

**Catholic Junior College
H2 Economics (9570)
THEME 2: MARKETS
THEME 2.3 Market Failure**

**2.3.1 Governments' Microeconomic Objectives
2.3.2 Market Failure and its Causes
2.3.3 Microeconomic Policies**

Introduction

In the first unit, we learned about the problem of scarcity and how it leads to the three basic economic questions of what and how much to produce, how to produce, and for whom to produce. In the second unit, we went on to examine how markets allocate scarce resources through the forces of demand and supply (i.e. the price mechanism). Our analyses also showed how the price mechanism can lead to allocative efficiency and the maximisation of social welfare under certain assumptions.

However, free-functioning markets need not necessarily always lead to the maximisation of social welfare, as in reality, there is usually a misalignment between private individuals' and society's goals. This leads to failure in some markets as they fail to allocate resources efficiently.

In this unit, students will learn the different sources of market failure. They will understand that market inefficiencies can arise when consumers and producers pursue their own self-interest. The result of these inefficiencies is deadweight loss, and society suffers as a result.

Governments intervene to address such inefficiencies in the market by determining the optimal societal output which forms the basis of government intervention. Whether the government ultimately decides to intervene in a particular market requires the government to go through a decision-making process.

However, due to imperfect information, the government also faces significant challenges in determining the extent of market failure and the optimal amount of intervention required. As a result, policy implementations are often made with imperfect information and uncertainty, and this could lead to a more inefficient allocation of resources than if the markets were left alone.

With the understanding of the sources of market inefficiencies and the respective implementations by the government, students will be able to appreciate the rationale and effects behind certain government actions in the local and global contexts. They will be able to analyse and evaluate the implementations proposed in correcting market inefficiencies in the real world. Students will also understand the complexities and challenges in achieving society's ideal outcomes in reality, made evident through the numerous examples of government failures across the world.

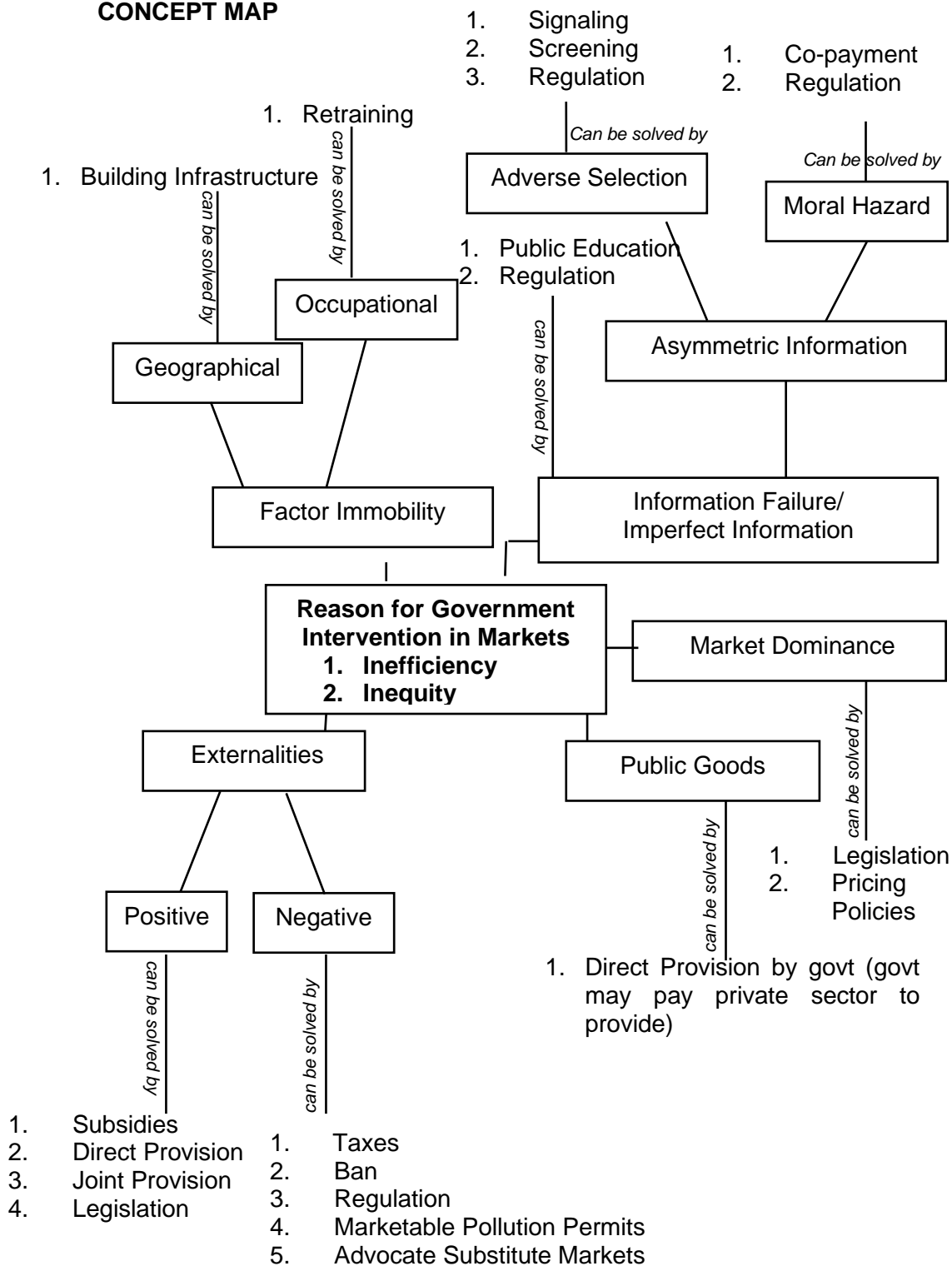
H2 Economics Syllabus (9570) Requirement

Check that you have mastered the following:

2.3.1 Governments' Microeconomic Objectives	✓
<ul style="list-style-type: none"> a. Governments' microeconomic objectives are efficiency and equity b. Efficiency in markets occurs when the social optimum is achieved, where Marginal Social Benefit (MSB) = Marginal Social Cost (MSC), maximising society's welfare c. Deadweight loss results when the social optimum is not achieved <ul style="list-style-type: none"> • Deadweight loss can be explained as the reduction in net benefit to society when output level is not at the social optimum d. Efficient resource allocation may not result in equitable outcomes e. Equity occurs when there is fairness in the distribution of essential goods and services 	
2.3.2 Market Failure and its Causes	
<ul style="list-style-type: none"> a. Market failure occurs when the free market is unable to allocate resources efficiently b. Markets may fail in terms of: <ul style="list-style-type: none"> • non-provision of public goods due to non-rivalry and non-excludability • non-socially optimal levels of goods and services due to the presence of externalities, information failure (including asymmetric information; and asymmetric information leads to adverse selection & moral hazard), immobility of factors of production, and market dominance 	
2.3.3 Microeconomic Policies	
<ul style="list-style-type: none"> a. Microeconomic policy decisions undertaken by governments to achieve microeconomic objectives in relation to efficiency and equity b. Policy measures including taxes and subsidies, quotas and tradeable permits, joint and direct provision, rules and regulations, public education in achieving efficiency and equity c. Effectiveness of policy measures and government failure d. An awareness that governments may apply knowledge of cognitive biases (sunk cost fallacy, loss aversion or salience bias) to nudge the decisions of economic agents is required. 	
Concepts and Tools of Analysis	
<ul style="list-style-type: none"> • Allocative efficiency • Equity • Market failure 	

<ul style="list-style-type: none">• Deadweight loss• Marginal private benefit and cost• Marginal external benefit and cost• Marginal social benefit and cost• Social versus private (market) optimum• Public goods<ul style="list-style-type: none">– Non-excludability, non-rivalry and non-rejectability• Positive and negative externalities• Information failure• Market dominance• Factor immobility	
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CONCEPT MAP



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 - 2.2.1 Myopic Decision-making
 - 2.2.2 Product Complexity
 - 2.2.3 Persuasive Advertisements and Misinformation
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 - 2.2.5 Addiction
 - 2.2.6 Asymmetric Information (Adverse Selection & Moral Hazard)
 - 2.2.7 Government intervention
 - 2.3 Public Goods
 - 2.4 Factor Immobility
 - 2.5 Market Dominance (to be covered in the topic of market structures)
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- 4 Conclusion**

Annex A – Carbon Tax versus Cap-and-Trade

Annex B – Public-Private Partnership

Annex C – Co-Payments

Annex D – Decision Making Framework

1. The Government's Microeconomic Objectives

The government has two main microeconomic objectives:

- (i) **Efficiency** in allocation of resources; and
- (ii) **Equity** in distribution of goods and services.

i) Efficiency

Efficiency in resource allocation is achieved when the resources are allocated to produce the combination of goods and services most wanted by society. This objective is achieved when the following conditions are satisfied:

- a) Price = Marginal cost, assuming no externalities; and
- b) Marginal Social Benefit (MSB) = Marginal Social Cost (MSC)**

In this topic we will be focussing on the second condition i.e. $MSB = MSC$.

Note: We will look at condition (a) in detail in the next theme when we learn about Market Dominance under the topic of Market Structures.

The free market may allocate resources efficiently only if all the following assumptions hold in the free market:

1. Goods and services sold in the free market are **rivalrous in consumption, and excludable**, i.e. private goods;
2. There is an **absence of externalities**;
3. There is **perfect competition**;
4. There is **perfect information**; and
5. There is **perfect mobility of factors of production**.

However, the above assumptions frequently do not hold in the real world and therefore the market fails to achieve efficient allocation of resources. Governments need to intervene when there is market failure to ensure that the allocation of resources is efficient.

ii) Equity

Even if the market is able to allocate its resources efficiently, it does not necessarily mean that the allocation of resources is fair. This is a question of equity.

Equity refers to an outcome where society considers the distribution of resources to be **fair**. Note that an *equitable* distribution is not the same as an *equal* distribution and that different people have different views on what is equitable.

Equity	Equality
Equity is about the sense of justice and fairness in terms of the distribution of economic welfare. It is concerned with fairness in distribution of economic welfare.	Equality is about things being equal in degree, size, number, amount, weight, status, rights etc.

In addition to a **socially optimal allocation of resources**, many societies consider **fair income distribution** as an important social goal. Government intervention is also required if essential goods are not distributed fairly among the people i.e. some groups of consumers may not have access to essential goods.

In a market economy, the individual's access to goods and services depends on their income and wealth. However, the **willingness and ability** of an individual to buy a good (which constitutes "**effective demand**") **may differ from an individual's needs**. Strictly speaking, in Economics, those who are unable to pay for the goods and services will not be captured in the market demand, because what matters in a market-based system is "**effective demand**", which is not merely about **willingness to buy** the good but also based on the **ability to pay** for the good. Therefore, while there is technically no shortages at market equilibrium where $Q_d = Q_s$, the allocation of resources may be unfair as the distribution of goods does not account for those who cannot afford the good.

Equity is inherently subjective as different economic agents in a society may have different perceptions as to what is considered as *being fair*. Nevertheless, lower prices and increased accessibility to goods like education, healthcare, housing, transportation, food and utilities should, in general, translate to more equitable outcomes. Similarly, transfers of income and wealth from higher to lower income households should also translate to more equitable outcomes.

Note:

Based on the A-Level syllabus, 'inequity' is a distributional issue and not considered a market failure.

Inequity or the unfair distribution of economic welfare arises due to the inability of certain groups of consumers to have access to essential goods and services that result from their inability to purchase them.

We will learn more about measures to address income inequality to address inequity under Macroeconomics in JC2.

2. Inefficient Allocation of Resources - Market Failure

Definition: Market failure occurs when the free market/ price mechanism fails to bring about an efficient allocation of resources. It occurs where the marginal social benefit does not equal marginal social cost.

Causes of Market Failure

1. Negative and Positive Externalities
2. Information failure
3. Public goods
4. Factor Immobility
5. Market Dominance (*to be covered in the topic of Market Structures*)

2.1 Externalities

Deriving the Free-Market Equilibrium and the Socially Efficient Equilibrium

In Demand & Supply, we have learned how the free market equilibrium is established when quantity demanded is equal to quantity supplied.

The demand and supply curves contain important information about private benefits and private costs. The demand curve reflects the value of the product to consumers, as measured by the prices consumers are willing to pay. That is, it shows the value to consumers of the **last** unit of the good consumed. The demand curve thus reflects the consumers' *additional* utility or **marginal private benefit (MPB)** at a given quantity consumed.

Similarly, the supply curve reflects the marginal private costs of producing the good. At any quantity, the supply curve shows the costs in terms of resources used in producing the **last** unit of the good. The supply curve therefore reflects the producers' *additional* cost or **marginal private cost (MPC)** incurred in producing the last unit of the good.

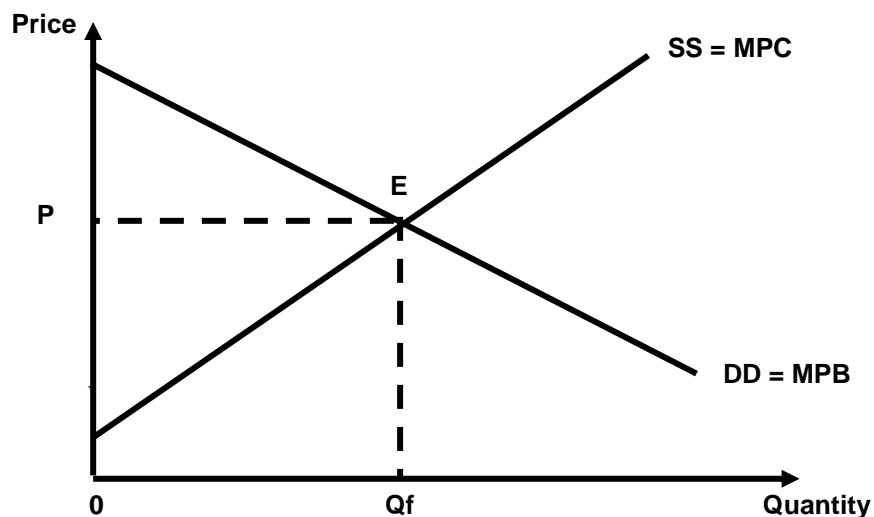


Figure 1a: Free Market Equilibrium

At the **free market equilibrium (Q_f)**, the marginal private benefit for the last unit of the product bought as reflected by the price that consumers are willing to pay equals the marginal private cost incurred in producing that last unit of the product and therefore,

$$\text{MPB} = \text{MPC}$$

Where:

- **Marginal Private Benefit (MPB)** is the extra benefit gained by a buyer from consuming an additional unit of a good or service.
- **Marginal Private Cost (MPC)** is the extra cost of producing an additional unit of a good or service which is borne by the seller of the good.

According to the Marginalist Principle of rational decision-making as explored in Central Problem of Economics, the **free market equilibrium (Q_f)** is where the private individual's net welfare is maximized, i.e. the sum of consumers' surplus and producers' surplus is maximized.

However, output Q_f , where $\text{MPB}=\text{MPC}$, may not be the socially optimal output where *society's* welfare is maximised.

- In the free market, private individuals may have failed to take into consideration that there may be **external costs/ benefits** that are incurred by/ accrued to **third parties** who are neither the consumers nor producers in a particular transaction. These are known as **externalities**.
- Without taking into account any externalities that may have been generated, the free-market equilibrium will not be efficient from the society's point of view. *Therefore, market failure occurs.*

Definition:

An **externality** is a cost or benefit of production or consumption of a product that is borne by **third parties** who are neither the buyer nor seller, and for which no payment or compensation is made.

In the case of a **negative externality**, the consumption/production activity creates an external **cost** on *third parties*.

For example, when a factory that produces garments dumps toxic waste from the dyes they use into the river, the fishes may die as a result and the fishermen (the third parties) suffer a loss in catch. They are not compensated for their loss in earnings (i.e. third parties stand to lose).

In the case of a **positive externality**, the consumption/production activity creates an external **benefit** on *third parties*.

For example, when a person is vaccinated against measles, the others around him (the third parties) will benefit in terms of a lower risk of contracting measles despite not having paid for the vaccination (i.e. third parties stand to benefit).

The **socially efficient equilibrium** is established when the Marginal Social Benefit (MSB) (benefit accrued to the entire society from consuming a good)

equals the Marginal *Social* Cost (MSC) (cost borne by the entire society from producing a good), that is:

$$\text{MSB} = \text{MSC}$$

Where:

- **Marginal Social Benefit (MSB)** is the marginal benefit enjoyed by society, i.e. by the consumer or producer of a good or service (marginal private benefit) AND the marginal benefit enjoyed by third parties (marginal external benefit/ MEB). Therefore,

$$\text{MSB} = \text{MPB} + \text{MEB}$$

- **MEB (positive externality)** refers to the benefit from production/ consumption of an additional unit of a good or service that is enjoyed by **third parties** who are neither the buyers nor sellers of the good/service.
- **Marginal Social Cost (MSC)** is the marginal cost incurred by society i.e. by the consumer or producer of a good or service (marginal private cost) and the marginal cost borne by third parties (marginal external cost/ MEC). Therefore,

$$\text{MSC} = \text{MPC} + \text{MEC}$$

- **MEC (negative externality)** refers to the cost from production / consumption of an additional unit of a good or service that is borne by the **third parties** who are neither the buyers nor sellers of the good/service.

As mentioned above, the output where $MSB = MSC$, is also the output where the society's net welfare is maximised. This is known as the **socially efficient equilibrium**. At this equilibrium, **allocative efficiency is achieved**.

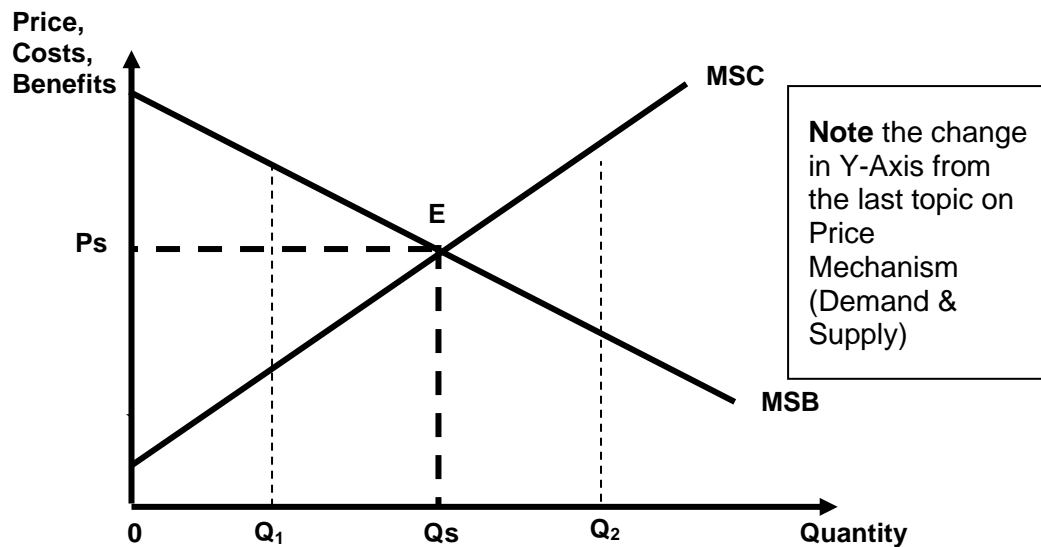


Figure 1b: Socially efficient Equilibrium

Explanation of why Q_s where $MSC=MSB$ is the socially optimum output:

As shown in Figure 1b,

At any output level lower than Q_s , $MSB > MSC$. (e.g. Q_1)

In other words, society values the benefits gained from an additional unit of good **more** than the cost of producing it.

From society's point of view, there is an **insufficient** amount of resources allocated to the production of this good. This results in **deadweight loss**, which is the loss in social welfare. Welfare can be increased by diverting more resources to the production of this good.

At any output level higher than Q_s , $MSC > MSB$. (e.g. Q_2)

In other words, society values the benefit from an additional unit of the good **less** than the cost of producing it.

From society's point of view, **too much** of resources are allocated to the production of this good. This results in **deadweight loss**, which is the loss in social welfare. Welfare can be increased by diverting resources away from the production of this good.

Therefore, at output Q_s , where $MSB=MSC$, society values the benefit from an additional unit of the good is equal to the cost of producing it. From society's point of view, the efficient amount of resources is allocated to the production of this good. **Social welfare is maximised here** as there is no need to decrease or increase resources for the production of this good.

⇒ **Socially efficient equilibrium is reached**

2.1.1 Negative Externalities

In this section, we will discuss how **negative** externalities lead to allocative inefficiency, and therefore, market failure; and how the government can help the market achieve the socially efficient equilibrium.

Definition:

Negative externalities are spill-over costs borne by third parties who are not directly involved in the consumption or production of the good itself without compensation.

These costs are not taken into account by the consumers or producers of the good in the market. Negative externalities are also commonly known as external costs to society.

a) Why is negative externality a source of market failure?

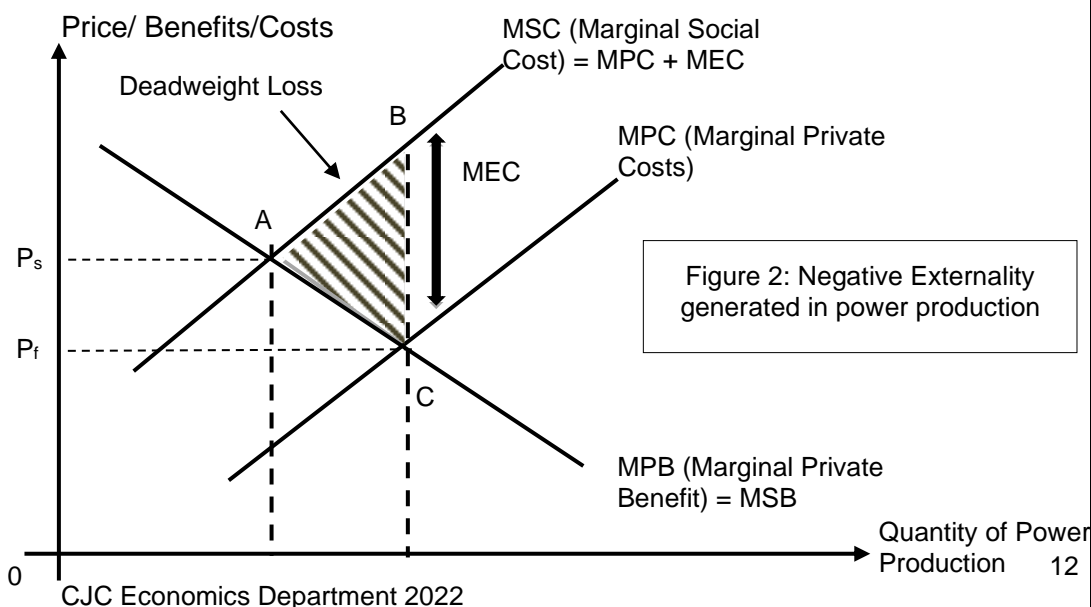
First, let us explore the consequences of the presence of negative externalities in a market.

