.

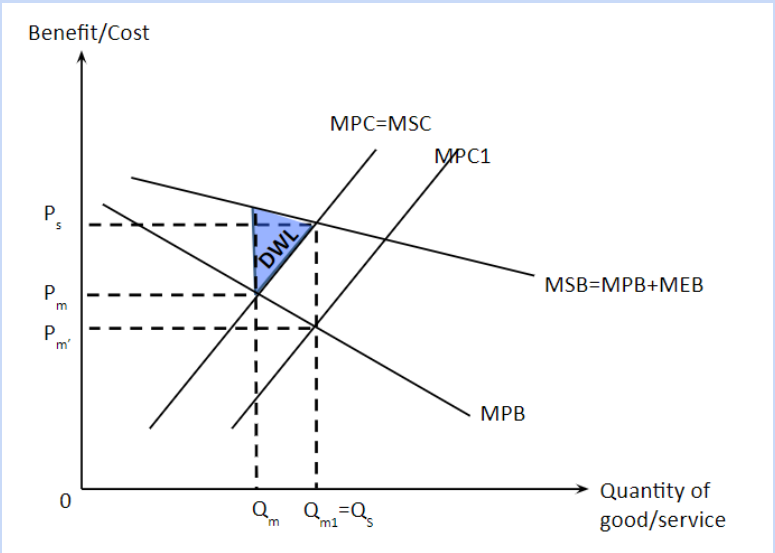
Figure 18: R&D to increase MPB



For R&D efforts that reduce MPC:

- R&D into new technology and processes can improve productivity of firms. This reduces the cost of production. (For externality in consumption: Firms may pass on the cost savings to consumers in the form of lowered prices) This causes the MPC to decrease, which causes the MPC to decrease to MPC_1.
- With reference to Figure 19, at the original market equilibrium output Qm, MPB>MPC_1, thus rational consumers/producers will increase their consumption/production till the point where MPB=MPC_1 to maximise their personal utility.
- The new market equilibrium is where MPC_1 = MPB and the new market output level increases from Qm to Qm1. This coincides with the socially optimal output. The increase in consumption/production to the socially optimal output level corrects for the market failure as the DWL is eliminated.

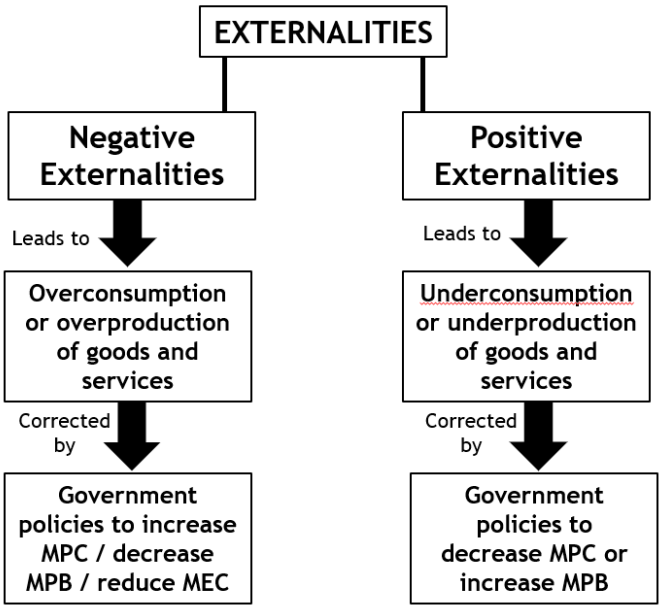
Figure 19: R&D to reduce MPC



Evaluation of Research & Development	
Consideration	**Strengths**
Long term and permanent solution	The improvement in benefits for consumers or the reduction in the cost of productions for producers from research and development are long term as once the innovations are realised, the benefits can be enjoyed without additional investment costs.
Consideration	**Limitations**

Refer to Section 2.2.3: Strengths and limitations of R&D to address negative externalities for the limitations.

Summary of Externalities



Key Learning Points in Section 2.2:

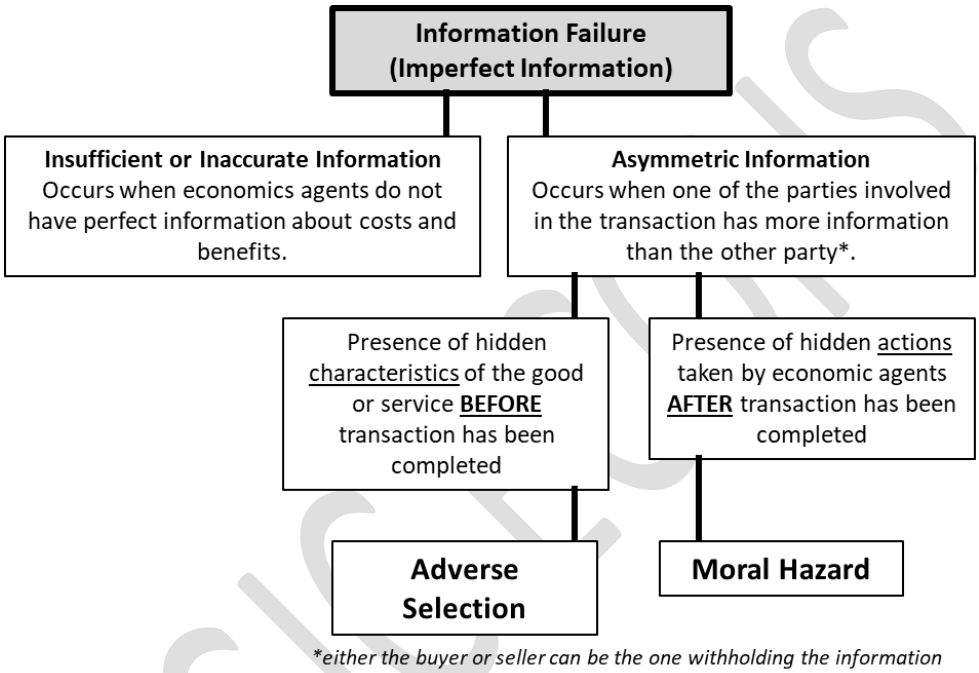
- ✓ Externalities are spillover effects that could positively or negatively affect third parties who are not involved in the transaction.
- ✓ Externalities could arise through the consumption or production of goods.
- ✓ A market fails (socially efficient level not attained) when externalities are not accounted for in the decision to consume or produce.
- ✓ Government intervention is necessary to achieve the socially efficient level.

2.3 Information Failure

- Recall that the price mechanism achieves an efficient allocation of resources (social optimum) if all economic agents have perfect information about the product or service (e.g. buyers and sellers knowing the quality of the product).
- However, this is hardly true in the real world as there might be information failure, which results in inefficient market outcomes.

Information failure, or imperfect information, is one of the key **underlying causes of market failure**. There are two types of imperfect information:

- Insufficient or inaccurate information
- Asymmetric information



2.3.1 Insufficient and Inaccurate Information

- Consumers/producers may be unaware of the true costs and benefits of consuming/producing a good.
- This could be because they have insufficient information on the product, or inaccurate information, perhaps due to misleading marketing strategies.

There are many situations that can lead to insufficient or inaccurate information, such as:

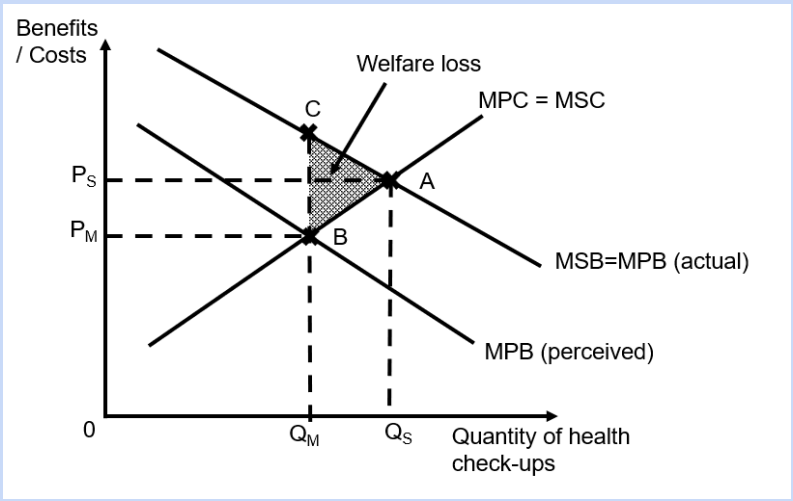
- Product complexity
- Misleading information
- User inexperience/ignorance
- Myopic decision making/uncertain about the future.

