ANGLO-CHINESE JUNIOR COLLEGE
JC1 Economics 2023

H1
H2

THE CENTRAL ECONOMIC PROBLEM

Reference Texts (Optional):

1. Sloman, Garratt & Guest, *Economics* 10th Edition, 2018, Pearson, Chapter 1.
2. Mankiw, Quah & Wilson, *Principles of Economics, An Asian Edition,* Cengage Learning, 2ND Edition, 2013, Chapters 1 & 2

WHAT IS THIS TOPIC ABOUT?

This topic is an introduction to the subject of Economics. Economics is much more than just a body of concepts, principles and theories. It is a way of thinking. It will equip you with the understanding of the rationale underlying the **decisions** which individuals, businesses and governments make about what to do with their **resources**, such as time and income.

Essentially, in all decisions we (consumers or producers) want to maximise the returns (or benefits we enjoy) in exchange for what we have to pay for or use up. For e.g. as consumers, we will look for the lowest price of a certain good (or minimise the costs) so that we can have the best outcomes in return for the money we spend; and as business owners, we want to produce the most output from a given amount of resources used.

For students to understand the most essential ideas in every topic, it is very important to carefully read and understand the learning outcomes below. When you end this lecture series, revisit these learning outcomes to check whether you have achieved them. If you have not, do not delay in asking your tutor for explanation or clarification**.** It is also important for you to answer the Essential Question and use the checklists provided because it will help you check your understanding as well as tie together all the key ideas in this topic

LEARNING OUTCOMES

Enduring Understanding: Students are to understand and note the following:

- The central economic problem of scarcity arises because individuals, firms, and governments have **unlimited wants** whereas the **resources** available for meeting these wants are **limited**.
- Due to the conflict between unlimited wants and scarce resources, **choices** have to be made.
- Choices are made by various economic agents to **maximise their self-interest**. However in the real world, decisions made may depart from this due to **cognitive biases**.
- For every decision made on the use of resources, there is **opportunity cost** incurred.

Overarching Essential Question:
Given the constraint of limited resources, how do we make decisions so as to maximise our benefits relative to costs incurred?

This article is to be <u>read and the following questions</u> answered before your first economics lecture.

Article: Cross Island Line could save commuters 40 minutes

The Cross Island Line that will stretch from Jurong to Changi could save commuters up to 40 minutes of travel time, said Land Transport Authority (LTA) chief executive Chew Men Leong. The new MRT line, which is scheduled to be ready by 2030, has been the subject of controversy in recent weeks, over one possible option of running the line under the Central Catchment Nature Reserve. Some Singaporeans have even questioned the need for the line in the first place.

Environmental groups in Singapore were also worried that the construction of the Cross Island Line would be harmful to the Central Catchment Nature Reserve, arguing that the Cross Island Line can potentially cause damage to highly valued ecosystems. As Central Catchment Nature Reserve is home to a diversity of plants such as the Keruing and Meranti and it also houses the Raffles Banded Langur and the Sunda Pangolin, both critically endangered animals.

Speaking to current affairs programme Talking Point, Mr Chew said the new line – with a potential daily ridership of 600,000 - would connect residents along the East-West corridor "to key employment centres such as Changi logistics park and the Jurong Lake district "with significantly shorter travelling times". "I give you an example. If the line is done, commuters from Ang Mo Kio can reach any part of the island using public transport within less than one hour, basically saving easily 30 to 40 minutes of travel time," he said.
In addition, "half of the 30-over stations have connections to other lines. This creates many more travel options for commuters. And it will help redistribute load in the other lines, generally giving better comfort to all commuters. At the same time, during disruptions, you have alternative travel options, enhancing the resilience of the entire network," said Mr Chew.

A debate currently centres around two possible alignments in the middle section of the Cross Island Line. One is a 4km stretch that would run for 2km under the nature reserve, at a depth of 40m. The second option is to skirt the reserve in a 9km route that might require land acquisition, and add 6 minutes to travel time.

"We have looked at many options. Right now, we have come down to two. There are not really other feasible alignments at this juncture," said Mr Chew. It may take two years for a decision to be made, Transport Minister Khaw Boon Wan has said. This is only after more environmental, technical and engineering studies as well as public consultations are carried out.