In the production or consumption of some goods, negative externalities are generated.

- Negative externalities of production: Over-production among heavy industries, e.g. power production, may result in industrial waste that causes harm to others (third parties) in the area.
- Negative externalities of consumption: Over-consumption of cigarettes may result in second-hand smoke and thus causing harm to the health of third parties not involved in the consumption of cigarettes (act of smoking).

When firms make decisions on how much output to produce, or consumers make decisions on how much to consume, they will only **consider their MPC and MPB respectively in their pursuit of self-interest**. They will produce/ consume at the output where $MPB = MPC$ to maximise their net private benefit. Therefore, markets produce at an output greater than the socially optimal output, which leads to allocative inefficiency and market failure.

Let us illustrate the case of market failure arising from over-production of power due to negative externality using a diagram.



7-Step diagrammatic analysis of Negative Externalities (Figure 2)

Steps	Elaboration
<p><i>Note: The following explanation is from producers' and production perspective. Negative externalities can also be a result of over-consumption by consumers. Do make the change from 'producers' to 'consumers' and from 'production' to 'consumption' when explaining negative externalities arising from over-consumption.</i></p> <p>There are negative externalities arising from the over-production of power (i.e. electricity).</p>	
Step 1: Establish the free market equilibrium.	In a free market economy driven by self-interest, producers will produce at Q_f (Fig.2) where MPB=MPC and their net private benefit is maximised. In this example, private costs borne by the producer will include labour costs, overhead costs and equipment. Private benefit accrued to the firm is the revenue they are able to enjoy.
Step 2: State assumptions.	We will assume there are no external benefits in the production of power ($MEB = 0$), hence $MSB=MPB$.
Step 3: Explain the divergence in context, i.e. identify the third parties and explain how they are affected.	Producers do not consider the external costs, such as environmental pollution during the production of power, as well as the adverse health impacts of people who live nearby. The marginal external cost (MEC) generated from production of power is shown by the divergence between MSC and MPC in Figure 2 above, where $MSC (MPC + MEC)$ is higher than MPC of power production at all levels of production.
Step 4: Establish socially efficient equilibrium.	The socially efficient equilibrium where society's welfare is maximised is at $MSB = MSC$, and the socially efficient quantity should be Q_s .
Step 5: State that there is an over-production/ over-consumption & under-pricing of the good.	Therefore, there is over-production of power by the amount Q_sQ_f and under-pricing of power at P_f instead of P_s .
Step 6: Explain how deadweight loss is reflected in diagram.	As a result of this over-production by the amount of Q_sQ_f , MSC exceeds MSB over this output of Q_sQ_f and a deadweight loss to society results. This is given by the shaded area ABC in Fig.2

Step 7:
Conclude that market failure is present.

Therefore, the government's microeconomic goal of allocative efficiency is not achieved and there is market failure **because of negative externalities**.

(Note: It is important to identify the source of market failure!)

Note: How do we explain the **deadweight loss** to society?

As shown in Step 6, with the over-production by the amount Q_sQ_f , the total social cost incurred at output Q_sQ_f is represented by the bigger trapezium Q_sABQ_f . The total social benefit at output Q_sQ_f is represented by the small trapezium at Q_sACQ_f . Thus, we can see that by overproducing at Q_f , producer incurs more social cost than social benefit and therefore a net welfare loss represented by triangle ABC is resulted, as shown in Figure 2.

[This is not required in most explanations of negative externalities]

SUMMARY

In the case of negative externalities, the free market output (Q_f , where $MPB=MPC$) is greater than the socially efficient output (Q_s , where $MSB=MSC$). There is over-allocation of resources to the production or consumption of this good, leading to market failure. Allocative efficiency is not achieved given the existence of a deadweight loss.

b) Government Intervention to correct Negative Externalities

Where negative externalities exist, the government will intervene to achieve an efficient allocation of resources by trying to *decrease* production or consumption.

There are many ways the government may intervene to correct market failure caused by negative externalities. These include:

- 1) **Indirect Tax**
- 2) **Laws and Regulations**
- 3) **Ban**
- 4) **Marketable Pollution Permits**
- 5) **Advocating Substitute Markets**

While the government may have various policy options to decide from, it is imperative for us to evaluate these policies to determine the best fit through the use of a criteria – **FEAST**:

- F easibility;
- Effectiveness;
- Appropriateness;
- Side-Effects; and
- Time Lag.

Criteria of Evaluation	Definitions / Descriptions
Feasibility	<p>Refers to the extent which the policy can be carried out by the government</p> <ul style="list-style-type: none"> • Manpower and financial resources needed by government to implement and monitor (to ensure compliance) • Amount of information available/needed by government to implement policy, e.g. about MEB or MEC.
Effectiveness [Note: Cognitive biases are used to evaluate the effectiveness of policies]	<p>Refers to the extent to which the policy, if implemented, can solve the problems or can achieve the stated goal/meet the objectives of the policy-maker</p> <ul style="list-style-type: none"> • Certainty of results (depends on whether consumers have choice to defer from the policy) • Ability to reduce deadweight loss <p>Knowledge of Cognitive Biases of producers /consumers can help the government to enhance the effectiveness of policies or recognise the limitations of its policies.</p> <p>i. Sunk Cost Fallacy</p> <ul style="list-style-type: none"> ➤ describes our tendency to follow through on an endeavour if we have already invested time, effort, or money into it, whether or not the current costs outweigh the benefits. <p>ii. Loss Aversion</p> <ul style="list-style-type: none"> ➤ describes the fact that the impact of losses feels much worse to us than the impact of gains. ➤ we are more likely to avoid losses than seek out gains. ➤ we may feel that our past investment will be 'lost' if we don't follow through on the decision, and make a decision based on loss aversion rather than consider the benefits that would be gained if we did not continue our commitment. <p>iii. Salience Bias</p> <ul style="list-style-type: none"> ➤ describes our tendency to focus on items or information that are more noteworthy while ignoring those that do not grab our attention.
Addressing Root Cause	<p>Refers to whether the policy is tackling the <u>root cause</u> of the problem or simply targeting the symptoms</p> <ul style="list-style-type: none"> • Have to identify the root cause/s first
Side Effects	<p>Refers to any unintended consequence (positive and negative) the policy might have on other objectives of the firm or govt adopting the policy or measure in others, the conflict of goals</p> <ul style="list-style-type: none"> • Positive & negative side effects on: government revenue, consumer sovereignty
	Refers to how long it takes for the policy to take effect

Time Lag

- Need to consider short-run vs long-run effects of policies

Note: The FEAST framework is to be applied when deciding which policy/policies are the best in addressing the source/s of market failure. **It is important to define the criterion / criteria used, and it is not supposed to replace the explanations of how each policy works**

1) Indirect Tax¹

An **indirect tax** levied to reduce the extent of over-consumption/ production of goods. It forces the consumer or firm to internalise the external cost by imposing a tax equal to the marginal external costs incurred at Q_s .

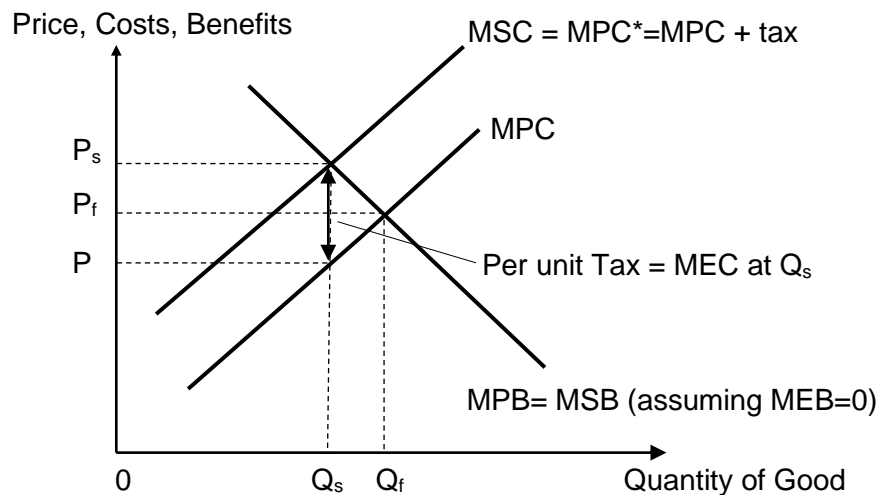


Figure 3: Effect of a tax in correcting negative externality

Diagrammatic analysis of an indirect tax to address negative externality **Figure 3**

1. The free market originally consumes/produces at Q_f where $MPC=MPB$.
2. A tax equal to the marginal external cost at Q_s (P_sP per unit) is imposed by the government. The tax makes the private firm/consumer internalise the negative externality in their decision making.
3. This causes the firm/consumer's new MPC to shift up to MPC^* .
4. As a result, the firm/consumer reduce the consumption/production to Q_s where the new $MPC = MPC^*=MPB$, to maximise their net benefit.
5. The socially efficient output level Q_s is achieved and the deadweight loss is eliminated.
6. There is also a change in prices in the market. The equilibrium price was initially at P_f but increases to P_s as a result of the tax. The

¹ **Indirect taxes** are taxes on expenditure on goods and services (e.g. GST). They are paid to the government, not by the consumer, but indirectly by the producers of the goods or services. These are different from **direct taxes**, which are taxes on income and wealth and paid directly to the government by firms or consumers.

increase in price would reduce the quantity demanded, reducing the equilibrium quantity towards Q_s .

Examples of such taxes in Singapore:

Tax on cigarettes, tax on alcohol, entry levy to enter legal casinos, Electronic Road Pricing (ERP) on the use congested routes and carbon tax on producers.

Evaluation of Indirect Tax using FEAST

Indirect Tax

E.g. Alcohol/cigarette tax, ERP, carbon tax, casino entry levy

****Should be equivalent to MEC at Q_s to force consumers/producers to internalise third party costs to be fully effective****

Feasibility: (i) Manpower and financial resources needed, (ii) Amount of information required

- Might be unfeasible because the government may not have complete information about the MEC incurred by 3rd parties and may end up over-/under-taxing, which does not eliminate DWL and achieve Allocative Efficiency. There could still be over-consumption or under-consumption. Difficult for the government to estimate MEC on their own (e.g. difficult to know who caused the air/water pollution when the government only knows the total level of pollution in environment).
- MEC can change over time but it is unfeasible for tax rates to keep changing over time. Every firm might individually contribute to varying extents to MEC but it is difficult for the government to set different tax rates for different firms and keep monitoring their contribution to MEC and keep adjusting tax rates accordingly. This might become difficult for consumers and firms to understand as they become too complex.
- A government will need to devote resources to monitoring and ensuring that consumers comply with taxes and not evade tax but this should be less than required from a total ban as there would not be a black market hence lower propensity for black market smuggling
- However, taxes do not require high levels of resources from government to implement. On the contrary, it adds to the government's revenue hence they are feasible in terms of the financial burden on the government.

Effectiveness: (i) Certainty of results; and (ii) Ability to reduce DWL

- Can be very effective in eliminating the DWL if tax is equivalent to MEC.
- However, the demand for addictive goods, e.g. cigarette/alcohol, is price inelastic. Therefore, an increase in price due to a tax would lead to a ***less than proportionate*** fall in quantity demanded. A large tax would be needed to reduce the output to Q_s but implementing high taxes may lead to political losses for the ruling government. (Usually hard for a government to implement large tax as it is politically not so feasible. The government could be voted out by its citizen after the end of its term.)
- Results of tax are uncertain hence tax may not be fully effective as consumers

have the choice to decide whether to cut back on consumption. They may decide that they are willing to pay the high taxes and still continue to consume (e.g. demand very price inelastic). E.g. car usage is still very high and traffic jams common in SG despite ERP.

- E.g. in UK 5% of pollution tax offenders are repeat offenders - a sign that taxes might not be high enough, i.e. less costly for these firms to pay taxes than to use green technology.
- In Singapore, the government imposes a heavy tax on tobacco - \$0.427/ gram – A large tax is required as the demand for a cigarette is price inelastic due to the addictive nature of cigarettes.

Cognitive Biases affect the Effectiveness of Tax

Sunk Cost Fallacy	<p>Road tax that is imposed on car owners semi-annually substantially raises the sunk costs of owning a car in Singapore. To spread the high fixed costs of owning a car over its lifespan, drivers in Singapore tend to utilise their cars more often that could worsen road congestion.</p> <p>In contrast, ERP works like a tax imposed on each unit of road usage. To the extent that the amount is significant, it avoids the problems associated with the sunk cost fallacy.</p>
Loss Aversion	Based on the cognitive bias of loss aversion, taxes that add to consumers' losses would likely be effective in altering behaviour while still providing choice to producers and consumers.
Salience Bias	<p>Taxes are more effective if it is made more salient. ERP is particularly effective in reducing car usage as it makes each charge very explicit to motorists via the In-Vehicle Unit (IU) (with a very loud beep) installed in the car and has a significant impact on motorists' behaviour due to the salience bias.</p> <p>In contrast, motorists only pay for COE once at the point of car purchase and road tax annually. Hence these measures are less salient and less effective than ERP.</p>

Addressing the root cause

Tax addresses the root cause of negative externalities, which is the indifference towards third parties which leads to MEC.

- Tax is a good policy as it targeted at the indifference towards third parties. A tax equivalent to the MEC should be implemented as it forces consumers to internalise the MEC hence reduce their consumption levels.

Tax is inappropriate to deal with the root cause of imperfect information which is ignorance about private costs. Hence by forcing consumers to internalise the MEC through tax, it does not help consumers by raising awareness. It simply forces unknowing consumers to pay more and hence they might still over-consume the good.

Side Effects:

(i) Positive side effects

- Raises revenue for government which can be used to reduce MEC further (e.g. engage in pollution control) or launch a campaign to deal with imperfect information.
- Does not impede the free market as market forces and demand and supply can still operate to clear surpluses and shortages.
- Does not deny consumers of their choice and consumer sovereignty – they can still choose whether to consume or not.

(ii) Negative side effects

- If imposed on producers due to negative externalities from production, this might raise the cost of production for producers and reduce their profits – and they may then retrench workers which leads to unemployment (full employment is a macroeconomic goal of government)
- A tax on goods, such as cigarettes and alcoholic drinks, may be regressive in effect as the amount of tax represents a larger fraction of income among lower income-earners (i.e. worsens inequity). This means that the indirect tax may increase income inequality.

Time Lag: (i) How long the policy takes to work

- The tax takes time to work because the extent to which Q_d will fall due to increase in price depends on the PED of the good. In the short run, $PED < 1$ hence consumers are unlikely to be able to change consumption patterns or kick off addiction as Q_d falls less than proportionate to the rise in price due to a tax. However, in the LR, $PED > 1$ hence Q_d will fall more than proportionately due to the increase in price brought about by tax.
- **The policy is dynamic in nature. Taxes are easily adjustable** according to the changing level of external cost.
- **E.g.** Per-use tax on road usage (Electronic road pricing in Singapore) can be changed from **\$0.50 - \$4. Charges are modified higher during peak hours. This help to achieve speeds higher than the threshold speed of 45km/hr.**

2) Laws and Regulations

Laws and regulations could be used to reduce (i) output; or (ii) external costs.

- a) Laws and regulations in the form of output quotas to compel producers to reduce output to the socially optimum output of Q_s where $MSB=MSC$ (refer to Figure 2).
- b) Laws and regulations to reduce external costs. Diagrammatically, MSC curve will fall, shifting closer to the MPC curve. Examples of such regulations include:
 - Requiring firms to adopt a particular technology to reduce harmful emissions, e.g. requiring vehicles to be fitted with catalytic converters.
 - Making it mandatory for power plants to replace unfiltered power generators with natural gas pipelines that pollute less.
 - For example, laws and regulations were passed to regulate the use of e-scooters in Singapore - reduction in speed limits on footpaths, mandatory registration of e-scooters and campaigns to promote safe riding habits for e-scooter users. This helps to reduce the possible negative externalities (external costs) arising from the use of e-scooters.

Both output quota and laws to reduce external costs force consumers/producers to consume/produce at the socially optimal output and hence eliminating deadweight loss and achieving allocative efficiency.

Example of laws and regulations in Singapore

Smoking (Prohibition in certain Places) Act

Smoking is prohibited at the following places

- All air-conditioned offices
- All schools including junior colleges, polytechnics, training institutes, air-conditioned and enclosed areas in Universities
- All bus shelters and interchanges, public pools and toilets, community clubs and open-air stadiums
- Public places i.e. entertainment outlets

3) Total Ban

A total ban is an outright restriction of output where the quantity produced will now be 0. This eliminates all external costs, because zero units of the good is produced. Ideally, the government should ban the product only **if the socially optimal output Q_s is at zero** and the MSC is greater than MSB for **all output levels** as seen in Figure 4 below. The negative externality from guns consumption is so large that MSC exceeds MSB at all output levels, i.e. the socially efficient amount of guns to be consumed is zero. It is more optimal to ban the good, as any non-zero consumption of guns would result in an inefficient resource allocation for society.

Price, Costs, Benefits

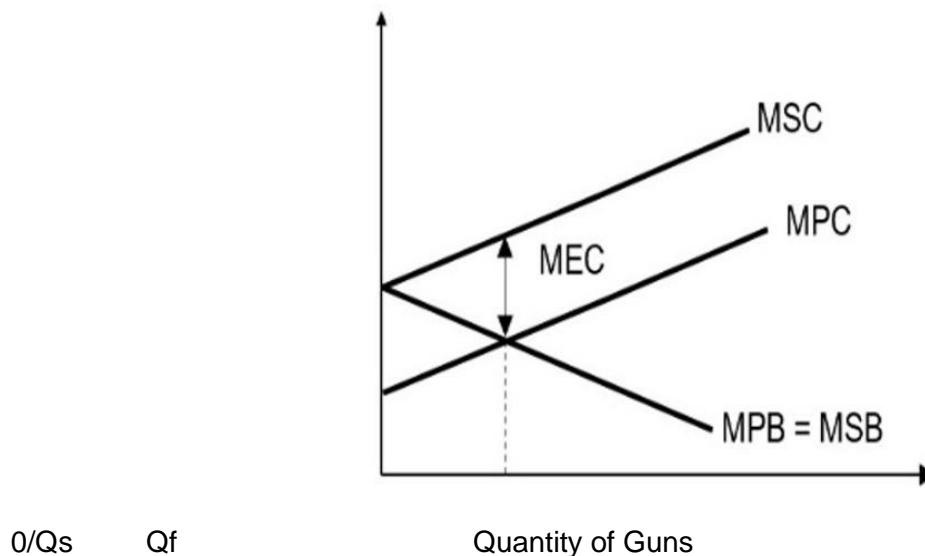


Figure 4: A socially efficient ban

Private consumption of shisha in Singapore is strictly banned since any quantity of private consumption may result in large negative externality e.g. lung related cancers to innocent third party. This causes a divergence between MPC and MSC to be so large that a ban on shisha is required.

Goods should not be banned when the negative externalities generated do not cause such a great divergence such that MSC exceeds MSB at all output levels. This means there is still a positive socially efficient output level (that is, Q_s is not at zero output level) that should be produced. If the government still insists on banning the good, the ban in this case will be an *inefficient ban*. Such an example is given below.

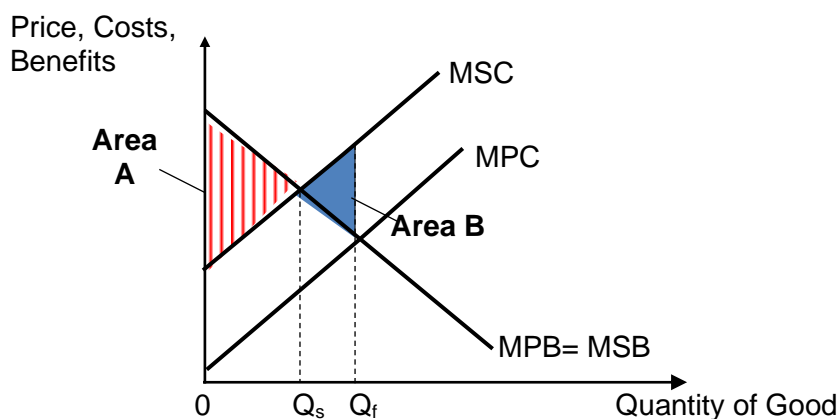


Figure 5: A ban that is socially inefficient

As can be seen from Figure 5 above, MSC does not exceed MSB at all levels of output, i.e. Q_s (where $MSC=MSB$) is greater than zero. There is still a positive quantity of the good that is socially efficient if it is produced/consumed.

Hence, by completely banning the good, potential net benefit from producing/consuming the good would be lost and this is represented by area A in Figure 5. In the example above, banning the good would have resulted in a deadweight loss of Area A, which would be larger than the deadweight loss of Area B that would have been generated if the government had not intervened and had allowed the free market to prevail at Q_f . The ban would have created an even larger welfare loss (Area A) than at free market equilibrium (Area B). Hence, a total ban would be more *inefficient than leaving it to the free market*.



Food for Thought:

What happens when Area A is smaller than Area B? Should the government still proceed with the ban?