Market Failure due to Insufficient and Inaccurate Information

Problem 1: Consumers underestimate the benefits of consumption (e.g. health check-ups)

- Due to ignorance, consumers may not be aware of the full benefits to themselves of going for regular health check-ups.
  - For example, healthy consumers may not realise that earlier detection of certain illnesses could increase the chance of recovery and extend their life expectancy in the long term.
- Thus, they may underestimate the actual private benefits.
- The consumer's perceived marginal private benefits (MPB) of health check-ups are lower than the actual marginal private benefits. (i.e. MPB perceived is lower than MPB actual)

Figure 20: Market Failure due to Imperfect Information (Underconsumption)



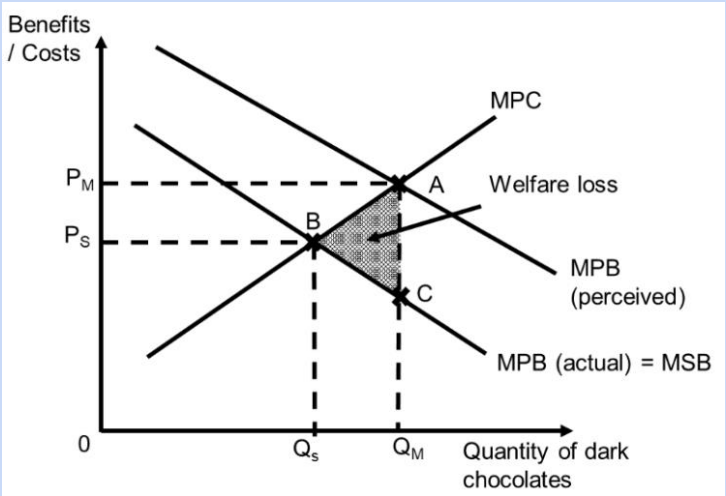
- Assuming that MSC = MPC, and MSB = MPB_{actual}, (i.e assuming no externality issues).
- With insufficient and/or inaccurate information, market equilibrium is at B where $MPB_{(perceived)}$ = MPC and actual consumption is at Q_M.
- However, social optimum is at A where $MPB_{(actual)}$ = MPC and consumption should be at Q_S.
- At the Q_M^{th} unit consumed, $MPB_{(actual)}$ is CQ_M and MPC is BQ_M. $MPB_{(actual)}$ is higher than MPC. Thus, there is a net benefit of CB to be gained but is not gained by the consumers.
- , $MPB_{(actual)}$ is more than MPC for the units between Q_M and Q_S. Additional consumption of health check-ups from Q_M to Q_S would have increased welfare by area ABC in Figure 20.
- However, under free market conditions, consumers would consume at Q_M, which is lower than Q_S.

- Therefore there is an **under consumption** of health check-ups of $Q_M Q_S$ and there is a **deadweight loss of** area ABC in Figure 20 where the societal welfare could have increased if quantity consumed was to increase up to Qs.

Problem 2: Consumers overestimate the benefits of consumption (e.g. misleading advertisements)

- Firms may sometimes adopt **persuasive advertising**. This aims to convince its audience of a certain belief that leads to them buying their products. Such advertisements could result in inaccurate/misleading information given to consumers.
    - For example, a dark chocolate firm may claim many benefits of consuming dark chocolate, such as reduced blood pressure. However, these claims are often based on studies that exaggerate their findings.
- Consumers may overestimate the actual benefit to their health involved in eating the dark chocolate (i.e. MPB perceived is higher than MPB actual)

Figure 21: Market Failure due to Imperfect Information (Overconsumption)



- Assuming that MSC = MPC, and MSB = MPB_{actual}, (i.e assuming no externality issues).
- With insufficient and/or inaccurate information, market equilibrium is at A where $MPB_{(perceived)}$ = MPC and actual consumption is at Q_M.
- However, social optimum is at B where $MPB_{(actual)}$ = MPC and consumption should be at Q_S.
- At the Q_M^{th} unit consumed, $MPB_{(actual)}$ is CQ_M and APC is CQ_M. $MPB_{(actual)}$ is lower than MPC. Thus, there is a net cost of AC incurred by consumers for excessive consumption of dark chocolate.
- , $MPB_{(actual)}$ is less than MPC for the units between Q_M and Q_S. Reducing consumption of dark chocolate from Q_M to Q_S would increase welfare by area ABC in Figure 21.

- However, under free market conditions, consumers would consume at Q_M, which is higher than Q_S.
- Therefore, the additional consumption of dark chocolate from Q_S to Q_M resulted in an **over consumption** of dark chocolate by Q_SQ_M. There is a **deadweight loss** of shaded triangle area ABC in, where the societal welfare would have increased if the quantity consumed was to reduce to Q_S.

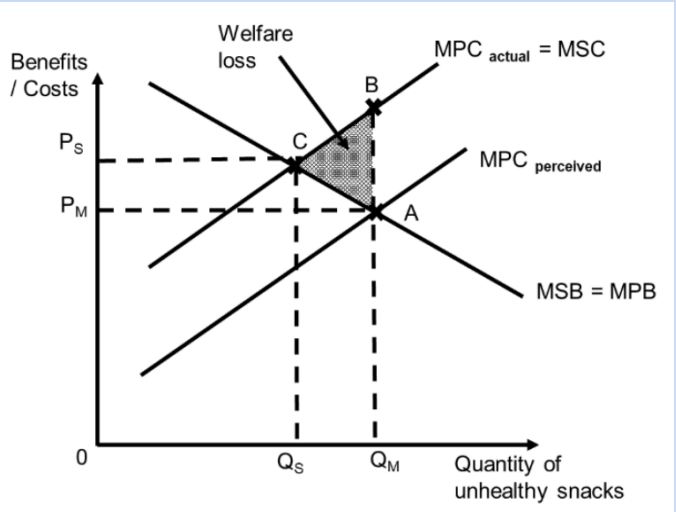
The above analysis of insufficient and inaccurate information focuses on the estimation of benefits. Consumers can also wrongly estimate the costs of consuming a good.

Problem 3: Consumers underestimate the costs of consumption (e.g. User's ignorance or myopic decision making/uncertainty about the future)

When left to the free market, there are some goods and services that are over-consumed because of consumers' **failure to recognise the full costs** that could be incurred in their consumption. They end up undervaluing their private costs. Alcohol and gambling are examples of goods that are over-consumed due to information failure.

- Due to ignorance, individuals can be **unaware** of the full harmful effects (i.e. the actual cost) of consuming a good to themselves.
    - For example, individuals may be unaware of the actual harm associated with obesity and the implication it has on their own health when consuming excessive unhealthy snacks.
- In other words, they may underestimate the actual private cost.
- Thus, a consumer's perceived marginal private costs ($MPC_{perceived}$) for unhealthy snacks are lower than the actual marginal private costs (MPC_{actual}) for unhealthy snacks because of the information gap.

Figure 22: Market Failure due to Imperfect Information (Overconsumption)



- Assuming that MSC = $MPC_{(actual)}$ and MSB = MPB, (i.e., assuming no externality issues).
- With insufficient and/or inaccurate information, market equilibrium is at A where $MPB_{(perceived)}$ = MPC, and actual consumption is at Q_M.

- However, social optimum is at C where MPB = $MPC_{(actual)}$, and consumption should be at Q_S. At the QMth unit consumed, $MPC_{(actual)}$ is BQM and MPB is AQM. $MPC_{(actual)}$ is higher than MPB. Thus, there is a net cost of BA incurred by consumers.
- $MPC_{(actual)}$ is more than MPB for the units between Q_M and Q_S. Reducing consumption of unhealthy snacks from Q_M to Q_S would increase welfare by area ABC.
- However, under free market conditions, consumers would consume at Q_M, which is higher than Q_S.
- Therefore, the additional consumption of unhealthy snacks from Q_S to Q_M resulted in an overconsumption of unhealthy snacks by Q_SQ_M. There is a deadweight loss of area ABC, where societal welfare would have increased if the quantity consumed were to decrease to Q_S.

