



Topic 5:

Government's Microeconomic Objectives

Theme 2.3
Microeconomic Objectives and Policies

How to use this set of lecture notes?

1) BEFORE LECTURES – UNDERSTANDING CONTENT

- Reference your notes against your H2 syllabus. Mark out the key concepts so that you know what you **MUST** know
- Read your notes ahead so that you can focus on listening and capturing additional notes during lectures

2) During lectures – APPLYING CONTENT

- Bring your hard copy notes along, and use your PLDs to refer to the lecture slides concurrently
- Capture additional notes, especially the real-world examples where you can note down how concepts are applied and how economic analysis are developed in varying contexts
- You should make use of a notetaking/consolidation tool to take notes during lessons and to consolidate your learning at timely junctures. Examples are MIRO, Notion, Goodnotes, Notability, Microsoft OneNote, KAMI, etc. The choice is yours!

3) After Lectures – TUTORIAL PREPARATION to use content flexibly to show application, analysis and evaluation skills

- Revise concepts relevant for the case study and essay questions
- Refer to the notes and use it flexibly to prepare your answers to meet question requirements. Pure memorisation will not work as it does not involve deep understanding.
- Do share your notes with your friends to multiply learning!

Introduction

- 1. Price Mechanism and Efficient Allocation of Resources**
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Annex

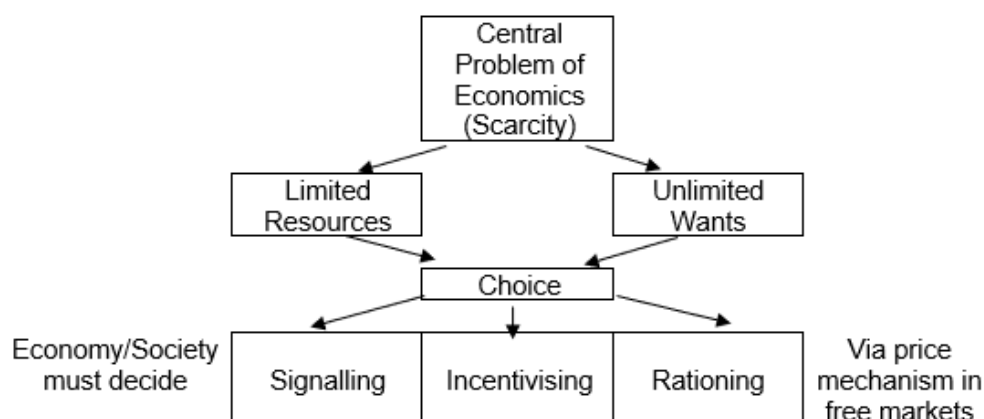
Essential Questions:

1. Under what circumstances would prices fail to serve as signals between producers and consumers in the allocation of resources?
2. How may each cause of market failure lead to inefficiency in allocation of resources in a free market economy?
3. Why might government need to intervene when there is inefficiency in resource allocation?
4. How does the government intervene to correct inefficient resource allocation?
5. Why does government intervention not always bring about allocative efficiency and equity?

Introduction

Have you ever questioned whether there are too many cars on Singapore's roads, or if cigarette consumption is excessively high? If so, you may be suggesting that there is an optimal number of cars the roads can support, and an ideal level of cigarette consumption for society. But how can we determine what that optimal level is? Can economic tools help us make sense of these issues?

Our study of economics begins with the fundamental problem of scarcity. In the topic of demand and supply, we examined how the price mechanism acts as a key economic tool, helping free markets allocate limited resources to satisfy unlimited wants. The price mechanism functions through signalling, incentivising, and rationing to guide resource allocation. However, we must also ask: does the quantity of goods and services determined by the price mechanism truly reflect what society desires? In other words, does it achieve allocative efficiency?



Proponents of the free market often argue that the free-market mechanism is the best way to achieve allocative efficiency and equity in resource allocation. However, markets do not always deliver these outcomes. Through government intervention, different stakeholders intervene to work towards achieving allocative efficiency and equity in the market. Even so, the government might not know how much intervention to carry out as they do not necessarily know the exact amount the society desires. Could government action unintentionally worsen the situation? If so, should we advocate for government intervention? And if we don't, would that compromise society's overall welfare?

By the end of this topic, you will be able to justify if the free market is always efficient and equitable in the allocation of resources. If the free market is unable to do so, is there a role for the government? If so, to what extent should the government intervene?

1. Price Mechanism and Efficient Allocation of Resources

With scarcity, all economies are faced with the basic questions of resource allocation and governments are concerned with how well the economy/society utilises and allocates these resources. In a free market, the price mechanism determines how much resources are allocated to producing each good or service based on the equilibrium.

In Topics 2 to 4, we assumed a **perfectly competitive market**, which is characterised by:

- Many buyers and sellers
- Identical/homogeneous product
- No barriers to entry and exit
- Perfect knowledge or information
- Perfect factor mobility
- Absence of externalities

Under the above assumptions, the perfectly competitive market is able to achieve an efficient and equitable allocation of resources.

The demand curve indicates the value [marginal private benefit (**MPB**)] that each buyer places on the last unit of the good that he consumes which is based on the utility derived from the consumption of that unit of good. In the absence of any external benefits to third parties, the MPB to each buyer (which is indicated by the **price**) is equal to the marginal social benefit (**MSB**).

The supply curve indicates the additional cost to a firm of producing the last unit of the good. In the absence of any external cost to third parties, the marginal private cost (**MPC**) incurred by firms is equal to the marginal social cost (**MSC**). The (opportunity) cost to society refers to other goods that could have been produced by the resources used to produce this additional unit of output.

Note: $MPB = MSB$ and $MPC = MSC$ only when there are no externalities.

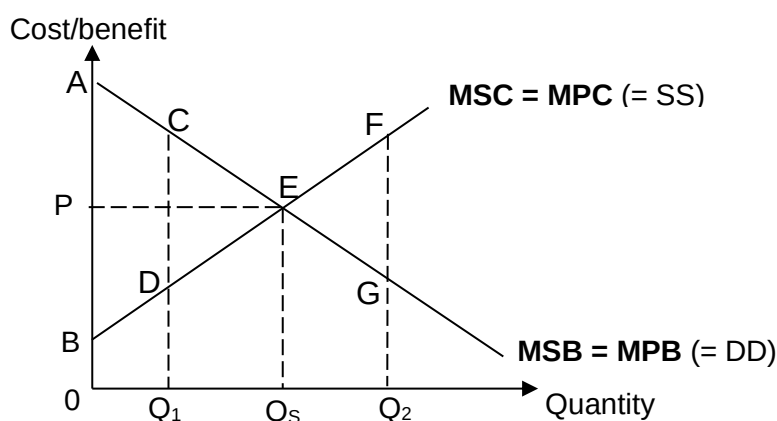


Figure 1: Social optimum $MSB=MSC$

Case 1: Under-production/consumption at Q_1 ($MSB > MSC$)

At output Q_1 which is below the socially optimal output Q_s , an additional production/consumption of the good towards Q_s will lead to a positive marginal net benefit (since $MSB > MSC$). Society's welfare could be better improved by increasing production/consumption till the socially optimal amount Q_s . Only then, will the total net benefit to society be maximised.

For example, if the output level of the good is only Q_1 , potential welfare can be gained by producing/consuming up till Q_s . This is because if the output level of the good is at Q_1 instead of Q_s , between Q_1 and Q_s , the additional benefit (Q_1CEQ_s) is greater than the additional cost (Q_1DEQ_s). This under-production/consumption of the good results in a deadweight loss represented by area CDE. Therefore, by increasing the output of the good to Q_s , where $MSB = MSC$, society welfare will be maximised.

Figure 1 shows that for every additional unit produced/consumed beyond Q_1 up to Q_s , MSB is still greater than MSC. Hence, to increase and maximise society's welfare, production/consumption of the good should be increased.

Case 2: Over-production/consumption at Q_2 ($MSC > MSB$)

Conversely, if the output produced/consumed is Q_2 which is beyond the socially optimal level Q_s , then MSB will be less than MSC. Producing/consuming an additional unit beyond the socially optimal amount results in the marginal benefit of that additional unit to be smaller than the marginal cost, hence resulting in a negative marginal net benefit and welfare loss to society. Therefore, reducing output to Q_s will maximise society's welfare.

For example, between output levels Q_s and Q_2 , the additional cost (Q_sEFQ_2) incurred is greater than the additional benefit (Q_sEGQ_2) reaped from producing/consuming it. Deadweight loss represented by area EFG arises from the negative welfare generated by the overproduction/consumption of the good when $MSC > MSB$. Therefore, by reducing the output of the good to Q_s where $MSB = MSC$, society's welfare is maximised.

Hence, we can see that social optimum is achieved at output Q_s where $MSB = MSC$. At Q_s , society's welfare or net benefit is maximised and allocative efficiency is achieved.

2. Governments' Microeconomic Objectives

Recall that the microeconomic aims of a government are to achieve **efficiency** and **equity** in resource allocation in the economy.

Is society producing enough (Q) of each good to maximise society's welfare?	Whose wants do/should society satisfy? Is the distribution of limited resources fair among people?
Allocative Efficiency	Equity
Are firms producing using least cost methods? Is society getting the most from its limited resources?	Are the markets improving over time? (quality of products/choice) Is society better able to meet its needs/wants over time?
Productive Efficiency	Dynamic Efficiency

Note: There are three key types of efficiency: allocative efficiency, productive efficiency, and dynamic efficiency. In this topic, the primary concern is allocative efficiency. In market dominance (which you will learn in Topics 6 – 8), all three types — allocative, productive, and dynamic efficiency—are considered.

Allocative efficiency

Allocative efficiency is achieved when society produces and consumes the **optimal/right mix** of goods and services that maximises its welfare. Efficiency in markets occurs when the social optimum is achieved, where **$MSB = MSC$** . This results in a socially optimum output Q_s where society's welfare or net benefit is maximised.

However, in a free market, allocative efficiency *may not* be achieved. This is because the market may not be perfectly competitive, and individuals act in their self-interests. As a result, over or under-allocation of resources to the good relative to the socially optimal level may occur. In extreme case, some goods and services may not even be produced by the market.

Equity

Equity occurs when there is fairness in the distribution of essential goods and services. For example, this distribution can be between ***rich and poor consumers***. There is inequity in resource allocation because poor consumers may not be able to afford and have access to basic necessities. More about equity will be explained in Section 4.

Therefore, governments might decide to intervene when **market outcomes are deemed undesirable**, for either efficiency or equity reasons.

3. Market Failure and its Causes and Government Intervention

In a free market, the price mechanism can achieve allocative efficiency only when the following assumptions hold:

- Perfect market (e.g., perfect information, perfect factor mobility, absence of market power)
- Absence of externalities
- Private goods are produced

If these assumptions do not hold, then the market will fail.

Market failure occurs when the free market is unable to **allocate** resources **efficiently**.

Note: Section 3 will be split into the various **causes** of market failure. Each part consists of the **cause** to why markets may fail, followed by microeconomic policies that governments can adopt to address that particular cause of market failure. Analysis of each policy will consist of **H-A-L**:

- **H**ow the policy works
- **A**dvantages
- **L**imitations

In discussing Advantages and Limitations, we will use the **FIRST framework**. Do note that not all elements of the framework can apply to all questions, and you will have to choose the ones applicable to the given context. There might also be advantages and limitations that lie beyond what this framework covers.

FIRST	Possible Guiding Questions	Remarks
Feasibility & Flexibility	- Why might the policy be easily implemented? What might hinder its implementation? - Can the government carry out the policy? - Is the policy politically unpopular? - Can the policy be easily adjusted/changed according to dynamic conditions?	In deciding which relevant point to choose, consider the nature and state of the economy/market
Impediments (or lack of)	Even if the government can carry out the policy: - Is there a lack of information? - Are there offsetting factors? - Are the conditions for the policy to achieve its objective met? - Are the assumptions met?	
Root cause	Is the policy targeted at the root cause of the problem?	
Side effects (Unintended Consequences)	- What problems will this policy cause? - What are the trade-offs incurred? - How does the policy affect different economic agents?	
Time period/ Timeliness	- Is the policy sustainable in the long run? - Is there a time lag? (A long-run policy has to be complemented with a short-run policy.)	

3.1 Public goods

Consider this:

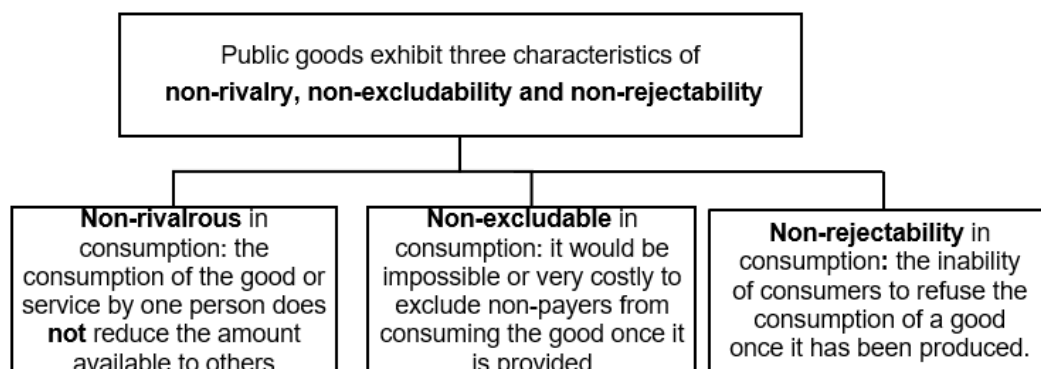
What is the difference between national defence and public housing?

One of the key differences is that the same public flat cannot be consumed by two persons simultaneously – if I have bought a public flat, you cannot have that same flat because there is one less unit available now. In contrast, your consumption of the protective service offered by national defence does not reduce the level of protective service available.

The next difference is that it is comparably a lot easier to exclude someone who does not pay from consuming the public flat. However, it is almost impossible or too costly to prevent someone who did not pay from consuming the protective service provided by national defence.

Finally, the last difference is that a consumer can refuse to buy the public flat, whereas for national defence, especially during an imminent threat, one cannot simply reject the protection service.

From the above example, national defence is an example of a public good while public flat is a private good.



The first two characteristics of public goods, namely **non-rivalry and non-excludability in consumption**, prevent the market from functioning efficiently, resulting in **no provision of public goods**, and hence a missing market for public good. As opposed to public goods, private goods are excludable and rivalrous in consumption.

As for the characteristic of **non-rejectability**, one example would be 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 protection service even if he wants to.

Why does the existence of public goods result in market failure?

Point 1: Left to the free market, public goods will not be provided for, given the free-rider problem

This stems from the **non-excludability** nature of the good, where it is **impossible or very costly to exclude non-payers** from consuming the good when the good is provided. Since those who cannot pay will not be excluded, **no one has the incentive to pay for the good**. This leads to **free-rider problem** where everyone will wait for someone else to pay, in hopes of enjoying the marginal benefit from the good without having to pay for it. In such case, there will be **no effective demand** for the good, i.e., consumers will not be willing to pay for the good even if they are able to pay. Since there is no effective demand for the good in the market, **firms will make the rational decision not to enter the market to supply the good**. Therefore, if the provision of public goods were **left to private firms**, there would be **no resources allocated to the production of such goods**.

Non-excludability
→ no one is willing and able to pay → Free-rider problem
→ no effective DD
→ no profits for firm → non provision → missing market
i.e., $Q_p=0$

In other words, the free market failed to use price signal to represent consumer's satisfaction of consuming the good. Even though some consumers value the good, the free-rider problem hinders the effective demand to be revealed in the free market, leading to a **complete market failure**, i.e., missing market for the good, even though society desires for the good.

Point 2: It is (allocative) inefficient to charge a price for the good

The **non-rivalrous** characteristic of public good means that the consumption by one person does not reduce the amount available to another. Therefore, supplying the good to an additional user does not add to the total cost to society. This means that the **marginal cost of providing this good for an additional user is zero**. Consider the case of a tsunami warning system. By having an additional person on the beach, it does not reduce the amount of siren that can be heard if a tsunami is approaching. Hence, the marginal cost of serving an additional user is zero. **In an allocative efficient market, the price to charge is equal the marginal cost ($P = MC$)**, hence the price which consumers should pay is equal to the marginal cost which is zero.

Non-rivalry → once produced, MC of providing **for additional users** = 0 → with AE: $P=MC$ → Price=0
→ no rational firm will provide i.e., $Q_p=0$

Note: MC of production is **NOT** zero

In a free market, profit-maximising firms will not provide their goods at a price of zero. Similar to the first explanation, no rational private firms who are assumed to be profit-motivated would be willing to supply the good if the price is zero. If left to the free market, no public goods will be produced, and there is complete market failure.



Connect, Extend, Challenge

Is a lighthouse a public good?

Economists have long used lighthouses as an example of a public good. Once the beacon is lit, one ship can take advantage of it without reducing another ship's ability to do the same. It is technically impossible or too costly to exclude another vessel from enjoying the benefit provided by the beacon light. Hence, each ship has an incentive to free ride by using the lighthouse to navigate without paying for the service. Because of non-rivalrous and non-excludable characteristics, private markets usually fail to provide the lighthouses that ships need. As a result, most lighthouses today are operated by the government.

Is the classification of lighthouse as a public good always true?

Imagine a jamming device that was invented made it possible to prevent ships from obtaining signals from the lighthouse unless they purchased a special receiver. In this case, as the lighthouse service can be made excludable, it is no longer a 'pure' public good but a quasi-public good. Therefore, the state of technology can move some goods away from the 'pure' public good classification.

In some cases, lighthouses may be closer to private goods. On the coast of England in the nineteenth century, some lighthouses were privately owned and operated. Instead of trying to charge ship captains for the service, the owner of the lighthouse charged the owner of the nearby port. If the port owner did not pay, the lighthouse owner turned off the light, and ships avoided that port.

In deciding whether something is a public good, one must determine the non-rivalrous and non-excludability characteristics of the good.

Adapted from Principles of Economics, An Asian Edition

There are many examples of public goods that are important to society. Examples include street lightings, national defence and the creation of basic knowledge and research. Public goods often confer substantial benefits to society, but which are lost if there is a missing market because of non-provision. Since the **free-market outcome is zero, (i.e., $Q_P = 0$)**, and the **socially optimal output is greater than zero (i.e., $Q_S > 0$)**, there is **complete market failure**. Hence government intervention is required to remedy the market failure and raise society's welfare.



Connect, Extend, Challenge

1. Are all public goods provided by the government?
2. Are goods that are provided by the government for free always public goods?

Government intervention (Microeconomic policies) to address no provision of public goods

As mentioned, there would be a missing market for public goods if left to the free market. Hence, there is a role for government intervention where the government provides public goods. The government must then determine which public goods to provide and in what quantities.

For example, the government is considering building a public project, such as flood warning system. To decide whether to build it, the government must compare the total benefits of all those who would use it to the costs of building and maintaining it. To make this decision, the government might hire a team of economists and engineers to conduct a study, called a cost-benefit analysis, the goal of which is to estimate the total costs and benefits of the project to the society as a whole.

If the government weighs that the **benefits from having the public good provided exceed the costs of providing it**, then the government can produce the public good either through direct or joint provision.

Public goods - Policy 1: Direct provision and Joint provision	
How it works	
<u>Direct/Public provision:</u> Government provides the public good, using its resources (tap into its tax revenue which comes in the form of direct tax or indirect tax like the goods and services tax) to finance or pay for it. In Singapore's context, the Ministry of Defence manages the army to provide national defence. The government can then decide how much to produce and how much to spend on it by considering multiple factors. The government will make an estimate of the MSC and MSB of national defence and provide an amount equivalent to the socially optimal amount, Q_s. The government can provide the public good for free to ensure allocative efficiency ($P = MC$; $MC = 0 \rightarrow P = 0$), since public good is non-rivalrous in consumption.	
<u>Joint provision (Subsidise/Pay private firms to produce it):</u> Alternatively, the government can consider paying private firms to produce the public good. In Singapore, basic research by private firms could be perceived as non-rivalrous as once the research is published, every other firm can access it. Hence, the $MC = 0$ for additional research produced. In an allocative efficient market, $P = MC$, hence private firms must charge $P = 0$ to produce additional research. As private firms aim to maximise profits, there is no incentive to produce research at $P = 0$, hence the quantity of research produced will be zero. Thus, the government needs to provide subsidies to private firms to incentivise them to produce some areas of basic research.	
Advantages	Limitations
• <u>Flexibility:</u> Government can decide the amount and quality of provision i.e., cutting edge defence systems and weapons, and the use of tax revenues ensures the financial burden is shared by its people.	• <u>Impediments:</u> Imperfect information. Government may not accurately determine the socially optimum level of public good to ensure allocative efficiency. Due to the free-rider problem, it is difficult to ascertain consumers' demand for a good. The government does not know how much consumers truly value the good as there is no price signal with which to evaluate whether to provide the public good and in what quantities. Hence, such difficulties in quantifying the costs and benefits of public goods are just estimates at best.