Evaluation of Laws and Regulations & Total Ban using FEAST

E.g. Quotas (e.g. COE, tradable permits), Age ban on alcohol & cigarettes, Regulating level of emissions, compulsory catalytic converters in cars, total ban of hard drugs, like Heroin

Feasibility - (i) Manpower and financial resources needed, (ii) Amount of information required

- Non-quota regulations, e.g. age restrictions on alcohol purchase, are **easy to implement** as not much information is required. The government does not need to know the level of MEC. Government just needs to regulate the output close to Q_s . Some information needed about Q_s but less complex than information about MEC.
- Regulation will be **standardized** for the whole industry hence easy to implement than taxes that vary according to the output of individual firms. It will also be easy for consumers and producers to understand.
- Resources will **need to be devoted to monitoring and ensuring compliance**. Feasibility will depend on context. E.g. regulating cigarette ban based on age/geography in Singapore is easy due to the small urban environment. However, regulating forest fires in Indonesia is difficult and unfeasible due to the expanse of forests.
- **Quota-based regulations (e.g. COE are highly complex. The government needs a lot of information** and expertise in terms of human resource to set up a system sound quota system. The government needs to know the level at which quota should be set, and how to allocate COEs. Therefore, such systems are more common in Developed Countries than Less Developed Countries.
- All in all, the feasibility of this policy depends on the ability of government to

enact, monitor and enforce law and regulation. It also requires government financing and hence taxes.

Effectiveness: (i) Certainty of results; and (ii) Ability to reduce DWL

- As long as penalties are sufficiently severe, regulation can be very effective.
- Results are certain as the government will decide on the level of output and consumers must comply or suffer penalties. Consumers have no choice over the level of consumption.
- Effectiveness is contingent on close monitoring and supervision. This is subject to context (e.g. size of the country). As long as the government is able to monitor and ensure compliance, the policy can be very effective.
- However, the government must be able to identify Qs and regulate in such a way that the regulated output will be at Qs.
- Overall, Laws and Regulation would directly ensure that the **socially efficient level of alcohol consumption could be attained**. For e.g. Coffeeshops in Singapore cannot sell alcohol after 10.30 pm.

While a total ban can definitely reduce consumption, it cannot lead to a complete elimination of DWL if the socially optimum output is greater than zero. In that case, a total ban would still lead to a DWL due to under-consumption. This DWL of under-consumption might outweigh the original DWL due to over-consumption (See Figure 5).

Cognitive Biases Affect the Effectiveness of Laws & Regulations/ Total Ban

Sunk Cost Fallacy

To own a car in Singapore, motorists are required to pay for a certificate of entitlement (COE). To the motorists (consumers), high COE prices are the high sunk costs for purchasing the car. To better spread the high fixed costs (sunk costs) of owning a car over its lifespan, **drivers in Singapore tend to utilise their cars more often as the MPC of car journeys is relatively low** (e.g. petrol costs, parking charges etc).

Therefore, it encourages car owners to drive more to justify the high sunk costs. This causes even greater over-consumption and DWL to society, hence greater allocative inefficiency and MF.

Alternative policy: Taxation on road usage via the Electronic Road Pricing (ERP)

Given the sunk cost fallacy, the government should focus more on addressing 'road usage' (i.e. raising the marginal private cost of each trip) rather than 'car ownership' to address traffic congestion (over usage of roads)

Loss Aversion

To make laws and regulations more effective, the government should emphasise the penalties to deter potential offenders whose behaviour would be affected by their aversion to potential losses. For instance, the amount of fine (e.g. FINE \$5000) may be included below signs that ban smoking.

Saliency Bias	<p>People may ignore laws and regulations if there is nothing prominent to grab their attention.</p> <p>E.g, it is against the law for motorists to leave vehicle engines idling while the vehicle is stationary (notwithstanding traffic congestion situations) due to air pollution and fuel wastage. However, many motorists may not abide by such regulations due to the lack of attention paid to them.</p> <p>Authorities should publicise enforcement actions, e.g. catching e-scooter riders on sidewalks, and the penalties involved as people tend to focus on information that are noteworthy and prominent.</p>
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Addressing the root cause

Regulation is inappropriate to deal with the root causes of both negative externalities and imperfect information

It does not deal with the **root cause of negative externalities, which is the indifference towards third parties** as it does not address the MEC

- When government regulates, it does not try to force consumers to care about the third party costs by making them internalise the MEC (as what would have been done through taxation)
- Regulation simply forces consumers to consume at a certain level – consumers still do not care about third party costs.

Does not deal with the **root cause of imperfect information which is ignorance of private costs**:

- Consumers still do not know the actual MPC
- However, laws and regulation for health warnings to be printed visibly on the packaging for cigarettes can address the root cause of imperfect information.
- In Singapore, such warnings go beyond just words but instead include graphic illustrations of diseased human organs as a result of smoking. This helps to **raise awareness** of the ill-effects of smoking and highlights the risks involved for smokers, targeting the root cause of imperfect information. Increasing the perceived MPC to better match up with actual MPC, thereby reducing consumption to a more optimal level.

Side Effects:

i) Positive side effects

- Quota-based regulations, e.g. COE, can raise revenue for the government but other forms of regulations cannot.

ii) Negative side effects

- Impedes the free market and hence price adjustment process may not be able to clear surpluses and shortages – may lead to black market and crime hence greater costs on society and taxpayers.
- Denies consumers of their consumer sovereignty as they cannot choose whether to consume or not.
 - E.g. It is illegal in Singapore to drink in public places from 10.30 pm to

7 am. This measure means that consumers don't have the freedom to drink in public places, hence no consumer sovereignty.

- Laws and regulations imposed on producers due to negative externalities from production) may raise the cost of production for producers and reduce their profits – and they may then retrench workers which leads to unemployment (full employment is a macroeconomic goal of government).
- May incur additional costs for a government to policy, monitor and prosecute offenders, e.g. the case for marijuana legalisation in many states in the USA is that the negative effects are not dissimilar to alcohol and the regulation/ban leads to a buoyant black market and active smuggling and drug mafias which costs the government greatly to crackdown).

Time Lag: (i) How long the policy takes to work

- Works very fast as consumers and producers have no choice. They need to adhere to the law within the given time frame by the government.
- Laws and regulations are not subjected to the limitations of PED in the short run, whereby $PED < 1$, since they do not rely on raising prices of goods and services to reduce consumption. Hence the effectiveness of the policies does not depend on consumer and producer's responsiveness.
- Once the law is implemented, the policy works immediately.

4) Marketable Pollution Permits

If pollution can be easily monitored and polluters easily identified, the government may choose to allocate pollution permits to reduce pollution. This is also known as the 'cap-and-trade' scheme. Marketable pollution permits attempt to align private firms' incentives with societal optimality. We shall see this in action using the numerical example below.

Two power generating firms, Firm A and Firm B, are producing 20 units of a particular pollutant each – 40 units of pollutant in total.

- Let us assume the government wants to reduce pollution by 8 units.
- Each firm is given a permit to emit up to 16 units of that particular pollutant – 32 units of pollutant in total.
- If Firm A is able to reduce its pollutants to 14 units, then, it would sell the units for 2 units of pollutants.
- If Firm B can reduce its pollutants to 18 units, it will buy 2 units from Firm A at a price that is mutually beneficial (i.e. at a price above the cost of emission reduction to Firm A and below the cost of emission reduction to Firm B).
- The total reduction in pollutants is still 8 units; Firm A reduces its pollutants by 6 units and firm B by 2 units.

Succinct Explanation:

The government (policy maker) sets a limit (**CAP**) on the total volume of pollution these firms will be collectively allowed to produce

If the total number of permits issued by the government coincides with the social optimal level of production (Q_s), the deadweight loss would technically be eliminated

The government issues firms with permits on the maximum level of pollution they are allowed to emit.

- Firms can then buy or sell (**TRADE**) the permits to each other in the carbon market.
- There are two ways for firms to pollute less:
 - o Cut production
 - o Find ways to reduce pollution (e.g. cleaner methods of production)
- If a firm emits pollution below its permitted limit, it can sell its 'rights to pollute' to other firms. This creates incentives for firms to pollute less to make a profit from sale of permits.
- Other firms that find it hard to reduce pollutants may purchase additional permits to pollute.
- When firms adopt cleaner methods of production, MEC is also reduced.

One example of marketable pollution permits is the EU Emissions Trading System.



EU's Emissions Trading System

The European Union's Emissions Trading System (ETS) is the world's biggest scheme for trading greenhouse gas emissions allowances. Launched in 2005, it covers some 11,000 power stations and industrial plants in 30 countries, whose carbon emissions make up almost 50% of Europe's total. A cap on the total emissions allowed within the scheme is set, and allowances adding up to the cap are provided to the companies regulated by the scheme. Companies can trade their allowances, providing an incentive for them to reduce their emissions.

In a basic sense the ETS has worked. It has set a cap on half of Europe's carbon emissions, which were previously unregulated, and the companies covered by the scheme are no longer free to pollute. Carbon has a price and this influences the economics of burning fossil fuels.

For example, burning coal creates more carbon pollution than burning gas, so coal plant operators need more permits. The higher the price of the permits, the more expensive it is to use coal rather than gas. Power companies choosing how to generate electricity therefore have an extra cost associated with the more polluting options, so they'll choose gas over coal more of the time.

Putting precise numbers on how far the ETS has worked in practice is difficult, as it means estimating what the level of pollution would have been if the ETS was not in place. It is likely, however, that in its first few years, the scheme was responsible for turning an anticipated increase in emissions into a decline of 2.5-5%. One in-depth study analysed background emissions, economic trends and weather patterns, and concluded that between 2005 and 2007 the ETS reduced emissions by 120-300m tonnes, with a best guess of 210m tonnes across Europe.

The Guardian, 7th June 2011

Both taxes and marketable pollution permits are examples of policies that place a price on the right to pollute. See **Annex A** for an article on the comparison of the two policies.

Evaluation of Marketable Pollution Permit using FEAST

Marketable Pollution Permits

E.g. Alcohol/cigarette tax, ERP, carbon tax, casino entry levy

****Should be equivalent to MEC to force consumers/producers to internalise third party costs to be fully effective****

Feasibility - (i) Manpower and financial resources needed, (ii) Amount of information required

- It is difficult to know how many permits to give out due to incomplete information about Qs. It is also complex to set up a fair trading system for all firms.

Effectiveness: (i) Certainty of results, (ii) Ability to reduce DWL

- In the short run, richer factories may simply purchase more credits rather than to reduce their emissions thus causing pollution to be concentrated in these geographical areas.
- In the long run, the government can reduce the number of permits over time. This means the price will steadily increase and create a **growing incentive to reduce pollution** over time. The idea is that **it gives firms time to try and invest in different technology which creates less pollution.**
- There is potential for firms to hide their pollution levels or shift production to other countries, with looser environmental standards.

Cognitive Biases Affect the Effectiveness of Marketable Pollution Permits

Sunk Cost Fallacy	Firms which have existing non-green plant and equipment may be reluctant to switch to green equipment as they might have already spent a huge amount of funds on the existing plant and equipment. It is likely that the firms will continue using the non-green equipment even though current costs may outweigh the benefits, rendering the policy not as effective
Loss Aversion	In addition, firms may consider their past investment in the non-green machinery as 'lost' if they do not continue using the existing machinery, and therefore make a decision based on loss aversion rather than consider the benefits (e.g. the earnings from trading the permits) that would be gained if we did not continue using the non-green machinery <ul style="list-style-type: none"> - This may cause the pollution to be concentrated in certain geographical areas. - High enforcement and monitoring cost may be necessary to make the whole system effective

Side Effects: (i) Negative side effects, (ii) Positive side effects

Negative side effects

- There could be inequity and unfairness among firms as larger firms may buy up all the permits to pollute and smaller firms that do not have the means to obtain permits may have to shut down and leave the industry.

5) Advocating Substitute Markets

To correct the negative externalities generated from the over-consumption of certain goods, the government may promote an alternative market in order to encourage the consumption of the alternative good. **As consumers switch over to consume the alternative good, they would reduce their over-consumption of the good that generates negative externalities. When the quantity of the good consumed falls to the social equilibrium output level, Q_s , the deadweight loss to society is eliminated and allocative efficiency is restored in the market.**

An example would be the use of electric cars instead of petrol-fuelled cars which are deemed to be damaging for the environment due to higher emissions.

The government could encourage the use of electric cars by law as well as making it more convenient for motorists. The UK is the first country to introduce a law where new homes will be required to have electric vehicle charging points by law from 2022.

The government may also enhance infrastructure to encourage the usage of electric vehicles so that more motorists will be more likely to switch from driving petrol fuelled vehicles to electric vehicles. For example, publicly accessible chargers have grown sevenfold across Europe in the past five years.

The fact that global electric car sales grew 140% in the first quarter of 2021 shows that advocating a substitute market, in this case, the electric car market, to curb pollution (negative externality) was seemingly successful.

Evaluation of using FEAST

Note: Students must use the explanation in bold to analytically explain the mechanism of this policy, i.e. use economics tools of analysis and link to the market failure diagram.

<u>Advocating Substitute Markets</u>	
E.g. Promote the use of electric vehicles to induce consumers to reduce consumption of petrol-fuelled vehicles)	
Feasibility: (i) Manpower and financial resources needed, (ii) Amount of information required	
<ul style="list-style-type: none"> Might be unfeasible because the government may not have accurate information of the substitutability between both goods, e.g. to what extent do consumers view electric cars as substitutes of petrol-fuelled cars. <i>(H2 Economics students should use the concept of cross elasticity of demand here.)</i> A government will need to devote a significant amount of resources building the infrastructure to support the use of electric vehicles. 	
Effectiveness: (i) Certainty of results; and (ii) Ability to reduce DWL	
<ul style="list-style-type: none"> Can be very effective in reducing DWL if there the alternative good is a close substitute of the good with negative externalities and can eliminate the third party costs <ul style="list-style-type: none"> Substitutability between goods may be poor, e.g. consumers may not make the switch to zero-emission vehicles if there are not 	

enough charging and refuelling stations along the roads where they drive. As such, they may not view electric vehicles as close substitutes due to the inconvenience.

- If laws and regulations are in place to advocate the consumption of a substitute (e.g. consumers must drive electric cars instead of petrol-fuelled cars by law), there is certainty of results when penalties are sufficient

Cognitive Biases affect the Effectiveness of Advocating Substitute Markets

Sunk Cost Fallacy	N/A
Loss Aversion	Based on the concept of 'loss aversion', consumers respond more to the impact of losses than gains. As such, promoting the benefits of substitutes, e.g. public transport/ electric cars to reduce the over-consumption of petrol-fuelled cars would likely be less effective than taxing car usage & petrol (i.e. increasing the losses associated with driving petrol-fuelled cars).
Saliency Bias	To increase the effectiveness of advocating substitutes, the government should mandate advertisements/ public messages that increase the saliency of the benefits of substitutes to consumers, e.g. advertisements at petrol stations to remind drivers each time they buy petrol of the cost-savings of public transportation/ availability of electric charging points for electric cars.

Addressing the root cause

- May not address the root cause of the negative externality, i.e. indifference towards third parties. E.g. promoting the use of electric cars to reduce the over-consumption of petrol-fuelled cars may not address the root cause of the problem as consumption of electric cars may still impose costs on third parties, e.g. traffic congestion for public transport commuters and the higher consumption of electricity inevitably worsens climate change.

Side Effects:

Positive side effects

- A subsidy in place to advocate a substitute market does not impede the free market as market forces can still operate to clear surpluses and shortages.
- Does not deny consumers of their choice and consumer sovereignty – they can still choose whether to consume or not. For instance, motorists can still choose to drive petrol-fuelled vehicles should they wish not to switch to driving electric vehicles.
- Subsidies provided to encourage consumers to switch to the substitute market can promote equitable access to the good regardless of income levels.

Negative side effects

- Promoting the alternative market may cause over-consumption of the good and negative externalities, e.g. electric cars may still impose 3rd party costs.

Time Lag: (i) How long the policy takes to work

- The subsidy in place to encourage consumption of electric vehicles takes time

because the extent to which Q_d will increase due to fall in price of electric cars depends on the PED of electric cars. In the short run, $PED < 1$ as consumers are unlikely to be able to change their consumption patterns. However, in the long run, $PED > 1$ hence Q_d will rise more than proportionately due to the decrease in price brought about by the subsidy.

2.1.2 Positive Externalities

In this section we will discuss how **positive** externalities that are generated may lead to market failure, and how the government can help the market to achieve the socially efficient equilibrium by applying various methods of intervention.

Definition:

Positive externalities are spill over benefits enjoyed by third parties who are not directly involved in the consumption or production of the good/service itself, without payment.

These benefits are not taken into account by the consumers or producers of the good/service in the market. Positive externalities are also commonly known as external benefits to society.

a) Why is positive externality a source of market failure?

Positive externalities are generated in the production/consumption of some goods and services. For example:

- Positive Externalities of consumption: when a person gets a vaccination for flu, he derives private benefit as he is less likely to contract the sickness. Other **unvaccinated** people around him (**third parties**) benefit as well because they are also less likely to be infected. Hence, they enjoy the external benefit without paying for the vaccination.
- Positive Externalities of production: when firms spend on research and development (R&D), this is likely to benefit **other firms that do not engage in R&D** and their workers may also enjoy external benefits from the increase in investments that may be attracted into the country without paying for R&D.

When producers/ consumers make decisions on how many goods/ services to produce/ consume, they will only take consider their MPB and MPC in the pursuit of self-interest. They produce/ consume at the output where **MPB=MPC** to maximise their net private benefit. However, this output may be lower than socially optimal output, which leads to allocative inefficiency and market failure.

Some markets that exhibit this feature of external benefits are:

- (i) Education;
- (ii) Healthcare; and
- (iii) Research & Development.

Let us illustrate market failure arising from the case of vaccination using a diagram.

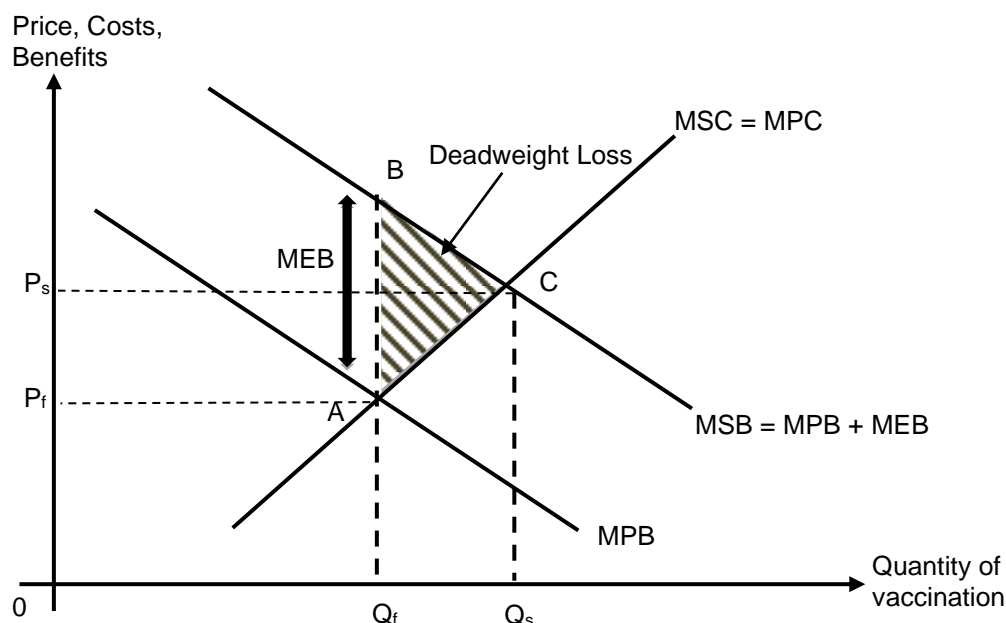


Figure 6: Positive Externality generated in consumption of vaccination

7-step diagrammatic analysis of Positive Externalities (Figure 6)

Steps	Elaboration
<p><i>Note: The following explanation is from consumers' and consumption perspective. Positive externalities can also be a result of under-production by producers. Make the change from 'consumers' to 'producers' and 'consumption' to 'production' when explaining positive externalities due to under-production.</i></p> <p>There are positive externalities arising from the under-consumption of vaccines.</p>	
Step 1: Establish the free market equilibrium.	A consumer who receives a vaccination against the flu will enjoy the marginal private benefit of being protected against the disease. Private costs borne by the individual will include fees paid to get the vaccination. In a free market economy, driven by self-interest, individuals will consume at Q_f where $MPC=MPB$ and their net private benefit is maximised.
Step 2: State assumptions.	We will assume there are no external costs in the consumption of vaccinations ($MEC=0$), hence $MSC=MPC$.
Step 3: Explain the divergence in context, i.e. identify the third parties and explain how they are	Consumers of vaccination do not consider the external benefits enjoyed by third parties are not taken into account. For example, the co-workers and family members (third parties) benefit as they are less likely to contract flu from the vaccinated individual. The marginal external

affected'	benefit (MEB) generated from consumption of vaccinations is shown by the divergence between MSB and MPB in Figure 6 above, where MSB (MPB + MEB) is higher than MPB of vaccination at all levels of consumption.
Step 4: Establish socially efficient equilibrium.	The socially efficient equilibrium where society's welfare is maximised is at Q_s where $MSB = MSC$.
Step 5: State that there is an under-production/ under-consumption & over-pricing of the good.	Therefore, there is under-consumption of vaccination by the amount $Q_f Q_s$ and under-pricing of the good at P_f instead of P_s .
Step 6: Explain how deadweight loss is reflected in diagram.	As a result of this under-consumption by the amount of $Q_f Q_s$, $MSB > MSC$, meaning net benefit can be gained if more vaccination is consumed. Since the allocative efficient or social optimum quantity is Q_s where $MSB = MSC$, at any output between Q_f and Q_s there is a potential net welfare gain for society should these units be consumed. The loss of this potential net welfare gain is given by the shaded area in the diagram.
Step 7: Conclude that market failure is present.	Therefore, the government's microeconomic goal of allocative efficiency is not achieved and there is market failure.