Note: There can also be a case where consumers overestimate the costs of consumption which can result in underconsumption of a good.

Take note:
Students often confuse externalities and imperfect information. The key difference is that externalities refer to an impact on a third party (external benefit/cost), while imperfect information refers to an impact on self (private benefit/cost).

2.3.2 Government Policies to Address Insufficient and Inaccurate Information

In addressing the issue of information failure, **government plays a crucial role to improve the functioning of markets** to achieve efficient allocation and fairer distribution of resources. This can be done through:

- Provision of information
- Providing incentives to facilitate the flow of information. This ensures accessibility of information to all relevant economic agents involved in the transactions.

Rules & Regulations

The government can implement rules and regulations that producers have to comply with to reduce imperfect information. For example:

- **Labelling of ingredients** is required for all food and beverage and beauty products. For food and beverages, producers are also required to chart the nutrition table.
- Advertisements need to adhere to the Singapore Code of Advertising Practice whereby all advertisements should be legal, decent, honest and truthful.
- **Advertising** is banned for some services, e.g. gambling and betting, some medical services, etc. This is to prevent persuasive advertising or misrepresentation.

With such rules and regulations put in place, it ensures accuracy of information disseminated through advertising. Thus, addressing the information gap, where consumers can make more informed decisions based on actual benefits and costs rather than perceived benefits and costs. This can thus lead to social optimum.

Evaluation of Rules & Regulations	
Consideration	**Strengths**
Predictability and Immediacy	Rules and regulations are clear and easy to follow and thus, it is more likely to achieve the government's aims quickly. Once the rules are implemented, it is mandatory for all to abide by the law and the intended outcome can be achieved immediately. As a result, rules and regulations can ensure that accurate information is provided within a shorter time frame.
Consideration	**Limitations**
High Cost of Monitoring and Enforcement	There are costs involved in maintaining a large manpower base capable of enforcing the regulations and monitoring the markets. This may result in a strain on the government's budget. ***Refer to "high cost of financing" on page 10 for the full explanation of this limitation.***

Public Education

Public education could include the **provision of accurate information** by the government so that information is easily available and accessible. This may also help consumers to be more aware of the actual costs and benefits, and make comparisons prior to purchase or consumption.

The government uses **campaigns** to educate the public and inform them about the full extent of benefits or harmful effects of the good.

For example:

- Governments may provide information on the healthier choices in food (with 'healthier choice' labels).

This aims at getting people to decide on the right amount of consumption for the good by making consumers and producers aware of the actual benefits or costs of consuming and producing a good respectively.

In doing so, it addresses the information gap by aligning the perceived MPB or MPC to the actual MPB or MPC respectively. With no difference between actual and perceived benefits/costs, it can ensure consumption and production at social optimum respectively, where market equilibrium output at Qm coincides with the social optimum, Qs.

Evaluation of Public Education	
Consideration	**Strengths and Limitations**
Refer to Section 2.2.: Strengths and limitations of public education to address negative externalities. They share similar strengths and limitations.	

Think about this:
Can you use a diagram to illustrate the impact of the above policies in correcting the market failure due to imperfect information?

2.3.3 Asymmetric Information

Asymmetric information is the situation in which the economic agents (e.g. consumers and producers) involved in the transaction do not have the same amount of knowledge (i.e. one party has more information than the other party does), resulting in a distortion of incentives where rational decision-making leads to inefficient market outcomes.

There are two potential outcomes of asymmetric information:

- **Adverse Selection**
- **Moral Hazard**

2.3.3.1 Asymmetric Information leading to Adverse Selection

Asymmetric information occurs when one party in a transaction has more or better information than the other party. This imbalance can lead to adverse selection, where one party makes decisions based on hidden information, resulting in suboptimal outcomes for the market.

- **Asymmetric Information:** One party hides information about the quality of the product or service from the other.
- **Adverse Selection:** Arises when certain parties naturally select themselves out of a market, which gives rise to missing markets where these parties do not get to buy or sell the good even though it may be beneficial for them to do so.

Adverse selection typically leads to the exclusion of high-quality goods from the market, as buyers cannot easily differentiate between higher and lower-quality options. This results in the overall decline of market efficiency.

Key Characteristics of Adverse Selection:

Aspect	Description
Cause	Asymmetric information between buyers and sellers.
Effect	High-quality goods are excluded, and lower-quality goods dominate the market.
Outcome	Market inefficiency due to misallocation of resources.

In-Depth Analysis of Adverse Selection

Example 1: Information Asymmetry in the Second-hand Car Market

Aspect	Details
Information Imbalance	Asymmetric information between buyers and sellers such that buyers are not able to distinguish between a low-quality car and a high-quality car. A vehicle with many problems and defects is referred to as a lemon.
Buyer Behaviour	Buyers lower their price offers, assuming a higher chance of purchasing a "lemon".
Seller Response	Sellers with high-quality cars are reluctant to sell at the lower price, reducing their market presence.
Adverse Selection	The market is flooded with low-quality cars (lemons) due to the information gap.
Market Outcome	The market becomes inefficient, with high-quality cars excluded. As a result, buyers and sellers both suffer from a lack of quality choices.

Example 2: Information Asymmetry in the Insurance Market

Aspect	Details
Information Imbalance	Individuals know more about their health status than insurance companies.
Buyer Behaviour	Buyers may hide pre-existing conditions to reduce premium costs.
Seller Response	Insurers increase premiums to account for the possibility of covering higher-risk individuals.
Buyer Response	Healthy individuals perceive the high premiums as a financial burden, leading them to avoid purchasing insurance
Adverse Selection	The insurance pool becomes dominated by high-risk individuals, making it difficult to maintain balance.
Market Outcome	Healthy individuals are priced out of the market, premiums rise, and the overall efficiency of the insurance market deteriorates.

Example 3: Information Asymmetry in the Labor Market

Aspect	Details
Information Imbalance	A recently graduated student hides the fact that he is lazy and obtained good grades through luck while applying for jobs.
Seller Behaviour	The job applicant conceals his lack of work ethic and exaggerates his abilities during the interview process to secure the position.
Buyer Behaviour	Employers, lacking complete information about the applicant's work ethic and skills, may offer a salary based on the perceived qualifications.
Seller Response	The applicant accepts the offer, despite not being fully capable of meeting the job expectations.
Adverse Selection	Employers unknowingly hire less competent individuals because the true quality of the candidate is hidden.
Market Outcome	The market experiences inefficiencies as employers hire suboptimal candidates, while more qualified individuals may be overlooked.

Conclusion: Impact of Adverse Selection on Market Efficiency

In both the used car and insurance markets, the presence of asymmetric information leads to adverse selection. This undermines market efficiency, as high-quality goods are pushed out and the market is dominated by lower-quality options. The resulting inefficiency causes the overall welfare of both consumers and producers to be compromised. The fear of an unfair transaction can prompt the consumers to withdraw from the transaction, diminishing the quality and volume of transactions in the market. This may cause a spiralling effect and the eventual collapse of the market.

2.3.3.2 Government Policies to address Adverse Selection

Provision of Information

Intended Outcome:

- Improve accessibility to information to economic agents **to distinguish between good and poor quality goods & services**.
- For example, **Consumers Association of Singapore (CASE),** a non-profit & non-governmental organisation is set up to inform, educate and protect consumers against misrepresentation. Consumers can check if a particular producer or product is on CASE's blacklist, allowing consumers to distinguish between good and poor quality goods and services. Consumers can then avoid buying the product or buying from that specific producer.

Evaluation of Provision of Information	
Consideration	**Strengths**
Informed Decision Making	Transparency allows consumers to compare quality, features, and potential risks, reducing the chance of unknowingly purchasing low-quality goods or services.
Improved value Selection:	Consumers can choose products/services that align with their needs and budget, maximizing their satisfaction.
Consideration	**Limitations**
Information Overload	Consumers might struggle to effectively process large amounts of information, especially with the abundance of sources available.
Cost of information provision	Creating and maintaining reliable information sources requires significant investment in research, data collection, and analysis.
Limited Effectiveness for Complex Goods and Services	In-depth knowledge or expertise might be necessary to properly evaluate certain products or services, rendering basic information insufficient even if such information is provided.