• <u>Side effects</u>: In the case of joint provision, private firms will try to minimise costs since the firms are profit-maximising, especially if they get a fixed fee from the government. This can ensure productive efficiency.	If the government under-provides or over-provides a public good, welfare losses will result. • <u>Feasibility</u>: Government budget constraint. Such government intervention results in increases in government expenditure, which may require raising taxes to finance spending on public goods. Spending on public goods incurs opportunity costs, e.g., new educational facilities foregone. In addition, the need to raise tax to finance the spending means that there will be distortions and deadweight losses associated with acquiring those taxes and society's welfare will be reduced. • <u>Side effects</u>: In the case of direct provision, managers in the public sectors are non-profit oriented, unlike in private firms. Hence, they might not have the incentive to minimise costs by sourcing raw materials from low-cost suppliers, resulting in productive inefficiency. However, instead of being the producer, the government could provide the funding and outsource the production and maintenance of the public goods to private producers by awarding them contracts as in the case of joint provision. These private producers are more efficient in minimising costs as compared to the public sectors since costs have a direct effect on profitability.
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Possible evaluation

The discussion on public goods is rarely about whether a government should intervene. Rather, it is about justifying the **proportion of government expenditure spent on the public good** and the **optimal level of provision**. As consumers are not willing to reveal their true demand, it is difficult to determine the efficient amount of good to produce for the society.

Even though government might not be able to accurately determine the optimal amount to produce, society will still be better off if the government provides the public good because there is net gain in welfare from the quantity produced.

3.2 Externalities

An externality is a spillover cost or benefit borne by a third party due to the production or consumption of a good or service. *A third party refers to someone who is not part of the economic transaction and is neither the buyer nor the seller.*

The pursuit of self-interest does not make economic agents (producers and consumers) take into account the externalities. Traditionally, producers aim to maximise profits while consumers aim to maximise utility. As a result, the free market causes an over-allocation of resources to producing/consuming goods with negative externalities, and an under-allocation of resources to producing/consuming goods with positive externalities.

Note: We are now using an analysis from the economic agent's perspective and not using demand and supply analysis. (See Figure 1a below)

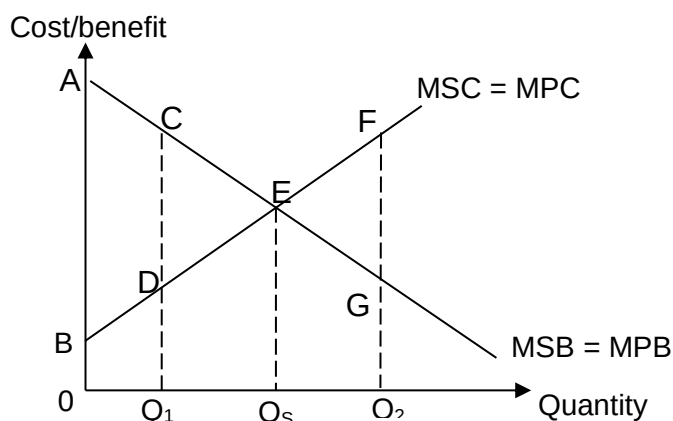


Figure 1a: Socially optimum level of output (Q_s) where $MSB=MSC$

Types of externalities

Externalities can be positive (benefits) or negative (costs) and can occur when a good or service is consumed or produced.

	Positive externality	Negative externality
Consumption	Exists when there are benefits enjoyed by third parties due to the consumption of the good or service. <i>e.g., vaccination for contagious diseases such as measles; consumption of education services</i>	Exists when there are costs borne by third parties due to the consumption of a good or service. <i>e.g., Cigarette smoking; excessive road usage by motorists</i>
Production	Exists when there are benefits enjoyed by third parties due to the production of good or service. <i>E.g., research and development (R&D) by firms</i>	Exists when there are costs borne by third parties due to the production of a good or service. <i>E.g., Carbon emission by airplanes; air/water pollution by factories</i>

Note: You need to be able to identify whether the externalities are a result from the consumption OR production of the good or service in the given context.

Terminology

External *cost* is applicable to *negative* externalities in production/consumption:

Marginal External Cost (MEC)	The additional cost incurred by third parties due to the production or consumption of an additional unit of a good or service.
Marginal Private Cost (MPC)	The additional cost incurred by consumers or firms when consuming or producing an additional unit of a good or service.
Marginal Social Cost (MSC)	The sum of MPC and negative externalities: $MSC = MPC + MEC$

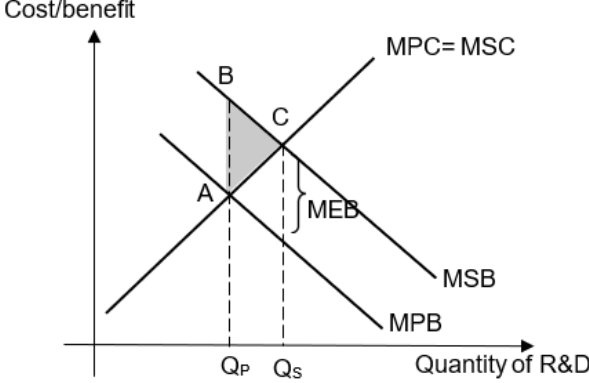
External *benefit* is applicable to *positive* externalities in production/consumption:

Marginal External Benefit (MEB)	The additional benefit enjoyed by third parties due to the production or consumption of an additional unit of a good or service.
Marginal Private Benefit (MPB)	The additional benefit enjoyed by consumers or producers when consuming or producing an additional unit of a good or service.
Marginal Social Benefit (MSB)	The sum of MPB and positive externalities: $MSB = MPB + MEB$

3.2.1 Positive externality in production

Why is positive externality in production a source of market failure?

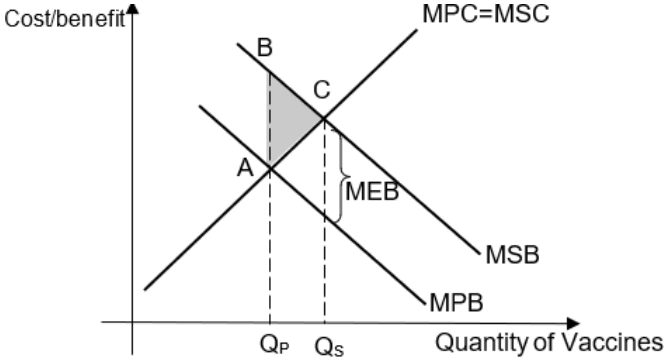
Consider the market for **research and development (R&D)**:

Step 1: Define Externality & Explain the MPB, MPC and MEB (third-party and the external benefit)	Positive externality in <i>production</i> exists when there are benefits enjoyed by third parties due to the <i>production</i> of good or service. When a firm conducts (“produces”) R&D, it incurs private costs such as the costs of production of R&D and wages. It will enjoy private benefits should the R&D efforts enable it to come up with a new product or improve its production process, which enables it to increase its revenue. However, it does not take into account the fact that other firms (third parties) will be able to enjoy the external benefits in the form of higher revenue without having to conduct R&D themselves.
Step 2: Explain divergence	Due to the positive externality in production, the marginal social benefits of R&D are higher than the marginal private benefits ($MSB > MPB$). In Figure 2, the MSB lies above the MPB by a vertical distance equal to marginal external benefit (MEB). Assuming no negative externalities, MPC is equal to marginal social costs (MSC).
Step 3: Draw diagram	 Figure 2: Positive externality in the production of R&D
Step 4: Explain market equilibrium output (Q_P) & Socially optimal output (Q_S)	In the pursuit of self-interest, the firm considers only its private benefits and costs when producing R&D. This leads to the market equilibrium output Q_P, where $MPB = MPC$. However, the socially optimal output is Q_S, determined by the intersection of the MSB with the MSC.
Step 5: Explain allocative inefficiency by comparing Q_P and Q_S	Since Q_P is less than Q_S, the firm under-produces R&D, leading to an under-allocation of resources. Between Q_P and Q_S, marginal benefit to society is greater than marginal cost to society. This means that societal welfare could have been gained by increasing quantity of R&D up to the socially optimal output of Q_S. This forgone societal welfare is the deadweight loss (area ABC), leading to allocative inefficiency and hence market failure.

3.2.2 Positive externality in consumption

Why is positive externality in consumption a source of market failure?

Consider the market for **vaccines**:

Step 1: Define Externality & Explain the MPB, MPC and MEB (third-party and the external benefit)	Positive externality in <i>consumption</i> exists when there are benefits enjoyed by third parties due to the <i>consumption</i> of the good or service. When a consumer consumes vaccination, he incurs private costs such as the prices of vaccination. With vaccination, the consumer will enjoy private benefits as he has a lower chance of being infected with a disease, and hence will be healthy and work productively to earn higher income. However, the consumer does not take into account the fact that third parties such as his friends and colleagues will enjoy external benefits in terms of higher income when they also enjoy a lower risk of contracting the disease and hence will be healthy and productive at work, without being vaccinated.
Step 2: Explain divergence	Due to the positive externality in consumption, the social benefits of vaccinations are higher than the private benefits ($MSB > MPB$). In Figure 3, the MSB lies above the MPB by a vertical distance equal to marginal external benefit (MEB). Assuming no negative externalities, MPC is equal to marginal social costs (MSC).
Step 3: Draw diagram	 Figure 3: Positive externality in consumption of vaccines
Step 4: Explain market equilibrium output (Q_P) & Socially optimal output (Q_S)	In the pursuit of self-interest, the consumer considers only his private benefits and private costs when consuming vaccination. This leads to the market equilibrium output Q_P, where $MPB = MPC$. However, the socially optimal output Q_S is determined by the intersection of the MSB with the MSC.
Step 5: Explain allocative inefficiency by comparing Q_P and Q_S	Since Q_P is less than Q_S, the consumer under-consumes vaccination, leading to an under-allocation of resources. Between Q_P and Q_S, marginal benefit to society is greater than marginal cost to society. This means that societal welfare could have been gained by increasing quantity of vaccine consumed up to the socially optimal output of Q_S. This forgone societal welfare is the deadweight loss (area ABC), leading to allocative inefficiency and hence market failure.

Government intervention in markets for goods exhibiting positive externalities

When a positive externality causes a good or service to be under-produced or under-consumed, the government can improve resource allocation by implementing policies that increase the production or consumption of such goods, by adjusting the benefits and costs. The aim of the government intervention would be to encourage production or consumption to the socially optimal level (Q_s) where $MSC = MSB$.

The policy options available are:

1. Subsidies
2. Direct provision (including Free provision)
3. Legislation & regulation
4. Public education (Moral suasion)

Positive externalities - Policy 1a: Subsidies

How it works

For positive externality in production

Figure 4 illustrates the case of a positive externality in production such as when a firm conducts research and development (R&D), allowing for benefits of successful R&D to spread throughout the economy. The government subsidies given to these firms should equal to the MEB. Subsidy reduces the production costs (e.g., private costs of R&D), decreases firms' MPC of conducting R&D from MPC_0 to MPC_1 (with subsidy). In doing so, the market equilibrium quantity increases to Q_s , the socially optimal output where $MSB = MSC$. The MEB has been internalised and the deadweight loss of ABC is eliminated.

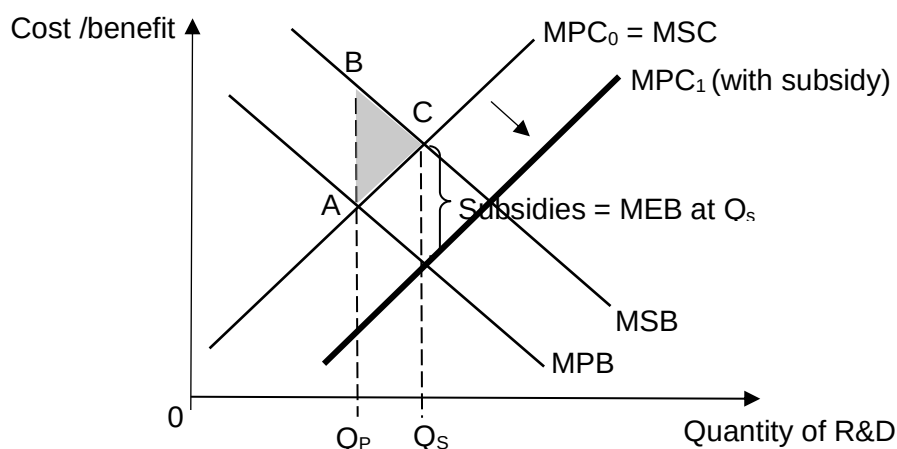


Figure 4: How subsidies correct positive externality

Examples: Under the Research, Innovation and Enterprise (RIE) 2025 Plan, the Singapore government will sustain investments in research, innovation and enterprise at about \$25 billion over 2021 to 2025. The plan covers four broad areas: Manufacturing, Trade and Connectivity, Human Health and Potential, Smart Nation and Digital Economy and Urban Solutions and sustainability.

Other examples of subsidies could include the Energy Efficient Fund (E2F), Productivity Solutions Grant (PSG), Enterprise Development Grant (EDG). More details can be found at <https://atc.sg/singapore-government-business-sme-grants-support-assistance.php>

For positive externality in consumption

Governments can correct positive externalities in consumption by offering subsidies to producers. The provision of subsidies to producers (e.g., hospitals) will lower the cost of production of vaccination, shifting the supply of vaccination rightwards, hence reducing the price of vaccination for the consumer (patient). The consumer now internalises the MEB. The consumer enjoys a lower price and thus his MPC falls, shifting MPC_0 down to MPC_1 (as illustrated in Figure 4). The new market equilibrium quantity Q_P (where $MPC_1 = MPB$) rises to the socially optimal output level Q_S , eliminating the deadweight loss and correcting the market failure.

Examples: Singapore government subsidises public hospitals which offer subsidised rates for medical treatments and hospitalisation. Another common example would be the grants given to schools/educational institutions to lower the cost of education to students. This reduction in the cost of production will translate to lower education fees.

Note: *Be consistent in the analysis as the perspective is taken from the point of the consumer.*

Advantages	Limitations
<u>Flexibility:</u> Subsidies can be easily adjusted as needed until the level of consumption or production is socially optimal level Q_S is attained.	1. <u>Impediments:</u> Imperfect information • Difficult to give an accurate valuation (in monetary terms) of MEB. Thus, the government may not know the optimal amount of subsidy to give to attain the socially optimum output. The government may over-subsidise leading to over-consumption. It may also under-subsidise and fail to solve the problem of under-consumption. • Even with subsidies, consumers might still not consume the good or service due to other reasons such as cultural beliefs. Hence other policies might be needed to tackle the root cause of the problem. 2. <u>Feasibility:</u> The effectiveness of subsidy depends on the PED for the good/service. The more price inelastic is the demand for the good, the greater is the expenditure on the subsidy incurred by the government in its efforts to increase output to the desired level. Governments that lack the resources to engage in such subsidy spending may not be able to achieve Q_S. 3. <u>Side effects</u> • Channeling of public funds to finance the subsidy puts a strain on the government's budget (Tax revenue – Government expenditure) over time, leading to a rise in budget deficit or a reduction in budget surplus. The decision to provide subsidies incurs opportunity costs as there will be less funds available for the provision of public goods or correction of other causes of market failures. • Furthermore, higher tax rates, such as income taxes, may be required to finance the subsidy. High income tax rates are known to discourage

	effort and investment in the country. Or if the tax revenues collected are insufficient, the government might incur budget deficit which leads to rising government debt, which can have negative impact on the economy in the long run.
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Positive externalities - Policy 1b: Free provision (Full subsidy)

The government could also fully subsidise goods with positive externalities. Examples include the COVID-19 vaccination programme and the National Childhood Immunisation Schedule (NCIS) where all recommended vaccinations are fully subsidised by the Singapore government. In these cases when goods/services are provided freely, the price would be zero ($P = 0$).

On what basis should government provide such goods for free?

i. **Large positive externalities:** There may be large external benefits involved from consumption of such a good. For example, if a person decides to get treatment for an infectious disease, third parties benefit by not being infected. In this case, a free health service will help to combat the spread of disease.

ii. High level of ignorance

Consumers: Consumers may not realise how much they will potentially benefit and may unwisely choose to go without the good if they must pay for it. For example, providing free healthcare may persuade those who are sick to consult their doctors before a condition becomes serious.

Dependents: In the free market, parents could choose the extent of education their children could consume. The quality of children's education would depend not just on their parents' income, but also on how much the parents cared. A government may choose to provide such goods free to protect children from disinterested parents. A similar argument is used for providing free prescriptions and dental treatment for all children.

iii. **Equity:** Society may feel that these goods should not be provided according to the ability to pay. Rather, they should be provided according to need, that is, an equity-based argument.

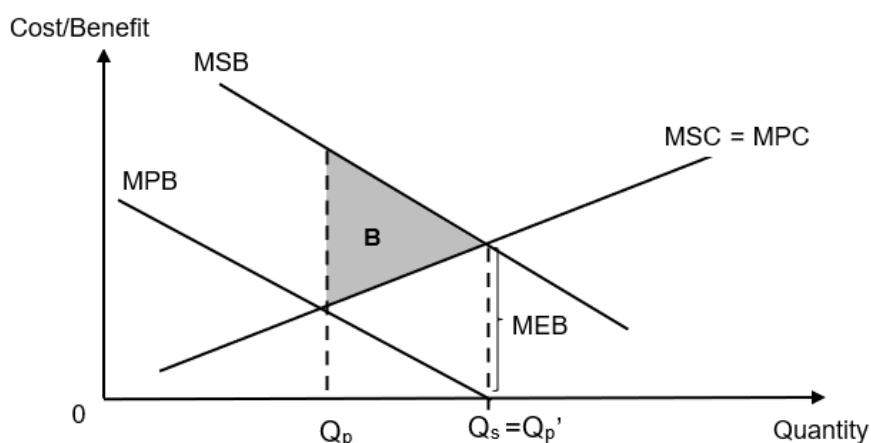


Figure 5a: Free provision of a good leading to allocative efficiency

In Figure 5a, the MEB is substantially large such that the socially optimal level of output Q_s coincides with the level that will be consumed at Q_p' where $MPB = 0$.

intersects the x-axis. This suggests that an ideal price for the good would be 0. In such an instance, free provision would be deemed to be both allocative efficient (where $MSB=MSC$) and equitable.

Should the government always provide such a good or service for free?

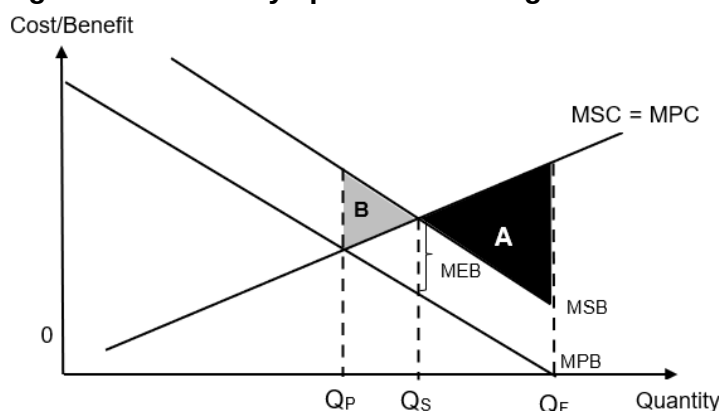


Figure 5b: Free provision of good leading to over-consumption

The socially optimal level of output is Q_S where $MSB = MSC$.

If the good is provided free (i.e., $P = 0$), MPC to consumers is zero. The quantity demanded will be Q_F units where MPB intersects the x-axis. At this output level consumers maximise their net private benefit where $MPB = MPC$

- If the entire quantity demanded is supplied by the government at zero-price, the level of consumption will be at Q_F , then area A. shows the resulting deadweight loss
- On the other hand, if the good was supplied fully by the free market without government intervention, the level of consumption will be at Q_P , where $MPB=MPC$. Deadweight loss will then be area B.