Adapted from Channel News Asia, 6 March 2016

** Refer to Annex (Pg 29) on the government's decision on the Cross-Island Line

Questions: *(to be attempted before first lecture)*

1) **What is the issue that the debate centres around?**

2) **Identify the different parties involved in the debate.**

3) **What are their aims and concerns?**

Parties involved	Aims	Concerns

4) **Whose perspective are you more in favour of? Why?**

1. SCARCITY AS THE CENTRAL ECONOMIC PROBLEM

In the previous set of lecture notes, you have learnt that Economics is about economic agents making decisions about how to use their limited resources to achieve the best possible outcome for themselves. This decision-making approach will be further expanded in this section.

1.1 Scarcity, Choice and Opportunity Cost

SLS Lesson: "*Scarcity, Choice and Opportunity Cost*"

The decision-making process links closely to the concepts of scarcity, choice and opportunity cost. Specifically, these concepts provide the basis for economic agents to rationalise how resources are to be allocated in order to achieve efficient outcomes.

1.1.1 Scarcity

Making a decision on how to use resources is necessary because of the ever present and universal problem of **scarcity**. Scarcity arises because human beings have unlimited wants but the resources available are limited.

What is a '***want***'**?**

- A want is a wish or a desire to have something. At any time, we have many wants. A want is not 'demand' because the person may not have the resources to attain the want. A want becomes a '**demand'** only when the person has the money to attain the want.
- Individuals have unlimited wants because we always want to have/enjoy more of everything in the world (luxury car, fancy restaurant food, branded clothes, etc.)
- Producers have unlimited wants because they want to produce more goods and services and make unlimited amounts of profits.
- Governments have unlimited wants because both the poorest and the richest nations in the world would wish to make available abundance of goods and services to their people.

What are '**resources**'**?**

Resources refer to factors of production needed for the production of goods and services. Economists classify resources into four groups:

1. **Land** refers to all the natural resources found on earth, e.g. forests, marine life, land and minerals. These are exhaustible resources and are finite.
2. **Labour** refers to the human effort from individuals who are both willing and able to work. These individuals belong to a country's labour force/working population. Although one's willingness and ability to work varies from person to person, it is still limited by the 24 hours available to each of us.
3. **Capital** refers to all man-made resources used to further production. Machinery, buildings, infrastructure (bridges, roads, satellites, airports, etc.) are examples of capital goods. These are limited as

'Land' is finite hence only a finite amount of capital can be produced. Capital can be categorised into physical and human capital.

Physical capital: the stock of manufactured resources such as factories, machinery, roads, and tools.

Human capital: the value of the workforce, which can be improved through education or training.

4. **Entrepreneurship** refers to the human effort that brings together resources for production of goods and services to earn profits. Entrepreneurs are risk takers because they use their resources or borrow funds to buy resources to set up business for profits. Without entrepreneurship, there can be no production.

> **Exams Tips:**
> An acronym to help you remember the 4 groups of resources is CELL.

So the fundamental economic problem is scarcity, defined as human wants are virtually unlimited, whereas the resources available to meet those wants are limited.

1.1.2 Choice

- As all economic agents (consumers, producers and the government) face limited resources but have unlimited wants, all economic agents face the same problem of scarcity. Hence, it is inevitable that decisions have to be made to choose the best outcome among all possible choices.
- In economics, such decisions are made based on the objective of maximising self-interest:
  - **Consumers** will allocate their limited income to maximise their own utility (i.e. satisfaction);
  - **Producers** will allocate their limited resources to maximise profits; and
  - **Governments** will allocate their limited resources such as land to maximise social welfare.
- Economic agents are assumed to make **rational choices.** Decision-makers will weigh the **costs and benefits** of different options in order of preference. The **highest-ranked option** based on a specific set of criteria will be the chosen one as it generates the **maximum net benefit** (total benefit – total cost) to the decision-maker. *(Refer to Section 2 for a more detailed explanation of the decision-making process)*

1.1.3 Opportunity Cost

- Each time a choice is made, all other alternatives are foregone.
- **Opportunity cost** refers to the value (or net benefit) of the next best alternative foregone.

[Note: opportunity cost does not refer to the total benefit of all other alternatives foregone.]

- Rational decision makers consider both the opportunity cost and the explicit cost incurred whenever a decision is made.
- The examples below illustrate how the opportunity cost of a particular use of resources is determined.