Rules & Regulations

Intended Outcome of rules and regulations:

- Ensure more information available to economic agents to distinguish between good and poor quality goods & services.

Some examples of rules and regulations to reduce adverse selection:

Lemon Law

- This law helps to protect consumers from asymmetric information on the quality of goods. This consumer protection law provides protection against defective goods (known as “lemons”), which fail to conform to the contract at the time of delivery.
- Such laws obligate sellers to repair, replace, refund or reduce the price of those defective goods when goods do not meet the standards of quality and performance as stated in the contract.
- In Singapore, the law covers all general consumer products purchased in Singapore (e.g. stationery, apparel, electronics, bedding, and big-ticket items such as motorcycles and cars)

Evaluation of Lemon Law	
Consideration	**Strengths**
Discourages Selling Defective Goods	Knowing they could be held liable for repairs, replacements, or refunds, sellers are less likely to offload defective products onto unsuspecting customers. This incentivizes maintaining a certain level of quality.
Increased Consumer Confidence	Lemon laws empower buyers, fostering a sense of security and encouraging them to participate more actively in the marketplace.
Consideration	**Limitations**
Potential for Abuse	Defining a "lemon" can be subjective. Disputes may arise regarding the severity of a defect and whether the warranty covers it. This can lead to drawn-out legal battles.
Burden of Proof	The onus often falls on the buyer to prove the product was defective at the time of purchase. This can be challenging, especially if the defect manifests later.
Time taken to Implement Law	The law implementation typically follows the legislative process which can take several months to a year or more depending on the complexity of the law.

Require sellers to offer warranties.

- This can be used to tell potential buyers that the car is not likely to be a “lemon” since it would not be advantageous to sellers to offer warranty if the used car is a “lemon”. A “lemon” is likely to require more repairs, and providing a warranty for it will end up costing the seller more. This can help to reduce adverse selection problem.

Evaluation of Warranties	
Consideration	**Strengths**
Incentivizes Preventive Measures	Manufacturers might invest in better quality control or design features to minimize warranty claims, potentially leading to a more reliable product overall.
Consideration	**Limitations**
Cost Burden on Sellers	Mandatory warranties can be expensive for sellers, especially if the product has a high risk of failure. This cost may be passed on to consumers through higher prices, potentially reducing affordability.
Warranty Wording	Ambiguous warranty language can lead to disagreements about coverage, requiring government interpretation.

Provide inspection services

- Government can sample and test products to check on the quality of the product. In Singapore, all models of motor vehicles sold in Singapore are required to have certain safety features, and clear the standards on noise and air pollution levels prior to sale in Singapore.
- This is also common among health insurance, food, drugs and electronics markets.
  - For example, HSA and AVA sample and test various food items to ensure that no harmful products are added, and that detrimental chemicals/bacteria count does not exceed a stipulated level.
  - In the health insurance market, potential buyers may be required to take mandatory health checks to avoid insurance coverage for any pre-existing ailments.
  - All electronics sold in the retail market in Singapore are to be cleared by the authorities so that it will not pose a fire hazard to users.

Evaluation of Inspection	
Consideration	**Strengths**
Discourages Sale of Low-Quality Products	Knowing their products will be inspected, manufacturers are incentivized to maintain a higher level of quality to avoid being blocked from the market. This can lead to overall improvements in product safety and reliability.
Consideration	**Limitations**
Cost and Resource Intensive	Implementing and maintaining a robust inspection system requires significant resources and funding. Government agencies need to employ qualified inspectors and develop effective testing procedures.

2.3.3.3 Asymmetric Information Leading to Moral Hazard

Moral hazard occurs when one party in a transaction behaves in a way that is detrimental to society because they do not fully bear the costs or enjoy the benefits of their actions. This typically arises after a transaction has been completed (e.g., after purchasing insurance), and asymmetric information leads to the economic agent taking on greater risks than they normally would.

Moral hazard leads to inefficiency in markets because economic agents may engage in risky behavior or suboptimal decisions, knowing that the associated costs will not be borne by them.

Key Characteristics of Moral Hazerd

Aspect	Description
Cause	Asymmetric information about actions and behavior after the transaction.
Effect	Economic agents take on higher risks, knowing that they will not bear the full costs.
Outcome	Inefficiency due to excessive risk-taking and misallocation of resources.

In-Depth Analysis of Moral Hazard

Example 1: Car Insurance

Aspect	Details
Information Imbalance	An insurance company sells car insurance to an owner. After the purchase, the insurer has incomplete information about the car owner's actions.
Buyer Behavior	The car owner, after being insured, may drive more recklessly or park carelessly because they are covered for damage. The car owner feels less incentive to protect the car from accidents, as they do not face the costs of damage.
Seller Response	The insurance company may face higher-than-expected claims for car damage, especially if the car owner takes unnecessary risks.
Moral Hazard	The car owner’s reduced care for the vehicle leads to more frequent claims, which is detrimental to the insurer's profitability.
Market Outcome	Higher claims lead to increased resource allocation to repairs, potentially driving up premiums for all insured individuals.

Example 2: Labor Market

Aspect	Details
Information Imbalance	The employer cannot fully observe the worker's behavior and effort after being hired.t their health status than insurance companies.
Seller Behavior	The worker, knowing that their actions are not fully observable, may reduce effort and shirk from responsibilities.

Buyer Response	The employer may not immediately notice the reduced effort, leading to lower overall productivity and inefficiency.
Moral Hazard	The worker's lack of diligence can lead to inefficiencies and wasted resources in the workplace.
Market Outcome	The employer experiences lower productivity, leading to a decline in the overall efficiency of the labor market.

Conclusion: Impact of Moral Hazard on Market Efficiency

Moral hazard creates inefficiencies by encouraging greater risk-taking among economic agents, as they do not fully bear the consequences of their actions. This results in over-allocating resources to mitigating the risks associated with these actions, leading to suboptimal market outcomes and overall inefficiency.

2.3.3.4 Government Policies to address Moral Hazard

Rules & Regulations

Intended Outcome

- Ensure that firms and households do not take unnecessary risks than they normally would. This can be done by taking into consideration the appropriate **incentives** to encourage individuals to be socially responsible whilst maximising their self-interest.

For most cases of moral hazard, firms are the ones who lose out because consumers have more information than they do (for example in the case of health insurance or hiring of employees). However in some markets, firms are able to implement measures of their own to reduce the problem of moral hazard without having to relying heavily on government intervention. Refer to the box below for more details on these measures.

Governments may step in to aid the firms by making these measures mandatory on a national level for some goods and services. For example, the government may make it mandatory for insurance firms to implement co-payments in health insurance policies.

Evaluation of Rules & Regulations	
Consideration	**Strengths and Limitations**
Refer to Section 2.2.3 on page 23: Strengths and limitations of rules and regulations to address negative externalities. They share similar strengths and limitations.	

Think about this:
What may firms do to reduce the problem of asymmetric information?

Besides relying on government intervention, firms also can take measures to reduce the problem of asymmetric information that it faces. Some examples include:

To reduce adverse selection:

- **Screening** customers, especially in insurance markets.
- **Offer warranties**, so that consumers might be able to distinguish between high and low-quality goods. Producers of low-quality goods will tend not to offer warranties, as this would incur substantial additional costs for them if they have to replace or repair the good whenever it is defective.

To reduce moral hazard:

- **Contracts** could be written to try to eliminate undesirable behaviour. For instance, some contracts tie the wages of the employee to his/her performance, including a clause for his/her dismissal if his/her performance falls below par. This will help to prevent employees from shirking.
- **Monitoring** the actions of the worker to prevent shirking
- **Co-payment in insurance policies** which requires the insured person to bear a portion of the medical cost. This gives an insured person a direct incentive to make economically appropriate choices.

Key Learning Points in Section 2.3:

✓ Due to information failure, the decisions made by economic agents do not lead to socially optimal outcomes.

✓ Asymmetric information leads to adverse selection and moral hazard.