SUMMARY

In the case of positive externality, the free-market output is less than the socially efficient output. Too little resources have been allocated to the consumption or production of this good, leading to market failure. Allocative efficiency is therefore not achieved given the existence of a deadweight loss.

b) Government Intervention to correct Positive Externalities

In the case of positive externalities, the free-market output is less than the socially efficient level. Therefore, the government intervenes to achieve an efficient allocation of resources by trying to *increase* production or consumption.

There are many ways the government may intervene to correct market failure in markets with positive externalities:

- 1) **Subsidies**
- 2) **Direct Provision**
- 3) **Joint Provision**
- 4) **Legislation**

While the government may have various policy options to decide from to correct inefficient allocation of resources due to positive externalities, it is imperative for us to evaluate these policies to determine the best fit through the use of a criteria – **FEAST**.

1) Subsidies

Subsidies lower marginal private costs to encourage greater consumption / production.

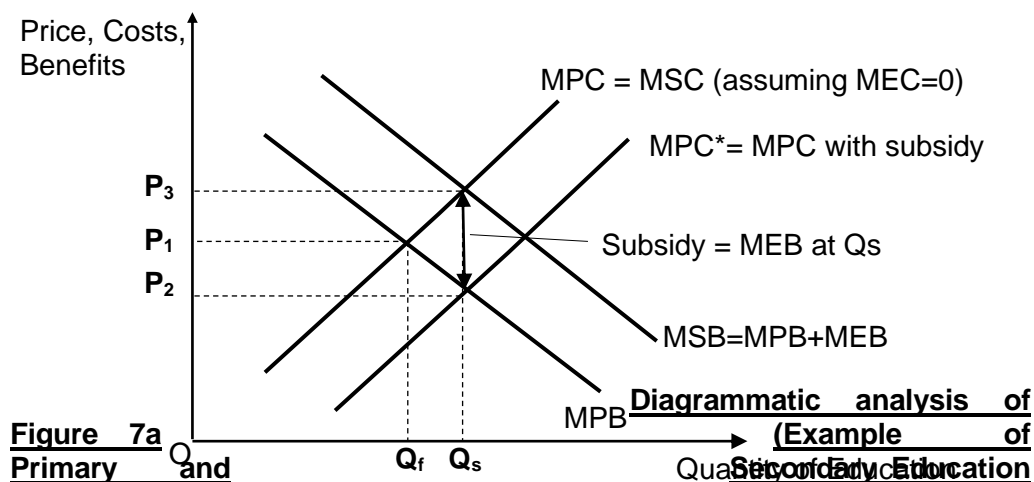


Figure 7a: Effects of a per unit subsidy in correcting positive externality in Singapore)

1. Establish the free market equilibrium for Primary and Secondary Education in Singapore.

In the absence of government intervention, the free market originally consumes at Q_f where $MPC = MPB$. For example, the MPB received by students is the knowledge they gain through education, while the MPC borne by students would be the school fees that they have to pay.

2. Determine and explain the size of subsidy to be provided by the government.

A subsidy equal to the marginal external benefit at Q_s (P_2P_3 is the subsidy per unit) is provided by the government.

3. Explain what happens to the MPC as a result of the subsidy provided.

Such a subsidy will result in the MPC of students going to school to fall by the extent of the subsidy. This causes the students' MPC to fall to MPC^* , causing the market price to fall to OP_2 . Therefore, a student attending school pays only a small portion of the school fees (OP_2), while the rest (P_2P_3) is paid for by the government to the school.

4. Establish the socially efficient equilibrium.

As a result, students will consume education up to the output where $MPB = MPC^*$ at Q_s as this maximises their net private benefit. In other words, the fall in equilibrium price from P_1 to P_2 motivates an increase in consumption from Q_f to Q_s , which is the socially efficient output, eliminating deadweight loss.

5. Explain how market failure is resolved.

Therefore, by subsidising school fees, the government allocates more resources in the consumption of education to solve the problem of under-consumption caused by positive externalities.

6. Explain what happens to equilibrium price.

As mentioned earlier, there is a fall in equilibrium price of education from P_1 to P_2 , as a result of the subsidy.

Example of subsidies for vaccinations in Singapore



All childhood vaccinations to be subsidised at polyclinics and CHAS GPs by end of 2020

All polyclinics vaccinations under the National Childhood Immunisation Schedule (NCIS) will be subsidised for Singaporeans by the end of 2020, and the subsidies will be extended to general practitioner clinics under the Community Health Assist Scheme (CHAS).

This was announced by the Ministry of Health (MOH) on Wednesday (Aug 28), as part of efforts to make childhood preventive healthcare more affordable and accessible.

With the changes, vaccinations for pneumococcal disease and human papillomavirus (HPV) will be subsidised as well - at both polyclinics and CHAS GPs.

For vaccinations recommended for personal protection, such as the one against pneumococcal disease, take-up rates are "much lower", said MOH, although they offer significant protection against disease.

CNA, 28th August 2019

Evaluation of Subsidies using FEAST

E.g. Means-tested hospitalisation subsidy in SG, subsidised education in SG, SkillsFuture (subsidies for skills training)

****Should be equivalent to MEB to enable consumers/producers to internalise third party benefits to be fully effective****

Feasibility: (i) Manpower and financial resources needed; and (ii) Amount of information required

- **Requires substantial levels of government financing**

- Universal subsidies (equal level of subsidies given to all) will be very expensive for the government to implement

EV: Many governments have moved into means-tested subsidies (subsidies which vary according to income levels of consumers: means-tested) which helps reduce the financial burden on the government. In Singapore, many subsidies, e.g. public hospital subsidies, are provided through means-testing and by having in place additional subsidies e.g. Medifund, specifically to assist the low-income household.

May not be feasible for governments that already have high levels of fiscal debt (e.g. USA, Japan, PIGS-Portugal, Ireland, Greece, Spain). Many of these governments are cutting back on subsidies.

- If the government increases income tax rates to finance the subsidies, this may discourage work and investment in the country.

- **Government needs to know the exact level of MEB (Imperfect Information)**

If MEB is not estimated accurately, it might lead to under- or over-subsidisation and hence under- or over-consumption. Deadweight loss will still exist, and there will still be allocative inefficiency.

- Hence, the policy may only be feasible if the government has sufficient funds and has sufficient information of the MEB that arises from consumption of the good.

Effectiveness: (i) Certainty of results; and (ii) Ability to reduce deadweight loss

- **The results are uncertain**

Consumers may not increase their consumption despite the subsidies being given because they may still exercise their choice.

Studies have shown that the poor still do not access healthcare as much as the rich despite being heavily subsidised or even if healthcare were free. This is because many low-income consumers tend to work part-time jobs that pay by the hour and have no sick leave. If they don't work, they don't get paid. Hence the opportunity cost of visiting the doctor is their livelihood (wages) as compared to middle- or high-income consumers who get sick leave (i.e. still get paid a monthly wage despite taking sick leave to see the doctor).

Cognitive Biases affect the Effectiveness of Subsidies

Loss Aversion

It is not enough to subsidise the consumption of goods and emphasising the benefits. E.g. consumers may factor in other potential losses and hence under-consume vaccines, like lost

	wages from work due to time-off to recover from the side effects. The tendency to avoid such losses means subsidies on vaccines alone itself may not help, i.e. the government must also address other costs like ensuring workers get paid medical leave and not lose out on their wages.
Saliency Bias	For consumers to respond to subsidies, the availability and ease of accessing such subsidies should be made very apparent for consumers. If these require consumers to do their research and 'jump through hoops' to discover, the subsidies would not be effective in raising consumption.

Addressing the root cause

- **Addresses the root cause of positive externalities** as it addresses the indifference towards third parties of consumers
 - Subsidies help consumers internalise the third-party benefits hence they now account for MEB when making consumption decisions.
- **Does not address root cause of imperfect information** as it does not address the ignorance of consumers.

Side Effects: (i) Negative side effects, (ii) Positive side effects

Negative side effects

- May cause the government to incur high fiscal debt and hence the need to reduce other forms of social spending.
- Incur high opportunity cost in terms of other forms of social spending – may cause under-consumption of other under-consumed goods with positive externalities, e.g. healthcare and education and hence allocative inefficiency and market failure.
- May require the government to impose high taxes on the economy to finance subsidies and this raises the cost of production for firms
- Hard to withdraw such subsidies in future as consumers become too accustomed to receiving these benefits (e.g. Quebec in Canada, UK, USA states face strong resistance from citizens against cuts to higher education subsidies despite soaring government debt).

Positive side effects

- **Subsidies are market-oriented tools**

They still allow markets to operate according to market forces (i.e. the price adjustment process could still work to clear surpluses and shortages). Subsidies help to motivate increases in production and consumption, and hence adjust and direct more resources into the industries affected to solve under-consumption/ under- production. This results in fewer distortions in the market and increases the efficiency of how markets work, reducing deadweight loss.

- Does not impede consumer sovereignty; i.e. consumers still retain the choice over whether to consume
- Means-tested subsidies help to promote equity (another microeconomic goal of the government) as low-income households enjoy greater levels of subsidies than higher-income households. This is seen as a levelling up of low-income groups.
 - E.g. helps children in low-income groups to receive education to

increase social mobility (these children can get better jobs and enjoy higher wages than their parents in future)

Time Lag: (i) How long the policy takes to work

- May take time for effects to be seen as PED is less than one in the short run as consumers need time to adjust Q_d in the short run in response to lower prices due to the subsidies.
- While it may be effective in the longer term, consumers with more elastic demand e.g. the lower-income households may respond to this quite quickly.

2) Direct Provision at Zero Price (Free Provision)

Alternatively, the government could **directly provide the goods/services at the socially efficient quantity (Q_s) where $MSC=MSB$ and at zero price**, or they could pay private firms to provide at Q_s . Typically, this is a policy used for public goods (refer to Section 2.3) but there are some other cases (notably merit goods, see Section 2.2) where direct provision can be used.

Price/ Costs/ Benefits

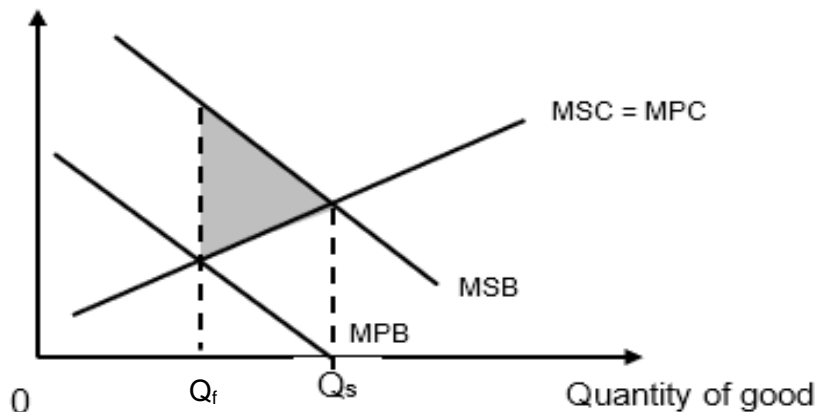


Figure 7b: Direct Provision of good/services at Zero Price

Direct provision ensures that the government controls both the level of production as well as the price charged for the good/service.

Examples include universal healthcare, like the National Health Service (NHS) in the UK; and education, like in Finland. Under such a policy, the government provides the goods for **free or at a price close to zero** (i.e. the government may or may not provide the good/service free of charge). See **Annex B** for more examples.

Evaluation of Direct Provision Using FEAST

E.g. Covid-19 vaccines, free entrance to museums and galleries in SG & UK, free morning off-peak MRT travel, education in European countries (Sweden), NHS provides healthcare for free in UK

Feasibility - (i) Manpower and financial resources needed, (ii) Amount of information required

- Requires extremely high levels of government financing**
 Unfeasible for governments that already have high levels of fiscal debt (e.g. USA, Japan, PIGS-Portugal, Ireland, Greece, Spain).
 If the government increases income tax rates to finance the subsidies, this may discourage work and investment in the country.
Note: Due to the large amount of resources required, it is almost impossible for less developed countries (LDCs) to implement.
- Lack of expertise**
 If governments provide the good for free (e.g. NHS in the UK), they may not have the high levels of expertise and information (e.g. how to run an effective hospital network; how many doctors to hire etc) that would be required to run it well.
EV: Government may pay private firms to produce it for free for consumers.
 E.g. SMRT is paid by the government to provide free morning off-peak train rides.
- Lack of accurate information on positive externalities**
 As it may be difficult to attach a monetary value to the positive externalities generated, the government may not know the socially efficient quantity to provide.

Effectiveness: (i) Certainty of results, (ii) Ability to reduce DWL

- Very effective in increasing consumption as consumers do not have affordability problems**
 Consumers will be most incentivised to consume since it is free.
- Inefficiency in Production**
 When the government produces the good directly, it may not be able to produce as efficiently as private firms.
 - Without the profit motive, public organizations *lack the incentive to minimise costs* and hence they tend to be productively inefficient.
 - As a result, resources are wasted during production, which worsens the situation.

Without market pricing and cost to guide the state, *mismanagement can occur resulting in a misallocation of resources and poor quality of services provided.*

 - It is not uncommon for teachers, doctors and nurses in state-run institutions to be paid below-market rates and to be overworked.
 - This may lead to a lack of such qualified labour and will then lead to chronic shortages and poor quality.
- Possibility of overconsumption**
 If the government chooses to provide the good for free or at a very low price, **over-consumption** of such goods could occur, which might result in a larger

(than free market) deadweight loss. See Figure 8 below.

Cognitive Biases affect the Effectiveness of Direct Provision

Sunk Cost Fallacy	It has been argued that when higher education is made completely free, the lack of 'sunk cost' for students meant that many of them had very low motivation to learn and performed poorly academically – taking many more years to complete their programmes.
Loss Aversion	Similar to subsidies, it is not enough to directly provide goods and emphasise the benefits. E.g. consumers may factor in other potential losses and hence under-consume vaccines, like lost wages from work due to time-off to recover from the side effects. The tendency to avoid such losses means even direct provision of vaccines alone itself may not help, i.e. the government must also address other costs like ensuring workers get paid medical leave and not lose out on their wages.
Salience Bias	For consumers to respond to direct provision, the availability and ease of accessing direct provision should be made apparent for consumers. If these require consumers to do their research and 'jump through hoops' to discover, the direct provision would not be effective in raising consumption. The potential benefits of higher education (e.g. securing a better job or earlier entry to the job market) should be made more salient to encourage consumers to consume this merit good.

Addressing the root cause

- **Addresses the presence of positive externalities**
 - Providing goods for free works similar to a subsidy – it constitutes a 'complete or full subsidy' and hence helps consumers internalise the MEB.
 - However, it does not take into account the true value of MEB like a subsidy does. It simply provides all consumers with full subsidies and hence likely to lead to over-consumption (side effect).
- **Does not address imperfect information**

Side Effects: (i) Negative side effects, (ii) Positive side effects

Negative side effects

- Almost always leads to over-consumption and wastage
 - Over-consumption beyond Q_s leads to deadweight loss, allocative inefficiency and MF (as in Figure 8 below)
- Other side effects similar to subsidies but more severe.

*Singapore generally does not provide any merit good for free. Most require some form of co-payment from consumers to prevent overconsumption/wastage.

Positive side effects

- Similar to means-tested subsidies: Direct provision can help to increase equity in terms of access to social benefits and merit goods. All individuals, regardless of their socioeconomic background, have equal access to consume these goods.

EV: Many argue that this exacerbates inequity because the rich also get to enjoy these benefits despite already having the ability to afford on their own. Hence the rich are still much better off than the poor. Yet this is still better in

terms of equity than completely leaving it to free market where the poor completely has no access.

Time Lag: (i) How long the policy takes to work

- May work faster than subsidies because of the extremely high level of provision given but still subjected to consumers' choice and willingness to consume in the SR.

Diagrammatic analysis of when direct provision at zero price is not optimal

Assume that the government directly produces the good and they do not charge consumers for the good (zero priced good).

Price/ Costs/ Benefits

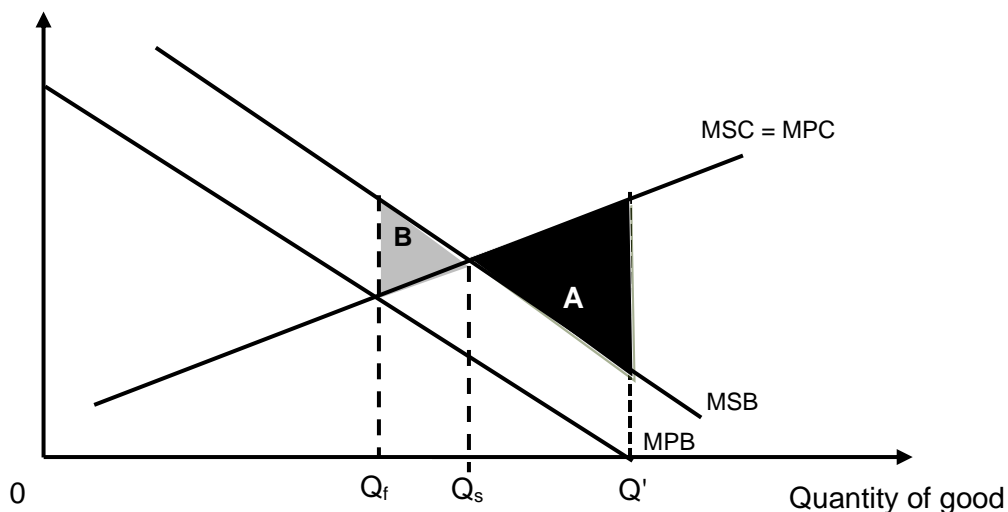


Figure 8: Over-consumption of zero priced good

The socially optimal level of output is at Q_s where $MSB = MSC$ i.e. output Q_s . If the good is provided for free (at zero price), consumers will consume at Q' where $MPB = MPC = 0$ (Fig. 8), i.e. where MPB intersects the x-axis, to maximise their **net** private benefit. Q' is greater than the socially optimal output of Q_s .

- Since $MSC > MSB$ between Q_s and Q' , there is a net loss to society and the resulting deadweight loss is shown by Area A.
- On the other hand if the good was supplied by the free market without government intervention, consumption will be at Q_f where $MPB = MPC$. The resulting deadweight loss will then be Area B.

In the case illustrated above, since Area A is bigger than Area B, direct provision of this good for free at Q' would lead to **an even greater inefficiency** compared to the free-market outcome where government did not intervene.

3) Joint Provision

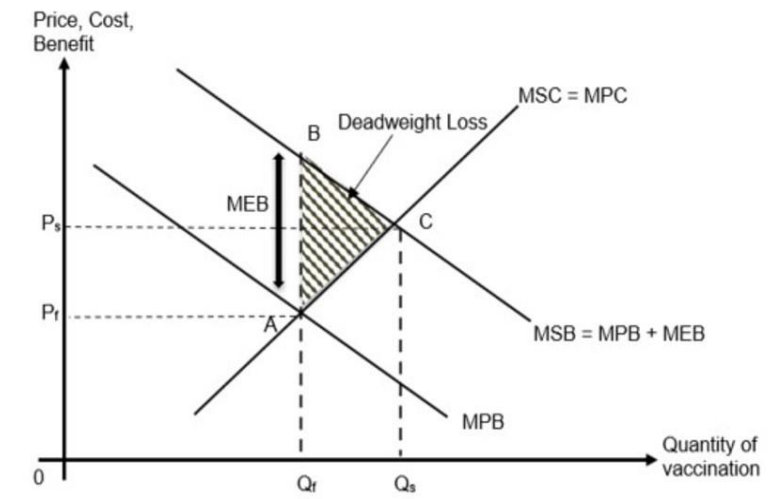


Figure 9: Positive externality generated in consumption of vaccination

Another way of intervention by the government would be through joint provision. **The free market will continue to provide Q_f units of the good and the government will only provide $Q_s - Q_f$ to make up for the shortfall in the market as shown in Figure 9.** The government can choose to provide the shortfall directly or pay private firms to do so. Additionally, this shortfall can be provided free, or at subsidised rates. Unlike direct provision where the government is the sole provider (or payer), joint provision means there are **both** private and public providers of a good.

In Singapore, healthcare is provided under a joint provision model. There are private hospitals and clinics, such as the Raffles Medical Group, a private healthcare company operating in Singapore and Asia. The government makes up the shortfall through government provision, in the form of government restructured hospitals (e.g. Tan Tock Seng Hospital) and polyclinics, which are highly subsidised. This is an example of joint provision where both the public and private sectors provide the good. Another example of joint provision is the **Public-Private Partnership**, where there are long-term partnering relationships between the public and private sector in order to deliver services (see **Annex B** for elaboration).

Joint provision is typically used when there are already private firms operating in the market. However, when the under-consumption is very large, it might make more sense for the government to take over the entire production of the good in order to reap economies of scale², or for reasons such as to ensure equity in the access to the good for all consumers regardless of income levels.

Note: Students must use the explanation in bold to analytically explain the mechanism of this policy, i.e. use economics tools of analysis and link to the market failure diagram.

² Economies of scale refer to cost-savings as a result of large-scale production.

Evaluation of Joint Provision using FEAST

<p style="text-align: center;"><u>Joint Provision</u></p> <p>E.g. healthcare and education in SG with both public and private providers</p>
<p>Feasibility: (i) Manpower and financial resources needed; and (ii) Amount of information required</p> <ul style="list-style-type: none"> Manpower and financial resources needed Joint provision allows a lighter burden on the government as compared to direct provision as the government produces a lower output of the good.
<p>Effectiveness: (i) Certainty of results; and (ii) Ability to reduce DWL</p> <ul style="list-style-type: none"> Greater variety for consumers to choose from Under joint provision, different producers are allowed to produce in the market and this leads to added variety for consumers as they can choose between consuming private or public services. Less inefficiency than free provision The presence of the private sector creates competition for the government enterprise and reduces inefficiency that could arise due to the lack of cost controls and wasteful production due to the lack of profit-making objectives and market competition. <p><i>The analysis of how cognitive biases would affect the effectiveness of Joint Provision is similar to the analysis under Subsidies & Direct Provision.</i></p>
<p>Addressing the root cause</p> <ul style="list-style-type: none"> The root causes of positive externalities (i.e. indifference towards third-party benefits) and imperfect information (i.e. ignorance of consumers) are not addressed.
<p>Side Effects: (i) Negative side effects, (ii) Positive side effects</p> <p>Positive side effects</p> <ul style="list-style-type: none"> Similar to means-tested subsidies: joint provision can help to increase equity in terms of access to social benefits and merit goods as government can direct the subsidies at those who need it more. <p>Negative side effects</p> <ul style="list-style-type: none"> May worsen government's fiscal health and reduce other forms of social spending.
<p>Time Lag: (i) How long the policy takes to work</p> <ul style="list-style-type: none"> Once the good is produced, it works quickly, providing consumers with the choice of public or private providers based on the type of service they would like to enjoy.