Example 1:

You have four hours of free time in an afternoon. You have three options on how to use the four hours and you have ranked them from the highest to lowest in terms of the utility/satisfaction (net benefit) you derived from them, with the assumption that all costs incurred for each option have been taken into account (e.g. transport, meals, etc.):

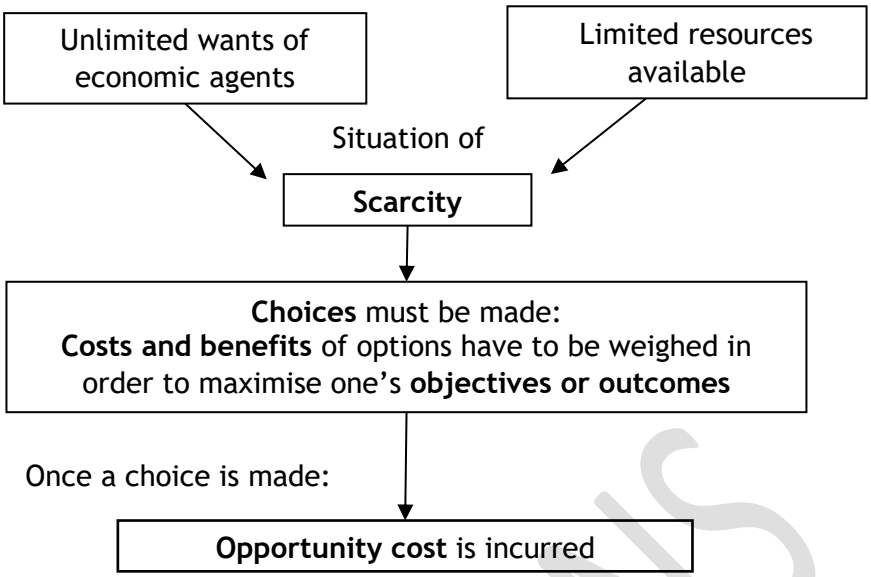
1. Work at a café and earn $20 to buy a shirt you wanted
2. Meet friends
3. Spend a quiet time reading in the library.

The ranking above should be based on a specific set of chosen criteria that is comparable across the options, and can best describe your highest level of satisfaction. For example, while meeting friends can be valued at a certain level of enjoyment, if the valuation of the happiness of working and having a new shirt is greater than that of meeting friends, you will rank the option of working at a café higher.

Having decided on working at a café as the highest ranked option, the second-ranked option, meeting friends, is considered as the next best alternative forgone. The forgone enjoyment from a friends gathering is therefore the **opportunity cost** incurred for working at the café.

Economists argue that choosing the first option is a rational decision as the net benefit is the greatest among the three options.

Linking Scarcity, Choice and Opportunity Cost



- Rational decision making is not always simple. **Information** is key to accurate calculation of benefits and costs. Net benefits from alternative uses of resources have to be determined and then ranked. There are challenges in determining the values assigned to the benefits of the options being ranked. For example, are the valuations of benefits assigned to reading and that of meeting friends comparable? How do governments determine whether higher net benefits will be derived from free healthcare services or from free education financed by government tax revenue?
- The basic concern of economics is simple to understand, but the challenges to individuals, firms and governments lie in making the 'best' or 'right' choices on how to use their resources to achieve the best possible outcomes. In short**, the challenge is to make decisions that maximize self-interest** of the decision-makers, be it the individual, the firm or the government**.**

Key Learning Points in Section 1:

- ✓ Scarcity applies to all economic agents.
- ✓ Scarcity necessitates choice on the use of resources amongst alternative uses in order to maximise economic agents' self-interests.
- ✓ The concept of opportunity cost guides the economic agents to make rational choices with regards to the use of resources.

2. DECISION-MAKING IN ECONOMICS

Assuming economic agents are fully rational, they would make decisions in their own self-interests and choose the one that will give them the maximum net returns.

SLS Lesson: "*Rational Decision Making (An Overview)*"

Different economic agents have different self-interests.

- **Consumers** seek to **maximise their utility (satisfaction).**
- **Firms** seek to **maximise profits (sales revenue minus costs).**
- **Government** seeks to **maximise social welfare.**

All economic agents are faced with limited resources and unlimited wants, and hence, would have to address the fundamental problem of economics: achieving **efficiency** in allocation of resources.