✓ Government intervention to provide information can reduce market failure due to imperfect information.

2.4 Factor Immobility

The price mechanism ideally allocates resources efficiently when factors of production, like labor and capital, move freely to their most productive uses in response to market signals. This is known as perfect factor mobility. However, factor immobility, where barriers restrict this movement, leads to inefficient market outcomes

Analysis of the problem:

- When factors are immobile, it can result in firms employing inefficient labour-capital combinations.

- In some cases, labours may even be laid off (unemployed), resulting in a surplus of workers in the declining industries to persist.
- While there may be a shortage of workers in the growing/ expanding industries where workers are not allocated to areas that they can contribute the most (underemployed).

When this happens, labour resources are not efficiently allocated, leading to society's welfare not being maximised since more goods could have been produced if the labour are utilised efficiently but are not. This led to market failure.

- In addition, factor immobility (labour in particular) can lead to productive inefficiency too. The shortage of suitable labour in the rising industries can lead to increase in wages. Search cost and hiring cost will also increase for firms in their attempt to hire suitable workers from both locally and from overseas. Such high costs of production for firms will eventually lead to an increase in the long run average cost of the firms as compared to if labours are perfectly mobile, causing productive inefficiency to arise.

Types of Factor Immobility:

Type	Causes
Occupational Immobility Occurs when there are barriers preventing workers from being employed across different sectors of the economy. Leads to unemployment or inefficiency.	**Lack of Skills or Qualifications**: Workers may lack the necessary skills or educational qualifications needed by expanding industries. For example, in Singapore, sectors like finance and pharmaceuticals require specialized skills. **Automation and Technological Change**: Technological progress may make low-skilled workers redundant in some industries, making it difficult for them to find re-employment in growing sectors. **Structural Changes in the Economy**: There can be a mismatch between the skills of the unemployed and those required by employers. This leads to structural unemployment. **Lack of Information**: Workers may not have sufficient information about available job opportunities, especially if such jobs are not listed on popular job portals
Geographical Immobility: Geographical immobility occurs when there are barriers that prevent labor from moving form one region or area to another to find.	**Family and Social Ties:** Personal commitments such as family responsibilities and social ties can prevent workers from relocating to areas where there are job opportunities. **High Relocation Costs:** The financial burden of relocating, including high housing and rental costs, as well as differences in the general cost of living between regions, can deter workers from moving. **Cultural, Language, and Immigration Barriers:** Cultural differences and language barriers can prevent

	labour from moving to other countries for work. In addition, immigration barriers, such as strict work permit regulations, make it difficult for workers (especially unskilled workers) to take up jobs in foreign countries.

2.4.1 Government Policies to address Factor Immobility

The objective of government intervention in the case of labour immobility is to ensure efficient and equitable distribution of resources.

2.4.1.1 Policies to address Occupational Immobility

Subsidies and Related Support for Training & Education

Subsidies

- Subsidies for training and education (supply-side policies) aim to increase job mobility by equipping workers with the relevant skills through subsidized upskilling opportunities.
- The subsidies may be granted directly to lower-skilled workers, unemployed, or even students to encourage them to learn new skills that match the needs of firms in the economy. Consequently, with the relevant knowledge and skills, workers would be able to move into expanding industries with more available job vacancies and possibly higher wages.
- Subsidies can also be granted to firms to offset the costs incurred when sending workers for training. Therefore, firms may be more willing to hire workers with less suited skills, as the training costs are reduced.
- Some examples of subsidies include:
    - SkillsFuture, a policy that aims to help Singaporeans attain mastery of skills and promote lifelong learning through a broad range of initiatives. This equips workers with up-to-date skills to respond to the changing demand for jobs.
    - Introduced in 2015, all Singaporeans aged 25 years and above received a SkillsFuture credit of $500 to support their training and development.
    - In 2020, a one-off $500 SkillsFuture credit top-up was issued to all Singaporeans aged 25 and above

Direct Provision

- Government can set up agencies to facilitate information sharing on jobs available in the various industries with institutes of higher learning, or via job portals to facilitate job matching. As the information on available jobs becomes more accessible, jobseekers will be able to find jobs that better fit their skillsets and profile and reduce unemployment due to factor immobility.
    - The Singapore government established Workforce Singapore (WSG), an agency that connects jobseekers with employers. WSG offers job portals and works closely with educational institutions to provide up-to-date information on available jobs across various industries. Their Jobs Bank platform is an example of a direct government initiative where jobseekers can access job listings in real-time. Additionally, WSG partners with schools and institutes of higher learning to ensure that students and graduates are informed of opportunities that match their qualifications and skills. This kind of

government action reduces unemployment caused by information asymmetry and helps workers find jobs that better suit their skills.

Partnership with Education Institutes

- Government can work with institutes of higher education (vocational institutes, polytechnics and universities) to ensure **alignment** between the courses provided and the **changing needs of the economy**.
    - Germany has been proactive in addressing the challenges posed by automation through its vocational training and **Industry 4.0** initiatives. As automation and digitalization have transformed the manufacturing sector, the German government, in collaboration with industries, offers extensive training programs. These programs equip workers with new, relevant skills for jobs in fields such as robotics, artificial intelligence (AI), and advanced manufacturing. For example, **dual education programs** combine classroom education with hands-on apprenticeships, enabling workers to learn modern skills while maintaining their employability. This reduces occupational immobility by helping workers transition from traditional manufacturing roles to high-tech roles within the same industry.

Evaluation of Subsidies and Related Support for Training & Education	
Consideration	**Strengths**
Receptivity of the Public	Training subsidised by the government will be well received by the public particularly the lower income workers who may lack the funds to sign up for training. Direct provision of training institutions by the government can reduce the hassles and hence encourage firms to send their workers for relevant job training. Similarly, government job matching portals can enhance the ease of accessibility to accurate and relevant job information.
Consideration	**Limitations**
Cost and Resource Intensive	Implementing effective upskilling initiatives to address factor immobility requires a substantial, long-term commitment of government resources. This goes beyond simply funding training programs. It involves creating and maintaining comprehensive information platforms to identify skills gaps, predict future labor market demands, and connect individuals with relevant training. Furthermore, successful upskilling necessitates complex, ongoing collaboration between government agencies, educational institutions, and private sector employers. This collaboration demands consistent communication and coordination to ensure training programs are aligned with industry needs and that individuals are equipped with the skills required for evolving job markets.

2.4.1.2 Policies to address Geographical Immobility

Subsidies and Related Support for Housing & Transport

The government could offer subsidies (e.g. housing subsidies & transport subsidies) to people who are moving into areas where there are shortages of labour. This would reduce the cost of moving to the new areas, reducing geographical immobility in the form of labour immobility across regions.

Example: Under the federal program of Trade Adjustment Assistance (TAA), the US government provides relocation allowance for workers. The relocation allowance subsidies the workers when they move to a new area outside of their normal commuting area.

Tax Reduction
The government could reduce specific taxes (e.g. property tax) to encourage labour to move into areas where there are shortages of labour as the costs of relocation would be reduced, reducing geographical immobility in the form of labour immobility across regions.

Improvement in infrastructure
Government can implement reforms to the housing market which are designed to improve the supply and reduce the cost of rented properties, and to increase the supply of affordable properties. The improved transportation services will facilitate labour movements, thereby reducing geographical immobility.

Provision of information
Government could provide information on where the job vacancies are to encourage workers to take up the jobs. Provision of job information could facilitate relocation by reducing uncertainty about employment prospects in other areas. Such provision of information could help match workers with jobs and diminish the perceived risks of relocation.

Evaluation of Subsidies and Related Support for Training & Education	
Consideration	**Strengths**
Promote economic growth	By directly reducing relocation costs, this policy encourages increased labour mobility across regions. This influx of skilled workers can act as a catalyst for economic growth in the host country, leading to a higher standard of living for its citizens. This approach focuses on minimising costs and resource use by making relocation more accessible, ultimately achieving the desired outcome of reduced geographical immobility.
Consideration	**Limitations**
Cost and Resource Intensive	High cost of financing and opportunity cost is incurred. Most of the above policies require the government to fork out huge sums of money in order to be carried out and this can create a strain on the

	government budget and lead to trade-off between this and other needs of the country.
Time Lag	Policies like the improvement in infrastructure like housing construction takes years for the benefits to be realised. Hence, government provision of subsidised rental housing requires a long time to take effect and will not be a suitable policy to tackle immediate problems.