In the case illustrated, the MEB is small, i.e., divergence between MSB and MPB is not significant. Hence, area A is bigger than area B. If such a good is provided free, the resultant over-consumption would lead to a larger deadweight loss as compared to the good being provided by the free market. Hence, the government's free provision for such goods gives rise to even greater inefficiency compared to a purely free market outcome.



Connect, Extend, Challenge

Are subsidies to producers more equitable than subsidies targeted at certain groups of consumers?

Not necessarily. For instance, MediFund in Singapore provides a safety net for patients who face financial difficulties with their remaining healthcare bills after receiving government subsidies and drawing on other means of payments including MediShield Life, MediSave and cash. For education, Edusave Account and MOE Financial Assistance Scheme (FAS) are available to provide Singapore Citizens in lower-income families with financial assistance for school fees and other expenses. Providing subsidies to a targeted group of consumers such as the low-income households would increase the willingness and ability of these Singaporeans to consume more healthcare and education, improving equity.

Positive externalities - Policy 2: Direct provision

How it works

Government could directly provide the socially optimal quantity (Q_s), or they could pay private firms to do so. An example is education where the infrastructures (school buildings and teachers) are directly provided by the Singapore government via Ministry of Education has resulted in the provision of 180 primary schools, 136 secondary schools, 16 mixed level and 11 JC/CIs in Singapore in 2022.

Direct provision of schools/healthcare by the Singapore government increases the number of schools/public hospitals (firms) providing education/healthcare. Government will provide education/healthcare up to Q_s in Figure 6, eliminating deadweight loss (shaded area) and correcting the market failure.

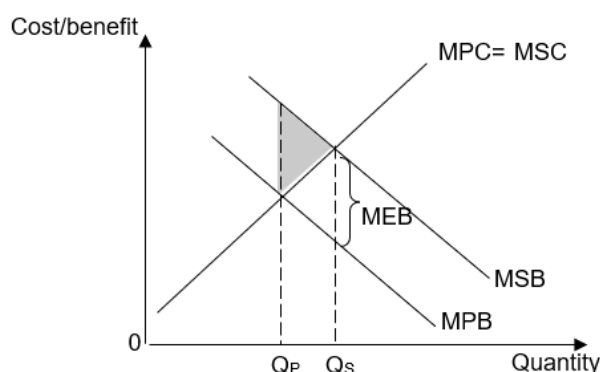


Figure 6: Direct provision in the market of education/healthcare

Advantages

Side effects:

- Besides achieving efficiency, direct provision **ensures equity**. All individuals, regardless of their socio-economic background, have equal access to consume these goods. There is fairness in the distribution of such essential goods and services.
- Direct provision allows the government to monitor and ensure the **standards and quality** of education or healthcare provided **are at a minimum acceptable level**. The government can also ensure that such goods and services remain affordable.

Limitations

1. Side effects

- The government may not be able to produce as efficiently as private firms. Without profit-motive, **public organisations lack the incentive to minimise costs** and hence they tend to be **productive inefficient**. As a result, resources are wasted during production which worsens the situation.
- Without market pricing and costing to guide the government, mismanagement can occur, resulting in **misallocation of resources and poor quality of services provided**. It is not uncommon for doctors 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 services.
- To finance subsidies, the provision of such goods comes from **taxation**. Imposing higher income tax rates may act as a **disincentive to work**.

2. Impediment: Imperfect knowledge. The government may not know the socially optimum amount to provide. Refer to page 18.

Positive externalities - Policy 3: Legislation and Regulation

How it works

The government can remedy an externality making certain behaviours compulsory by law. Those who violate the law would face punishment in the form of fines or imprisonment.

Positive externality in consumption

The Compulsory Education Act passed in 2000 requires all Singaporean children to complete six years of primary education in national schools before they turn 15. If convicted, parents shall be liable to a fine not exceeding \$5,000, or to imprisonment for a term not exceeding 12 months, or to both. For fear of facing fines/jail time, parents will have to increase consumption up to the socially optimum level Q_s , where $MSB = MSC$. This eliminates the deadweight loss (shaded area in Figure 7), hence correcting market failure.

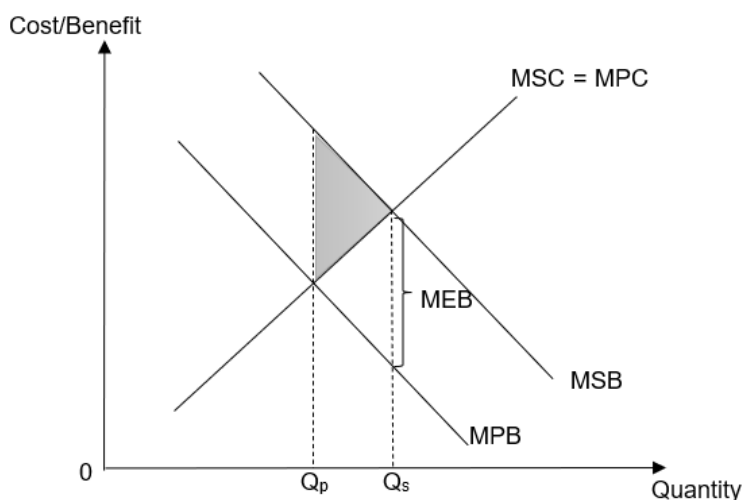


Figure 7: Legislation/regulation in the market for primary education

Advantages

In some cases, the goods have **substantial external benefits** such that the government may deem it necessary for the entire population to consume. For instance, vaccinations for highly contagious and fatal diseases such as polio and measles, and basic primary education which is essential to build a productive and competitive workforce to tap on the maximum potential of human capital. In these cases, legislation/regulation would be **more effective** than subsidies.

Limitations

Side effects: To enforce these legislation/regulations, the government faces **high monitoring costs**. Also, there are **loopholes** in the **enforcement and monitoring** which make it difficult to ensure that every person obeys the law. For **larger** countries, the government would find it **more costly and difficult to ensure** that all citizens obey the law. Unlike subsidies, legislation/regulation does not give people the incentives to consume more of the good.

Positive externalities - Policy 4: Public education (Moral suasion)

How it works

Government can provide information to encourage the producer or consumer to internalise the positive externality.

For example, the government can educate the public about the positive effects of vaccinations on the public. The Health Promotion Board, Singapore often

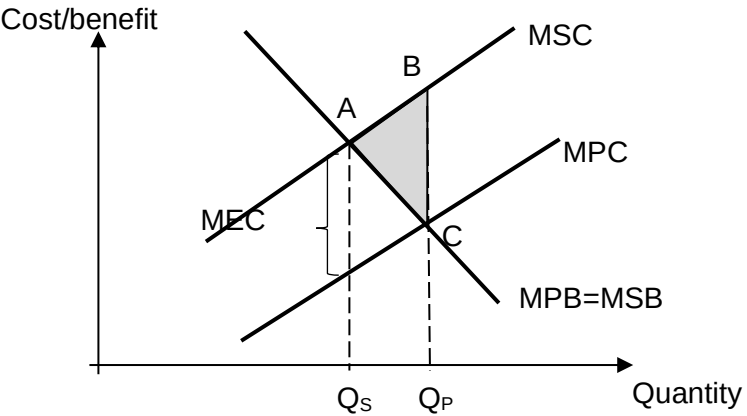
organises health education programmes to raise public awareness of the positive effects of vaccinations. Assuming that the education campaigns are successful, consumers of vaccines will internalise the external benefit enjoyed by the public during their decision-making process, shifting MPB closer to MSB (refer to Figure 7), achieving Q_s .

Advantages	Limitations
<u>Root cause</u>: Targets the root cause of the issue, which in this case is the self-interested nature of consumers and producers who do not take into account the external effects on third parties when consuming the good. Furthermore, education campaigns can reach out to many consumers, thus raising their potential effectiveness and help consumers make better choices for themselves.	1. <u>Timeliness</u>: It might be a long-drawn process before seeing the desired results because of the time required to change the mindsets of consumers. It is also dependent on how receptive the public is. 2. <u>Impediment</u>: There are difficulties in collecting and disseminating the accurate information to consumers. Often, such public education alone will not be sufficient to eliminate the deadweight loss.

3.2.3 Negative externality in production

Why is negative externality in production a source of market failure?

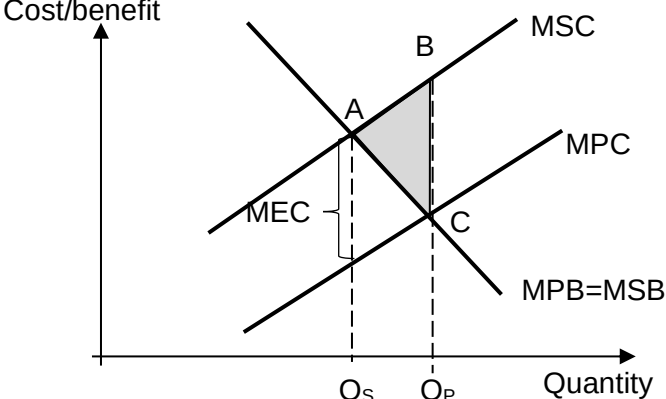
Consider the market for **coal-fired electricity**:

Step 1: Define Externality & Explain the MPB, MPC and MEC (third-party and the external cost)	Negative externality in <i>production</i> exists when there are costs borne by third parties due to the <i>production</i> of a good or service, for which they are not compensated. When coal-fired power station produces electricity, its private benefits are the additional revenue from selling electricity. It also incurs private costs such as the costs of production. However, producing electricity by burning coal leads to air pollution which worsen global warming/extreme weather conditions. The firm does not take into account the fact that farmers and fishermen (third parties) must bear the external cost in terms of making losses due to <u>falling crop yields and fishery stocks that are caused by global warming</u> and are <u>not compensated for the financial losses that they suffer</u>.
Step 2: Explain divergence	Due to the negative externality in production, the social costs of producing electricity are higher than the private cost ($MSC > MPC$). In Figure 8, the MSC lies above the MPC by a vertical distance equal to marginal external cost (MEC). Assuming no positive externalities, the marginal private benefits (MPB) is equal to marginal social benefits (MSB).
Step 3: Draw diagram	 Figure 8: Negative externality in production of coal-fired electricity
Step 4: Explain market equilibrium output (Q_P) & Socially optimal output (Q_S)	In the pursuit of self-interest, the firm considers only its private benefits and private costs when producing coal-fired electricity. This leads to the market equilibrium output Q_P, where $MPB = MPC$. However, the socially optimal output is given by Q_S, determined by the intersection of the MSB with the MSC.
Step 5: Explain allocative inefficiency by comparing Q_P and Q_S	Since Q_P exceeds Q_S, the firm over-produces coal-fired electricity, leading to an over-allocation of resources. Between Q_P and Q_S, marginal cost to society is greater than marginal benefit to society. This means that societal welfare could have been improved by reducing quantity of coal-fired electricity to the socially optimal output of Q_S. This forgone societal welfare is the deadweight loss (area ABC), leading to allocative inefficiency and hence market failure.

3.2.4 Negative externalities in consumption

Why is negative externality in consumption a source of market failure?

Consider the market for **cigarettes**:

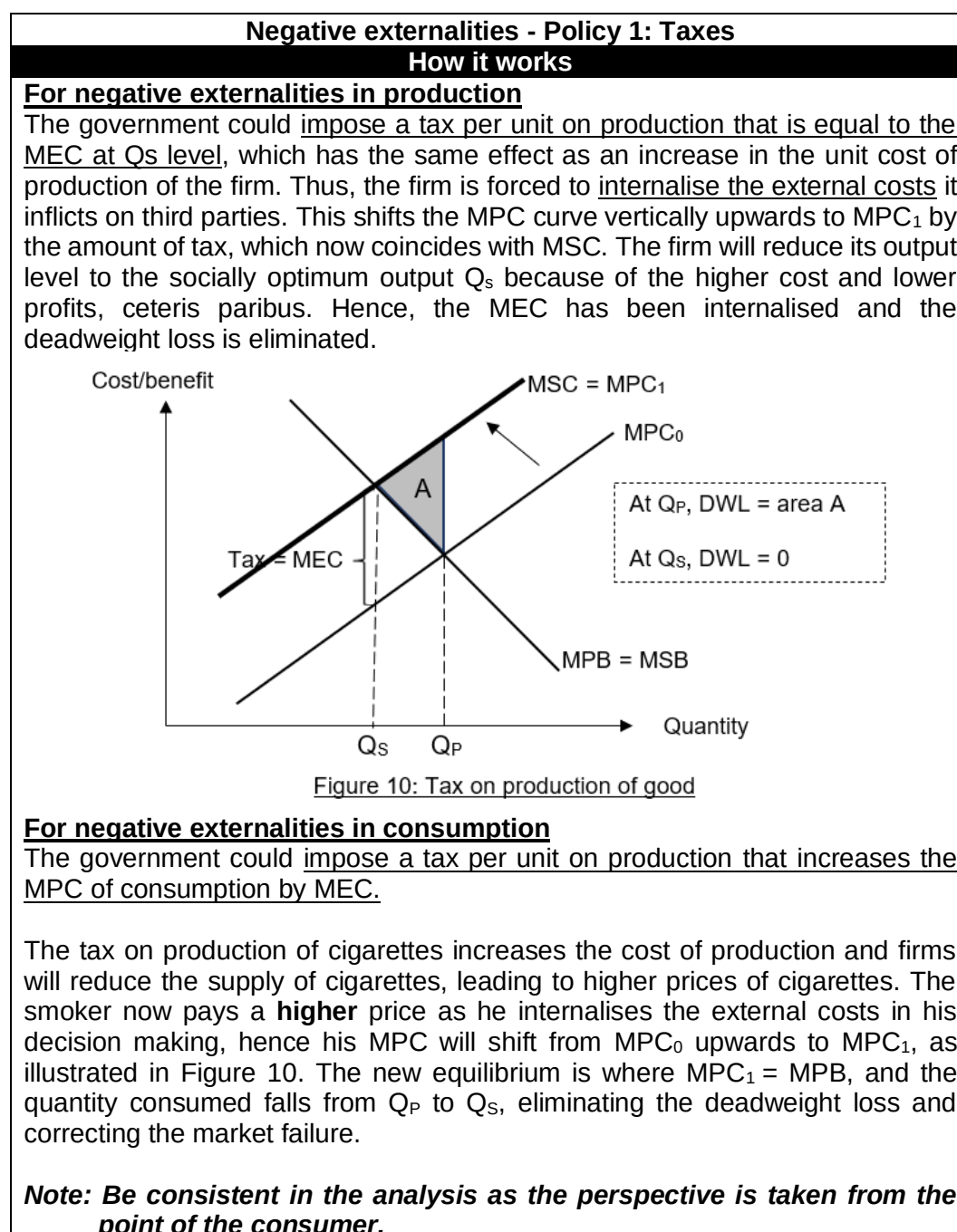
Step 1: Define Externality & Explain the MPB, MPC and MEC (third-party and the external cost)	Negative externality in <i>consumption</i> exists when there are costs borne by third parties due to the <i>consumption</i> of a good or service. When a smoker consumes cigarettes, he enjoys private benefits in terms of satisfaction. He also incurs private costs such as the price of cigarettes. However, the smoker does not take into account that smoking also adversely affects non-smokers (third parties) who inhale secondhand smoke and suffer health problems such as lung cancer and suffer the external cost in terms of <u>higher healthcare treatment costs</u> and are <u>not compensated for the damage done to their health</u>.
Step 2: Explain divergence	Due to the negative externality in consumption, the social costs of consuming cigarettes are higher than the private costs ($MSC > MPC$). In Figure 9, the MSC lies above the MPC by a vertical distance equal to marginal external cost (MEC). Assuming no positive externalities, the marginal private benefits (MPB) is equal to marginal social benefits (MSB).
Step 3: Draw diagram	 Figure 9: Negative externality in consumption of cigarettes
Step 4: Explain market equilibrium output (Q_P) & Socially optimal output (Q_S)	In the pursuit of self-interest, the consumer considers only his private benefits and private costs when consuming cigarettes. This leads to the market equilibrium output Q_P, where $MPB = MPC$. However, the socially optimal output is given by Q_S, determined by the intersection of the MSB with the MSC.
Step 5: Explain allocative inefficiency by comparing Q_P and Q_S	Since Q_P exceeds Q_S, the smoker over-consumes cigarettes, leading to an over-allocation of resources. Between Q_P and Q_S, marginal cost to society is greater than marginal benefit to society. This means that societal welfare could have been improved by reducing quantity of cigarettes consumed to the socially optimal output of Q_S. This forgone societal welfare is the deadweight loss (area ABC), leading to allocative inefficiency and hence market failure.

Note: Intuitively, the true price, which is consistent with Q_S , is higher than what is charged in the market. Hence, to reduce cigarette consumption to Q_S , a higher price should be charged.

Government intervention in markets for goods exhibiting negative externalities

If left to the free market, goods that have negative externalities will result in an allocative inefficient outcome i.e., over-consumption or over-production of goods. Hence, the government intervenes in the hope to achieve an efficient allocation of resources by reducing the production/consumption level to the socially optimal level (Q_s). To do so, the government can consider the following policy options:

1. Taxes
2. Legislation and Regulations (including Quota and Ban)
3. Tradeable permits
4. Public education (Moral suasion)



Advantages	Limitations
1. <u>Root cause</u>: The tax acts as an incentive over the long run to reduce pollution. The more a firm can reduce pollution, the more it can save on tax payments. This encourages firms to clean up pollution in the most cost-effective way possible, addressing the root cause of the problem. 2. <u>Flexibility</u>: Firms have the flexibility between cleaning up their own pollution or paying the tax. • Firms with a higher cost of cleaning up will prefer to pay the tax, since paying the tax is cheaper for the firm. • Firms with a lower cost of cleaning up will prefer to reduce pollution substantially to avoid paying the tax. • Either way, the socially-optimal quantity of pollution is achieved in the most cost-effective manner to the firms. 3. <u>Side effect</u>: Taxes increase government revenue which is a source of funds to finance economic, social and community development projects. The more price inelastic demand for the good, the higher the tax revenue for the government.	1. <u>Impediments: Lack of information</u> • The damage from pollution is extremely difficult to assess, especially so in monetary terms. • An over- or under-estimation of the size of MEC would lead to over- or under-taxation, which would mean either a less than (due to overestimation) or more than social optimum level of output is produced. 2. <u>Feasibility</u>: It is not feasible to use different tax rates for different firms. Each factory produces varying amounts of pollution. A newer power plant factory might emit less pollutant due to the use of pollutant abatement technologies. Hence, the MEC caused would be less compared to the older factories. It would be costly and difficult to measure and impose a different tax rate on different firms. <u>In the case of negative externality in consumption:</u> <u>Impediments</u>: The effectiveness of taxes in reducing consumption is subjected to the PED of the good. If the demand of the good, such as cigarettes and alcohol, is highly price inelastic, to achieve the desired reduction in consumption, a higher tax rate is required as compared to a good where the demand is relatively more price elastic. This may make it politically difficult for governments to impose tax.



Connect, Extend, Challenge

Draw a diagram to illustrate over-taxation and the associated deadweight loss.

Negative externalities – Policy 2a: Legislation and Regulation

How it works

The government could enact a law such that it is compulsory for all producers to equip their factories with emission reduction devices to reduce pollution. In the case of emission reduction devices, the government can make it mandatory for power plants to replace unfiltered power generators with natural gas pipelines that pollute less. Since less pollution is emitted with the use of such devices, MEC is reduced to MEC_2 which is the divergence between MSC_2 and MPC . At the new socially optimal level Q_{S2} where $MSC_2 = MSB$, the deadweight loss area is smaller, hence reducing market failure.