2.1 Rational Decision-Making Process

In economics, the "best economic decision" is defined as:

1) **Rational**, where the **total net benefits are the maximised** and
2) **Feasible**, where the **costs are within the constraints** of the economic agent(s).

Now let us look at the different aspects of decision-making process.

2.1.1 Aspects of Rational Decision-making approach in Economics

As far as possible, a rational decision-making process considers the following factors:

- **Costs and Benefits**
- **Constraints**
- **Perspectives**

Costs and Benefits (The Marginalist Principle)

- Every economic decision is motivated by a set of benefits and a set of costs. In making any decision, every economic agent would consider the monetary and non-monetary costs and benefits of every possible choice.
- The opportunity cost of the decision is also considered.
- When considering costs and benefits, economic agents consider the **marginal** cost and benefit.

The Marginalist Principle:

- All economic agents make economic decisions <u>at the margin</u>.
- Such decisions are often about whether consumers are to <u>consume the additional unit</u> of good or service, or producers are to <u>produce the additional unit</u> of good.
- The key word is "**marginal**". What exactly does 'marginal' mean?
- The term 'marginal' means <u>additional</u>. In helping the economic agents to make such decisions, economists look at the **marginal benefits (MB)** (additional benefit) and **marginal costs (MC)** (additional cost) of that unit of the good and service consumed or produced.
    - The **marginal benefit** of an economic activity refers to the **<u>addition</u>** <u>to total benefits</u> due to the consumption / production of that one unit of good or service.
    - The **marginal cost** of an economic activity refers to the **<u>addition</u>** <u>to the total costs</u> due to the consumption / production of that one unit of good or service.
- Since different economic agents have different objectives, the marginal benefits (MB) and marginal costs (MC) are different for different economic agents.
    - For a **consumer**, MB is the **marginal utility** that is derived from consuming the good while MC is the **marginal cost** he/she has to incur from purchasing the good for consumption, which is equivalent to the price that he/she has to pay for the good as well as the opportunity cost of the price he/she paid for the good.
    - For a **producer**, MB is the **marginal revenue** earned from selling the good while MC is the **marginal cost** (e.g. costs of extra raw materials or more labour hired) of producing the good.
    - For a **government**, the MB is the **marginal social benefit** while MC is the **marginal social cost** that arise from the production / consumption of the food.

<u>Example to illustrate decision-making of a consumer, using the marginalist principle:</u>

Peter decides to have sushi rolls for lunch and is wondering how many he should have. He has already had 6 sushi rolls and is now deciding whether to go for the 7th sushi roll. How will Peter decide whether or not to go for the 7th sushi roll?

Assuming rational decision-making, consumers like Peter would aim to maximise their utility.

- If the **MC** of the 7th sushi roll **<** **MB** (his satisfaction) of the 7th sushi roll, Peter <u>should consume</u> the additional sushi roll. This is because the additional benefit outweighs the additional cost of consuming the 7th sushi roll. As such, Peter's <u>net benefit will increase</u>.

SLS Lessons:
"*Rational Decision-Making by Consumers*" and "*Rational Decision-Making by Producers*"

- If the **MC** of the 7th sushi roll **> MB** of the 7th sushi roll, Peter should not consume the additional sushi roll because this represents an overall drop in his net benefit.

So how would Peter know when to stop consuming sushi?

All economic agents will make the economic decision at the point where:

MARGINAL COST (MC) = MARGINAL BENEFIT (MB)

At this point where **MC=MB**, the total **NET** benefits (total benefits MINUS total costs) from the consumption / production is the **maximum** possible.

Note: This marginalist principle is very important and will be applicable throughout the entire A-level syllabus.

- Economic agents weigh the expected marginal costs and benefits of each alternative.
- The economic agent will proceed to compare and rank the options. *Do note that some options can yield negative net benefits, which means that option is considered as irrational.*
- Economic agent will hence choose the alternative with the greatest marginal benefits relative to the marginal costs (to maximise NET benefits).

Constraints

- Economic agents identify the constraints facing each option to evaluate the feasibility of each option.
- Constraints could include **income/budget** and **level and accuracy of information** such as expertise, skills, technology.
- For example, constraints to a consumer could be the income / budget he has to purchase the good. Constraints to a government when deciding whether to build an additional hospital is the budget they have and whether they have the skills/technical know-how to do so.