4) Legislation

For goods with external benefits, the government could increase consumption/ production by **using laws to compel consumers or firms to consume or produce up to the socially efficient output (Q_s in Figure 6)**. For example, the government can make education compulsory up to a certain age. Primary and secondary education is compulsory in Singapore.

Evaluation of Legislation using FEAST

Legislation

E.g. Compulsory education and vaccination. Australia is punishing parents who do not vaccinate their children by cutting their welfare benefits

Feasibility: (i) Manpower and financial resources needed, (ii) Amount of information required

- **Manpower and financial resources needed**
It may involve significant cost of monitoring for adherence.
- Typically, if the government compels consumers to consume goods that generate positive externalities, they must also subsidise or provide for free. If not, low-income consumers will not be able to comply regardless of the severity of penalties.
 - E.g. unlikely that government would compel parents to send children to school without helping them financially.
 - Therefore, the feasibility of this policy also predicates on feasibility in terms of subsidy/free provision.

Effectiveness: (i) Certainty of results, (ii) Ability to reduce DWL

- **Certainty of results**
Will force the consumption/ production to be at the **socially efficient output Q_s where $MSC=MSB$** . The outcome is certain. In order to ensure that the laws are followed, the government usually imposes a penalty every time the consumption/ production deviates from the socially efficient level of output.
- As long as penalties are severe enough, compliance would be high and hence consumption levels would be raised.

Cognitive Biases affect the Effectiveness of Legislation

Sunk Cost Fallacy	N/A
Loss Aversion	Governments should emphasise the penalties of flouting the legislation through public messages/ social campaigns to increase compliance. E.g. Austrian law makes it compulsory for adults to get vaccinated against Covid-19 and emphasises fines of up to S\$4000 for breaches.
Salience Bias	The ubiquity of messages regarding vaccine-differentiated measures and the need to show vaccination status increases the compliance with legislation that consumption of vaccination to enter workplaces and other public areas in Singapore.

Note:
Students must use the explanation in bold to analytically explain the mechanism of this policy, i.e. use economics tools of analysis and link to the market failure diagram.

Addressing the root cause

- Does not address the indifference towards third parties or imperfect information

Side Effects: (i) Negative side effects; and (ii) Positive side effects

Negative side effects

- **Eliminates consumer sovereignty** hence consumers no longer have the ability to choose what they wish to consume/not consume.
 - E.g. parents cannot choose what is best for their children. They may argue that they vaccines have side-effects and can now not protect their children against these side effects
- **Political costs** may be involved– Consumers or firms may be unhappy when forced to follow the regulation and this could lead to election losses, e.g. Canadian truckers blockaded the Ambassador Bridge that connects to the US in protest of Covid vaccine mandates.
- Tends to also involve subsidies/provision for free hence also leads to side effects of those policies.

Time Lag: (i) How long the policy takes to work

- Can work very fast as consumers do not have a choice but to comply by the legislation imposed / deadline given by the government. [e.g. laws on the use of personal mobility devices (PMDs)]

2.2 Information Failure

**Note to students: Information failure is synonymous with imperfect information.*

In theory, in a perfect market, both consumers and producers have perfect knowledge about the market. In reality, this is not the case and decisions are often made where there is **information failure**.

When the consumers or producers lack information (potentially caused by **inaccurate, incomplete, uncertain or misunderstood** data), they would more likely make a poorer decision than if they had better information.

This means that consumers and producers often may **under- or over-estimate the actual private benefits or costs**. This would cause market failure as there will be under/over-consumption of the particular good.

Below are common causes of imperfect information:

1. Myopic Decision-Making
2. Product Complexity
3. Persuasive Advertisements & Misinformation
4. User Inexperience
5. Addiction
6. Asymmetric Information³

For each cause of imperfect information above, note how each of the following under- & over-estimation of costs and benefit apply:

1.	Over-estimation of the marginal private cost (MPC) to the economic agent	$MPC_{\text{perceived}} > MPC_{\text{actual}}$
2.	Under-estimation of MPC to the economic agent	$MPC_{\text{perceived}} < MPC_{\text{actual}}$
3.	Over-estimation of the marginal private benefit (MPB) to the economic agent	$MPB_{\text{perceived}} > MPB_{\text{actual}}$
4.	Under-estimation of the MPB to the economic agent	$MPB_{\text{perceived}} < MPB_{\text{actual}}$

³ We will not use the MPC-MPB framework to analyse Asymmetric Information.

2.2.1 Myopic Decision-Making

Consumers also often engage in myopic decision-making. This means that consumers often **under-estimate long-term costs and benefits** when making a decision about how much to consume currently.

i) Myopic Decision-Making leading to under-consumption/ production

If left wholly to the free market, goods may be under-consumed because individuals **under-estimate their actual private benefits** from consuming such goods. Examples of imperfect information that exist in the market for education and healthcare insurance:

- **Imperfect information about education:** Parents who are poorly educated may themselves be unaware of the long-term benefits that their children may derive from a proper education.
 - o This causes them to underestimate the long-term gains from a formal education. In other words, they *perceive* the marginal private benefit from consuming education to be lower than it *actually* is (perceived MPB < actual MPB), and therefore consumption of education will be *lower* than what it should be.
- **Imperfect information about healthcare insurance:** A young, healthy man may underestimate the probability of him falling seriously ill, and so fails to consider that as he ages, the chances of him becoming ill increases significantly.
 - o Since medical insurance premiums incur additional private cost currently but pay benefits only in the event of any future illness, this young, healthy man will be less likely to buy any medical insurance currently as he thinks that he is still young and healthy.
 - o Left to the free market, many people will under-consume health insurance (as perceived marginal private benefit is less than the actual marginal private benefit).
 - o As a result, when they are hit by illnesses and have to pay large medical bills, they may be unable to afford the bill and cause financial difficulties for their families or even the state (should the state have to help pay for the bill).

Other examples: vaccinations, health-screening, pre-school or tertiary education.

Let us illustrate with a diagram how market failure arises in the case of education due to imperfect information.

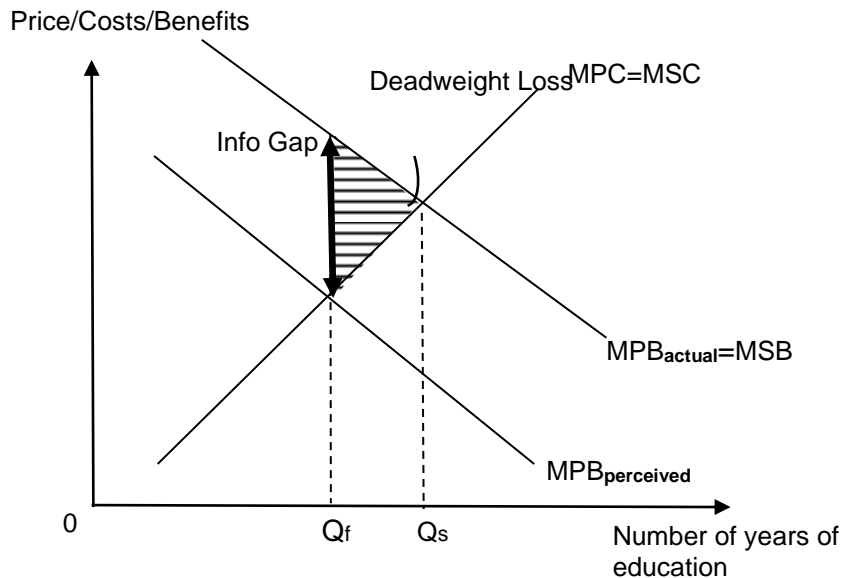


Figure 10: Underconsumption of Education

Diagrammatic analysis of Imperfect Information (Under-Consumption) (Figure 10) (Example of Education)

Steps	Elaboration
Step 1: Establish the free market equilibrium.	Due to imperfect information and ignorance of consumers about the actual benefits of education, $MPB_{perceived}$ is less than MPB_{actual} . Therefore, consumers will under-consume education at Q_f , where $MPB_{perceived}=MPC$.
Step 2: State assumptions.	We will assume there are no external costs in the consumption of education $MEC=0$ hence $MSC=MPC$. In this diagram, we also assume that there are no positive externalities, therefore $MPB_{actual}=MSB$.
Step 3: Establish socially efficient equilibrium.	The socially efficient equilibrium where society's welfare is maximised is at Q_s , where $MSC = MSB = MPB_{actual}$. Allocative efficiency is achieved.
Step 4: Explain the divergence (info gap).	Being myopic, consumers tend to underestimate the long-term benefit of having education. They cannot foresee the benefits of having more education which will earn them much higher income in the future.
Step 5: State that there is an under-consumption.	Therefore, there is under-consumption of education by the amount Q_fQ_s due to imperfect information.
Step 6: Explain how deadweight loss is reflected in	As a result of this under-consumption by the amount of Q_fQ_s , there is a deadweight loss of the shaded area.

diagram.	
Step 7: Conclude that market failure is present.	Therefore, the government's microeconomic goal of allocative efficiency is not achieved and there is market failure.

Note:

The under-consumption of some goods, e.g. healthcare or education, could be due to both **positive externalities** (i.e. consumers are indifferent towards the external benefits enjoyed by third parties) and **imperfect information** (i.e. **ignorance about private benefits**). However, students should not explain both causes of under-consumption using the same diagram; students should explain both causes separately before concluding that the under-consumption of such goods is due to both causes.

ii) Myopic Decision-Making leading to over-consumption/ production

When left to the free market, some goods, such as alcohol and cigarettes (often termed 'sin goods'), will be over-consumed because individuals **underestimate the actual private cost as they do not consider the long-term costs due to their myopic decision-making**, e.g. the medical costs of addressing ill effects on their own health from consuming such goods. Examples include:

- Imperfect information about **alcohol**:
 - Individuals who consume alcohol on a regular basis often underestimate the negative effects of alcohol on their own health. They underestimate the possibility of getting heart diseases, stroke, liver cirrhosis, cancers of the mouth, oesophagus, throat, liver, breast, and a weakened immune system. In other words, they **underestimate their actual private costs**, i.e., the *perceived* marginal private cost of consuming alcohol is lower than the *actual* marginal private cost of consuming alcohol, and therefore the consumption of alcohol would be *higher* than what it should be.
- Imperfect information about **cigarettes**:
 - Individuals who consume cigarettes on a regular basis often underestimate the negative effects of cigarettes on their own health. They ignore the possibility of getting cancer of almost every organ, heart diseases, stroke, diabetes, impotence and early death because these may only occur in the long run. Since the long run is so far away (as compared to the satisfaction they receive from each cigarette smoked now), consumers may *perceive marginal private costs to be lower than it actually is*. In other words, they **underestimate their actual private costs**.

Let us illustrate this market failure using a diagram.

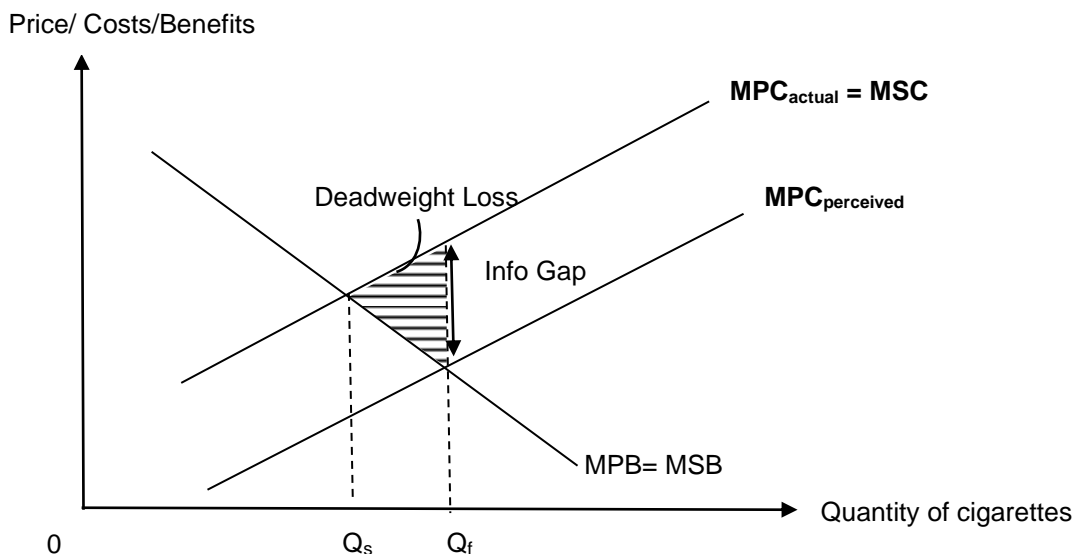


Figure 11: Imperfect Information in the Cigarette Market due to under-estimation of MPC

Diagrammatic analysis of Imperfect Information (Over-consumption)
(Figure 11) (Example of Cigarettes)

Steps	Elaboration
Step 1: Establish the free market equilibrium.	Due to imperfect information of consumers about the actual costs of cigarettes, $MPC_{\text{perceived}}$ is less than MPC_{actual} . Therefore, consumers will over-consume cigarettes at Q_f , where $MPC_{\text{perceived}} = MPB$.
Step 2: State assumptions.	We will assume there are no external benefits in the consumption of cigarettes ($MEB=0$), hence $MSB=MPB$. In this diagram, we also assume that there are no negative externalities, therefore $MPC_{\text{actual}} = MSC$.
Step 3: Establish socially efficient equilibrium.	The socially efficient equilibrium Q_s is at output where society's welfare is maximised is at $MSB = MSC = MPC_{\text{actual}}$, where allocative efficiency is achieved.
Step 4: Explain the divergence (info gap)	Being myopic, consumers tend to underestimate the long-term cost of smoking which will worsen their health and life expectancy in the long run.
Step 5: State that there is an over-consumption.	Therefore, there is over-consumption of cigarettes by the amount $Q_s Q_f$ due to imperfect information.
Step 6: Explain how deadweight loss is reflected in diagram.	As a result of this over-consumption by the amount of $Q_s Q_f$, there is a deadweight loss of the shaded area.
Step 7: Conclude that market failure is present.	Therefore, the government's microeconomic goal of allocative efficiency is not achieved and there is market failure.

Note: The over-consumption of some goods, e.g. cigarettes, could be due to both **negative externalities** (i.e. consumers are indifferent towards the external costs incurred by third parties) and **imperfect information** (i.e. ignorance about private costs).

However, students should not explain both causes of over-consumption using the same diagram; students should explain both causes separately before concluding that the over-consumption of such goods is due to both causes.

Therefore, there is a need for government intervention in the case of such goods.

Summary			
Cause of imperfect Information:	Lead to:	Where:	Resulting in:
Myopic Decision-Making	Under-estimation of the actual MPC to the economic agent	$MPC_{\text{perceived}} < MPC_{\text{actual}}$	Over-consumption/production of the good
	Under-estimation of the actual MPB to the economic agent	$MPB_{\text{perceived}} < MPB_{\text{actual}}$	Under-consumption/production of the good

Merit Goods	Demerit Goods
Definition: Merit goods are deemed by the government to be desirable for consumption and under-consumed when left to the free market.	Definition: Demerit goods are deemed by the government to be undesirable for consumption and over-consumed when left to the free market.
We may use 'merit goods' to refer to goods that are under-consumed due to positive externalities AND imperfect information (myopic decision making).	We may use 'demerit goods' to refer to goods that are overconsumed due to negative externalities AND imperfect information (myopic decision making).
i.e. consumers consume at Q_f which is less than Q_s	i.e. consumers consume at Q_f which is greater than Q_s
E.g. Education, Healthcare, Vaccination	E.g. Alcohol, Cigarettes, Gambling
Note Goods must be over- or under-consumed due to BOTH externalities and imperfect information to be referred to as demerit or merit goods respectively. E.g. petrol-fuelled cars are over-consumed due to negative externalities and not imperfect information arising from myopic decision-making. As such, we would not refer to petrol-fuelled cars as 'demerit goods'.	

2.2.2 Product Complexity

Another reason for consumers' over-consumption is because the information provided may be too complex for consumers to comprehend. For example, when deciding to purchase a laptop, consumers have to understand terms of specifications such as 'processor speed', 'hard disk space', 'RAM', etc. Consumers might be misled into thinking that more is better, and as a result, **overestimate their own private benefit** gained from the consumption of such goods (*perceived MPB* > *actual MPB*) as shown in Figure 12. Consumers consume at Q_f where $MPB_{\text{perceived}} = MPC$ and this leads to

overconsumption of $Q_s Q_f$ as Q_s is the socially optimal output where $MSB=MPB_{actual}=MSC$.

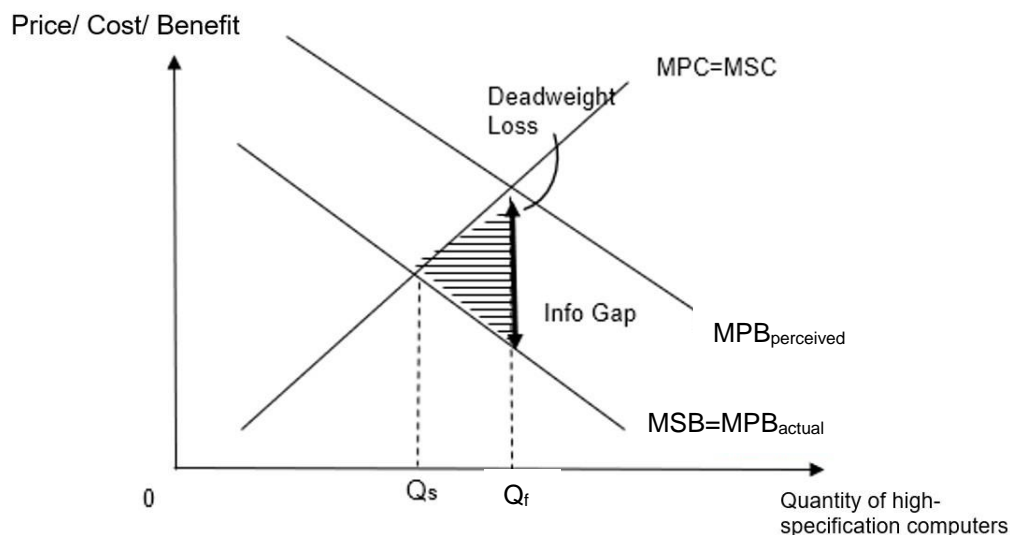


Figure 12: Imperfect Information in the Computer Market due to Over-estimation of MPB

Other examples include **Specified Investment Products (SIPs)**, which are generally products that are more complex than others. For example, they may contain derivatives which can expose consumers to more factors that may affect their investment or have returns or losses determined by complicated formulas. Hence, consumers should have some prior financial knowledge or experience in order to make an informed investment decision.

To help retail investors, the Monetary Authority of Singapore (MAS) has classified certain investments as SIPs, and requires financial institutions to assess the investor's investment knowledge and experience before selling SIPs to the investor. This is to assess that investors have the relevant knowledge and experience to understand the features and risks associated with investing in such products, before they invest.

Summary			
Cause of imperfect Information:	Leads to:	Where:	Resulting in:
Product Complexity	Over-estimation of the actual MPB to the economic agent	$MPB_{perceived} > MPB_{actual}$	Over-consumption/production of the good (e.g. high-specification computers)

2.2.3 Persuasive Advertisements & Misinformation

The presence of highly persuasive advertisements may cause consumers to **over-estimate private benefits to be higher than it actually is**, leading to overconsumption as shown in Figure 13 by $Q_s Q_f$. Consumers consume at Q_f where $MPB_{perceived} = MPC$ and this leads to overconsumption of $Q_s Q_f$ as Q_s is the socially optimal output where $MSB=MPB_{actual}=MSC$.

One example is in the formula milk market, where companies, such as Nestle and Abbott vie for larger market share by bombarding consumers with endless advertisements. These advertisements usually contain endorsements by purported nutritionists about these 'branded' formula milk, which may in fact contain the same nutritional content as non-branded formula milk.

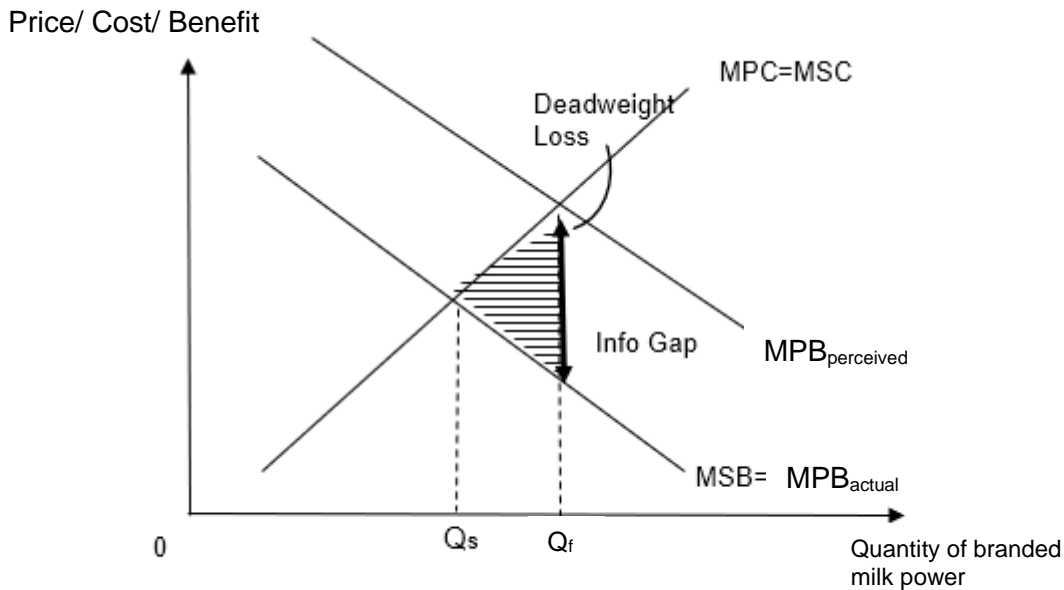


Figure 13: Imperfect Information in the Branded Milk Powder Market due to Over-estimation of MPB

Misinformation on the internet is a key reason behind decision-making by consumers based on imperfect information. Spreading of fake news, misleading research and rumours may cause consumers to over- or under-estimate the actual MPB or MPC. In the case of fear mongering and falsehoods spread about vaccines, these can cause consumers to:

- over-estimate the actual MPB (**Figure 13**); OR
- under-estimate the actual MPB of vaccines (refer to **Figure 10**).