Key Learning Points in Section 2.4:

- ✓ The market fails to achieve an efficient outcome when there is factor immobility.
- ✓ The two types of factor immobility are occupational and geographical.
- ✓ Factor immobility leads to underemployment and unemployment.
- ✓ Firms are unable to achieve productive efficiency when there is factor immobility.
- ✓ The government policies adopted depends on the root cause of the problem and government would also consider other aspects such as the costs, benefits, constraints as well as the degree of imperfect information that exists, and the unintended consequences.
- ✓ The effectiveness of he policies also depends on the responsiveness of the economics agents.

2.5 Market Dominance

(This section will be covered in detail in the next topic, "Firms and Decisions")

Market Dominance can lead to market failure in the following ways:

- Allocative inefficiency
- Productive inefficient)
- Dynamic inefficiency

Note: More information on the types of inefficiencies and the types of firm's profits will be covered in detail in the next chapter "Firms and Decisions – Market Structure"

2.5.1 Market dominance leading to allocative inefficiency

Analysis of the problem:

- Recall that the price mechanism achieves an efficient allocation of resources when the market is perfectly competitive.
- But if there is imperfect competition (where the market is dominated by a few firms) then the market fails as there might be too few resources allocated towards the production of the good.
- Firms with a dominant position in a market may make use of their market power to reduce their output, causing prices to drive up.
    - In fact, when the firm is under-producing, it causes consumers to enjoy less output than the allocative efficient output in the perfectly competitive market (where there is a lack of market power).

- Also with under-production, it results in output prices rising. Consumers are charged at a price that is higher than the marginal cost of the good produced (Price charged is greater than Marginal Cost, P > MC).

- Since market output produced is not at the socially optimal level, resources are not efficiently allocated. The society incurs deadweight loss as the consumers' welfare could have increased by producing more outputs and charging at a lower price.

2.5.2 Market dominance leading to X-inefficiency

- X-inefficiency comes about due to a lack of competition in the market.
- Without competitive pressure on profits, firms get complacent and may end up overstaffing and over spending on buildings and equipment. There is also less effort to keep technology up to date or research new products.
- This could result in higher costs as firms are no longer productively efficient.

2.5.3 Market dominance leading to dynamic inefficiency:

- Dynamic efficiency occurs over time and is strongly linked to the pace of innovation within a market and improvements in both the range of choice (products variety) for consumers and also the quality of products
- Firms earning supernormal profits tends to have the ability to re-invest the profits to improve the end product or production process, which enables them to lower their long run average cost.
- However with market dominance, firms with strong market power may choose not to re-invest the profits since it is protected by the high barriers to entry, resulting in dynamic inefficiency.

2.5.4 Market dominance leading to inequity:

- Firms with a dominant position in a market may command higher revenue and hence profit than other small firms in the market.
  - For example, with a 90 per cent market share, Sistic will earn more substantial profit relative to her smaller competitors in the market. This causes an inequitable distribution of profit between Sistic and other smaller competitors.

Take Note:
Please refer to your subsequent lecture notes on 'Firms and Decisions - Market Structure' for more details on market dominance and government intervention.

2.5.5 Government Intervention

The objective of government intervention in the case of market dominance is to increase the production levels to the socially efficient levels (allocative efficient) and ensure equity.

The following are the different ways of government intervention (this section will be briefly described below, though **more details of these policies will be provided in the later set of lecture notes: Firms and Decision**

Price Regulation

To regulate large companies with large market shares, the government can adopt various pricing policies (example, price controls MC or AC pricing) to ensure price charged will lead to consumption and production that is closer to the allocatively-efficient output level.

Antitrust Law

Antitrust law is a set of regulations designed to promote fair competition in the marketplace. It aims to prevent businesses from gaining too much power and acting as monopolies, which can lead to higher prices, lower quality goods, and less choice for consumers. These laws are enforced by government agencies to ensure businesses compete independently and consumers benefit from a healthy competitive environment.

Nationalisation

Nationalization is the process where a government takes ownership and control of private companies or industries. This can involve buying them outright, acquiring a majority share, or taking control through legislation. Governments might nationalize firms to protect strategic industries, ensure essential services are provided, or intervene in failing companies. It's a controversial policy with potential benefits like increased public control but also drawbacks like reduced efficiency and political influence.

Key Learning Points in Section 2.5:

- ✓ *Firms with market dominance are able to restrict their output to increase prices and earn higher profits. Thus, market dominance leads to under production below the socially optimal quantity.*
- ✓ *Also, firms with market dominance may not have an incentive to minimise costs due to a lack of competition.*
- ✓ *Hence, firms with market dominance may lead to allocative inefficiency and productive inefficiency, and hence affecting consumers in terms of price, product availability, variety, and quality.*
- ✓ *Market dominance often results in inequity as dominant firms are able to earn higher profits compared to less dominant firms.*

3. EQUITY IN RELATION TO MARKETS

3.1 Understanding the concept of equity

- Equity is an outcome where society considers the distribution of resources to be fair. It involves ensuring that the low-income households have access to essential goods and services, such as food, education and healthcare services.
- Value judgements need to be made when discussing and deciding what goods and services are deemed essential in society. This is so as equity is inherently subjective as different economic agents in a society may have different perceptions as to what is considered as fair. This means that different countries may deem different goods to be essential as well.
- Nonetheless, the lowering of prices and increasing accessibility of goods such as education, healthcare, housing, transportation, food and utilities can translate to less equitable outcomes.
- The issue of inequitable outcomes can arise in a free market because, whilst the price mechanism could help to achieve an efficient allocation of resources as explained in the above section, it could fail to achieve an equitable allocation of resources.

Possible causes of inequity

- Technological advancement
  - It gives rise to jobs requiring new skills, thus the demand for labour in such jobs increases, resulting in higher wages for skilled labour.
  - On the other hand, technological advancement could replace many jobs, particularly routine ones, reducing the demand for unskilled labour. This depresses the wages of unskilled labour.
- Globalisation
  - With increased flows in goods, capital and labour, many lower-skilled jobs in developed countries may be outsourced to developing countries. Thus, lower skilled labour might lose their livelihood.

Analysis of the problem of inequity:

- What matters in a market-based system is the **demand** (willingness and ability to pay) for goods and services or dollar votes.
- Since incomes are unevenly distributed, households with high-income levels will be able to determine what should be produced as they are able to cast higher dollar votes for the goods/services that they want.
- In this way, profit maximising producers will channel/ divert scarce resources away from the production of necessities that the poor desire to produce goods for the rich.
- The needs of the poor (in terms of goods/services such as necessity items) may not be satisfied since they do not have the ability to pay.
- It is thus crucial that the government takes into account the needs of all in the society, especially the disadvantaged, through measures such as subsidies and even direct provision of essential goods.

3.2 Government Intervention to Address Inequity

The government has two microeconomic objectives: **efficiency** and **equity**. Governments could make decisions to improve equity using policies such as subsidies and direct provision of goods that are deemed essential. The following are some policies the government may use to improve equity in the economy.

The detailed analysis and diagrams for the following policies have been explained in Section 9 of "Price Mechanism".

Subsidies

- **Intended outcome of using subsidies:** to achieve efficient allocation of resources as well as fairness in the distribution of economic welfare for such essential goods.
- The government can provide subsidies to low-income households. This provides more equal opportunities for the poor to access the goods they need but may not be able to afford, e.g. education and housing.
- The government can provide **transfer payments**, which are transfers from the government to individuals without production taking place. Examples of transfer payments are unemployment benefits and social security payments. Transfer payments help to bolster the incomes of the poor and increase purchasing power to enable purchase of goods and services.
- Transfers given in the form of goods and services rather than cash (known as "in-kind transfers") ensure direct consumption of essential goods and services E.g. Food aids, medical services and USave rebates etc.