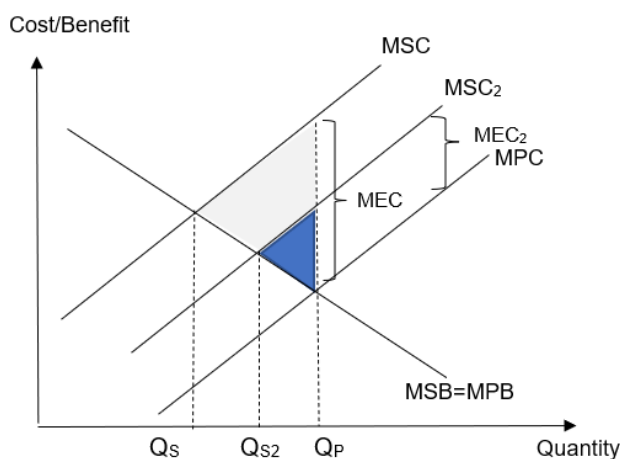


Figure 11: Legislation

Advantages

1. **Feasibility: Simple and** often relatively **easy to administer** compared to other policies such as taxes. Inspectors can conduct spot checks to see that the law is being enforced. The technical difficulties involved in formulating a tax often make it more practical to impose

Limitations

1. **Side effects**
 - Penalties imposed must be hefty enough to deter violations such that only occasional checks are necessary to ensure that regulations are being followed.
 - If penalties are not severe enough, more frequent checks by the regulatory authority would be

regulations that limit the amount of pollution firms/smoking can emit.	required and this may raise the costs of monitoring . Society gains only if the benefits outweigh the costs of implementing this measure.
2. <u>Root cause</u> : Certain regulations, i.e., pollution reducing devices explained above, addresses the root cause of the problem.	2. <u>Feasibility</u> : The government must be able to ensure that citizens comply with the law. For it to be effective, it has to be accompanied by vigilant policing and heavy penalty for those who flout the rule.

In the News

Enhanced Vehicular Emissions Scheme to be extended until 2025

VES was introduced in 2018 to encourage drivers to choose vehicles with lower emissions across carbon dioxide and four pollutants: Hydrocarbons, carbon monoxide, nitrogen oxides and particulate matter. Under the scheme, buyers of cleaner cars receive rebates to offset the additional registration fee for their vehicles, while buyers of vehicles that produce more emissions are required to pay surcharges.

Revised Vehicular Emissions Scheme (VES) rebates in 2024

Band	Rebate/surcharge for cars	Rebate/surcharge for taxis
A1	\$25,000	\$37,500
A2	\$5,000 (from \$15,000)	\$7,500 (from \$22,500)
B	-	-
C1	\$15,000	\$22,500
C2	\$25,000	\$37,500

NOTE: VES rebates, if any, from Jan 1 to Dec 31, 2025, will be announced in 2024.

Source: <https://www.channelnewsasia.com/singapore/ves-enhanced-vehicular-emissions-scheme-extended-until-2025-nea-lta-2782836>

Negative externalities - Policy 2b: Quota (Including Ban)

How it works

Quota

A quota is a quantitative restriction on output that is imposed by the government through legislation and regulation (*recall Topic 4: Government Intervention*). For example, the Vehicle Quota System (VQS) caps the number of new vehicles that can be registered in Singapore. This helps to control the vehicle population in Singapore given the limited road space. The VQS classifies vehicles into 5 COE categories. Hence to control the car population, the government **limits the quantity to the socially optimal level (Q_s)**.

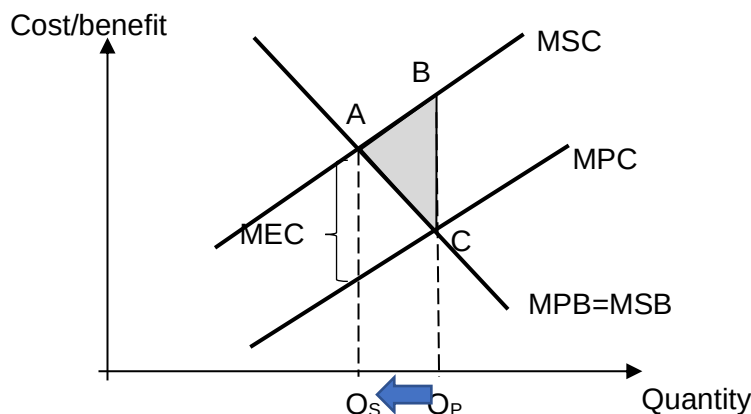


Figure 12: Quota (Vehicle Quota System)

Ban

A ban is a prohibition of the production and consumption of a good and service, hence the output would be at 0. The government may impose a ban on the sale of the product when the MEC is so large that it is likely that the **socially optimal level is zero**. Figure 13 illustrates the situation when the MSC is greater than MSB for all output levels. There is no positive socially amount of good that the government could hope to influence production to be. Such a ban would mean that no firm can sell the good and hence the quantity falls to zero, eliminating the deadweight loss and correcting market failure. Hence a ban on a product is socially efficient when the source of market failure arises from **substantial MEC** generated.

For example, class A narcotics like heroin is not only highly damaging to the drug addict himself but has substantial external costs to society when addicts influence others with their drug abuse lifestyle, and when they commit serious crimes to finance their drug abuses. Moreover, addicts are often unproductive and unable to work or contribute positively to society.

Note: Some governments may impose a partial ban on certain goods and services. For example, the Singapore government has put in place smoking prohibition in many public places. From 1 February 2024, the Orchard Road No Smoking Zone (ORNSZ) boundaries will be adjusted and expanded. Another example is the consumption of alcohol in public places will not be allowed from 10.30pm to 7am every day. Technically, this will also be considered as a quota.

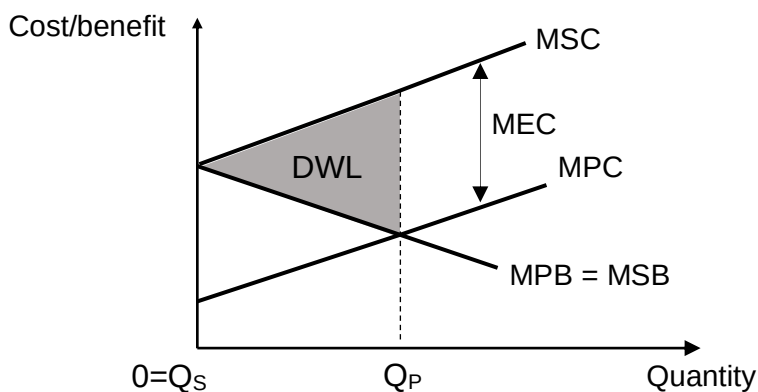


Figure 13: A ban is socially efficient

Do you know?

Finland would be the first country in the world to ban the use of coal in energy production by 2029. This is part of the bigger picture where Finland aims to make the nation's energy production carbon-neutral and based on renewable biofuels by 2050. However, this is only an appropriate solution if the MEC is so large that the MSC is greater than MSB for all output levels.

Inefficient Ban

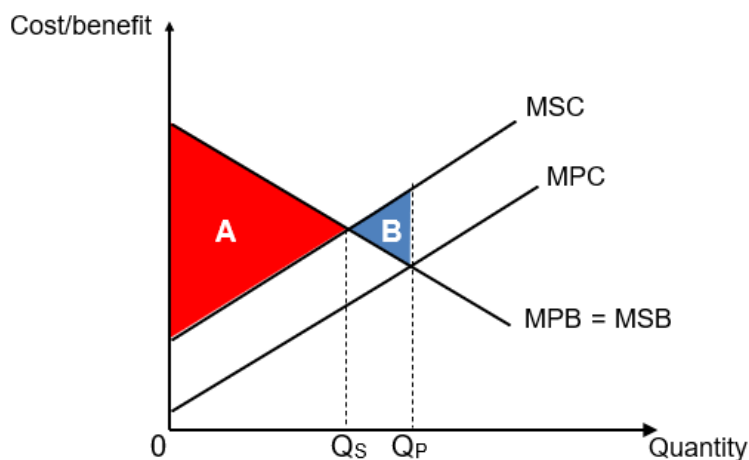
Goods **should not be banned** when the **negative externalities generated do not cause** such a **great divergence between MPC and MSC**, i.e., there is still a positive socially efficient quantity that should be produced/consumed. If the government still insists on banning, the ban in this case will be termed as an *inefficient ban*.

Hence, by banning the good, potential net total social benefit from producing or consuming the good is lost to the society. The resultant deadweight loss would be far larger than the deadweight loss that would have been generated if the government had not intervened and had allowed the free market to prevail. Hence, the ban has created an even larger deadweight loss than at free market equilibrium.

Advantages	Limitations
1. <u>Feasibility</u>: A blanket ban is simple to implement, and transgressors can be easily identified. 2. <u>Effectiveness</u>: Making smoking inconvenient in public places discourages smoking because it increases the immediate cost (e.g., time and effort) for a smoker to light up. If the smoker is caught flouting the law, he will have to pay financial penalties.	1. <u>Side effects</u>: If the social optimal output is more than zero, a ban will result in a loss in welfare shown by area A in Figure 14 which is greater than area B. Hence, a ban will result in greater welfare loss than if the government had not intervened. For example, the unintended consequence of banning the sale and consumption of alcohol in public and clubs after a certain timing might have a negative effect on the economy. 2. <u>Impediments</u>: Effective monitoring and border controls are required to ensure no one smuggles drugs into the country. The Singapore government has harsh punishments (including death penalty) for drug smugglers to deter them from bringing in such drugs. For large countries, it would be more difficult to manage the large borders and thus to eliminate any imports of drugs.

Connect, Extend, Challenge

How can an inefficient ban be represented in a diagram?



Negative externalities - Policy 3: Tradeable permits

How it works

Do you know?

From Europe Commission

The EU emissions trading system (EU ETS) is a cornerstone of the EU's policy to combat climate change and its key tool for reducing greenhouse gas emissions cost effectively. It is the world's first major carbon market and remains the biggest one.

The EU ETS works on the 'cap and trade' principle.

A cap is set on the total amount of certain greenhouse gases that can be emitted by installations covered by the system. The cap is reduced over time so that **total emissions fall**.

Cap = Quota

A restriction on the production/import of a good or service to a specific quantity.

Within the cap, companies receive or buy **emission allowances** which they can trade with one another as needed. They can also buy limited amounts of international credits from emission-saving projects around the world. The limit on the total number of allowances available ensures that they have a value.

What are tradable pollution permits?

Tradeable

When the good/service can be bought/sold (traded/exchanged) between firms/individuals

Permits

The right to produce a certain amount of a good/service/pollution, typically given by the government to a firm.

Tradable pollution permits work like the '**cap and trade**' principle, where firms are given the rights to buy or sell pollution permits/credits in artificially created markets. Firms can thus bid for a permit that allows them to create a fixed

amount of pollution. If firms do not use up their pollution credits, they can sell it to other firms who want it. The government can gradually reduce the number of pollution permits available so that total pollution emissions can be reduced to the socially-optimal amount.

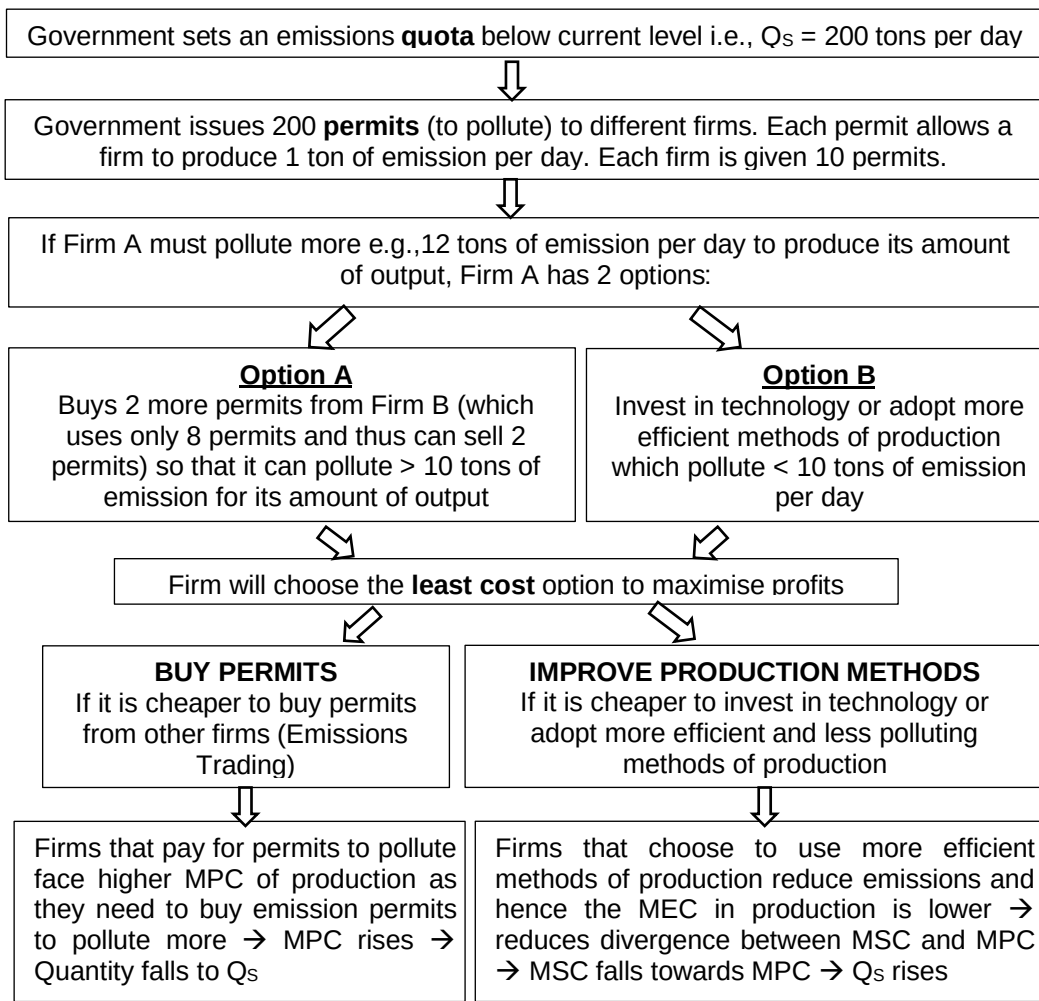
How does it work?

Suppose the government determines that the socially optimal amount of pollution emission is two hundred tons of emission per day. Two hundred permits are then issued in denominations of one ton of emission per day. If a firm has ten permits, then it can contribute to ten tons of emission per day. Once the permits are issued by the government, they can subsequently be bought and sold by any firm who wishes to increase and decrease the amount of pollutants they discharge respectively.

Assuming there are two firms, Firm A and Firm B. Firm A might only use eight permits while Firm B requires twelve permits. However, Firm B only has ten permits and can thus purchase two additional permits from Firm A.

The market for permits will reach a market clearing price that is equal to the marginal benefit of pollutant emission. Firms can either buy permits or invest in technology to reduce pollution emissions, depending on which approach saves more costs.

Note: There is no need to use numbers to illustrate how tradable permits work



Advantages	Limitations
<u>Flexibility:</u> - This measure might be an incentive for some firms to cut back on their pollution and invest in pollution reduction method of production. This is because they might be able to benefit from the sale of the unused permits. Firms can sell permits to boost profit via the Emissions Trading Scheme (ETS). If permit prices are high, firms that can cut down on output or improve production methods more cheaply will do so to emit less so that they have excess permits to sell. - With tradeable permits, the opportunity cost to society is the lowest possible. This is so as firms who can lower pollution at lowest cost will lower first and sell their permits. For firms who are unable to cut back on pollution will choose to purchase permits.	<u>Side effects:</u> - The tradeable permit system may lead to emissions/waste being concentrated in certain geographical regions where firms have the purchasing power to buy excess credits from firms in other regions. This can have serious consequences for third parties on region that might have higher urban density. - Moreover, firms may relocate production to other countries without a cap-and-trade system to avoid paying for permits or investing in more efficient technologies. - There are high administrative costs associated with monitoring pollution emissions as the number of firms involved is large. In addition, funding for poor countries to develop new technology to reduce pollution is a problem. This is further compounded by the need to ensure commitment and compliance from the wealthy countries such as in the form of legally binding consequences. (think of the USA) <u>Impediments:</u> Government do not have sufficient information in determining the socially optimal amount of pollution. Hence, the artificial number might be above or below the socially efficient amount. <u>Feasibility:</u> Legislation dealing with pollution can be affected by the political process. More dominant (and influential) firms could be given preferential treatment in the form of more permits.

Connect, Extend, Challenge

A Comparison between Carbon Tax and Cap and Trade

A price on carbon emissions

The idea of a carbon price is increasingly gaining favour with governments as countries around the world look for ways to cut greenhouse gas emissions. **BY ANDREA SOH**



Two main forms of carbon pricing

	CARBON TAX	EMISSIONS TRADING SCHEME (ETS)
Description	A tax on CO2 emissions. Levies fees on emissions from fossil fuel production, distribution and use.	A market system established to set a price for the right to emit CO2 above a set level. Caps emissions overall and/or by industry.
Price	The set price level provides certainty. This is desirable because investment in low-carbon technology requires confidence in sufficiently high, long-term carbon prices.	Prices are set by trading in the market – and, therefore, can be volatile. Prices swing with economic cycles and restrictions on the quantity of emissions allowances.
Emissions reductions	The tax is not directly tied to an emissions reduction target because it is derived by modeling the cost of cutting emissions.	An ETS delivers emissions reductions by limiting allowances.
Flexibility	Tax rates can be altered to reflect progress in emissions cuts. They can also target specific groups such as car users.	The supply of emissions allowances can be modified to influence prices.
Administration	Can build upon existing tax infrastructure, but raises administrative burden. Requires measuring, reporting and verification (MRV).	Complicated to implement. Requires creation of emissions allowances, their allocation, and a market for trading them. Needs MRV as well.
Examples	Mexico, Japan, Denmark, Finland, France, Norway, Portugal, Sweden, Canada (to be decided), S. Africa (2017), Chile (2018).	EU, California, Regional Greenhouse Gas Initiative, in the US, China (merging seven regional pilots into a national ETS in 2017).

Carbon pricing in Asia



The circles represent subnational jurisdictions: subnational regions are shown in large circles and cities are shown in small circles. The circles are not representative of the size of the carbon pricing initiative.

Sources: Blackrock, World Bank, local news nt

Negative externalities - Policy 4: Public education (Moral suasion)	
How it works	
Governments can provide information to <u>encourage the producer or consumer to internalise the negative externality</u> . For example, the Health Promotion Board works with community organisations and organises programmes to raise awareness of smoking-related issues among the general public, examples include an annual smoking control campaign and always-on marketing efforts via social media. Assuming that these education campaign are successful, smokers will take into account the external cost imposed on non-smokers during their decision-making process, MPC will shift closer to the MSC, reducing the MEC and deadweight loss.	
Advantages	Limitations
Refer to page 23 for the Advantages and Limitations.	

How Cognitive Biases can influence the effectiveness of government policies.

In the 9570 H2 Economics syllabus, students are required to have an awareness that **governments** may apply knowledge of cognitive biases to nudge the decisions of economic agents.

Please refer to the handout on ***Behavioural Economics – Cognitive Biases***. (Sections 1a, 2a, 3a on **How cognitive bias could affect government's policy decision.**)

3.3 Information failure 1: Perceived vs. Actual Cost/Benefit

The free market allocates resources efficiently on the assumption that all consumers and producers have perfect information about the market. This means consumers and producers will know the benefits and costs of consuming and producing the good or service respectively. However, this is not often the case.

Information failure or imperfect information arises when economic agents **lack critical information** to make rational decisions on choices and resource allocation.

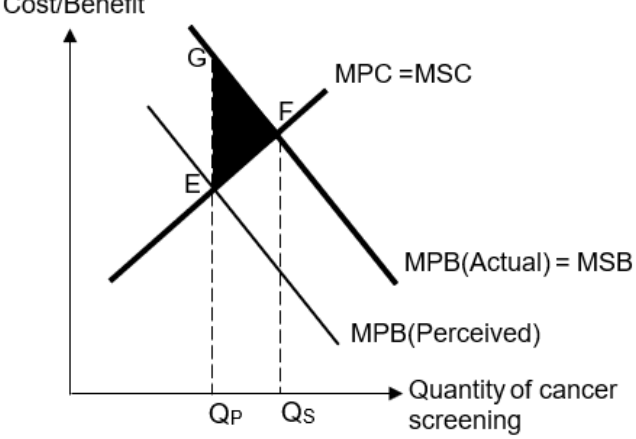
The lack of critical information could be due to **incomplete or inaccurate information**, causing:

- Consumers to under- or over-estimate the actual private benefits or costs of consumption; or
- Producers to under- or over-estimate the actual private benefits or costs of production.

Note: We will focus on **consumers** under- or over-estimating the **actual** private benefits or costs of consumption, due to incomplete or inaccurate information.