Summary			
Cause of imperfect Information:	Lead to:	Where:	Resulting in:
Persuasive advertisements & misinformation	Over-estimation of the actual MPB to the economic agent	$MPB_{perceived} > MPB_{actual}$	Over-consumption/production of the good (e.g. premium milk powder)
	Over-estimation of the actual MPC to the economic agent	$MPC_{perceived} > MPC_{actual}$	Under-consumption/production of the good (e.g. vaccines)
	OR Under-estimation of the actual MPB to the economic agent	OR $MPB_{perceived} < MPB_{actual}$	

2.2.4 User Inexperience

To illustrate the notion of 'user inexperience' which leads to overconsumption of good, let us consider the case of a consumer purchasing a piece of new equipment.

If consumers only take the purchase price into account, they will underestimate the true cost over the lifetime of the equipment, and hence, leading to overconsumption. Like an iceberg, there is plenty below the waterline. The true cost of ownership of the equipment purchased is not merely the capital cost of the equipment but also the maintenance/servicing cost as well as downtime costs incurred.

E.g. many car owners buy cars only considering the cost of buying the car and monthly car loan repayments. However, the costs of using the car each monthly are much greater than the monthly car loan.



[Based on the cheapest car in the Singapore market in 2019: Perodua Bezza 1.3 Premium] Source: <https://blog.seedly.sg/buy-car-how-much-should-be-earning/>.

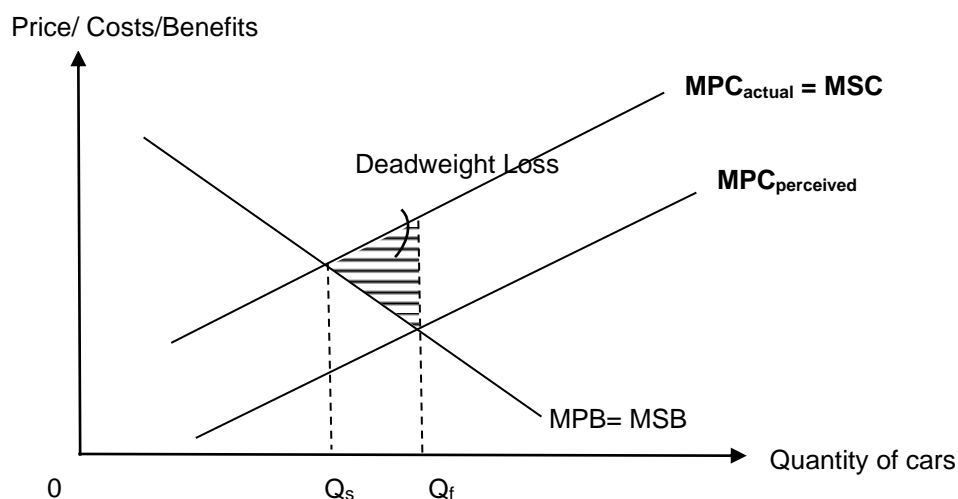


Figure 14: Imperfect Information in the Car Market due to Under-Estimation of MPC

Summary			
Cause of imperfect Information:	Lead to:	Where:	Resulting in:
User Inexperience	Under-estimation of the actual MPC to the economic agent	$MPC_{\text{perceived}} < MPC_{\text{actual}}$	Over-consumption/ production of the good (e.g. cars or specified investment products – see Section 2.2.2)

2.2.5 Addiction

Addictive behaviours are characterised by attentional biases for substance-related stimuli. Attentional bias and craving have a mutual relationship such that increases in one lead to increases in the other. Therefore, individuals tend to perpetuate the consumption of a good as they may overestimate the actual benefits and underestimate the actual costs of consumption a good.

Consumers' addiction to goods may be due to intense cravings caused by stimulation from substances. This then causes consumers to:

- overestimate the actual benefits (e.g. cigarettes) (**Figure 13**); and/or
- under-estimate the actual costs (e.g. gambling) (**Figure 14**) of consumption of the good.

Examples: Alcohol, cigarettes & addictive drugs.

Summary			
Cause of imperfect Information:	Lead to:	Where:	Resulting in:
Addiction	Under-estimation of the actual MPC to the economic agent	$MPC_{\text{perceived}} < MPC_{\text{actual}}$	Over-consumption/ production of the good
	Over-estimation of the actual MPB to the economic agent	$MPB_{\text{perceived}} > MPB_{\text{actual}}$	Over-consumption/ production of the good

2.2.6 Asymmetric Information

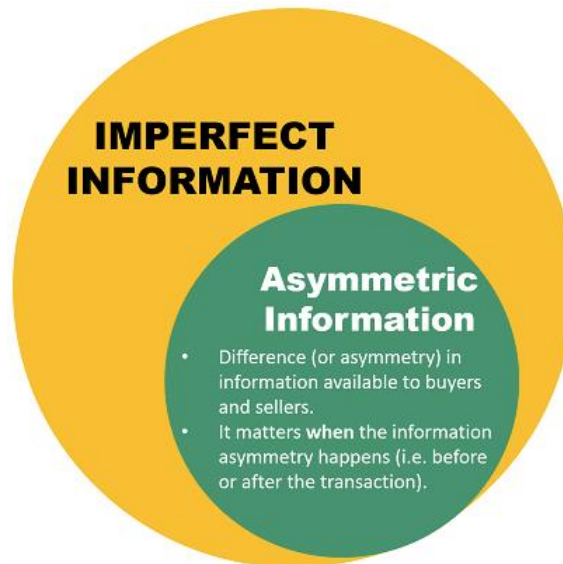
Definition:

Asymmetric information is a situation whereby one party has significantly more information about a good or service than the party on the other side of an economic transaction.

Note: Asymmetric Information will not be analysed with the MPC-MPB framework.

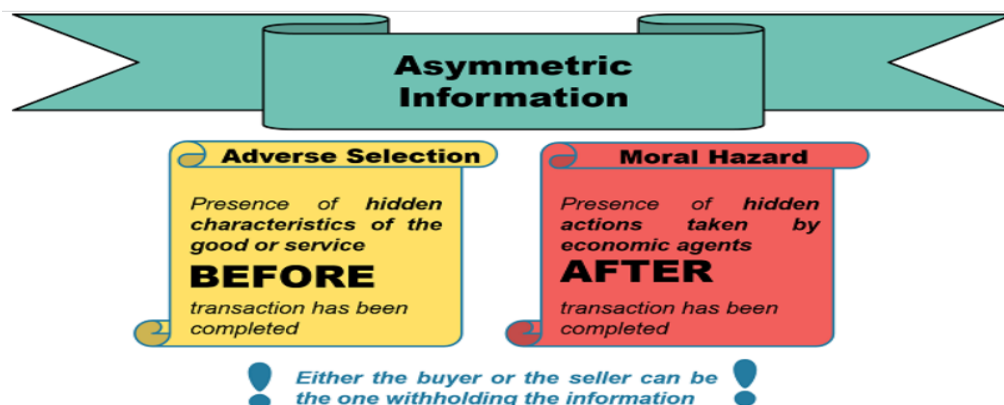
Asymmetric information is a subset of imperfect information. It results in a distortion of incentives and inefficient market outcomes. The party with **more information** may exploit the information gap, resulting in an undesirable allocation of resources and thus society's welfare will not be maximised.

For example, there is asymmetric information in the healthcare market. Patients often know much less about their medical conditions and treatments available as compared to doctors. The doctor may prescribe unnecessary tests or recommend more expensive treatments leading to over-consumption of healthcare services or higher healthcare expenditure. This leads to wastage of resources resulting in an inefficient outcome.



Source: MOE SLS

We shall now discuss in greater detail the two main problems that asymmetric information can lead to: the problem of **Adverse Selection** and **Moral Hazard**.



(i) Adverse Selection

Definition:

Adverse selection occurs due to asymmetric information between the buyer and seller **before** the transaction has been completed.

The economic agent with the superior information will exploit his position, resulting in the other party having a lower return, potentially damaging the market's ability to allocate resources well.

Example of second-hand car market:

Imagine that you are a prospective car buyer in the second-hand car market. How would you be able to distinguish between a good-quality car and a low-quality one (a 'lemon')? Sure - you would be able to take it out on a test drive, but the fact will remain that the person selling you the car will have more information about the car that he/she is selling, than you do. This is a situation of asymmetric information, where one party has more information about the transaction than the other party does.

Explanation:

- Because buyers are unable to certify that the car they are going to buy is a good-quality car, the price that they are willing to pay is going to be *lower* than the price they would pay if *they knew for certain* that the car was good.
- The sellers of **good quality cars** would therefore exit the used car market, thereby **reducing the average quality of cars left** in the used car market.
- This creates a downward spiral in the prices that buyers are willing to pay, and the quality of used cars present in the market.
- If left unchecked, the market will collapse with no transactions possible as the only cars left in the market are "lemons" that no buyer would want to buy.
- In other words, the market collapses with a degradation of quality of products sold in the marketplace of as a result of asymmetric information existing between the buyers and sellers.
- The number of transactions, as such, will fall below the socially optimum level. This is more popularly known as the 'Lemons Problem'.

Example of health insurance market:

Another good example of adverse selection is in the health insurance market.

- The people who are most likely to purchase health insurance are those who are most likely to use it, i.e. smokers/drinkers/those with underlying health issues but do not disclose it (i.e. 'high' risk).
- As the insurance company is unable to distinguish between the high risk and low risk customers, it raises the average price of insurance premiums.
- This risks pricing healthy consumers out of the market, i.e. only high-risk individuals gain insurance - this is clearly a market failure.

Another reason for adverse selection in the health insurance market could also be due to asymmetric information between a doctor and an insured patient.

- Once the doctor finds out that the patient is insured, this may result in 'supplier-induced demand', i.e. the doctor prescribes more treatment

than required since they could derive more revenue and the patients do not bear the costs.

- This results in higher costs for the insurance company. Hence, to cover this, the **insurance company raises the average price of premiums for all insurance policies, out-ricing the low-risk consumers out of the market.** This can result in the insurance market for low-risk individuals collapsing.

(ii) Moral Hazard

Definition:

Moral hazard arises because an individual or institution does not bear the full consequences of its actions and, therefore, has a tendency to act less carefully than it otherwise would. This stems from information asymmetry between the buyer and seller **after** the transaction has been completed.



At Wheeler State University, one out of every 10 bicycles was stolen in 2002. A group of young entrepreneurs, realising no one in campus had bicycle theft insurance, decided to provide one-year bicycle insurance for the student population at US\$15 per bike. They sold 100 policies in 2003 and expected 10 out of the 100 insured customers to lose their bicycles to theft, leaving them with a tidy profit even after replacing the 10 bicycles.

By the end of 2003, a total of 20 bicycles were stolen and the entrepreneurs lost a tidy sum in their little enterprise.

What happened that led to the loss?

Example of insurance market:

- Moral hazard in the insurance market occurs because insurance encourages risky behaviour - especially so when the actions of the insured party cannot be accurately monitored or controlled by the insurer.
- When *no one* had theft insurance, the rate of bicycle theft was 10%.
- When the entrepreneurs offered the theft insurance, they expected the same theft rate. But because of moral hazard, the students who bought theft insurance were less careful in protecting their bicycles, perhaps using less secure locks or leaving their bicycles on campus overnight.
- The theft rate increased to 20% due to moral hazard and thus, not expecting this increased risk-taking behaviour, the entrepreneurs lost money in their little enterprise because they had a lot more claims to pay out.

Explanation:

- The issue with moral hazard lies in the difficulty of the producers/consumers to monitor and control the increased risk-taking behaviour of the other party.
- This is because one party (e.g. insured consumers) has more information than the other party (e.g. insurers) about their own actions **after** the transaction.

- The party who knows more will **take greater risks than they normally would when the resultant costs would not be borne by the economic agents themselves**, e.g. insured consumers are tempted to take more risks than usual knowing that the insurer will cover the risks.
- In the example of the insurance market, if there is no way for the insurance company to monitor the buyer's behaviour after the policy is purchased, there would be a collapse of insurance market, as it would be too unprofitable for any producer to offer this service.

2.2.7 Government Intervention

To correct market failure caused by information failure, the government may intervene through various policies as listed below:

Causes of Imperfect Information	Methods of Government Intervention
<ul style="list-style-type: none"> - Myopic Decision-Making - Product Complexity - Persuasive Advertisements & Misinformation - User Inexperience - Addiction 	<ol style="list-style-type: none"> 1. Public Education 2. Regulation
<ul style="list-style-type: none"> - Asymmetric Information⁴ 	<ol style="list-style-type: none"> 3. Screening 4. Signalling 5. Co-Payment 6. Regulation

1. Public Education

Public education involves the use of advertisements and campaigns by the government to educate the public and influence consumers' perceived MPB. Some examples of such agencies in Singapore include:

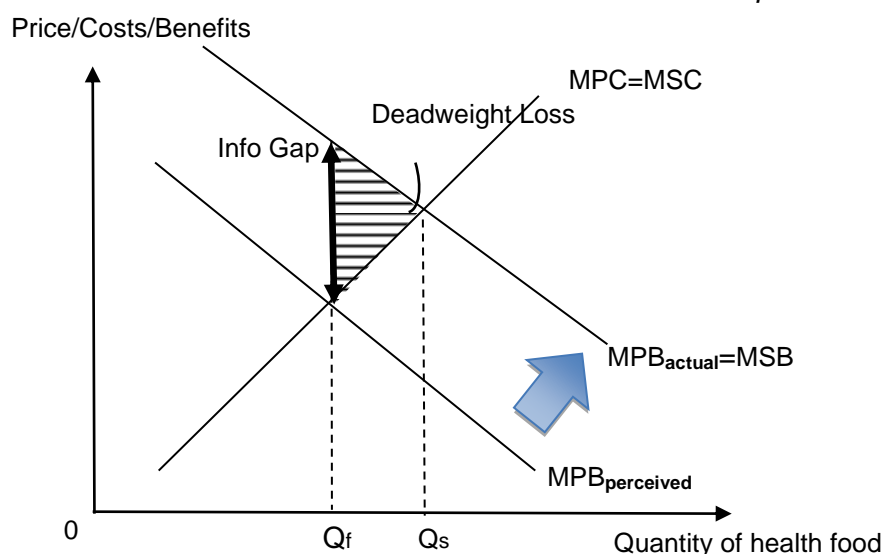
- Health Promotion Board; and
- National Council on Problem Gambling.

In response to the various causes of imperfect information, public education bridges the information gap between:

- Increases MPB perceived; or
- Reduces MPB perceived.

Scenario 1: Increase $MPB_{\text{perceived}}$ when $Q_s > Q_f$ (i.e. under-consumption)

a. To address information failure when $MPB_{\text{actual}} > MPB_{\text{perceived}}$



Mechanism:

Public education campaigns can educate consumers of the actual MPB to **increase $MPB_{\text{perceived}}$** and bridge the information gap between $MPB_{\text{perceived}}$ and

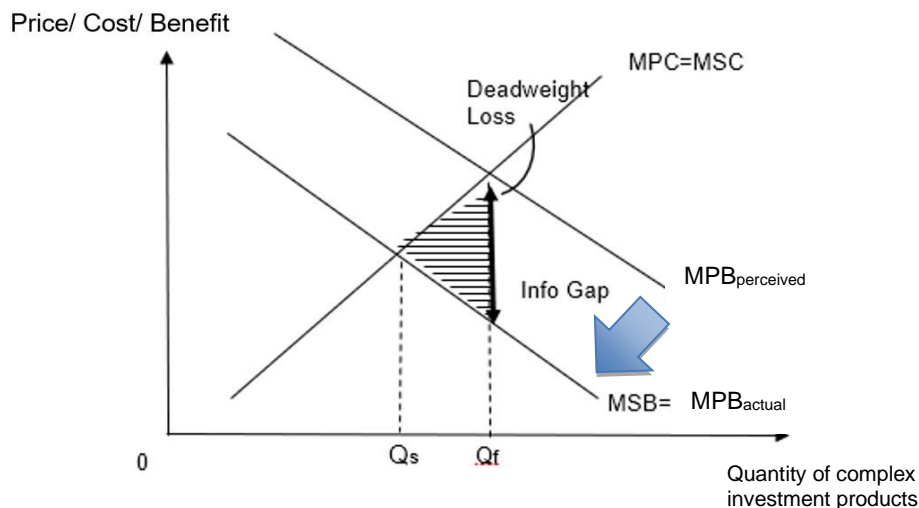
⁴ We will not use the MPC-MPB framework to analyse Asymmetric Information.

MPB_{actual} such that consumers would **increase** their consumption to Q_s where $MPB_{actual}=MPC=MSC=MSB$

Examples: Health Promotion Board's healthy living campaign addresses under-consumption of healthy food that may be under-consumed due to information failure caused myopic decision-making.

Scenario 2: Decrease $MPB_{perceived}$ when $Q_f > Q_s$ (i.e. over-consumption)

a. To address information failure when $MPB_{perceived} > MPB_{actual}$

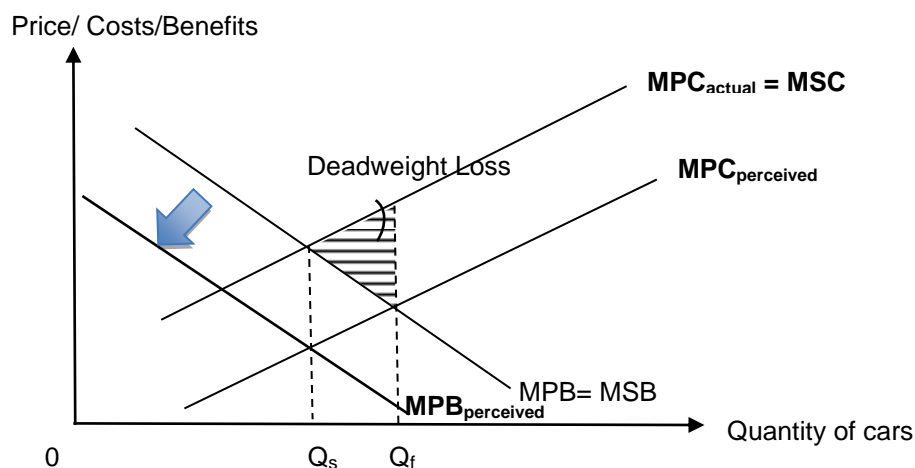


Mechanism:

Public education campaigns can educate consumers of the actual MPB to **decrease $MPB_{perceived}$** and bridge the information gap between $MPB_{perceived}$ and MPB_{actual} such that consumers would **decrease** their consumption to Q_s where $MPB_{actual}=MPC=MSC=MSB$

Examples:

- Monetary Authority of Singapore's MoneySense financial literacy programme educates consumers on the actual MPB of complex investment products to address the **over-consumption due to information failure caused by product complexity**.
- Health Promotion Board (HPB) launched a multi-year campaign on the nutritional needs of children to address the over-estimation of MPB in the market for premium formula milk due to **information failure caused by persuasive advertisements**. The campaign reinforced messages that:
 - o For babies that cannot be breastfed exclusively, infant formula is essential – and all formula milk in Singapore, regardless of price, meets the safety standards and nutritional requirements under Singapore's Food Regulations, and provides sufficient basic nutrition for infants to grow healthily.
- To address the **over-consumption of cigarettes due to informational failure caused by addiction**, education campaigns can be used to discourage smoking can reduce consumers' perception of MPB of smoking by debunking myths about the perceived benefits of smoking.

b. To address information failure when $MPC_{actual} > MPC_{perceived}$ **Mechanism:**

Public education campaigns can educate consumers and reduce their perceived MPB of the product such that consumers would **decrease** their consumption to Q_s where $MPB_{perceived} = MPC_{perceived}$.

Examples:

- To address the over-consumption of cars due to **information failure caused by user inexperience** and hence the under-estimation of MPC, the government can use education campaigns to educate consumers about the MPB and reduce the $MPB_{perceived}$.

Evaluation of Public Education using FEAST

<u>Public Education</u>	
E.g. public social campaigns, road shows, advertisements	
Feasibility - (i) Manpower and financial resources needed, (ii) Amount of information required <ul style="list-style-type: none"> • Most feasible as the least amount of resources required. • However, <ul style="list-style-type: none"> ○ government may have to incur high costs in implementing the specific measures. ○ government may also lack perfect information about the issue and not be able to determine the extent of imperfect information that exists. 	
Effectiveness: (i) Certainty of results, (ii) Ability to reduce DWL <ul style="list-style-type: none"> • Effectiveness is likely to be limited as habits and mindsets are hard to change. 	
Cognitive Biases affect the Effectiveness of Public Education	
Sunk Cost Fallacy	N/A

Loss Aversion	Public education alone is unlikely to work but it could be very effective when coupled with taxes or legislation as consumers may reduce the consumption of the good so as not to pay the taxes and fines
Salience Bias	Public education/ social campaigns can help make the government's other policies, e.g. subsidies/ taxes/ direct provision, more apparent to consumers and influence their behaviour.
Addressing the root cause	
<ul style="list-style-type: none"> • Appropriate for dealing with ignorance due to imperfect information. 	
Side Effects: (i) Negative side effects, (ii) Positive side effects	
<ul style="list-style-type: none"> • No side effects 	
Time Lag: (i) How long the policy takes to work	
<ul style="list-style-type: none"> • Takes the longest time as habits and mind-sets are hard to change. • However, the only true long term solution to imperfect information. 	