Rules & Regulation

- **Intended outcome of rules and regulation:** to achieve efficient allocation of resources as well as fairness in the distribution of economic welfare.
- **Price controls** are a form of legislation that governments use to achieve a more equitable allocation of resources.
- Recall from the last set of lecture notes (Price Mechanism and Its Application) the two types of price controls: price ceiling and price floor. Refer to the previous set of lecture notes for the relevant economic analysis.

  Price Ceiling (Maximum Price):

  - As the market equilibrium price is too high in a free market, a maximum price is set by the government to prevent prices from rising beyond the maximum price.
  - The maximum price is the price that producers can legally charge. Thus, the prices are fixed **below** the market equilibrium prices.
  - Price ceiling on necessities such as healthcare may help keep prices low enough for low-income families to afford essential goods and services so as to reduce inequity.
    - This is especially so for healthcare products and services where demand can be price inelastic. Any rise in cost of production could decrease supply causing sharp increase in prices.
    - Through maximum price, it keeps prices low so that low-income families could have access to affordable healthcare.

Price Floor (Minimum Price):

- As the market equilibrium price is too low in a free market, a minimum price is set by the government to prevent prices from falling below the minimum price.
- Thus, the prices are fixed above the market equilibrium prices.
- This policy can help reduce inequity by protecting farmers' incomes.
  - This is especially so for agricultural products where supply fluctuates severely, (e.g. crops prices can fluctuate due to bumper crops).
  - Through minimum price, it prevents the fall in farmers' incomes below subsistence level. This ensures that farmers have greater purchasing power to therefore gain access to goods and services.
- Another example of price floor is the minimum wage policy. This helps to ensure low-wage labour have higher wages to maintain a decent standard of living.

Key Learning Points in Section 3:

- ✓ Governments aim to achieve both efficiency and equity. Even when efficiency is achieve, there may still be inequity in the market.
- ✓ Equity refers to fairness in the distribution of income.
- ✓ The concept of equity is normative and is based on value judgements.
- ✓ Governments may choose to intervene in markets to ensure a more equitable distribution of income.

4. DECISION-MAKING BY GOVERNMENT

4.1 Summary on government intervention*:*

Due to the various ways in which the market mechanism has failed to achieve an efficient allocation of resources (as explained in section 2), **the government needs to step in and intervene in such markets, so that an efficient and equitable allocation of resources can be achieved.** While this ideal situation may not be achieved, the government can at least ensure that resources are allocated more efficiently relative to a situation with free market forces.

The different channels of government intervention are as follows:

Policies the government can adopt	**Sources of market failure addressed**
1. Direct Provision	• Public Goods
2. Taxes and Subsidies	• Externalities • Imperfect Information • Factor Immobility
3. Rules and Regulations	• Externalities • Imperfect Information
4. Quotas and Tradable Permits	• Negative Externalities
5. Public Education	• Externalities • Imperfect Information
6. Joint Production	• Positive Externalities

It is also useful to note that government can apply the knowledge of cognitive bias (sunk cost, fallacy, loss aversion or salience bias) when implementing policies so as to influence the decisions of economic agents such as consumers and producers when deemed needed by the government.

4.2 Government Failure

Definition: Government failure is a situation where government intervention results in greater market inefficiencies than would otherwise be without government intervention.

Government intervention in the market can itself lead to problems where resource allocation is less efficient. This is possible as the government comprises people, such as politicians and bureaucrats who may act in their own self-interest, just as other economic agents (firms and consumers) would.

Governments too, have limited resources but have many objectives to achieve. Conflicting objectives thus can occur; government actions may serve to reduce short run problems but lead to long run unintended consequences. It is important to recognise that government intervention does not necessarily lead to more efficient outcomes.

For example,

- The government may make policy decisions that bring about quick results or adopt more popular measures such as subsidies to favour key individuals or groups.
- In the case of subsidies, it is often used as a measure by the government to encourage production of some goods that the government deemed as beneficial to the society. While this may result in more goods being produced and more consumers being able to enjoy the goods, it may allow inefficient firms to continue to survive, worsening market inefficiency.

Causes of government failure:

Lack of/distortion of Market Incentives

- Government intervention could remove or distort market signals by removing market forces or cushioning the effects of market forces. Examples include:

Welfare payments	• Discourage effort to work & less likely to improve one's employability • Create problems related to moral hazard ○ With free treatment, one will be less cautious about staying healthy (e.g. they might smoke more)
Subsidy	• Protect inefficient firms from competition • Create barriers to entry for new firms due to prices being kept 'artificially' low
Taxes	• Tax on income: create disincentive effect and discourage individuals from working hard
Direct provision of goods	• Lack of profit motivation • May worsen inefficiency due to little incentive to seek out most efficient production methods
Price controls	• Creates distortions that lead to shortages and surpluses

Imperfect Information

- Governments may not have perfect information of the costs and benefits of policies.
- It may lack the ability to gather sufficient and/or interpret the data accurately to make effective decisions about the best way to allocate scarce resources.

Administrative Cost

- Developing and implementing measures requires funds, hence funds have to be raised from somewhere (such as through taxes, etc.)
- In addition, funds used for measures in certain areas would also imply that it could not be used elsewhere (opportunity cost must be taken into account).

Time Lag

- Government measures aimed at resolving economic issues, particularly externalities, often suffer from significant time lags, contributing to government failure. This delay stems from several factors, including the inherent bureaucratic processes involved in policy formulation and implementation. Red tape, characterized by excessive regulations and administrative procedures, further exacerbates these delays, slowing down the response to pressing economic problems. The time required for policies to take effect also varies across countries, influenced by factors such as the size of the nation, the complexity of its economic circumstances, and the efficiency of its administrative structures. Consequently, the effectiveness of government intervention is often diminished by these time lags, as economic conditions may have shifted considerably by the time the policies are fully implemented. Thus, the issue of time lag may cause policies to be ineffective and, in some cases, it may even destabilise the economy further. There are 4 main aspects of time lags:

Recognition lag	Time taken to collect and analyse economic data
Decision lag	After identification of the problem, government policy makers need to decide on a suitable course of action, before passing legislation, laws, or administrative rules deemed necessary
Implementation lag	After selecting a policy, steps are needed to implement the policy
Impact lag	Time needed for policy to take effect and have the intended consequences on relevant economic agents

Political Pressure/Rent-Seeking Behavior (Corruption)

Political pressure

- Political pressure can cause government failure in a few ways. Short-term interests of powerful groups might trump long-term benefits for society. Politicians may prioritize policies that get them re-elected over those with more complex or delayed benefits. This can lead to underinvestment in crucial areas like infrastructure or unsustainable spending that burdens future generations. Additionally, pressure from special interests can lead to regulations that benefit specific groups over the public good, hindering competition and economic efficiency.

Rent-Seeking Behavior

- Rent-seeking behavior significantly contributes to government failure when attempting to resolve externalities. It involves individuals or firms using political influence to secure economic benefits without generating new wealth, often through lobbying and bribery. This can skew government policies away from socially optimal outcomes, favoring private gains and exacerbating negative externalities. Resources intended for externality correction are diverted to rent-seeking activities, diminishing policy effectiveness and potentially resulting in subsidies for polluters rather than policies that internalize costs. Rent-seekers may also manipulate information, leading to

inefficient or harmful decisions. Consequently, policies fail to accurately reflect social costs and benefits, reducing overall welfare. Corruption, a form of rent seeking, and regulatory capture, where regulatory agencies are dominated by the industries they regulate, further distort policies. Ultimately, rent-seeking creates inefficiencies, hinders government efforts to improve market outcomes, and leads to government failure.

Key Learning Points in Section 4:

- ✓ When market failure occurs, government intervention is needed.
- ✓ Governments consider the costs, benefits and constraints as well as apply the knowledge of cognitive biases when deciding on the best policy to use.
- ✓ Even with government intervention, government failure can occur as well. This may result in further refinements of the policies used.
- ✓ As long as the policy tools that the government uses are able to get the market to be closer to efficient allocation of resources, the society will still be better off than leaving everything to the market

Learning Reflection

Congratulations! You have finished this lecture topic.
However, how much have you understood?