3.3.1 Causes of Information failure

Information failure leading to under-estimation of MPB(Actual)

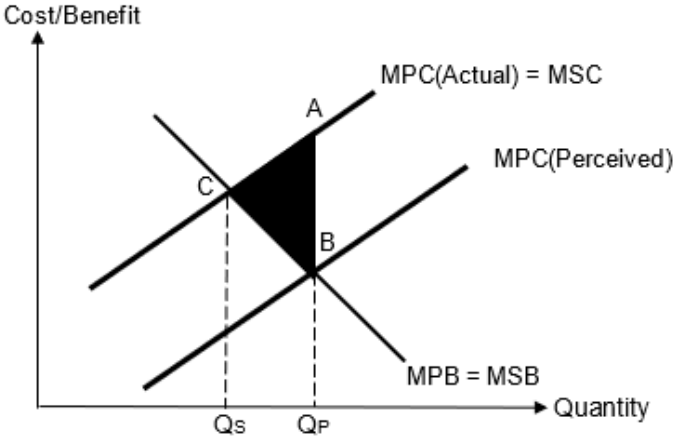
Step 1: Define information failure or imperfect information & Explain the cause of information failure or imperfect information	Information failure or imperfect information arises when economic agents lack critical information to make rational decisions on choices and resource allocation. Consumers may not buy certain goods or services even though they are beneficial, due to ignorance of the actual benefits of consuming them. For example, consumers may be unaware that the actual benefit of early detection of illnesses such as breast or colorectal cancer is the increased probability of survival to almost 100%. They may only know that screening detects malignant tumours, but do not know that cancer screening can detect pre-cancerous stage cancer. This can increase chances of recovery for the consumer.
Step 2: Explain divergence	This makes consumers underestimate their actual marginal private benefit MPB(Actual) from cancer screenings, causing MPB(Actual) to be higher than MPB(Perceived).
Step 3: Draw diagram	 <u>Figure 14: Imperfect information on actual MPB of cancer screening</u>
Step 4: Explain free market equilibrium output (Q_P) & Socially optimal output (Q_S)	In Figure 14, assuming no externalities, MPB(Actual) equals to marginal social benefit (MSB), and marginal private costs equals to marginal social costs (MPC=MSC). MPC is the cost of cancer screening to the consumers, such as the screening fees. Due to imperfect information, rational consumers will consume up to Q_P where MPB(Perceived)=MPC. However, the socially optimal output is Q_S where MSB=MSC
Step 5: Explain allocative inefficiency by comparing Q_P and Q_S	Hence, imperfect information causes an under-consumption of $Q_P Q_S$. Between Q_P and Q_S, Area $Q_P G F Q_S$ which is the total social benefit is greater than area $Q_P E F Q_S$ which is the total social cost. This means that societal welfare could have been gained by increasing quantity consumed up to the socially optimal output of Q_S. This forgone societal welfare is the deadweight loss (area EFG) due to under-consumption of and under-allocation of resources to cancer screening, leading to allocative inefficiency and hence market failure.



Connect, Extend, Challenge

With the use of a diagram, explain how the free market fails when consumers have information failure on the actual MPB of education.

Information failure leading to under-estimation of MPC(Actual)

Step 1: Define information failure or imperfect information & Explain the cause of information failure or imperfect information	Information failure or imperfect information arises when economic agents lack critical information to make rational decisions on choices and resource allocation. Consumers may buy too much of certain goods or services even though they are harmful if they are misled about the actual cost of consuming them. For example, where cigarettes manufacturers used misleading captions in their advertising campaigns, such as “More doctors smoke CAMELS than any other cigarettes”, they sought to create the impression that even doctors feel that there was no harm in smoking cigarettes.
Step 2: Explain divergence	This made consumers underestimate their actual marginal private cost MPC(Actual) from cigarette consumption causing MPC(Actual) to be higher than MPC(Perceived), as shown in Figure 15.
Step 3: Draw diagram	 Figure 15: Imperfect information on actual MPC of smoking cigarettes
Step 4:	Assuming no externalities, MPC(Actual) equals to marginal social cost (MSC), and marginal private benefit equals to

Explain free market equilibrium output (Q_P) & Socially optimal output (Q_S)	marginal social benefits ($MPB=MSB$). MPB is the benefit of smoking cigarettes to the consumers, such as the utility from participating in the social activity. Due to imperfect information, rational consumers will consume up to Q_P where $MPB=MPC$ (Perceived). However, the socially optimal output is Q_S where $MSB=MSC$.
Step 5: Explain allocative inefficiency by comparing Q_P and Q_S	Hence, imperfect information causes an over-consumption of amount Q_SQ_P . Area Q_SCBQ_P is the total social benefit gained, while area Q_SCAQ_P is the total social cost incurred from over-consuming Q_SQ_P of cigarettes. Since the total social cost incurred exceeds the total social benefit gained from the amount over-consumed, the shaded area ABC represents the deadweight loss due to over-consumption of and over-allocation of resources to cigarette smoking, leading to allocative inefficiency and hence market failure.



Connect, Extend, Challenge

Using a diagram, explain how information failure can result in over-allocation of resources in the market for alcohol.



Connect, Extend, Challenge

Even in the event where information is complete and accurate, will there be a situation where individuals still make erroneous choices? If so, why?

Information avoidance: How people select their own reality

Drawing on research in economics, psychology and sociology, Carnegie Mellon University's George Loewenstein, Russell Golman and David Hagmann illustrate how people select their own reality by deliberately avoiding information that threatens their happiness and wellbeing. In a paper published in the Journal of Economic Literature, they show that while a simple failure to obtain information is the most clear-cut case of "information avoidance," people have a wide range of other information-avoidance strategies at their disposal. They also are remarkably adept at selectively directing their attention to information that affirms what they believe or that reflects favourably upon them, and at forgetting information they wish were not true.

"The standard account of information in economics is that people should seek out information that will aid in decision-making, should never actively avoid information, and should dispassionately update their views when they encounter new valid information," said Loewenstein, the Herbert A. Simon University Professor of Economics and Psychology who co-founded the field of behavioural economics. "But people often avoid information that could help them to make better decisions if they think the information might be painful to receive," Loewenstein said.

Even when people cannot outright ignore information, they often have substantial latitude in how to interpret it. Questionable evidence is often treated as credible when it confirms what someone wants to believe. And evidence that meets the rigorous demands of science is often discounted if it goes against what people want to believe, as illustrated by widespread dismissal of scientific evidence of climate change.

Information avoidance can be harmful, for example, when people miss opportunities to treat serious diseases early on or fail to learn about better financial investments that could prepare them for retirement. It also has large societal implications.

Despite the consequences, information avoidance is not always a mistake or a reflection of a lazy mind. "Those who do not take a genetic test can enjoy their life until their illness can't be ignored, an inflated sense of our own abilities can help us to pursue big and worthwhile goals, and not looking at our financial investments when markets are down may keep us from selling in a panic," said Golman, assistant professor of social and decision sciences.

The researchers believe understanding when, why and how people avoid information can help governments, firms and organisations reach their audiences effectively without drowning them in unwanted messages.

Source: <https://www.cmu.edu/news/stories/archives/2017/march/information-avoidance.html#:~:text=Drawing%20on%20research%20in%20economics,threatens%20their%20happiness%20and%20wellbeing>

Government intervention to address information failure

1. Legislation and Regulation
2. Public education (Moral suasion)
3. Taxes/Subsidies

Information failure - Policy 1: Legislation and Regulation	
How it works	
Legislations and regulations can be implemented by the government to correct market failure arising from incomplete or inaccurate information to (i) correct MPB from MPB(Perceived) to MPB(Actual), or (ii) correct MPC from MPC(Perceived) to MPC(Actual).	
(i) When MPB(Perceived) is corrected to MPB(Actual) for goods/services which were under-consumed, the socially optimal amount Q_s where $MSB = MSC$ will be achieved since consumers will consume up to where $MPB(Actual) = MPC$. Hence, deadweight loss is eliminated, and allocative efficiency is achieved.	

(Note: Refer to Figure 14 on page 37)

- (ii) When MPC(Perceived) is corrected to MPC(Actual) for goods/services which were over-consumed, the socially optimal amount Q_s where $MSB = MSC$ will be achieved since consumers will consume up to where $MPB = MPC(Actual)$. Hence deadweight loss is eliminated, and allocative efficiency is achieved.

(Note: Refer to Figure 15 on page 38)

Use specific and relevant examples to elaborate on the correction of misperception of information.

Mandatory nutrition labels and advertising prohibitions for Nutri-Grade beverages

The Nutri-Grade labelling measure for beverages sold in Singapore in pre-packaged form and from non-customisable automated beverage dispensers have come into effect on 30 December 2022. These measures aim to help consumers identify beverages that are higher in sugar and saturated fat and to reduce the influence of advertising on consumer preferences, thus encouraging more informed decisions based on MPB(Actual).

Mandatory health warning labelling

In Singapore, plain packaging is required for all tobacco products beginning July 1, 2020. Combined picture and textual health warnings are required to appear on 75 percent of the front and back of smoked tobacco product packaging. The mandatory health warnings correct (potential) smokers' perception of private costs of smoking, thereby allowing them to make a more informed decision based on MPC(Actual).

Advantages	Limitations
Timeliness - Short response time lag. Legislation and regulation when passed, have the immediate impact of correcting imperfect information.	1. Impediments: Effectiveness is conditional on the government's ability to enforce the regulation. For example, in the case of mandatory nutrition labels, where the producer is the provider of information, the government will need to implement checks to ensure that information provided by the producer is accurate and complete. Furthermore, the administrative costs incurred in enforcing the regulations can be quite high and spending on enforcement can have significant opportunity costs. Governments can face budget constraints in financing the administrative costs of enforcing regulations, especially when there are many competing demands for government spending. 2. Timeliness: While legislation and regulation can have immediate impact once passed, they generally take a long time to be drafted, negotiated and passed in parliament.

Information failure - Policy 2: Public education (Moral suasion)	
How it works	
Government can provide information to (i) correct the MPB from MPB(Perceived) to MPB(Actual), or (ii) correct MPC from MPC(Perceived) to MPC(Actual), and help consumers make informed choices. <i>Analysis is similar to Information failure - Policy 1: Legislation and Regulation</i> Use specific and relevant examples to elaborate on the correction of misperception of information <u>Health advisory</u> While exercising, i.e., running in the public spaces, can bring about benefits, the lack of complete information about the quality of air can lead consumers to overvalue the private benefits of running. During the haze period, the Singapore Ministry of Health educated the public on types of activities they can engage in for different PSI levels. This piece of information about the quality of air is useful in correcting the MPB of exercising outdoors from MPB(Perceived) to MPB(Actual). <u>Health education</u> <i>Refer to pages 22 – 23 and 38 for examples.</i>	
Advantages	Limitations
<u>Root cause</u>: Education campaigns can reach out to many consumers, thus raising its potential effectiveness and help consumers make better choices for themselves, targeting the root cause of imperfect information especially if consumers are unaware of the harmful effects of consuming the good, then education would help consumers make better informed decisions.	<i>Refer to page 24 for the Limitations.</i>

Imperfect Information - Policy 3: Taxes/Subsidies	
How it works	
<i>Analysis is similar to that of externalities. Refer to pages 17 – 20 and 26 – 27.</i>	
Advantages	Limitations
<i>As above.</i>	

3.4 Information failure Part 2: Asymmetric information

Consider this:

Instead of getting a new pair of Apple AirPods Pro from the Apple Store, you may consider getting a new pair from Carousell, at a lower price. However, there are many sellers selling the AirPods Pro and you cannot tell them apart because all sellers post identical photographs.

For that reason, you are unable to distinguish the quality of the products. Assuming a brand-new pair of AirPods Pro costs you \$379, how much will you be willing to pay for a pair from Carousell, and why?

Asymmetric information refers to a situation where one party in the economic transaction has more information than the other party. In other words, economic agents (e.g., consumers and producers) involved in the transaction do not have the same amount of knowledge, resulting in a distortion of incentives and inefficient market outcomes.

When the party who has more information decides to exploit the other party, this may result in the problems of:

1. Adverse selection
2. Moral hazard

This can possibly cause the good and service to be sold in **very small quantity** (*underconsumption/underproduction*) or **not at all** (*complete market failure*).

Consequences of asymmetric information

3.4.1 Adverse selection

Adverse selection arises when certain parties naturally select themselves out of a market, which gives rise to missing markets when these parties do not get to buy or sell the good, even though it may be beneficial for them to do so.

Adverse selection can occur in two possible cases:

1. Informed sellers & uninformed buyers (e.g., used cars market)
2. Informed buyers & uninformed sellers (e.g., health insurance market)

Adverse selection is sometimes called a **hidden characteristic problem** i.e., an attribute of a good is known to one party but unknown to others.

Case 1: Informed sellers and uninformed buyers – Used cars market

When buyers do not know whether the product they are buying is of high or low quality, the tendency is for the market to be dominated by low quality products being traded.

Step 1: Describe the market	There is asymmetric information in the used car market, leading to adverse selection for lower quality cars (“lemons”) in the market. A “lemon” is a poor-quality product. In the case of the used car market, it could probably be a car that needs frequent repairs.
Step 2: Explain the informed sellers ; Explain the uninformed buyers	The seller will likely have more information, e.g., problems with the steering, transmission, brakes etc. compared to the buyer. This is because <u>the seller knows more about the true quality of the car than the buyer</u> e.g., seller knows the service history of the car and whether it has been in traffic incidents. Despite a mixture of high-and-low-quality cars in the market, most of the used cars appear to be identical on the outside even though they differ substantially in the number of repairs they must undergo. To sell the car at the highest price, the seller of used cars might hide some of the information about the condition of the used cars from potential buyers.
Step 3:	Due to the presence of informed sellers and uninformed buyers, potential buyers take this into consideration in the decision-

Explain the market outcome and thus adverse selection	making process and tend to lower the price they are willing to pay for used cars because they may be purchasing "lemons". At this lower price, sellers with used cars in good condition (often referred to as "peaches") are unwilling to offer the cars for sale, resulting in a market where only lower quality of used cars (lemons) are sold. <u>Eventually, sellers of good condition used cars will leave the market and only lower quality cars (lemons) are sold in the used car market</u>
Step 4: Explain the market failure	<i>Consider a missing market for good quality used cars. As quantity of good quality used cars sold is now at 0, social welfare is absolutely foregone, resulting in a large deadweight loss. Asymmetric information thus results in the used car market adversely selecting against higher-quality used cars in favour of lower-quality ones. The market failed to produce mutually beneficial trade and is allocative inefficient, hence leading to market failure.</i>

For the Thirst of Knowledge: An article on Lemons

Assume that used cars come in two types: those that are in good repair, and "lemons". Suppose further that used-car shoppers would be prepared to pay \$20,000 for a good one and \$10,000 for a lemon. As for the sellers, lemon-owners require \$8,000 to part with their old cars, while the one-owner, careful-driver with the well-maintained estate (i.e., the 'peach owner') will not part with hers for less than \$17,000. If buyers had the information to tell wheat from chaff, they could strike fair trades with the sellers, the careful driver getting a high price and the lemon-owner less.

If buyers cannot spot the quality difference, as is often the case in the real world, there will be only one market for all used cars, and buyers will be ready to pay only the average price of a good car and a lemon, or \$15,000. This is below the \$17,000 that good-car owners require; so, they will exit the market, leaving only lemons. This result, when bad quality pushes good quality from the market because of an information gap, is known as "adverse selection".



Source: The Lemon Dilemma, The Economist, 11 Oct 2001

Why are bad cars called "Lemons"?

It is an American and British slang used in the beginning of the 20th century to describe a highly flawed vehicle with several manufacturing defects, affecting its safety, value and utility. Its first mainstream media attribution was by a Volkswagen advertisement created in the 1960s.

Government intervention to address adverse selection (Informed sellers and uninformed buyers)

Case 1: Adverse selection (Used cars market) – Policy 1 - Legislation

How it works

To overcome the problem of adverse selection due to informed sellers and uninformed buyers, the government can adopt **legislation** to restrict the ability of the informed party from taking advantage of hidden information, and to equalise information among parties:

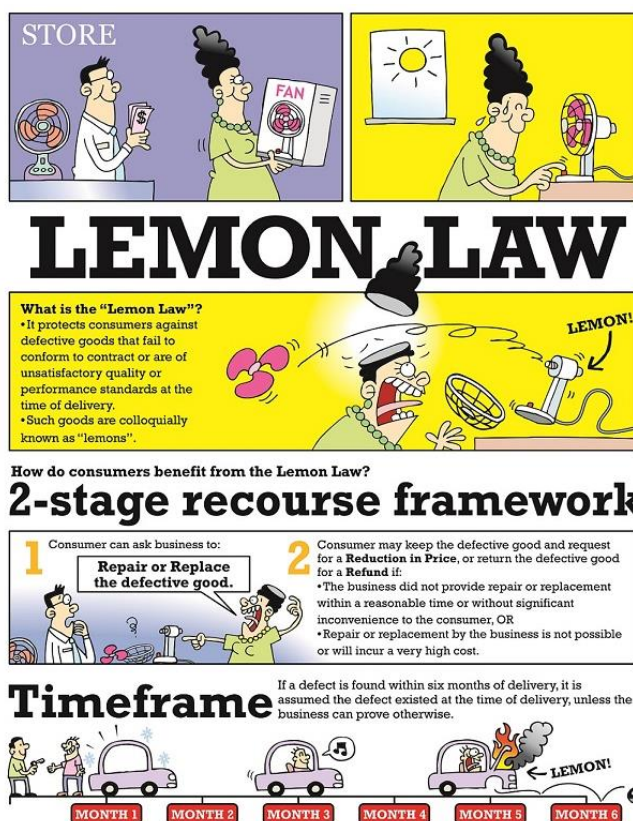
The introduction of product liability laws protects the buyer from being stuck with non-functional and dangerous products. In Singapore, Consumers Association of Singapore (CASE) use laws to prohibit fraudulent misrepresentations in the sale of defective consumer products or set **minimum** safety standards for consumer products.

In the case of second-hand goods and vehicles markets, the **government** can either regulate the quality that producers must meet or enact **laws and legislation** such as the Lemon Law that forces producers to replace defective goods at the point of sale or delivery and restrict dealers from reselling defective products until they have made the needed repairs. Hence, such laws help to correct market failure by ensuring that good cars remain in the market. Allocative inefficiency is reduced as buyers can now make informed decisions with some degree of legal protection.

The Lemon Law in Singapore

The Lemon Law came into effect on 1 September 2012. It is a consumer protection law that provides remedies against defective goods, which fail to conform to the contract at the time of delivery, e.g., do not meet standards of quality and performance, especially after repeated repair. Under the Lemon Law, consumers may require the business to repair, replace, reduce the price of the goods, or perform a refund if the goods are found to be defective.

For defects that occurred within a period of six months from the date of delivery, it is presumed that the goods failed to conform to the implied condition of satisfactory quality at the date of delivery. However, Lemon Law does not cover individuals who transact in a business capacity or on behalf of a company. In this regard, private-hire cars are not covered under Lemon Law.



Source: Consumer Association of Singapore

Advantages	Limitations
Root cause: By making it obligatory for sellers to provide warranties for defective goods (or “lemons”), the Lemon Law improves accountability and transparency and thereby reducing asymmetric information between buyers and sellers in the market. The law protects buyers who may not have the income and knowledge to act against sellers of defective goods.	Impediments: Costs of monitoring. Penalties imposed must be hefty enough to deter violations of the Lemon Law – such that only occasional checks are necessary to ensure that regulations are being followed. If penalties are not severe enough, more frequent checks by the regulatory authority would be required and this may raise the costs of monitoring. Society gains only if the benefits outweigh the costs of implementing this measure.

Case 2: Adverse selection (Electronics) – Policy 2: Provision of Information via Standards & Certifications

How it works

In some markets, government agencies provide buyers with information about the quality of different goods and services. If the information given is credible, it can reduce adverse selection by enabling consumers who desire high-quality products to avoid buying low-quality products.

Governments can providing information by establishing standards – a metric or scale for evaluating the quality of a particular product. Consumers learn about the quality of the good by looking at the certification – a report that a particular product meets or exceeds the standard.

SPRING Singapore is empowered to oversee product safety regulations and consumer safety. One of the ways they do is by having the SAFETY Mark on 45 categories of household electrical and gas products that require certification to verify that they meet specified safety standards.

The **SAFETY MARK** helps consumers and traders to identify registered controlled goods. All registered controlled goods must be individually marked with the SAFETY Mark either on the product or packaging. It comprises a "safety logo" enclosed in a square on the left and the words "**SAFETY MARK**" within a rectangle on the right. The unique 8-digit registration number is traceable to the registrant and the registered models.