2. Regulation

The government may step in through regulation against misleading advertisements and misinformation that lead to over-consumption. Therefore, consumption of the good would be higher than what it should be.

A case in point would be the stricter rules on labelling and advertising of food, including formula milk for babies passed in parliament by the Singapore government in 2017. Certain claims and images on formula milk powder tins may create the impression that these products can somehow do more for children even though the scientific evidence is weak. Through regulation, infant formula companies are to place statements encouraging breastfeeding on their labels.

Regulation can also correct overconsumption of a good due to **addiction**.

Consumers, in particular, young children may underestimate the actual costs of playing video games for hours, affecting their health and overall well being. The *perceived* marginal private cost of playing video games is lower than the *actual* marginal private cost of playing video games.

In 2021, China set a limit to 3 hours a week for under-18s for video games. They can play for one hour a day from 8 pm to 9 pm on Fridays, Saturdays, Sundays and public holidays. This is a move the government deemed necessary to combat gaming addiction among children.

Cause of imperfect Information:	Lead to:	Resulting in:	Examples of regulations
Myopic Decision-Making	Under-estimation of the actual MPC to the economic agent $MPC_{\text{perceived}} < MPC_{\text{actual}}$	Over-consumption/production of the good	Governments mandating health warnings and public education messages on packaging of cigarette packs and alcohol to reduce $MPB_{\text{perceived}}$ of smoking.
	Under-estimation of the actual MPB to the economic agent $MPB_{\text{perceived}} < MPB_{\text{actual}}$	Under-consumption/production of the good	HPB's Healthy Meals in Schools Programme (HMSP) require school canteen vendors to incorporate foods that then to be under-consumed from the four main food groups – brown rice and wholemeal bread, meat and others, vegetables and fruit – thereby helping students receive the right nutrients necessary for their growing needs. This increases the consumption of healthy food to Qs.
Product Complexity	Over-estimation of the actual MPB to the economic agent $MPB_{\text{perceived}} > MPB_{\text{actual}}$	Over-consumption/production of the good (e.g. complex investment products)	The Monetary Authority of Singapore (MAS) requires financial institutions to assess investor's investment knowledge and experience before selling Specified Investment Products to them. This ensures that only consumers with sound information will consume at Qs.
Persuasive advertisements & misinformation	Over-estimation of the actual MPB to the economic agent $MPB_{\text{perceived}} > MPB_{\text{actual}}$	Over-consumption/production of the good (e.g. premium milk powder)	Regulations against misleading advertisements reduce the over-estimation of MPB caused by such advertisements.

Evaluation of Regulation using FEAST

<p style="text-align: center;"><u>Regulation</u></p> <p>E.g. limits on environmental pollution, truthful labelling of the ingredients in food and drugs, safety regulations</p>
<p>Feasibility - (i) Manpower and financial resources needed, (ii) Amount of information required</p> <ul style="list-style-type: none"> • Easy to implement as not much information is required. The government does not need to know the level of MEC. Government just needs to regulate the output close to Q_s. Some information is needed about Q_s but it is much easier than determining the information gap between $MPC_{perceived}$ and MPC_{actual} or $MPB_{perceived}$ and MPB_{actual} • Regulation will be standardized for all consumers – easy to implement and for consumers to understand. • Resources will need to be devoted to monitoring and ensuring compliance. Feasibility will depend on context. E.g. Ensuring that children play video games for no more 3 hours per unit may be not be feasible the government cannot ensure that log in accounts belong to the children . • The feasibility of this policy –regulation- depends on the ability of government to enact, monitor and enforce the regulations. It also requires government financing and hence taxes.
<p>Effectiveness: (i) Certainty of results, (ii) Ability to reduce DWL</p> <ul style="list-style-type: none"> • As long as penalties are sufficiently severe, regulation can be very effective. • Results are certain as the government will decide on the level of output and consumers must comply or suffer penalties. Consumers have no choice over the level of consumption. • Effectiveness is contingent on close monitoring and supervision. This is subjected to context (e.g. size of the country). As long as the government is able to monitor and ensure compliance, the policy can be very effective. • However, the government must be able to identify Q_s and regulate in such a way that output will be at Q_s. • Overall, regulation would directly ensure that the socially efficient level of consumption could be attained, e.g. number of hours spent on video game
<p>Cognitive Biases affect the Effectiveness of Regulation</p>

Saliency Bias	<p>Regulations that mandate health labels, e.g. 'healthier choice labels', can improve the saliency of health benefits for consumers and help to address the under-consumption of healthier food due to myopic decision-making.</p> <p>Regulations against misleading advertisements and exaggerated claims can help to reduce the saliency bias that such advertisements rely on that cause consumers to over-consume certain goods, e.g. premium milk powder.</p>
Addressing the root cause <ul style="list-style-type: none"> Regulation against alcohol or cigarettes addiction may include warnings of health concerns to be printed on labels for alcohol or cigarettes, thereby dealing with the root cause of imperfect information. 	
Side Effects: <p>i) Positive side effects</p> <ul style="list-style-type: none"> Regulations can raise revenue for the government as consumers/producers who flout regulations would pay a penalty. Hefty fines can boost the government coffers. Fines issued in New South Wales, Australia, in 2021 surge to almost \$1 billion worth despite lockdowns. <p>ii) Negative side effects</p> <ul style="list-style-type: none"> Impedes free market and hence price adjustment process may not be able to clear surpluses and shortages – may lead to black market and crime hence greater costs on society and taxpayers. For instance, cigarettes may be illegally traded in black markets. Denies consumers of their consumer sovereignty as they cannot choose whether to consume or not. E.g. No consumer sovereignty – e.g. Children in China can only play video games at any time they want but only allowed to play video games for one hour on Fridays, during weekends and public holidays. 	
Time Lag: (i) How long the policy takes to work <ul style="list-style-type: none"> Works very fast as consumers and producers have no choice. They need to adhere to the regulation within the given time frame by the government. Regulation does not rely on changes in price to change consumers' consumption and hence it is not subjected to the limitations of PED<1 in the short run. Hence the effectiveness of the policies does not depend on consumer and producer's responsiveness. Once the regulation is implemented, it takes effect immediately. 	

Methods of managing Asymmetric Information

3. Screening by Consumers and/ or Producers (to manage Adverse Selection)

Definition:

Screening refers to economic agents gathering information to make the right decision.

In the lemons market, potential buyers of second-hand cars could bring the car to a mechanic for a thorough check or look at the vehicle's accident and maintenance records. This way, they will be better informed on the quality of the car.

Insurance companies tend to have lengthy questionnaires on the details of the potential buyer's lifestyle and family history, or even undergo a medical check-up. All these help the insurance company determine the level of risk of each consumer and set the appropriate price. These screening methods help to gather information.

Limitation:

- (i) **Feasibility:** Increase in cost for the party which has less information
- (ii) **Effectiveness:** The affected party may not be willing to undertake the additional cost of screening

4. Signalling by Consumers and/ or Producers (to manage Adverse Selection)

Definition:

Signalling refers to sellers' attempt to reveal credible information about what they have to sell in order to make themselves more attractive to a buyer.

One way of signalling is to provide guarantees or warranties. Sellers of poor quality products are less likely to offer guarantees/ warranties as they would be liable for subsequent repairs or refunds for their products. Hence, when sellers of good quality products offer guarantees/ warranties, buyers are more willing to pay for their product as they believe that the product sold is more likely to be of good quality.

Limitations:

- (i) **Feasibility:** May raise the cost for the firms that engage in signalling
- (ii) **Effectiveness:**
 - Firms may selectively share only those information that would make the product/service more desirable.
 - Depends on the receptiveness of the consumers as it may take time to change habits and mindsets.

5. Co-payments (to manage Moral Hazard)

In the case of market failure involving moral hazard, it is sometimes possible to reduce the risk-taking behaviours by the insured party through the use of co-payments. In such cases the insured person co-pays part of the actual cost. The underlying philosophy is that with co-payments, the insured party

will undertake less risk-taking behaviours because he has to pay for some of the bill.

For instance, patients in Singapore are expected to co-pay part of their medical expenses and to pay more when they demand for a higher level of service. This is to ensure individual responsibility and to prevent people from seeking medical services that may not be necessary. The recent debate over hospitalisation riders is a case in point. When insured individuals did not need to co-pay, they tend to over consume healthcare, leading to the insurer incurring losses (see **Annex C** for an article covering this issue).

Effectiveness – Co-Payments are likely to be very effective due to consumers' **loss aversion**. To avoid such losses, consumers will try to avoid-over-consumption.

The effectiveness can be further enhanced by making such co-payments even more apparent through public education/ marketing campaigns to enhance consumers' **salience bias** to influence their behaviour.

Limitations:

- (i) **Feasibility:** May raise the cost of administration
- (ii) **Side-Effects:** May compromise on equity as low-income households may not be able to afford the good/service.

6. Regulation and Legislation (to address Asymmetric Information in general)

The government can pass laws and regulations to ensure quality standards and safety features that must be maintained by sellers of goods and services, such as cars, food, medication, toys and all types of construction.

Examples:

- a) Lemon Law (see example below)
- b) The Ministry of Health mandated that private hospitals must publish medical operation fees. This increases the transparency of medical charges and allow patients to make more informed decisions regarding medical procedures. Such information allows for fees comparison among all the hospitals and help patients choose that that is most appropriate for them.



Lemon Law to prevent adverse selection in Singapore

STORE

What are "Lemon laws"?

- Laws protecting consumers against defective goods that fail to conform to contract or are of unsatisfactory quality or performance standards at the time of purchase
- Such goods are colloquially known as "lemons"

How do consumers benefit from the Lemon law?

2-stage recourse framework

- 1** Consumer can ask business to: **Repair or replace the defective product.**
- 2** Consumer may keep the defective goods and request a reduction in price, or return the defective goods for a refund if:
 - The business did not provide repair or replacement within a reasonable time or without significant inconvenience to the consumer, OR
 - Repair or replacement by the business is not possible or incurs a very high cost

Timeframe If a defect is found within six months of delivery, it is assumed the defect existed at the time of delivery, unless the business can prove otherwise

MONTH 1 MONTH 2 MONTH 3 MONTH 4 MONTH 5 MONTH 6

For assistance/clarification, call CASE at 6100 0315 or visit www.case.org.sg

CASE

Laws can protect consumers, who lack the same amount of information as producers, against defective goods that fails to conform to contract or are of unsatisfactory quality or performance standards at the time of purchase.

Such goods are colloquially known as 'lemons'.

How can consumers benefit from the Lemon Law?

- Consumer can ask business to: Repair or replace the defective product.
- Consumer may keep the defective goods and request a reduction in price or return the defective goods for a refund if the business did not provide repair or replacement within a reasonable time or without significant inconvenience to the consumer OR repair or replacement by the business is not possible or incurs a very high cost.
- If a defect is found within six months of delivery, it is assumed the defect existed at the time of the delivery unless the business can

prove otherwise.

Such laws give consumers confidence to purchase goods despite the lack of information as compared to producers.

Adapted from MOE SLS Resources

Limitation:

- (i) **Feasibility:** High cost involved for government to monitor and enforce regulations.

These methods, however, can be time-consuming and costly. For example, in the case of food safety control, which not only involves food & beverage but hygiene in restaurants as well, a huge number of products and service producers are involved. Hence, a huge amount of monitoring is required.

2.3 Public Goods

2.3.1 Characteristics of Pure Public Goods and Why Free Markets Fail in the Provision of Public Goods

Definition:

Pure public goods are **non-rejectable** goods that are not provided by the free market due to **non-excludability and non-rivalry in consumption**.

a. Non-rejectability

A key characteristic of public goods is that they are non-rejectable. Non-rejectability can be defined as the inability of consumers to refuse the consumption of a good once it has been produced. For example, when a certain level of deterrence to external threats is created by the provision of national defence, a person residing in that country will not be able to refuse the safety created even if he wants to.

b. Non-excludability

Non-excludability in consumption means once provided, no one can be excluded from consuming the good, **even if they do not pay**. For example, even if a child does not pay for defence, we cannot exclude the child from the safety provided by the SAF or the police. As a result, no one will be willing to pay for the good and the price of the good will be zero.

Non-excludability leads to the **free-rider problem**. Since there is no feasible way of excluding non-payers from enjoying the benefits of the good (non-excludability), consumers can consume a public good without paying for it (in effect acting as a *free rider*). Consumers would not be willing to pay for the good and hence, there is **no effective demand**.

Therefore, in a free market, private firms will not provide public goods as the firms are unable to derive the effective demand for it since no consumers will reveal their willingness and ability to pay for the public good.

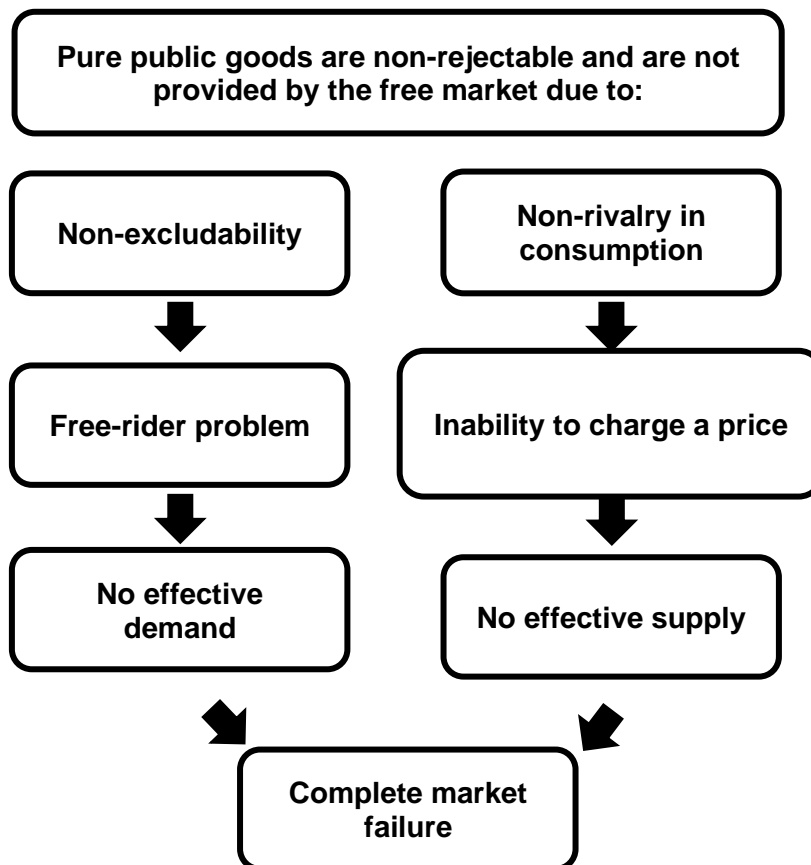
c. Non-rivalry in consumption

Non-rivalry in consumption means that consumption of the good by one more person **will not leave less for others to consume**. For example, the addition of one more resident in the country does not reduce the provision of protection offered by the defence force to others. As a result, the marginal social cost of **providing the good to an additional person** is zero.

To maximise society's welfare, it should be provided at Q_s where $MSB = MSC$. Since the MSC of providing the good is equal to zero, the good should be provided till $MSC = MSB = 0$, at zero price i.e. provided for free. However, a profit motivated producer has no incentive to produce at zero price, hence there is no supply, leading to total market failure.

As there is **no effective supply or demand for the good due to its characteristics of non-rivalry in consumption and non-excludability respectively**, the public good will not be provided by the free market. This results in complete market failure in the context of public goods.

Examples of public goods include national defence, street lighting, lighthouses, flood control schemes etc.



2.3.2 Government Intervention

In such a situation, the government intervenes in the market through the **direct provision of the public goods**. There is no other solution as the entire market is missing.

The government can either produce the public goods on their own (such as defence) or pay private firms to produce them (such as paying firms to build street lights). The finance for public goods comes from tax revenue.

Evaluation of the Direct Provision of Public Goods

- **Feasibility - Manpower and financial resources needed**

High government expenditure is needed to finance the provision of public goods. This is not only a drain on government resources but may require higher tax rates, such as higher income taxes and tax on goods and services to finance public goods. High income tax rates are known to discourage effort and investment in the country.

- **Feasibility – Lack of information**

The government may over-produce a public good because they government may not be able to determine the optimal level of output.

This can be caused by imperfect information on the part of the government, resulting in inefficiency to persist.

- **Effectiveness**

The government may not be able to produce those goods as efficiently as private firms resulting in waste of resources. This is because being an effective state-run monopoly, it has no profit maximisation pressure from shareholders and may have the little incentive to cut cost and might produce in a wasteful manner.

2.4 Factor Immobility

Factor immobility is another source of market failure. In a perfect market, factors of production move freely across different uses based on price signals. In real life, however, factors of production like labour, capital and land can experience difficulty in moving across different uses due to various reasons. This problem is known as factor immobility.

Definition:

Factor immobility or immobility of factors of production is a constraint experienced by producers when making production decisions. As a result of this constraint, producers may make production decisions that do not lead to the most efficient outcomes (such as employing inefficient labour-capital combinations).

a) Causes

Occupational Immobility

Definition:

Occupational immobility occurs when there are barriers to the mobility of factors of production between different industries and occupations.

Labour as a factor of production often experiences occupational immobility. Occupational immobility of labour occurs due to a **mismatch between the skills of labour and the skills required by firms**. It results in labour being unemployed or used inefficiently. This is also termed as 'structural unemployment'. Labour immobility is a common source of market failure leading to productive inefficiency as there is wastage of scarce resources due to skills mismatch.

For example, a surgeon requires specialised knowledge and skills which takes years to acquire, therefore a soccer player will not be able to move into the medical field easily. Conversely, it also takes time for the surgeon to learn the skills required to take up another job, say a computer engineer for example.

Occupational immobility can arise due to the following:

- Lack of appropriate skills, training and education;
- Unsuitability of factor in another industry;
- Exclusive ownership rights on the factor by particular firm or industry; and
- Lack of information by factor owner.

Geographical Immobility

Definition:

Geographical immobility occurs when people are less able or willing to move from one region to another in search of jobs.

People have different preferences in terms of where they want to live when making job decisions. Geographical immobility can be observed in the form of regional unemployment. This usually exists in large countries, such as USA, United Kingdom and China.

[Note: Geographical immobility is less of a concern in the Singapore context due to our relatively small land area and well-developed transportation infrastructure.]

Geographical immobility can arise due to the following:

- Family and other social ties;
- Lack of proper infrastructure or transport system to facilitate movement;
- Unwillingness to shift to another area (e.g. preference for home ownership over renting, high cost of relocation, differences in general cost of living between regions); and
- Lack of information by factor owner.

b) Methods of Government Intervention to correct Factor Immobility

Occupational Immobility

- Subsidising retraining or skills upgrading, e.g. Skills Future credits to incentivise workers to attend courses and workshops to learn relevant skills.
- Public education, e.g. advertising campaigns by Workforce Development Agency (WDA) to encourage skills upgrading in employees.
- Conduct Research & Development to make factors (like capital) more mobile. Legislation to remove exclusive ownership rights to factors.

Limitations

- i. **Feasibility** – May require large sums of money to be allocated by government to subsidise/fund relevant training and re-training
- ii. **Addressing root cause** – Promoting training and retraining addresses the root cause of occupational immobility, which is the mismatch of skills.
- iii. **Effectiveness** – depends on the receptiveness of workers, e.g. may be less effective with older workers who may find it harder to pick up current skills.
- iv. **Time period** – May take a long time for the results of the policy to be seen

Geographical Immobility

- The government can provide subsidised rental housing in the major cities for workers. Alternatively, the government can impose cooling measures in the housing market to reduce rental and housing prices by lowering the demand for housing in cities. This could be in the form of higher interest rates or higher down payment requirements for residential purchases. With more affordable housing options, workers would be more inclined to accept job offers in the cities.
- The government can facilitate the creation of jobs and job portals, which enable job matching to allow the spouses of those relocating to find jobs in the new cities more easily. The government can also relax immigration controls and issue work permits to the spouses of workers who are relocating into the cities. These measures would make workers more inclined to accept job offers in the cities.
- Develop infrastructure or transport system, e.g. in other countries, there have been heavy investment in high speed rails to connect cities such as China's One-Belt-One-Road project.

Limitations

- i. **Feasibility** – May require large sums of money to be allocated by government to improve the infrastructure
- ii. **Effectiveness** – depends on the willingness of workers to take on job opportunities which are further away (e.g. homeowners may not be willing to give up their homes and family networks)
- iii. **Time period** – May take a long time for the results of the policy to be seen

Note: We will revisit these limitations of the policies in greater detail in JC2. (Under Supply-side policies and Fiscal Policies respectively)

2.5 Market Dominance

Market dominance may result due to imperfect competition in markets, leading to market failure. This section would be covered in greater detail in the topic on "Firms and Decisions" for H2 syllabus.

Note: Remember to include this as one of the sources of Market Failure in your notes!

3. Government Failure

Government failure may occur where government intervention results in greater market inefficiencies that would otherwise occur without government intervention. Some economists believe that even with good intentions, governments seldom get their policy application correct, and may create inefficiencies when they intervene in markets. Government intervention to correct market failures might introduce further inefficiencies due to high administrative cost, information gaps and time lags resulting from red tape and bureaucracies. There could also be unintended and undesirable consequences. This is because governments have their limitations.

It is essential to understand how governments make decisions in real-world contexts. Non-economic considerations, such as public and political acceptability, have to be taken into account when governments make policy decisions.

Note:

This section is useful for students to use as evaluation of government intervention through the Economics syllabus!

Causes of Government Failure

Governments may create inefficiencies in their intervention in markets due to the following factors:

1) High administrative cost

In many countries, the government generates a high administrative cost. There could also be implementation and monitoring costs, as explored earlier. Imposing a ban on smoking in public places, for example, requires funds to inform the public of the ban and to hire staff to monitor the ban. As a pseudo monopoly, the government is inefficient (see Section 2.1.2b under “Direct Provision”) and generates high waste (due to lack of profit-maximising motive). This creates a large burden on the economy.

2) Information gaps

The government may not be in the best position to establish what consumer preferences are and understanding these preferences based on the number of people that are willing and able to pay for particular goods and services. This might cause the government to over or under estimate the amount to produce and cause a wastage of resources.