Below are the areas of focus in this topic and a checklist that you may use to know how much you have understood:

	Areas of Focus	What you should be able to do	Check-list
	Efficiency and Market Failure	● Define allocative efficiency ● Explain how the price mechanism might allocate resources efficiently. ● Explain why the social optimum is at the output and price where MSB=MSC.	
	Causes and effects of market failure ● Public goods ● Externalities ● Information failure ● Merit and demerit goods ● Factor immobility ● Market dominance	● Explain the characteristics of public goods and the rationales for government intervention in the provision of these goods.	
		● Illustrate and explain positive and negative externalities in both production and consumption using diagrams, and how they lead to inefficient allocation of resources	
		● Explain the characteristics of merit and demerit goods, and why these goods are under/over consumed.	
		● Explain the different types of factor immobility, and how they may constrain producers in production decisions.	
	Correction of market failures ● Different policies that are used to address market failures	● Explain the governments' objectives	
		● Explain and evaluate the decisions made by governments in using a range of policy tools to correct market failures.	
		● Explain possible failures of government interventions	
	Equity in resource allocation	● Explain the implications of inequity on resource allocation. ● Explain and evaluate the decisions made by governments to improve equity.	

Annex 1:

Extension: Merit and Demerit Goods

Merit Goods

Definition: A merit good is one that is deemed by the government to be socially desirable and tends to be under-consumed in a free market.

- Examples of merit goods include education, healthcare, library services and immunisation.
- There are two main reasons why merit goods may be under-consumed in a free market:
  1. The **consumption** of merit goods produces **significant positive externalities**.
  2. There might be **imperfect information** present. Consumers might not know the full extent of benefits to themselves that could be gained from consumption of the good, thus their perceived benefits gained is less than the actual benefits they will receive.
- Markets for such goods may generate an undesirable distribution of income, resulting in the social exclusion of some individual especially from the lower-income group **(inequity)** from the access to such essential goods.
- Because of the points above, the government intervenes to encourage a higher level of consumption and production of merit goods.

Demerit Goods

Definition: A demerit good is one that is deemed by the government to be socially undesirable and tends to be over-consumed in a free market.

- Examples of demerit goods include cigarettes, alcohol and drugs.
- There are two main reasons why demerit goods may be over-consumed in a free market:
  5. The consumption of demerit goods produces **significant negative externalities**.
  6. There might be **imperfect information** about the good. Consumers of the demerit good do not have full information about the harmful effects to themselves of consuming it, possibly because some of these effects might only arise in the long term. Thus, the actual costs of consuming the demerit goods might be greater than the perceived costs.
- Thus, the government needs to intervene to discourage the production and consumption of such goods.

Take Note:
The government policies to address merit and demerit goods would be similar to the policies to address externalities and insufficient information. You may refer to the earlier sections for the detailed explanation of these policies.

Annex 2:

Decision Making by the Government

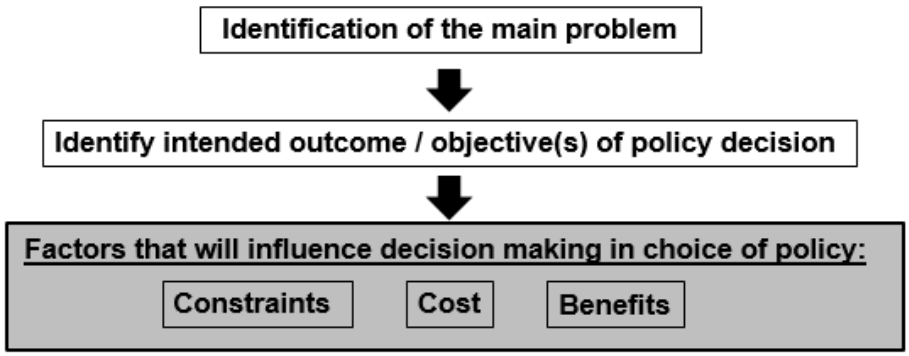
Decision Making Framework for Governments

Lecture activity:

Read the articles in the appendix at the end of this set of notes. Try to apply the framework given in this section to understand the Singapore government's decision-making process in implementing carbon taxes.

What factors did the government consider in implementing the carbon tax?

In attempting to correct market failure, the government goes through a decision making process to decide how best to intervene. This process can be summarised in the following flow chart:



1. Identification of main problem

- **Assessment of current economic situation:**
  - The country could be facing low labour productivity growth, aging population or traffic congestion.

- **Prioritisation of problems**
  - Given that the country is facing multiple problems, government will have to decide:
    - Which problem is most urgent or/and severe
    - Which problem should the government prioritise
    - Whether the market distortion is so great that it requires immediate intervention
  - After considering the questions, the government might prioritise a problem over others (e.g. low labour productivity growth over aging population and traffic congestion).

- **Analysis of the main problem:**
  - The government will have to consider the **root cause** of the problems (e.g. low productivity growth). Employers and employees may not
    - Know the actual benefits of training (to raise productivity).
    - Have sufficient funds to go for training or send employees for training
    - Ignore the spill-over effects on third-parties when productivity is raised (through training).

2. Identify Intended outcome/objective(s) of policy option(s)

- Increase consumption of training to the socially optimal level and achieve **efficient allocation of resources**
- Reduce information failure
- Ensure **equity** where there is fairness in the access to training for all individuals

3. Factors that will influence decision making in choice of policies:

Having identified the problem(s) and the intended outcome / objective(s), the government will consider the policy options available.

To decide which policy to implement, the government has to go through the decision-making process by taking into consideration:

1. Possible **constraints** the government may face
2. **Cost** and **benefits** of the policies

Constraints

1. **Quality & Quantity of Factors of Production**
   - In trying to achieve the objectives, the government might have to consider if they have the necessary factors of production (capital, entrepreneur, land and labour) to increase production and consumption of training.
   - The country might not have sufficient qualified professionals to provide training to employees. This lack of trained professionals could limit the effectiveness of the policies (e.g. subsidies, joint production and public education) and prevent the society from consuming at the socially optimal level.

2. **State of Development of country**
   - The government will also have to consider if the country has the necessary infrastructure to provide quality training for employees, or whether there are guidelines and procedures in place to implement the policies.

3. **Consider the characteristics of country / economy**
   - The government will have to consider the characteristic of the country such as the size, accessibility and demographic of the country, as well as the population size.
   - The size of the country could limit the government's effort to encourage employees to go for training. Larger country size could mean that more manpower and funds are needed to implement the policies at national level compare to country with smaller land size.

4. **Financial ability**
   - The government will have to consider if they have sufficient funds to implement the policies, especially if the policy requires huge funding. If the government does not have sufficient budget, the government might have to consider if they are able to borrow to finance their spending.
   - If the extent of market failure is severe, the government might need substantial funds to correct the market. The limited budget might restrict the government's ability to finance the policies and hence the choice of policies. Certain policies (e.g. subsidies and direct provision) require substantial government expenditure.

5. **Political acceptability**
   - The government has to consider the receptivity of the public (employers and employees) to policies.
   - Employers may not want to send their employees for training for fear that training would make it more likely for their employees to job-hop.

6. Information

- The government has to consider the reliability, availability and accessibility of information.
- To provide subsidies for training, the government needs the correct valuation of the MEB. However, the lack of reliable and available information may lead the government to over or undervalue the externalities.

7. Time frame

- The government has to consider the urgency of the problem. If low productivity growth requires immediate solution, it might restrict the type of policy that government can adopt. Some policies, such as subsidies, may see a more immediate result compare to public education.

Costs	Benefits
Cost of implementing policy may differ for different policies. ● Some policies (e.g. subsidies require recurring spending by the government. ● While other policies (e.g. public education) only require a once-off spending by the government (if it is only a once off campaign). ● Opportunity costs are also incurred (e.g. the funds used for subsidies could have been used to build public infrastructure)	Government will also consider the benefits of the various policies. ● Some policies such as rules and regulations would yield **immediate** benefit for the society (employees, employers & third parties). ● Subsidies will benefit the society especially the low-income families.

Feasibility and Net Benefits

Having gathered all these information, the government will then select the policy that is feasible and gives the highest net benefit.

1) Feasibility:

- A policy is feasible if the costs is within the constraints (costs < constraints)

2) Beneficial:

- A policy is beneficial if the benefits outweigh the costs (benefits > costs)
- The government will select the policy it deems to have the highest net benefit (where net benefit = total benefit – total cost)