Source: SPRING Singapore

Government intervention to address adverse selection (Informed buyers and uninformed sellers)

Case 3: Adverse selection (Health insurance market)

Step 1: Describe the market	There is asymmetric information in the health insurance market, leading to adverse selection in the market. Insurance is an arrangement by which an organisation undertakes to provide a guarantee of compensation for specified loss, damage, illness, or death in return for payment of a specified premium (i.e., insurance fees). In the case of health insurance, it covers the cost of an insured individual's medical and surgical expenses. Typically, the insured individual will have to first pay the
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	expenses incurred and then seek reimbursement via claims. Typically, individuals with prevailing health conditions pay higher premiums as the probability of them claiming their health insurance is higher.
Step 2: Explain the informed buyers Explain the uninformed sellers	The buyers of health insurance will likely have more information about their health condition compared to the sellers. This is because the buyers understand their own diet as well as the healthy and unhealthy daily habits that they partake in such as smoking and drinking. Despite a mixture of healthy and unhealthy individuals in the market, most of the individuals appear to be identical on paper as their healthiness is judged based on insufficient criteria such as age and gender. Individuals are incentivised to conceal their actual health conditions from the insurance companies as they seek to pay a lower premium.
Step 3: Explain adverse selection	Due to the informed buyers and uninformed sellers of health insurance, the sellers of health insurance worry that the buyers of health insurance conceal their health conditions and are indeed unhealthy. Hence, they tend to offer a higher price for health insurance due to the high risk of insuring an unhealthy individual. However, at a higher price, healthy individuals will not be willing to buy health insurance as they are unlikely to develop health problems that incur medical fees requiring reimbursement. <u>Eventually, healthy individuals will leave the insurance market and the market would be dominated by unhealthy individuals. The market thus adversely selects against low-risk consumers.</u>
Step 4: Explain market failure	<i>Consider a missing market for insurance for healthy individuals.</i> As quantity of health insurance purchased by healthy individual is now at zero, social welfare is absolutely foregone, resulting in a large deadweight loss. The market failed to produce mutually beneficial trade and is allocative inefficient, hence leading to market failure.

Government intervention to address Case 2: Adverse selection (Informed buyers and uninformed sellers in health insurance market)

To overcome the problem of adverse selection due to informed sellers and uninformed buyers, the government can use **direct provision**.

Case 2: Adverse selection – Policy 1: Direct provision
How it works
The government could reduce adverse selection by offering compulsory nation-wide health insurance to all citizens and mandating that everyone buys the insurance for universal coverage. Hence, pooling the healthy and sick into one national insurance plan together spreads the risks across many citizens. Such nation-wide insurance provides universal coverage (e.g., National Health Service in United Kingdom and MediShield Life in Singapore) at lower costs. Since November 2015, the Singapore government introduced a compulsory nation-wide health insurance for Singaporeans known as the MediShield Life which is administered by the Central Provident Fund (CPF) Board. It offers lifetime coverage and is <i>compulsory</i> for all Singaporeans and permanent

residents, regardless of age or pre-existing health conditions. This makes the scheme less costly by increasing risk pooling, thereby making insurance premiums lower and more affordable.

8 THINGS YOU NEED TO KNOW ABOUT MEDISHIELD LIFE

- 
1 It covers everyone
 - All Singapore Citizens and Permanent Residents
 - Even if you have pre-existing conditions
 - Even if you were previously rejected by insurers
- 
2 It protects you for life
- 
3 It provides better benefits than MediShield
 - MediShield Life will pay more of your hospital bill, and you will pay less
- 
4 Premiums will be payable by Medisave
- 
5 With better benefits, premiums will be higher than MediShield
- 
6 Government will provide significant support
 - Premiums Subsidies for the lower- to middle-income
 - Pioneer Generation Subsidies
 - Transitional Subsidies for all Singaporean Citizens for the first four years to ease the shift from MediShield to MediShield Life
- 
7 The needy will not lose coverage
 - Additional Premium Support for those who cannot afford premiums even after subsidies
- 
8 No need to apply
 - MediShield Life will replace MediShield in end 2015
 - Automatic inclusion for Singapore Citizens and Permanent Residents

Advantages

Side effects

- By adopting risk pooling, the government-sponsored insurer could enjoy internal economies of scale which lowers the average cost of insurance to consumers. This increases the affordability of health insurance for the high-risk consumers and ensures the low-risk consumers do not leave the insurance market. Furthermore, this **brings the output to the socially optimal level.**
- Such universal coverage reduces adverse selection in a **fair and equitable** manner.

Limitations

Side effects

- If a government decides to provide health insurance for all citizens, it will **increase the government spending** and **reduce the amount of resources that could be spent on other public goods.**
- An overly low price of healthcare/insurance premiums may result in over-consumption of additional healthcare – that is, moral hazard is most likely to occur.

3.4.2 Moral Hazard

Moral hazard refers to a situation where an economic agent behaves in a way that is detrimental to society because the agent does not fully enjoy the benefits or bear the costs of his actions.

It occurs after a party has entered a contract, and subsequently alters their behaviour (such as bearing more risks than they normally would). This is because their risk or bad decision-making or costs is borne by someone else, and not by the individual himself.

Moral hazard is sometimes called a **hidden action problem** i.e., where an act by one party to a transaction is not observed by the other party.

Example 1: How moral hazard leads to market failure (insurance market)

If a car is not insured, the driver will take greater care of it to avoid having it damaged or stolen. For example, the driver will choose to lock the car and drive it carefully. This is because if the car is damaged, the driver will have to incur costs to repair the car. However, if the driver purchases insurance for the full value of the car, he/she would not have to incur any costs in the event of a theft, or the car being damaged in a traffic accident. Thus, it is likely that **an insurance firm faces a moral hazard problem**, in which when drivers buy insurance, they may engage in **risky behaviour** (e.g., by not locking up the car or by engaging in reckless driving) **because they know that at least part of costs will be borne by the insurance firm, and not fully by the drivers themselves.**

This could lead to higher premiums and thus greater underproduction of insurance, or a missing market (extreme case) if insurance firms choose not to provide insurance because consumers of such products **change their behaviour after purchasing the insurance.** Market failure thus results.

***Note:** Although we explained using the car insurance, such an issue also applies to the health insurance market, where consumers may pay less attention to their health, or overconsume health products, such as screening tests.*

Example 2: How moral hazard leads to market failure (health insurance market)

Moral hazard arises when **one person (agent) is performing some tasks on behalf of another person (principal)**, and this is known as the **principal-agent problem**. If the action of the agent cannot be perfectly monitored, the agent would tend to undertake more risk or put in less effort than what is desired by the principal.

For example, in the healthcare market, **patients (principal)** rely on **doctors (agent)** for good medical advice because they lack knowledge about the medicine or treatment that help them recover.

While some doctors selflessly act only in their patients' best interest, others might take advantage of their medical knowledge to exploit patients or the companies that insure them (or doctors have agreements with pharmacies to sell certain medicines). Doctors may recommend expensive and/or excessive medication or treatment to earn more for themselves. This is also known as "physician-induced demand" where

some doctors take advantage of patients' lack of medical knowledge to provide them with more care than necessary, or to charge a higher fee.

In a study conducted in 2014 to investigate the doctor's behaviour at top Beijing hospitals, the results showed that:

- Doctors prescribed similarly whether a patient had insurance if the doctors received no compensation for prescriptions.
- If the doctors were compensated for prescriptions, they prescribed drugs that cost 43% more on average for insured patients than for uninsured patients.

There is overconsumption of medications and treatments **because these doctors do not bear the cost of their recommendations (i.e., cost of purchasing the medication/treatments)**, and thus mislead the patients to perceive MPB to be greater than actual MPB, leading to market failure.

Another example of the principal-agent problem is when **an employer (principal)** who hires an **employee (agent)** to work in the principal's store. If the principal cannot practically monitor the agent all the time, the agent may engage in opportunistic behaviour such as taking two hours of coffee break, surfing social media while at work, etc. Consequently, this leads to economic inefficiency as costs of production is higher and production of the good or service is likely to be below socially optimal amount. Hence, such a problem leads to an undesirable outcome on the market.

Government intervention to address Moral Hazard

To overcome the problem of moral hazard, the government can use **legislation and regulation** to restrict the ability of the informed party from taking advantage of hidden information, and equalising information among parties. Essentially, this policy results in agents bearing more of the benefits or costs of their actions.

Moral hazard: Policy 1 – Legislation and Regulation	
How it works	
The government implements a law which makes it mandatory that the agent reduce taking risk excessively. The most popular solution to moral hazard is to make buyers pay a share of the costs, through co-payments and deductibles, of hazardous or risky behavior.	
Co-payment is the percentage of the insured loss that is paid by the insured for each and every healthcare service utilised by the insured.	
Deductible is a sum specified in an insurance policy that the insured individuals must pay before being compensated for a claim.	
Co-insurance is the percentage of the insured loss that is paid after paying the deductibles.	
In health insurance markets, the legislation aims to remove the incentive to use medical services and spend excessively . In Singapore, the government sets the level of insurance benefits, imposes a deductible, insists on co-payment by the patient, and introduces claim limits per year. Under MediShield Life (national health insurance scheme), there is a deductible (\$1,500 to \$3,000), which is the amount the insured must pay before the insurance payout kicks in, while the co-insurance rate (3 to 10 per cent) is the fraction of the bill that the	

insured needs to co-pay after the deductible is reached. MediShield Life also has a claim limit of \$150,000 per policy year.

Integrated Shield Plans (IPs) offer private insurance coverage on top of MediShield Life, which cover non-subsidised healthcare expenditures, **are also legally required to have deductibles and co-insurance**. The purpose of these features is to reduce the moral hazard problem by having patients pay a share of the hospital bill, and in this way manage health expenditure. To ensure the sustainability of health insurance, all IPs “riders” (add on to limit the amount of out-of-pocket expenses for hospitalisation and/or medical bills) will require minimum 5% co-payment, including renewals of existing IPs with full riders from 2 April 2021.

The legislation aims to enhance the transparency of medical costs in Singapore. By providing a baseline for assessing what are reasonable charges, the legislation will **offset the incentive of the doctors to recommend more than necessary medication or procedures and thus charging higher healthcare bills**. This would address the problem of overconsumption arising from moral hazard in the healthcare sector.

For more information, visit <https://www.asiaone.com/money/integrated-shield-plan-riders-now-require-co-payment-what-you-need-know>

Advantages	Limitations
<i>Flexibility:</i> The implementation of legislation is simple and direct. Its impact is immediate to temper the risk-taking behaviour of the agent and protect the principal from the consequences of morally hazardous behaviour.	<i>Impediments:</i> In health insurance market, the government has imperfect information in the absence of relevant data and precise international guidance. There is very little data on how to optimally set the level of these parameters and they vary internationally considerably. For instance, France's deductible lies below \$2 per sickness episode, while Switzerland's maximum annual deductible of \$3,500 is higher than Singapore's. For co-insurance rates, Germany's ranges from 5 to 10 per cent, France's ranges from 30 to 40 per cent, while Singapore's MediShield Life insurance program, co-insurance rates typically range from 10% to 20% for hospital care. Lastly, most European countries do not have a claim limit but, instead, cap the amount of cost sharing. In other words, the risk exposure of the insured person (instead of the insurer) is capped. In contrast, Singapore limits the amount that is paid out-of-pocket for certain hospital treatments through MediShield Life's benefits, Means-tested Subsidies and Medisave (compulsory medical savings scheme) and means-tested subsidies.



Connect, Extend, Challenge

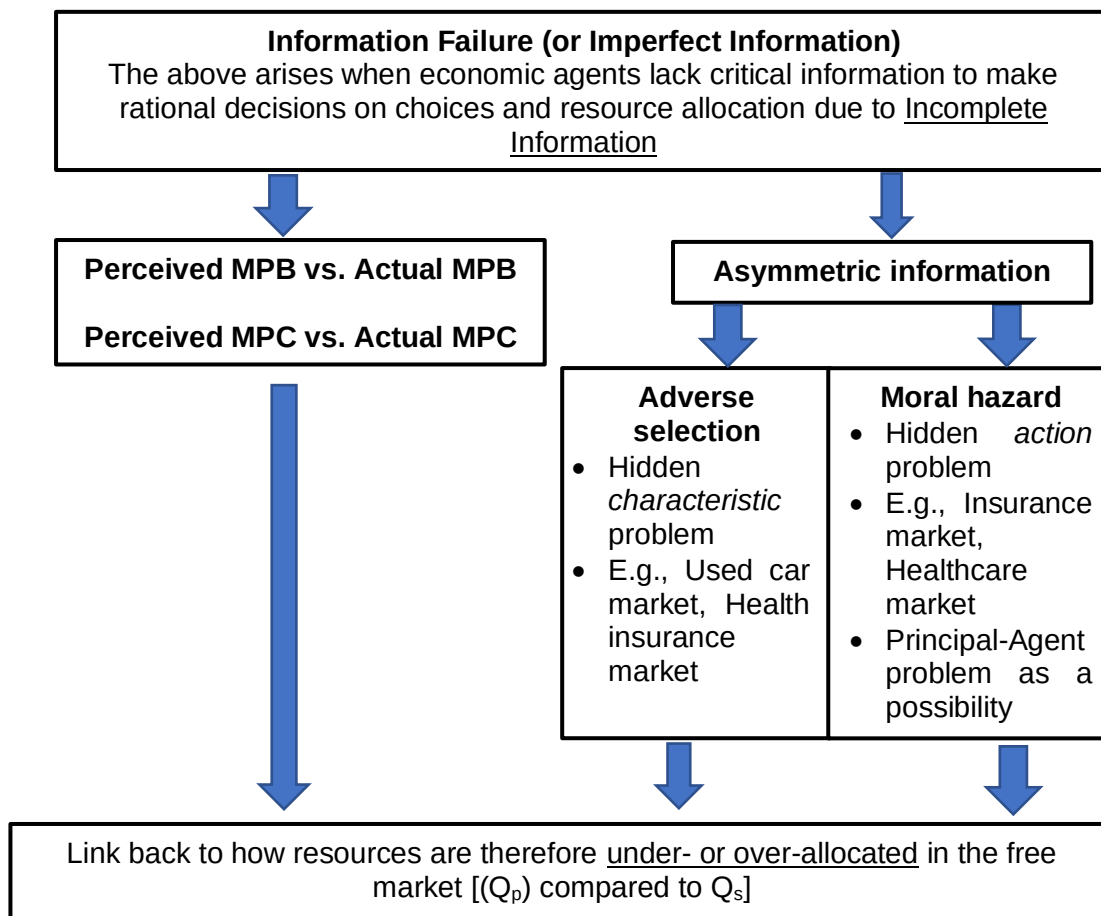
In 2023, a man recruited people to act as “phantom” drivers to stage traffic accidents and fill fraudulent accidents statements to claim payouts from insurers.

1. Explain how the above scenario accounts for market failure in the case of motor insurance.
2. Suggest how the Singapore government could effectively manage the above market failure.

Summary of Asymmetric Information

Asymmetric Information	Economic agents involved in the transaction do not have the same amount of knowledge	
	Adverse selection	Moral hazard
Concept	Arises when certain parties naturally select themselves out of a market, which gives rise to missing markets when these parties do not get to buy or sell the good, even though it may be beneficial for them to do so. Hidden characteristic: <u>Attribute</u> of the products is not known to one party • Informed sellers, uninformed buyers • Informed buyers, uninformed sellers	Refers to a situation where an agent behaves in a way that is detrimental to society because the agent does not fully enjoy the benefits or fully bear the costs of his actions. Hidden action: <u>Behaviour</u> of one party is not known to another party • Increased risk-taking by one party • Some situations involve the principal-agent problem
When does it occur?	Before the economic transaction/contract	After the economic transaction/contract
Examples	i) Used cars market ii) Health insurance market	i) Car/Health insurance market ii) Healthcare market
What are the impacts?	Due to asymmetric information, goods and services are under or overconsumed, preventing the socially optimal amount to be achieved, resulting in a deadweight loss. Allocative inefficiency and hence market failure would have thus occurred. In more extreme cases of asymmetric information, it may even lead to missing markets, resulting in zero goods and services being produced/consumed. The large deadweight loss incurred would therefore cause a complete market failure.	

Summary of Information Failure



3.5 Factor immobility

Factor immobility refers to the inability of factors of production (land, labour, capital, entrepreneurship) to move freely.

Factor immobility is a constraint experienced by producers when making production decisions. As a result of this constraint, they may make production decisions that do not lead to the most efficient outcomes.

One of the assumptions of the free market is that factors of production are perfectly mobile and homogeneous for allocative efficiency to be achieved. If there is a rise in price because of an increase in demand for a good, producers will increase the quantity of the goods. Hence, resources would move from one market to another to reach the socially optimal level of output. However, when factors of production are immobile, the socially optimal level of output cannot be achieved.

Factors of production (especially labour and capital) tend to experience difficulties in moving due to **occupational immobility and geographical immobility**.

In general, we have four types of factor immobility:

1. Occupational immobility of labour
2. Occupational immobility of capital
3. Geographical immobility of labour
4. Geographical immobility of capital

Factor immobility only poses a problem when there is a need to move factors of production. Hence, when explaining how factor immobility causes market failure, we must begin with the changing needs of the economy. For example, as a country develops, it may transit from an agrarian economy to an industrial economy.

3.5.1 Occupational immobility

Occupational immobility is often due to the mismatch between the skills of factors of production and those required by producers seeking factors of production, resulting in the inability of factors of production to move from one occupation/sector to another.

Causes of occupational immobility of labour

1. Labour lacks necessary skills, training or education

Workers may be unable to move from one form of employment to another because they do not have the necessary skills, particularly in the short run. Hence, when demand for certain skills increases, it takes time for workers to move from one market to another. For instance, robots and machinery are replacing factory workers and hence, causing the average worker to be displaced and unable to find jobs in sectors higher up the value chain, such as cloud computing and artificial intelligence as they lack the relevant skills.

Note: *Occupational immobility is further explored in Macroeconomics: Unemployment in JC2.*

2. Unwillingness to change to different job

Workers may be unwilling to change to a different job because the new job may involve certain health and safety risks. For example, there may be an unwillingness to be a construction worker due to the constant exposure to dust and danger.

Causes of occupational immobility of capital

1. Inability to repurpose specialised capital

Specialised machinery may only have limited uses and cannot be repurposed to a different use. For instance, a car assembly plant is useful for car assembly and not for assembling airplanes.

2. Exclusive ownership rights on factor by a firm/industry

When a firm has exclusive ownership of capital, for example, Singtel having the rights to own 5G mobile network infrastructures, it cannot be easily transferred to another firm as it is unable to obtain ownership rights from Singtel.

3.5.2 Geographical immobility

Geographical immobility is often due to the inability or lack of willingness of factors of production to move from one geographical area to another for reasons such as costs of relocation.

Causes of geographical immobility of labour

1. Poor transport infrastructure
2. Social and family ties
3. Insufficient housing at destination

Workers have different preferences in terms of where they want to live when making job decisions. Geographical immobility may be observed in the form of regional unemployment. This usually exists in large countries such as the USA and UK because workers are less willing to move from one state to another. Poor transport infrastructure may also make it difficult for workers to move from one part of the country to another (for example: from rural to urban areas). Cities like Shanghai and Hong Kong also suffer from immense overcrowding as the domestic housing infrastructure is unable to accommodate the inflow of workers from nearby cities. Thus, workers are increasingly unwilling to move to such overcrowded cities to work.

Cause of geographical immobility of capital

High transport costs - Some capital goods can be geographically immobile when it is difficult to transfer it from a geographical location to another. For example, a petrochemical plant built in China cannot be easily uprooted and transferred to another region.

How immobility of labour/capital leads to market failure

Step 1: Describe the changing needs of the economy	Assuming that there is a change in the needs of the economy from agriculture (e.g., producing rice) to technology (e.g., producing cloud computing software)
Step 2: <u>State</u> and define the type of factor immobility Explain the reason for that type of factor immobility	There is occupational immobility of labour. This refers to the inability of labour to be <u>reallocated to different uses in different parts of the economy</u>. This can be due to various reasons such as a lack of necessary skills, training, and education by the workers. For example, producing computer programs requires the specialised skill of programming and coding which involve extensive training. Labour from the agricultural industry, namely farmers, may have knowledge of how to operate farming machinery, but not knowledge on programming. As these skills are not transferable to the new job of cloud computing, they are unable to perform it.
Step 3: Explain unemployment of factor	As a result, there will be a surplus of labour in the agricultural industry at the initial wage rate, resulting in unemployment. On the other hand, there will be a shortage of labour in the cloud computing industry. This results in <u>unemployment of factors of production (specifically labour)</u> due to a skills mismatch.
Step 4: Link to market failure (LINK TO PPC)	Hence, the economy is not productively efficient, because it is unable to utilize all its inputs to produce maximum output. This is represented by the economy producing inside its PPC. Since the economy is not productive efficient, it also means that it is not allocatively efficient. Furthermore, the shortage of labour in the technology industry also means that there is an under-allocation of resources to the technology industry, and that there is forgone societal welfare (deadweight loss) that could have been gained by producing more in the cloud computing industry. Hence, occupational immobility of labour causes unemployment of resources when the needs of the economy change, resulting in allocative inefficiency and market failure.