3) Time lags, bureaucratic procedures & red tape

The government may suffer from *recognition* lag (identifying and determining the problem), *decision* lag (deciding on the type of policies to use in order to resolve the problem), *implementation* lag (implementing the policies). As a result of these time lags, policies implemented may be overdue, or worsen an existing problem.

These time lags may also arise due to bureaucratic processes (i.e. needlessly time-consuming) and red-tape. Red tape is a term for excessive regulation or rigid conformity to formal rules that is considered redundant or bureaucratic and hinders or prevents action or decision-making. It is usually applied to government’s bureaucratic processes.

It generally includes the filling out of seemingly unnecessary paperwork, obtaining of unnecessary licenses, having multiple people or committees approve a decision and various low-level rules that make conducting one's affairs slower and/or more difficult.

4) Corruption & the power of self-interest

Politicians and civil servants may pursue self-interest (e.g. personal fame, higher salary) rather than operating on behalf of citizens or seeking efficiency leading to a misallocation of resources (for example, instead of allocating resources to build roads, funds may be channelled into expanding the existing headquarters of the ministry).

5) Regulatory capture

This is when the industries under the control of a government regulatory body is able to move policy options in their favour. Some economists argue that regulators can prevent the ability of the market to operate freely. This may lead to poor service, fewer choices and sometimes high prices charged by the public enterprise. We might find examples of this in agriculture, telecommunications and the other utilities and also in environmental protection.

6) Short-termism

Governments have to be accountable to the public. However, this may result in governments considering short term relief to particular problems but does little to address long term problems. A decision to provide unemployment benefits for welfare reasons might add to the problems of higher unemployment in the country in the longer term.

7) Disincentive effects

Government policies may result in disincentive for businesses if it results in higher business cost. A policy to reduce income inequality, for example, may result in higher unemployment as business leave the economy due to the higher tax rates.

8) Electoral pressures & political considerations

Governments may conduct additional spending or tax reductions ahead of an election without the projects being subjected to a full and proper cost-benefit analysis.

4. Conclusion

We have seen how the free market can lead to inefficiency and inequity, and therefore the market fails. Government can use various policies to intervene in the market to correct this market failure, with each policy having its own strengths and weaknesses. These interventions may also create inefficiencies.

In Singapore, the government uses a myriad of policies to correct market failure. These are in the form of market-based policies and, command and control policies.

Glossary of Key Terms

Adverse Selection	Adverse selection occurs due to asymmetric information between the buyer and seller before the transaction has been completed.
Asymmetric Information	Asymmetric information is a situation whereby one party has significantly more information about a good or service than the party on the other side of an economic transaction.
Ban	A ban is an outright restriction of output.
Demerit Goods	Demerit goods are deemed by the government to be undesirable for consumption and over-consumed when left to the free market.
Direct Provision	Direct provision refers to the provision of goods and services by the government free or at a price close to zero. The government could provide these goods directly, or they could pay private firms to do so.
Externality	An externality is a cost or benefit of production or consumption of a product that is borne by third parties who are neither the buyer nor seller, and for which no payment or compensation is made.
Equity	Equity is about the sense of justice and fairness in terms of the distribution of economic welfare.
Factor Immobility	The difficulty faced by factors of production in moving across different uses or geographical regions.
Gini coefficient	A number that ranges from 0 to 1 and that measures income distribution in a country. The higher it is, the greater is the inequality.
Government failure	Government failure may occur where government intervention results in greater market inefficiencies that would otherwise occur without government intervention.
Imperfect Information	Consumers and producers may not have enough information to make informed choices. This could be due to the imperfect information about the extent of <i>actual</i> private benefits/costs.
Market Failure	Market failure occurs when the free market/ price mechanism fails to bring about an efficient allocation of resources. It occurs where the marginal social benefit does not equal marginal social cost.
Merit Goods	Merit goods are deemed by the government to be desirable for consumption and under-consumed when left to the free market.
Moral Hazard	Moral hazard arises because an individual or institution does

not bear the full consequences of its actions and, therefore, has a tendency to act less carefully than it otherwise would. This stems from information asymmetry between the buyer and seller after the transaction has been completed.

Negative Externality	Negative externalities are spill-over costs borne by third parties who are not directly involved in the consumption or production of the good itself without compensation.
Non-excludability	Non-excludability in consumption means no one can be excluded from consuming the good once it is produced, even if they do not pay.
Non-rivalry	Non-rivalry in consumption means that consumption of the good by one more person will not leave less for others to consume.
Positive Externality	Positive externalities are spillover benefits enjoyed by third parties who is not directly involved in the consumption or production of the good/service itself, without payment.
Public Goods	Pure public goods are non-rejectable goods that are not provided by the free market due to non-excludability and non-rivalry in consumption.
Screening	Screening refers to economic agents gathering information to make the right decision.
Signalling	Signalling refers to sellers' attempt to reveal credible information about what they have to sell in order to make themselves more attractive to a buyer.
Socially Efficient/Socially Optimum Output	Socially efficient/socially optimum output is achieved at a quantity (Q_s) where society's welfare is maximised (i.e. no deadweight loss to society). It is where marginal social benefit of producing or consuming an additional unit of the good is equal to the marginal social cost.

Annex A – Carbon Tax vs Cap-and-Trade

Carbon tax VS cap-and-trade⁵: which is better?

The Guardian, 28 Jan 2013

Economists argue that, if the market is left to operate freely, greenhouse gas emissions will be excessive, since there is insufficient incentive for firms and households to reduce emissions. As such, they recommend applying the polluter pays principle and placing a price on carbon dioxide and other greenhouse gases. This can be implemented either through a carbon tax (known as a price instrument) or a cap-and-trade scheme (a so-called quantity instrument).

A carbon tax imposes a tax on each unit of greenhouse gas emissions and gives firms (and households, depending on the scope) an incentive to reduce pollution whenever doing so would cost less than paying the tax. As such, the quantity of pollution reduced depends on the chosen level of the tax. The tax is set by assessing the cost or damage associated with each unit of pollution and the costs associated with controlling that pollution. Getting the tax level right is key: too low and firms and households are likely to opt for paying the tax and continuing to pollute, over and above what is optimal for society. Too high and the costs will rise higher than necessary to reduce emissions, impacting on profits, jobs and end consumers.

By contrast, a cap-and-trade system sets a maximum level of pollution, a cap, and distributes emissions permits among firms that produce emissions. Companies must have a permit to cover each unit of pollution they produce, and they can obtain these permits either through an initial allocation or auction, or through trading with other firms. Since some firms inevitably find it easier or cheaper to reduce pollution than others, trading takes place. Whilst the maximum pollution quantity is set in advance, the trading price of permits fluctuates, becoming more expensive when demand is high relative to supply (for example when the economy is growing) and cheaper when demand is lower (for example in a recession). A price on pollution is therefore created as a result of setting a ceiling on the overall quantity of emissions.

In certain idealized circumstances, carbon taxes and cap-and-trade have exactly the same outcomes, since they are both ways to price carbon. However, in reality they differ in many ways.

One difference is the way the two policies distribute the cost of reducing pollution. With cap-and-trade, it has often been the case that permits are given out for free initially (known as "grandfathering"). This means cheaper compliance for industry in the early stages of the scheme, because they only pay for any extra permits bought from other firms – not for the initial tranche of permits given to them to cover most of their emissions under 'business as usual'. This approach is obviously popular with industry and explains why grandfathering has been used, since it helps get firms to accept controls on emissions in the first place. By contrast, with a tax there is an immediate cost for businesses to pay on every unit of greenhouse gas produced, so there is a bigger initial hit to the balance sheet. But while grandfathering is better for near-term business profitability, it is not necessarily the best outcome for society. Indeed, it deprives the government of valuable revenues, which it

⁵ Also known as marketable pollution permits.

could raise in auctioning the permits initially, and which could be used to reduce other taxes.

The mechanisms also differ in how they perform under uncertainty about the costs and benefits of reducing emissions. Under a tax, the price of emitting a unit of pollution is set, but the total quantity of emissions is not. Therefore, a tax ensures everyone knows the price being paid (at least for the immediate future) for each unit of carbon dioxide emitted, but uncertainty remains about the actual quantity of emissions. Conversely, cap-and-trade provides certainty about the quantity of emissions (it cannot exceed the cap), but uncertainty about the cost of achieving these reductions. Which is preferred depends on how sensitive the level of environmental damage is to changes in emissions, compared with how sensitive the cost of reducing pollution is to the same changes. If the level of environmental damage is more sensitive, then it is important to be sure what the quantity of emissions is, which points to cap-and-trade. Conversely if the cost of reducing pollution is more highly sensitive to changes in emissions, it is better to be sure about the cost of cutting emissions, pointing to a tax.

What this means for climate change policy is debated. In the short term, most economists agree that uncertainty alone argues for a tax. Climate change depends on the stock of greenhouse gases in the atmosphere, and in each year the increase in that stock due to new emissions is small, so the environment is probably not that sensitive to the uncertainty about the level of emissions brought about by choosing a tax, at least over a year or two. On the other side of the ledger, the cost of reducing pollution is highly sensitive to changes in emissions, since it can be expensive to businesses to change their production methods abruptly. In the long term, however, it is less clear whether a tax is preferable, because big changes in the stock of greenhouse gases in the atmosphere may cause substantial environmental damage.

Some economists recommend a hybrid model that may offer the best of both worlds. This tends to comprise of a cap on emissions (to regulate the quantity of pollution), but with adjustment mechanisms such as a carbon price floor or ceiling, to keep the price of a permit within acceptable bounds. Hybrid schemes have their own problems, however, such as greater complexity and more intervention by the regulator in the permit market.

Whichever of these policies is favoured to place a price on carbon, they represent just one of a number of policies needed to cut greenhouse gas emissions.

Summarize the article by filling in the following table:

	PROS	CONS
CARBON TAX		

CAP-AND-TRADE		
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Annex B – Public-Private Partnership

One example of joint provision is the **Public-Private Partnership (PPP)**. PPP is where long-term partnering relationships between the public and private sector⁶ are forged in order to deliver services. It is an approach that the Singapore Government has adopted to increase private sector involvement in the delivery of public services.

Under the PPP, the government engages in a partnership with private firms to deliver goods and services. It can happen through working with non-profit organizations or VVO. It can happen through a contractual agreement to design, finance and operate. For example, the Singapore Sports Hub is a PPP between Sports Singapore (a public agency) and a private consortium. The Sports Hub consortium has a 25-year contract with the Sports Singapore to design, build, finance and operate the Sports Hub. This is an example of the Design-Finance-Build-Operate (DFBO) model of PPP. Sports Hub integrates sports and recreational infrastructure and facilities, which can be considered merit goods.

⁶ "Private sector" in this context refers to the part of the economy not controlled by the government. It can be "for-profit", or "not-for-profit" in nature.

Annex C – Co-Payment

Fee guidelines, getting patients to pay share of the bill among proposals to curb healthcare costs

SINGAPORE - The cost of healthcare in the private sector far outstrips what private patients in public hospitals pay, and part of the reason for this is the lack of fee guidelines and more patients whose insurance pays the whole cost of their treatments.

This has resulted in sharp increases in insurance payouts, which in turn pushes up premiums people have to pay.

An 11-member task force set up by the Life Insurance Association (LIA) of Singapore, including two members each from the Ministry of Health (MOH) and the Monetary Authority of Singapore (MAS), has released recommendations on how to rein in runaway healthcare costs.

They are:

- Have fee guidelines - currently not allowed as they are seen as anti-competition - to reduce overcharging and to "empower insurers to detect inflated claims".
- Streamline an existing process so insurers can raise suspected inappropriate or excessive medical treatments to the Singapore Medical Council, the professional watchdog.
- Insurers should have a panel of preferred healthcare providers who charge reasonable fees to help manage costs. This is done in other countries. Patients can opt for other doctors or hospitals, but doing so could affect the amount of their bill covered by insurance.
- The number of people who have bought riders, which cover their entire medical bill, has gone up from less than one in five residents in 2011 to one in three today. Half the people who have bought integrated health insurance plans (IPs), which cover non-subsidised treatments, have riders today. **Patients with riders⁷ generally have bills that are 20-25 per cent higher than those who have to bear a share of the cost.** The task force suggested the six insurance companies offering IPs tweak their products so patients pay a share of the bill to prevent the "buffet syndrome" which occurs when patients are "insulated from the cost".
- Require pre-authorisation from the insurer for treatments, so the insurer can "assess the medical necessity" and so patients know that the treatment is covered by their insurance. This is also practised in other countries.

The task force, headed by Ms Mimi Ho of financial consultancy firm Regulatory Professionals, also suggested greater consumer education so more people would "actively manage their health and healthcare costs".

The MOH on Thursday (Oct 13) issued a press release hailing the report as "timely and commendable".

⁷ For some insurances, you need to pay a portion of the hospitalisation bill. A rider covers this portion, hence the entire hospitalisation bill will be paid for by the insurer.

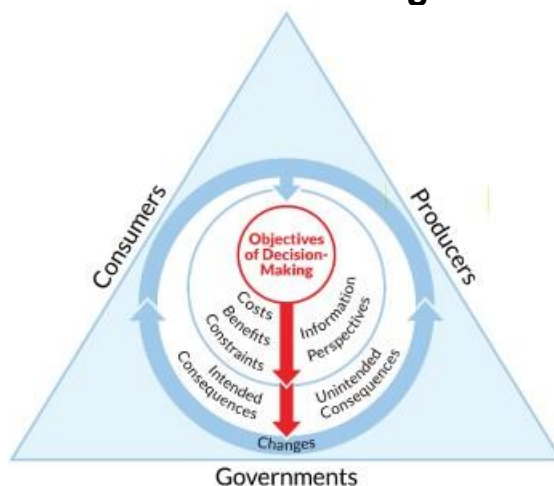
It said there was value to fee transparency and "will continue to work with healthcare providers and IP insurers on ways to further improve fee transparency".

Last week, the ministry made public the range of fees charged by private hospitals and specialists for a large number of common procedures.

MOH agreed that co-payment by patients, a "key tenet" in its healthcare financing framework, "helps to guard against over-consumption and over-treatment".

It said: "The absence of any co-payment may encourage over-consumption by some patients and over-servicing or over-charging by some healthcare providers which will eventually increase healthcare costs and insurance premiums for all Singaporeans."

Annex D - Decision Making Framework



Theme 2.3 highlights the need for government intervention as the free market can give rise to inefficient or/and inequitable outcomes. The decision-making framework can be used to help students better appreciate the complexities of the decisions made by governments.

Following are examples of how this framework can be applied:

Suppose the **government** is deciding whether to ban the use of e-scooters.

DMF Factors	Application to the Government's Decision-Making
Benefits & Costs	It will first need to consider whether the benefits of the decision (e.g., less accidents, injuries and deaths to the riders, pedestrians and other motorist) will outweigh the costs (e.g., longer travelling time for commuters, higher transport costs for food delivery providers and higher food delivery prices).
Constraints	The government will also need to consider the constraints (e.g., the capacity of the traffic police to monitor and enforce the ban, and the ease with which food delivery riders can switch to other alternative modes of transport like bicycles, e-bikes and motorcycles), whether these constraints can be overcome and how long will it take to do so.
Information	To estimate these benefits, costs and constraints, the government needs to gather information . For example, it will need to know how many accidents were caused by e-scooters and how severe they were, how many commuters and food delivery riders will be affected by the ban and the extent to which they will be affected, how much time and effort is required to monitor the illegal use of e-scooters and to prosecute the offenders.
Perspectives	To gather such information accurately, the government will need to seek the perspectives of multiple economic agents such as commuters, food delivery riders, food delivery companies, consumers of delivered food, the judicial courts, manufacturers and importers of e-bikes,

	among others.
Intended & Unintended Consequences	Should the government decide to proceed with the ban, it will then need to factor in whether the intended consequences have materialised (e.g., the extent to which the number of e-scooter related accidents, injuries and death have fallen) whether there were any unintended consequences (e.g., more accidents associated with e-bikes and motorcycles as people switch to such modes of transports).
Changes	Finally, the government also needs to account for internal changes to its environment (e.g., downsizing of the traffic police force) and external changes (e.g., entry of more food delivery platforms into the food delivery market) before deciding on whether to continue, amend or abandon the existing policy. All these decisions will again naturally require the government to gather information and seek the perspectives of other affected economic agents.

FOOD FOR THOUGHT – Selected Past Year A Level Essay Questions & other JCs Prelim Questions Related to This Topic:

A Level Essay Questions (2012 – 2021)

(2021, H2)

The market for bicycles is often said to generate external benefits such as reduced traffic congestion and reduced air pollution.

- a) Explain how economic theory suggests consumers act rationally to decide whether or not to buy a bicycle, and how producers of bicycles act rationally to determine their level of output.
[10]
- b) Discuss how government intervention in the market for bicycles could be used to maximise social welfare and consider how likely it is that such intervention will be successful in achieving this aim. [15]

(2020, H2)

Discarded plastic and carbon emissions are among the biggest causes of pollution. The environmental damage to air and water runs into billions of dollars. This not only affects our health but also our food supply.

- a) Explain how pollution leads to market failure. [10]
- b) Discuss the extent to which government policy measures are likely to address this market failure. [15]

(2019, H2)

There was a serious outbreak of flu (influenza) across the world at the beginning of 2018. In many countries, vaccinations were provided free of charge to the most vulnerable people and various Health Authorities urged the elderly and children to get vaccinated as soon as possible.

- a) Explain why vaccinations against infectious diseases, if left to the free market forces, might be allocated undesirably. [10]
- b) Suppose the government decides to intervene in the market and subsidise vaccinations against infectious diseases.

Discuss whether government subsidy is the best policy to ensure vaccinations are allocated desirably. [15]

(2017, H1)

Two possible reasons markets fail are externalities and public goods.

- a) Using examples from Singapore, explain why a free market would fail to operate efficiently when the provision of a good by a private producer generates positive externalities. [10]
- b) Discuss the view that the provision of government subsidies would be the best policy to correct market failure caused by public goods. [15]

(2016, H2)

Singapore's spending on healthcare is about 4% of GDP. This is lower than many developed countries. However, Singapore's population is ageing and economic growth may not be as high as before. The government share of national healthcare expenditure is expected to rise from 33% in 2012 to over 40% in the future.

- a) Explain why a government intervenes in the provision of healthcare. [10]
- b) Discuss how opportunity cost of increased healthcare expenditure differs, depending on whether it is financed by individuals or the Singapore government. [15]

(2015, H2)

'Market dominance is the main factor determining the profitability of firms.'

- (a) Explain how market dominance can influence a firm's price and output decisions. [10]
- (b) Discuss whether government intervention is always needed when a firm dominates the market. [15]

(2014, H2)

There is considerable agreement over the need for governments to provide public goods. There is less agreement over the extent to which markets fail because of imperfect information.

- (a) Explain why markets might fail in the case of public goods and where information is imperfect. [10]
- (b) Evaluate the alternative policies that are adopted by the Singapore government to correct for both these types of market failure. [15]

(2013, H2)

Economics assumes rational decision-making both by consumers, firms and government.

- a) Explain what is involved in rational decision-making both by consumers and by firms. [10]
- b) Discuss whether rational decision-making by consumers, firms and government always leads to an efficient allocation of resources. [15]

(2013, H1)

'Market failures always exist, so reliance on the price mechanism alone is inevitably an unsatisfactory way of allocating scarce economic resources.'

- a) Explain how the price mechanism allocates scarce resources in a free market. [10]
- b) Explain and evaluate one method that a government might use to bring about a more efficient allocation of resources when, for some reason, there is market failure. [15]

Other JCs Prelim Questions (2018 – 2019)

(2019, ACJC, H2)

According to Zero Waste SG, a non-governmental organization, the government has introduced a few campaigns to encourage people to use less single-use plastic bags. If it is just voluntary and encouragement, there is going to be hardly any impact. The group called on the government to do more to tackle the chronic plastic over-use problem.

Source: Channel NewsAsia, March 2016

- a. Explain how rational decision-making by the government may result in their intervention in the market for single-use plastic bags. [10]
- b. Discuss whether the Singapore government should implement more policies to achieve efficient allocation of resources in the market for single-use plastic bags. [15]

(2019, ASRJC, H2)

The tourism sector in Singapore receives subsidies through the Tourism Development Fund to attract visitors. In contrast, Italy imposes a tourist tax to manage the flow of tourists in cities and fund conservation efforts.

- (a) Explain how the price mechanism allocates scarce resources efficiently for goods and services in a market economy. [10]
- (b) Discuss the economic case for the different approaches adopted by the two governments to achieve efficiency in the market for tourism. [15]

(2019, HCI, H2)

In the move towards a more sustainable and liveable city, Singapore introduces a carbon tax rather than tradable permits to incentivise industries which use fossil fuel, such as power stations and oil refineries, to cut their carbon emission and spur the growth of cleaner energy. However, the government will continue its decision of not subsidising the use of solar energy to avoid over-consumption.

- (a) Explain the economic case for the Singapore government imposing a carbon tax and not subsidising the use of solar energy. [10]
- (b) Assess the extent to which a carbon tax is more appropriate than tradable permits in reducing carbon emission in Singapore. [15]

(2018, ACJC, H2)

(a) Explain how imperfect and asymmetric information can lead to market failure in the markets for healthcare services and healthcare insurance. [10]

(b) Discuss whether joint provision is the most appropriate policy to correct the market failure in Singapore's healthcare services. [15]

(2018, PJC, H2)

There are various types of market failure. Market failure provides one of the major justification for government intervention in the economy.

(a) Explain how market dominance and immobility of factors of production in a country can lead to market failure. [10]

(b) Evaluate the policies currently used by the Singapore government to correct these types of market failure. [15]

(2018, VJC, H2)

With access to quality schooling and information on the Internet, most Singaporeans are educated on various issues, ranging from the risks of excessive plastic use to being a more discerning buyer of second-hand cars. However, there remains hurdles that prevent Singaporeans from making well-informed choices.

(a) Explain why a government might intervene in the above cases. [10]

(b) In light of the above-mentioned, evaluate the policies that the Singapore government can adopt. [15]