Note: Students should also be able to explain how geographical immobility leads to market failure by modifying steps 2 and 3 accordingly.

Government intervention to address occupational immobility of labour

1. Retraining and upgrading
2. Moral suasion
3. Grants and subsidies for new industries
4. Reduce information gap in job matching

Occupational immobility of labour – Policy 1: Retraining and upgrading

How it works

Because of continuously changing technology and new methods of production, on-the-job training becomes important for greater productivity. For workers to remain relevant in the globalised world, they need to go for skills upgrading so that they can acquire new skills for the jobs available.

The Singapore government has introduced the following measures to support workers' training and upgrading:

- The **SkillsFuture** movement provides Singaporeans with the opportunities to develop their fullest potential throughout life, regardless of their starting points. All Singaporeans aged 25 and above will receive an opening \$500 credit for a wide range of SkillsFuture-eligible courses. From 1 May 2024, Singaporeans aged 40 years and above will receive a SkillsFuture Credit (Mid-Career) top-up of \$4,000 which can be used for about 7,000 selected courses that support substantive upskilling and reskilling.
- The Singapore **Workforce Skills Qualifications (WSQ)** is a national credential system that trains, develops assesses and certifies skills and competencies for the workforce. Training programmes developed under the WSQ system are based on skills and competencies validated by employers, unions and professional bodies.
- The Ministry of Manpower (MOM) has refreshed the **Continuing Education and Training (CET) Masterplan** to better ensure a competitive and resilient workforce. It enables working adults, regardless of their starting qualifications, to continue to build and deepen their skills and competencies, throughout their careers.

Occupational immobility of labour - Policy 2: Moral suasion

How it works

Examples include advertising campaigns by WDA to encourage skills upgrading in employees

Occupational immobility of labour – Policy 3: Grants and subsidies for new industries

How it works

Helping to develop new industries e.g., by giving grants and subsidies to firms to restructure or channel unemployed labour to expanding industries. In 2020, the Singapore government announced that up to \$150mil has been set aside for the enhancement of the Startup SG programme to boost the pipeline of new innovative startups in Singapore.

Occupational immobility of labour – Policy 4: Reduce information gap in job matching	
How it works	
Reduce information gap through providing job matching or information services for factor owners.	
Advantages	Limitations
<u>Root cause:</u> If such training is successful, then the labour market can become more flexible and responsive to changes in labour demand and supply conditions, hence reducing the unemployment rate and addressing the issue of occupational immobility where labour lacks the necessary skills .	1. <u>Side effect:</u> Expenditure on subsidies will put a strain on government budget over time, possibly leading to a rise in budget deficit or reduced budget surplus. 2. <u>Time period:</u> The effectiveness of skills training/upgrading policy depends largely on the receptivity and learning attitude of the economy's workforce in acquiring and applying the new set of skills for the new industries as this may involve a long time.

Government policies to address occupational immobility of capital

Occupational immobility of capital – Policy 1: Incentivise firms to purchase capital	
How it works	
For capital immobility, governments can perhaps target certain sectors and encourage firms to purchase capital goods by giving them incentives (e.g., tax cuts, financial help). In Singapore, the Productivity Solutions Grant (PSG) is available for local companies looking to kickstart their adoption of technology with prequalified IT solutions and equipment that enhances productivity. Other forms of tax cuts and subsidies help the firms to maintain their profit margins and economically viable as they invest in capital goods. Therefore, firms can now overcome the problem of capital immobility by purchasing new capital goods in replacement of old ones, which cannot be converted to use for modern purposes.	
Advantages	Limitations
<u>Side effects:</u> Subsidies and tax cuts incentivise firms to invest in capital goods by reducing the costs of production of firms.	<u>Root cause; Side effects:</u> This policy does not tackle the root cause as it does not smoothen out the capital goods' transition from one use to another . Instead, it replaces redundant capital goods altogether. In the case of sunset industries, the replacement of an entire industry's worth of capital goods incurs high opportunity cost . Funds are redirected from similarly important areas of society such as education, healthcare, etc.

Government intervention to address geographical immobility of labour

1. Improve transport infrastructure
2. Improve housing market at destination

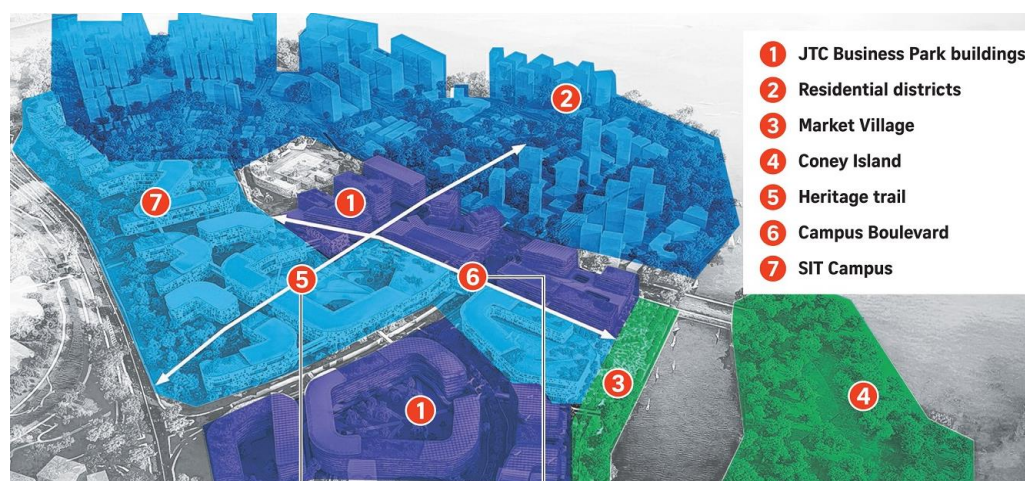
Geographical immobility of labour – Policy 1: Improve transport infrastructure	
How it works	
A government can improve the transport infrastructure so that workers can easily move from one workplace to another. For example, the development of the high-speed rail system in China has enabled many workers staying in rural areas to move to the main cities to work.	
Advantages	Limitations
<u>Root cause:</u> Improved efficiency due to enhancement in transport infrastructure would reduce regional unemployment and allow for reallocation of labour with greater ease.	1. <u>Time period:</u> The development of transport infrastructure takes time and does not address short term issues. For example, in Kobe, the Akashi-Kaikyo Bridge that links the city of Kobe to the island of Awaji took about 30 years to complete 2. <u>Side effects:</u> The cost of developing these transport infrastructure means that the government will have less resources to spend in other areas such as healthcare or R&D. An opportunity cost is incurred. 3. <u>Impediments:</u> Developing infrastructural networks might sometimes be politically unviable as it may involve buying up residential land. Residents may be unwilling to move and forcing them to do so may incur a political cost.

Geographical Immobility of labour – Policy 2: Improve housing market at destination	
How it works	
Governments can intervene by directly providing or incentivising private firms to supply housing at the destination. This will help to improve workers' willingness to move to areas where they are needed most.	
For example, in developing the Northern Regional Centre (Woodlands) and Western Regional Centre (Jurong), the Singapore government has included residential projects to ensure that the housing in the area is able to support the expected increase in the number of workers.	
Advantages	Limitations
<u>Root cause:</u> The improvement in housing at the destination would incentivize workers to relocate to workplaces that are less accessible to increase mobility of labour.	1. <u>Side effects</u> • The cost of developing these housing infrastructure means that the government will have fewer resources to spend in other areas such as healthcare or R&D. An opportunity cost is incurred. • The demand for the housing created may only be temporary as the demand for workers will fall after the development has been completed. Moreover, the regional development might not take off as planned (for example, the Iskandar

	Development Region in Malaysia). Thus, the demand for housing might be lower than expected, leading to a surplus and wastage of resources.
	2. <u>Time period</u> : It takes time to build the infrastructure.

The Punggol Digital District (PDD)

PDD will be the first district in Singapore to adopt a one-integrated masterplan approach that brings together a business park, a university and community facilities. The co-location of the Singapore Institute of Technology's (SIT) new campus with business park buildings will facilitate greater industry academia collaboration, through the cross-fertilisation of ideas and knowledge among students and industry professionals. PDD will also house key growth sectors of the digital economy such as cybersecurity and Internet of Things, and is expected to bring approximately 28,000 exciting jobs closer to residents in Punggol and the north-east region.



Source: Smart Nation Singapore Website; Image: The Straits Times

Government intervention to address geographical immobility of capital

Geographical immobility of capital – Policy 1: Subsidies/Grants	
How it works	
Government can offer incentives such as tax rebates, advanced infrastructure, or a skilled workforce to attract Foreign Direct Investment (FDI). Other measures include targeting specific sectors of the economy. This compensates companies for the transport costs incurred in moving production from one part of a country to another.	
Advantages	Limitations
<u>Root cause</u> : Tax rebates and subsidies would incentivize firms to relocate capital across regions to offset part of the costs incurred in the movement of capital.	<u>Impediments</u> : However, expenditure on such incentives will put a strain on government expenditure over time, possibly leading to a rise in budget deficit or a reduction in a budget surplus.

3.6 Market dominance (as covered in Firms and Decisions)

Market dominance refers to a situation in which a market is dominated by one or a few large firms. These firms have considerable monopoly power. They are not only able to set prices but are also able to act in ways that preserve and enhance their monopoly power. Market dominance is a source of market failure that results in the inefficient allocation of resources. It results in both allocative and productive inefficiency. This will be covered in detail in Theme 2.2 on Firms and Decisions.

4. Inequity and Government Intervention

Equity occurs when there is fairness in the distribution of essential goods and services. It can be discussed from the perspective of **equitable access to essential** goods and services, such as education and healthcare services.

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 because efficient resource allocation may not result in equitable outcomes, given that equity is concerned with the fair distribution of resources.

In the free market, an individual's **access** to essential goods and services is dependent on his income and wealth. When the consumption of essential goods like education and healthcare is left to the free market, it results in inequity as low-income consumers may not be able to afford such essential goods.

Equity is inherently subjective (normative concept) as different economic agents in the society may have different perceptions as to what is considered as being fair. In principle, a fair distribution must be one that does not deprive individuals of having access to basic necessities. However, equity issues are difficult to resolve because value judgements are required to decide what goods and services are deemed essential in society. Problems may arise in determining which goods and services are considered necessities and how to assess the level of needs of different groups in the society to ensure an equitable distribution.

The **main causes of inequity** are:

1. Income inequality
2. Market dominance (*Refer to Topic 7: Firms and Decisions*)

4.1 Income Inequality (A cause of inequity)

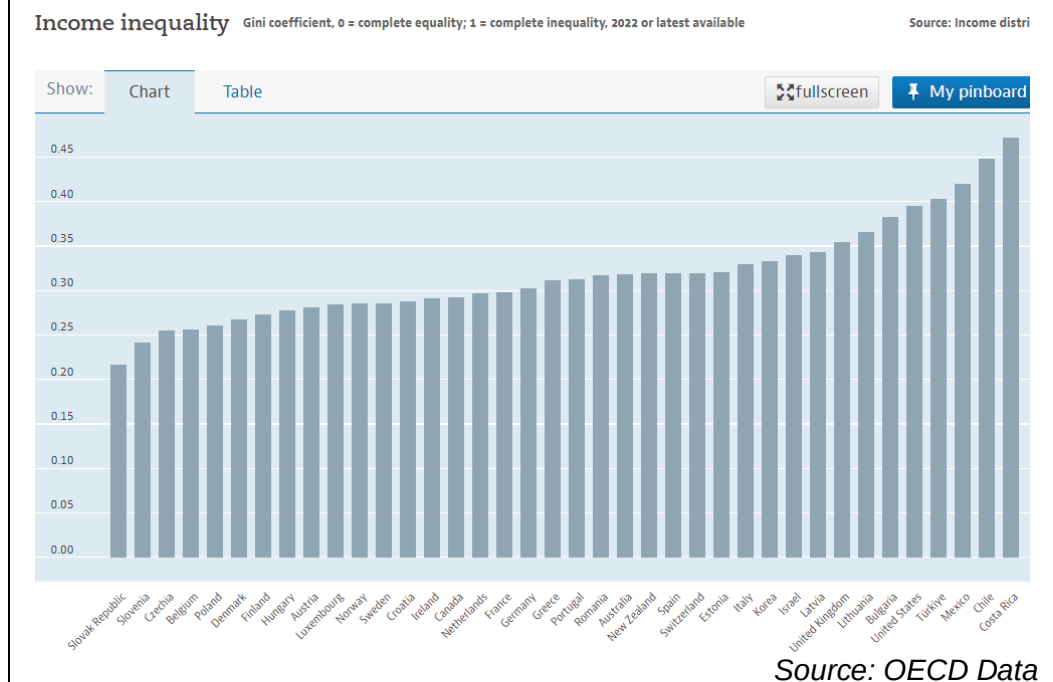
Income is the amount of money an individual receives over a period of time, including:

- the payment for labour services – wages per day
- the payment for the ownership of other factors of production – land (rent per month), entrepreneurship (profit per month), etc.
- dividends from stocks per year

Measurement of income inequality

The distribution of money income can be represented using the Gini coefficient. The Gini coefficient ranges from 0 to 1. The closer the value to 1, the greater the inequality is. A nation having a coefficient of 0 has perfect equality (i.e., every

person has the same income) while a nation having a coefficient of 1 has perfect inequality (i.e., one person owns 100% of the nation's income). The bar chart below shows the Gini coefficient in 2022 for the various OECD countries.



4.1.1 Causes of income inequality

(i) Wage inequality

Wages differ from industry to industry, from firm to firm and even for the same job done. In a competitive labour market, wage, which is the price of labour, is determined by the demand for and the supply of labour. Generally, workers who are more productive and generate higher returns to the firms are higher in demand, hence they are paid more than workers who are less productive, *ceteris paribus*.

From the labour supply perspective, these workers who are more productive tend to be highly educated and more skilful, and therefore the supply for such worker would be relatively lower (e.g., proportion of the population with university degrees). Hence, they would earn higher wages compared to those who are less educated and low skilled.

Recent major factors that have caused changes in demand and/or supply of labour are:

- **Technological change:** Technological change can impact the distribution of income among different factors of production. Advancements in technology have raised the relative productivity of high-skilled relative to low-skilled labour, thus raising the demand for high-skilled labour compared to low-skilled labour. This has led to a rise in wages of high-skilled labour while the wages of low-skilled labour remained stagnant. Hence, it resulted in a widening income gap between high and low-skilled workers in a country. In addition, technological advancements may be biased in favour of capital. This results in rising incomes

of capital owners and hence rising income inequality because capital incomes accrue more to the rich than to the poor.

- **Globalisation:** Globalisation and greater integration in trade are commonly cited as reasons driving income inequality. In advanced economies, there is a general decline of the manufacturing industries due to competition from imports from low-cost foreign producers, as well as offshoring activities by the more labour-intensive industries to developing economies. Thus, firms in advanced economies are hiring less manual labour and have instead increased their demand for high-skilled labour, resulting in a widening income gap. In addition, the government reduces corporate and income tax rates to attract foreign companies to invest in the country and high-skilled labour to reside in the country respectively. As a result, an increasingly globalised economy will cause wage gap to widen between high-skilled labour and the low-wage low-skilled labour.

Nonetheless, an important factor resulting in wage inequality is not the difference in demand and supply conditions across different labour markets, but **factor immobility**. Labour is unable to move from low-paying jobs to high paying ones due to mismatch of skills. For example, it will be difficult for a chef to switch career and become a doctor in response to higher wages for doctors. This is because the skills and certification needed to be a doctor is difficult and takes time to obtain.

(ii) Wealth inequality

In addition to wage inequality, there is also wealth inequality. The free-market mechanism yields very large non-wage incomes (like dividends, interest, rents and profits) to those who possess financial assets such as stocks, bonds and physical assets like land and real estate. These individuals may receive very large property incomes due to inheritance, and/or having acquired such assets at the right time (Assets such as properties, cars, personal valuables, businesses, savings, shares and bonds.). The owners of such assets are thus able to obtain an income other than that from their own labour. On the other hand, those that receive low wages tend to be those who receive less education and training. Individuals receiving low wages also tend to be those with little ability to save. The lack of financial resources makes it more difficult for them to accumulate the aforementioned financial and physical assets. Thus, the greater the inequality of wealth, the greater is the inequality of income.

4.1.2 How excessive income inequality leads to inequity

Demand for essential goods and services does not accurately reflect society's needs

In the free market, an individual's access to goods and services is dependent on his income and wealth. As such, the effective demand in the market is characterised by the willingness and ability to pay. For individuals in the lower income group, even though they may be willing to consume a particular essential good/service (e.g., basic healthcare or education), **their preference will not be captured in the market because of their inability to purchase it**. Therefore, in extreme cases, **the lower income group will not be allocated or have access to the essential good/service, resulting in an inequitable outcome**. The inequitable distribution of the essential good/service represents an inequitable distribution of economic welfare, which implies an undesirable market outcome.

Price inelastic demand of essential goods and services

Essential goods/services (e.g., basic healthcare or education), by its nature, have few substitutes and consumers have a high degree of necessity for them. Thus, demand tends to be price inelastic, resulting in higher market equilibrium prices. Thus, low-income consumers may not be able to afford such essential goods/services, thus resulting in inequity.



Connect, Extend, Challenge

What is the difference between **income inequality** and **inequity**?

Income Inequality	Inequity
Incomes being unequal E.g., Differences in wages	Unfair distribution of resources E.g., necessities are not accessible to all.
Measurable; factual figures (Commonly used indicator - Gini Coefficient)	Intangible, a normative issue which involves making value-judgments.

4.1.3 Government intervention to reduce inequity

To increase affordability of essential goods

1. Price ceiling
2. Indirect subsidy on essential goods

To reduce income inequality

3. Policies to reduce factor (labour) immobility
 - a. Education
 - b. Retraining and upgrading labour
4. Redistributive policies
 - a. Progressive tax system
 - b. Transfer payments
5. Minimum wage

To increase affordability of essential goods – Policy 1: Price ceiling

How it works

(Please refer to Topic 4: Government Intervention for a detailed analysis and diagram on price ceiling.)

A price ceiling is usually imposed with the goal of achieving equity. While a price ceiling does not address income inequality itself, it can help to mitigate the negative effects of income inequality, specifically the inability of low-income consumers to afford essential goods/services.

For example, consider the case of apartment rental rates. If there is a sudden surge in the demand for rental apartments, this will lead to an increase in the equilibrium price, i.e. rental rates. As a result, the lower-income group might not be able to afford the higher rental rates. Hence, to ensure the affordability of basic necessities such as housing, the government can intervene in the apartment rental market by imposing a price ceiling (maximum price) on rental apartment rates.

Advantages	Limitations
<u>Timeliness:</u> Price ceiling is quick to take effect the moment it is enacted. This is because of the severe penalties for those who do not abide by laws and legislations.	<u>Side effects:</u> • Equilibrium quantity is now lower compared to before the price ceiling was implemented, meaning that fewer consumers get the goods that they need. • A black market may arise, where sellers ignore the government's price restriction and sell illegally above the legal maximum price, will be created if the shortage is persistent. This will worsen the affordability issue for the lower income group because it would be the rich who will be able to purchase the good. • Shortage will arise because quantity demanded exceeds quantity supplied, causing the need for rationing, indirect subsidies, or direct provision. These measures will incur opportunity costs as they require government spending. • Deadweight loss will arise, causing a reduction in societal welfare.

To increase affordability of essential goods – Policy 2: Indirect subsidy	
How it works	
<i>(Please refer to Topic 4: Government Intervention for a detailed analysis and diagram on indirect subsidy)</i> While an indirect subsidy on a good/service does not address income inequality itself, it can help to mitigate the negative effects of income inequality, specifically the inability of low-income consumers to afford essential goods/services. By imposing an indirect subsidy on the production of necessities like food and essential goods/services, prices of these goods/services can be lowered, thus increasing their affordability.	
Advantages	Limitations
1. <u>Flexibility:</u> Indirect subsidies are flexible market-based policies which allow the price mechanism to continue to operate. Moreover, the government can adjust the level of subsidies relatively easily according to the degree of need for the good/service by the lower-income group. 2. <u>Root cause:</u> Since necessities have a price inelastic demand, the imposition of a subsidy is likely to bring about a significant reduction in price of the good/service,	<u>Side effects:</u> • However, if the market was initially allocative efficient, introducing an indirect subsidy will distort the market and result in a deadweight loss. In other words, there is a trade-off between allocative efficiency and equity. • If the subsidies are not targeted only at the lower-income group, the higher-income group will also end up enjoying them even though they do not need them. This not only represents a wastage of resources (and government spending) but can also worsen inequity if the higher-income group ends up consuming more of the good/service and reducing the amounts available for the lower-income households. • Subsidies represent a form of government spending which incurs opportunity costs. Moreover, subsidising essential

effectively affordability.	raising	goods/services will put a strain on government budget.
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To reduce income inequality – Policy 3: Policies to reduce factor (labour) immobility

How it works

In Singapore, education being a key leveller in Singapore society, the Government has been making significant investments in this field. Improvements are sought across the spectrum - from pre-school level, and in early intervention programmes (the early childhood education sector) such as KidStart, to SkillsFuture initiatives. The main idea is to provide the low-income families or the disadvantaged sufficient opportunities in education and skills training to ensure social mobility, closing the income gap. In general, the government can invest in human capital through 2 main policies to reduce labour immobility:

a. Expenditure on education

Increasing government spending in education, especially primary education, ensures that the low-income group have access to basic education, which reduces disparity in human capital across income groups and narrows income inequality in the long run. For example, increasing access to education and rising school enrolment have resulted in narrowing wage gaps between skilled and unskilled workers in Latin America in recent years. In Singapore, the Government has made major spendings in the pre-school and primary school systems to ensure that every child has access to quality education and a good start in life, regardless of family income.

Recent studies also show that a rise in the share of workers with upper secondary education is associated with a decline in labour earnings inequality. Examples of policy initiatives to raise upper secondary education attainment include enhanced accountability for schools, better teacher recruitment and training, and special support for pupils at risk of dropping out.

b. Expenditure on retraining and skills upgrading

Governments can introduce policies to raise the demand for low-skilled labour by raising their productivity. For example, the Singapore government is always investing in Singaporean workers to ensure that they can continue to improve themselves and their prospects throughout their lives. Workers are encouraged to attend subsidised courses provided by the government under various programmes of the SkillsFuture national movement and Workfare Training Support (WTS) Scheme to upgrade their skills. This will increase the demand for the low-skilled labour because they would have been equipped with relevant skills to be employed in the skilled industries, reducing labour immobility across industries. In the labour market, an increase in the demand for such workers will lead to an increase in their wage rate, hence reducing the wage income inequality. Workers who are retrenched because their skills are no longer relevant can be retrained to attain skills that are relevant to the current economy, thereby increasing their wage and hence reducing income inequality.

Advantages	Limitations
<u>Root cause</u> : Policy. Addresses the root cause of the income	1. <u>Impediments</u> Government budget constraints. High expenditure on human capital will put a

inequality which is due to factor immobility arising from the disparity in education and the skill levels of labour.	strain on government budget over time. Governments may not have sufficient funds to finance and sustain the high levels of spending on education programmes in the long run. • The effectiveness of the expenditure depends largely on the receptivity and learning attitude of the workforce in an economy in acquiring and applying the new set of skills for the new industries. 2. <u>Timeliness</u>: Such a policy would take a long time before the effects can be seen (response time lag), because it takes a certain number of months or years to put an individual through training or education programmes. Additionally, education and training programmes can take a long time to implement (implementation time lag). 3. <u>Root cause</u>: Policy may not target all root causes. Expenditure on education alone might not be effective to overcome income inequality because children from low-income households often live in small and crowded homes which are not conducive for studying, and their often less-educated parents are not able to help them academically. In other words, there may be other root causes associated with income equality.
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To reduce income inequality – Policy 4a: Progressive tax system

How it works

A progressive tax system is one in which the rich are taxed proportionately more than the poor. By adopting a higher marginal tax rate on the rich than the poor, the post-tax income distribution will be less unequal than the pre-tax distribution.

For Year of Assessment 2024, these are the rates that Singapore residents will pay:

Chargeable Income	Income Tax Rate (%)	Gross Tax Payable (\$)
First \$20,000	0	0
Next \$10,000	2	200
First \$30,000	-	200
Next \$10,000	3.50	350
First \$40,000	-	550
Next \$40,000	7	2,800
First \$80,000	-	3,350
Next \$40,000	11.5	4,600
First \$120,000	-	7,950
Next \$40,000	15	6,000
First \$160,000	-	13,950
Next \$40,000	18	7,200
First \$200,000	-	21,150
Next \$40,000	19	7,600
First \$240,000	-	28,750
Next \$40,000	19.5	7,800
First \$280,000	-	36,550
Next \$40,000	20	8,000
First \$320,000	-	44,550
Next \$180,000	22	39,600
First \$500,000	-	84,150
Next \$500,000	23	115,000
First \$1,000,000	-	199,150
In excess of \$1,000,000	24	

Advantages

Flexibility: Ability to adjust tax brackets. The more progressive the tax system, the more income will be equally distributed. In doing so, the income inequality within the country is reduced.

Limitations

1. Side effects:

- High taxes reduce the reward to individuals to work and save, particularly so for high-income earners, who would be taxed more heavily. This tax system becomes a **disincentive for work**, thus leading to side effects on the economy like **lower productivity**.
- The higher the rate of tax, the more likely people try to escape paying for some of their taxes. People who are subjected to higher rates of income tax will be more tempted not to declare all their income. Some individuals might find loopholes in the system and evade taxes. If they successfully do this, it does not effectively reduce the income inequality issue in the country. **Tax evasion** is a severe problem in countries with weak tax administration. Hence, a lack of administrative capacity may hamper redistributive efforts.

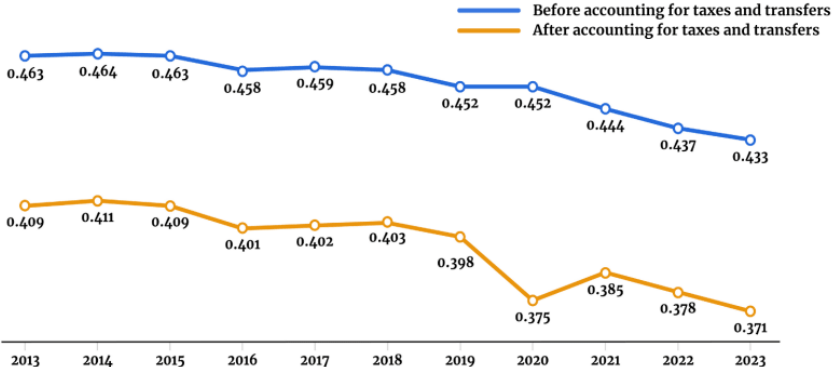
	2. <i>Impediments: Need for competitive tax rates.</i> With globalisation, governments will be under greater pressure to reduce taxes to remain competitive to attract top talent. Singapore must remain sensitive to these global trends that impact us as a small and open economy. This means that if other countries such as the US and Hong Kong have lower personal income tax and corporate tax rates, Singapore will be pressured to keep her tax rates low too.
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To reduce income inequality – Policy 4b: Transfer payments
How it works

Transfer payments are usually welfare payments made not in exchange for any goods or services and are targeted at the low-income or the disadvantaged groups.

The Singapore government have many targeted, means-tested assistance schemes which provide transfers and subsidies to lower-income groups. The Community Care (ComCare) Endowment Fund provides three broad types of assistance: long-term help, largely for the elderly poor; medium- and shorter-term help for those facing crises, such as illness or retrenchment; and childcare, kindergarten and infant care subsidies for children. In addition, the Workfare Income Supplement (WIS) Scheme was introduced as a permanent scheme to supplement the wages and retirement savings of older low-wage workers as well as to encourage them to stay employed. Growth Dividends Scheme is also another example which allocate more to less well-off Singaporeans. Other examples are MOE's Financial Assistance Scheme (FAS), and substantial bursaries to make quality education affordable to all.

The redistributive effect of government transfer payments and taxes on Singapore's Gini coefficient



Year	Before accounting for taxes and transfers	After accounting for taxes and transfers
2013	0.463	0.409
2014	0.464	0.411
2015	0.463	0.409
2016	0.458	0.401
2017	0.459	0.402
2018	0.458	0.403
2019	0.452	0.398
2020	0.452	0.375
2021	0.444	0.385
2022	0.437	0.378
2023	0.433	0.371

In 2023, Singapore's Gini coefficient was 0.433, which is the lowest since 2000. After adjusting for government transfers and taxes, the figure was 0.371. Department of Statistics (Singstat) said in a report on key household income trends that this reflected the redistributive effect of government transfers (e.g. utility bill rebates and CDC vouchers) and taxes.

Resident households (including households with no employed person) received \$6,371 per household member on average from Government schemes in 2023. Resident households staying in HDB 1- and 2-room flats continued to receive the most Government transfers. In 2023, they received \$13,623 per household

member on average from Government schemes, close to double the transfers received by resident households staying in HDB 3-room flats.

Sources: Channel NewsAsia and Department of Statistics, Singapore

Advantages	Limitations
<u>Side effects</u> - The benefits given to the poor will increase their effective demand for essential goods and services and hence enhance their ability to consume those goods.	1. <u>Feasibility</u> - Government budget constraints. With an ageing population, the challenge of using redistributive policies will be greater because of the rise in amount of benefits that needs to be given out relative to the tax revenues earned by the government. 2. <u>Impediments</u> • The government may not have perfect information on the optimal level of income level for individuals or households to qualify for the transfer payment schemes. For example, the level of income above which people become ineligible for benefits may be set too low, and the policy ends up being largely ineffective at addressing income inequality. • Individuals might take advantage of the benefits by under-reporting their income to qualify for the schemes, and this will be a strain on the government's budget.

To reduce income inequality – Policy 5: Minimum wage	
How it works	
(Covered in Topic 4: Government Intervention - Please refer to this set of lecture notes for a detailed analysis and diagram on minimum wage.) Minimum wage can be implemented to help lower-income manual workers earn a higher wage, thus reducing wage income inequality. Furthermore, this will increase their purchasing power and enable people from a lower-income group to consume goods that they previously were not able to, even though they desired for it.	
Advantages	Limitations
<u>Timeliness:</u> The minimum wage is quick to take effect and immediately narrows the wage income inequality gap in the country by increasing the purchasing power of the lower income group.	<u>Side effects:</u> • This can result in labour surplus and unemployment, which further worsens the income inequality issue as those who become unemployed earns zero income. • The minimum wage law may also cause an increase in the prices of final goods through cost-push inflation. This is because a rise in wages, <i>ceteris paribus</i>, increases a firm's cost of production. Firms thus pass the higher costs to the consumers by charging a higher price. • Illegal employment of some workers at wages below the legal minimum wage may result. This often involves illegal immigrants who may be willing to supply their labour at very low wages.

4.2 Market dominance**

Market dominance might cause inequity that is due to the inability to purchase essential goods by low-income consumers.

Market dominance results in large firms establishing market power to raise prices and restrict output through erecting barriers to entry. This has implications on exacerbating inequity between various parties due to affordability issues for poorer consumers.

***Refer to Topics 6 – 8 on Firms and Decisions. ***

6. Government Failure (as an assessment of effectiveness of government intervention)

Government failure can be defined as the situation in which government intervention results in **greater** market inefficiencies or inequity than would otherwise occur without government intervention, i.e., government intervention causes the **deadweight loss to be even greater** than the case without government intervention.

In the previous sections, we have discussed how government intervention can help to address issues of misallocation of resources. In some cases, the government may choose not to intervene if the society could be better off without government intervention than if it had intervened. This is because government intervention fails to improve market outcomes as such intervention might introduce further inefficiencies into the market, hence giving rise to government failure.

Reasons for government failure (usually used for evaluation):

1. Information gaps

The government may not be in the best position to establish what consumer preferences are and aggregating these preferences based on the number of people that are willing and able to pay for particular goods and services. Regarding externalities, government might not be able to accurately determine the monetary value of externalities or what is the socially optimal level of output.

2. Time lags

It takes time for a government to recognise that market failure is occurring (recognition lag), to draw up an appropriate policy measure and to implement it (implementation lag). By the time policy measures are introduced, the problems may have become acute, requiring more radical measures, or economic circumstances may have changed, necessitating different measures (effect/impact lag). This may result from red tape and bureaucracy.

3. High administration cost

In many countries, the government generates a high administrative cost. There could also be implementation, monitoring and enforcement costs, as explored earlier.

4. Rent-seeking behaviours (Corruption)

The World Bank defines corruption as ‘the abuse of public office for private gain’. Government officials are said to “seek rents” when they try to obtain benefits for themselves through the political arena.

Strong government intervention opened possibilities for corruption such as the payment of bribes to government officials to secure particular policies. Such rent seeking behaviour can result in a misallocation of resources as government officials accept bribes to pursue uneconomic projects instead of socially necessary services like education, healthcare, sanitation, etc. Hence, this results in wasteful use of valuable resources and talents in unproductive activities and invariably redistributes resources from large unorganised populations to small, organised groups.

5. Political considerations e.g., Policy myopia

Critics of government intervention in the economy argue that politicians tend to look for short term solutions to solve difficult economic problems in order to gain political favours, rather than taking a long-term perspective in solving the economic problem. In a modern democracy, the elected government may hold office for a stipulated time period, usually five years. Hence, they are reluctant to make long term decisions that extend beyond their term of office. The risk is that myopic decision-making will only provide short term relief to particular problems but does little to address structural problems. For example, a decision to build more roads might simply add to the problems of traffic congestion in the long run by encouraging an increase in the total number of cars on the roads.

In reality, government intervention might not necessarily achieve an efficient allocation of resources due to the limitations discussed above. Nevertheless, government intervention could improve the current allocation of resources as compared to leaving it to the free market.

Note: After analysing the how the policies work and their limitations, students can bring in the concept of government failure to explain his choice/decision in the summative conclusion.

After going through Theme 2.3 on Governments' Microeconomic Objectives, it is timely to consolidate the following **Enduring Understandings**:

1. The pursuit of self-interests may lead to inefficient market outcomes, with implications on resource allocation.
2. Price mechanism fails to allocate resources efficiently, resulting in market failure, when there is:
 - a. non-provision of public goods
 - b. an existence of externalities
 - c. information failure
 - d. factor immobility
 - e. market dominance
3. Governments might decide to intervene when market outcomes are deemed undesirable, for either efficiency or equity reasons.
4. The form and extent of government intervention lies in the complexities of decision-making at the governmental level.
5. Effective government policies may correct market failures or improve the society's welfare, but inappropriate intervention will lead to government failure.

Annex

Even though the government can intervene to address asymmetric information, firms may also engage in the following strategies to reduce such asymmetric information. This is so that they can increase demand for their products and achieve higher profits.

Firms' strategies to address Case 1: Adverse selection (Informed sellers and uninformed buyers in used car markets)

Case 1: Adverse selection - Firm strategy 1 - Signalling	
How it works	
<u>Signalling is an action taken by an informed person to send information to a less informed party to reveal relevant information that is helpful for the less informed party to make a better decision.</u> Signals solve the adverse selection problem only when the recipient views it to be credible. For example, sellers of high-quality used cars will choose to send signals that the sellers of the low-quality used cars are not able to do, for example the low mileage of the used car. By doing so, the sellers of these high-quality used cars will be able to sell their used cars at a high price as compared to the initial low price which caused them to leave the market. Sellers can signal confidence that their products are reasonably high-quality to buyers in various ways.	
Case 1: Adverse selection - Firm strategy 1a) Offer warranties	
How it works	
A warranty serves as a credible signal of quality to better reflect the benefits (true quality) of a good to the buyer. It is less expensive for firms of a high-quality product to offer a warranty than a firm that produces a low-quality product. This is because products with higher quality are less likely to breach a warranty, hence preventing the firm from servicing it. In the used cars market, issuing warranty is a form of signal to the potential buyer that the used car is of high quality. This is because sellers that offer a car warranty are liable for any repair work, hence it is unlikely to be offering one of low quality that requires frequent maintenance. Therefore, by offering warranty it solves the initial problem of a missing market for high-quality used cars. Warranties also show the true cost of the seller because warranties make it more expensive for sellers of low-quality goods to enter the market, hence making it possible to reduce the effects of adverse selection in the used car market. The same explanation applies to the market selling durable goods such as refrigerators and cameras.	
Advantages	Limitations
As above	<i>Impediments:</i> Crucially, signalling only works if the signal is credible: if sellers of low-quality goods found a way to obtain a warranty, then they could mask their low-quality goods. Consequently, when both sellers of low-quality and high quality could send the same signal, the signals become unhelpful to the buyer. Hence, signalling may not always be an accurate way to bridge the information gap.

Case 1: Adverse selection - Firm strategy 1b) Information from third parties; 1c) Build seller reputation	
How it works	
<u>Information from third parties</u> In the used car market, sellers can hire a credible mechanic to check on the quality of the car and give an accurate and complete report of the condition of the car. Assuming only high-quality used cars sellers can signal because the marginal cost of hiring a mechanic outweighs the marginal benefit for the low-quality used cars sellers, this report would signal to buyers that the used car is of high quality. Hence, they will be able to sell their high-quality used cars at a higher price.	
<u>Build seller reputation</u> Sellers of high-quality products have an incentive to ensure that they consistently produce high-quality products to maintain their reputations in the long run. This is because when buyers are perfectly informed that the firms' past product quality is of high quality, they will be incentivised to purchase the firms' high-quality products. This causes an increase in demand which in turn causes price and quantity sold to increase. Assuming no change in the firms' cost structures, this causes revenue to increase, hence increasing firms' profit. Therefore, the ability to earn positive profits from producing high-quality goods in the long run creates an incentive for firms to establish and maintain a reputation for high-quality production. For example, on online shopping platforms such as Shopee, buyers are more likely to purchase goods from sellers with 5-star ratings.	
Advantages	Limitations
As above	1. <i>Feasibility</i> : While firms can signal their quality of goods by getting the relevant certification, it might involve a high transaction cost i.e., legal cost and time taken. Thus, it will not prevent adverse selection if it is unprofitable for firms selling high-quality products by engaging third parties. 2. <i>Impediments</i> : Firms will have little ability and incentive to maintain their reputation if other firms engage in price war with the aim of increasing their market share. The reduction of prices lowers profit margins and removes the incentive to produce high-quality products to maintain its reputation.

Firms' strategies to address Case 2: Adverse selection (Informed buyer and uninformed sellers in health Insurance market)

Even though the government can intervene to address adverse selection, firms also engage in **screening** to reduce such asymmetric information.

Case 2: Adverse selection: Firm Strategy - Screening
How it works
<u>Screening</u> is an action taken by an uninformed party to determine information possessed by the informed party.
To reduce adverse selection, health insurance firms can gather information such as medical history to determine the risk of potential customers or require buyers to undergo a checkup at a certified clinic. With a copy of the medical report, the insurance firm can gauge the true costs of insuring the individual. The insurance firm uses such information to better estimate the probability that it will have to pay off on a policy, and if the individual is high-risk, the firm can decide whether to

insure (but with certain additional terms and conditions) or charge a higher premium.

Ideally, the insurance firms would do better by collecting all information, but they would only collect information up to where the marginal benefit from the extra information they gather equals marginal cost of obtaining it.

Screening reduces the chance of high-risk individuals entering the insurance market and better reflects the true benefit to the buyer or the true cost to the seller. This leads to a reduction in adverse selection and brings the output closer to the socially optimal level.

Advantages	Limitations
<u>Root cause:</u> Screening is based on observable characteristics, which makes it hard for individuals to lie or conceal information.	<u>Side effects:</u> Screening can result in cherry-picking by private insurance companies who take on low-risk healthy individuals and leave the remaining high-risk individuals in the national insurance market. Therefore, the government can choose to either subsidise the premiums of the low-income or create a national health insurance scheme that is mandatory for everyone, which will fully eliminate the problem of adverse selection.