Perspectives of other economic agents

- In the real world, economic agents do not make decisions in isolation of others as the decision by an economic agent (e.g. consumer) will have an impact on other economic agents (producer or government). Their (producer or government) subsequent reactions will in turn affect the intended outcome of the decision made (by the consumer).
- For example, the profit-driven producer considers the perspective of the consumers in analysing the potential effectiveness of strategies employed, while governments consider the perspectives of stakeholders (households and firms) in their policy decisions.

- Rational decision-making thus require as much accurate information as possible about other agents' perspectives to obtain the most efficient outcome.

2.1.2 Factors that might hinder rational decision-making:

While agents try their very best to be as rational as possible in decision-making, certain conditions may influence the outcomes, such that they may result in less optimal outcomes for them. Thus, they might think that they have made a rational decision, their outcomes may not necessarily be an efficient one.

Hard to quantify costs / benefits / constraints

- The valuation of costs and benefits may **include intangibles** that may result in decisions that may not necessarily reflect an optimal outcome. For example, the Singapore government sees the creation of a Founders' Memorial site to be of historical significance to the country. Thus, the value of benefit it brings to country goes beyond what is economically profitable.

The valuation of costs and benefits may differ between agents, even for the same good or economic activity.

- For example, different consumers regard the value of a buffet spread in a hotel restaurant differently. In other example such as reducing the number of accidents caused from using personal mobility devices (PMDs), the government values the benefits of public safety more than consumers' own valuation of benefits such as convenience or ease of travel on PMDs, resulting in the decision of a ban imposed on use of PMDs on pedestrian walkways.

Insufficient Information

Refer to Topic 3 "Market Failure: Information Failure" for a more detailed explanation.

- Rational decision-making entails the need for a breakdown of the quantitative and qualitative information on costs, benefits, trade-offs, and intended and unintended consequences pertaining to each choice are necessary.
- The quality of decisions made is affected by the accuracy and timeliness of information made available to the economic agents. Information includes statistics, survey data, reports, articles, empirical observations.
- The accuracy of information may be affected by the nature of its sources, which may not be trustworthy or may be value laden. For example, during the COVID-19 pandemic, information could be taken from sources that are unverifiable or written using unscientific information.
- While accurate information is critical, sometimes the cost of gathering of information could be so high that it reduces the net benefit of a decision. For example, professional football clubs in

Europe would incur a high fee to obtain an accurate picture of the medical fitness of a potential player before deciding to hire him.

2.1.3 Consequences of economic decision making

- Economists will assume rational consumer and producer behaviours for any given economic conditions when forecasting the outcomes of an economic decision.
- Whether positive or negative, the outcomes of a decision made can be considered as **intended or unintended.**

Intended consequences/outcomes

- **Intended outcomes** describe the expected consequences or outcomes predicted based on the assumption of rational behaviour of economic agents.

Unintended consequences/outcomes

- These are **outcomes which are not intended** while making the decision.
- This might occur because economic agents may not have made their decisions under full or perfect information conditions, due to an inability to have access to complete information or when economic conditions unforeseeably change.
- If these are adverse outcomes, then further economic decisions should include measures to manage them. Note that there are also a possibility of unintended outcomes that are positive where benefits are reaped unexpectedly.

Subsequently, the consumer might review his/her decision after taking into account changes that occur over time (internal changes such as the changing needs of the family or external changes such as changes in government policy).

2.2 Cognitive Biases

SLS

SLS Lesson:
"*Cognitive Biases*"

The basis of decisions made by agents may sometimes be inconsistent with a rational behaviour. The traditional self-interest model is simple and elegant, but they could result in incorrectly predicted outcomes in the real world.

Economic agents often make systematic cognitive errors that prevent them from choosing the decision that will best promote their self-interest. These cognitive errors are collectively known as "**Cognitive Biases**":

Cognitive biases exists when someone thinks in a way that can be regarded as irrational or that goes against sound, logical judgement. There are multiple types of cognitive biases, but we can focus on three types of cognitive biases:

Sunk cost fallacy:

A sunk cost refers to any cost that has already been incurred, but cannot be recovered. The sunk cost fallacy refers to the human tendency to be influenced by sunk costs. Economic agents tend to continue an action because of their past decisions (such as usage of time, money, resources) rather than choose something else that will maximise their utility at this present time.

For example, when one has paid for a buffet meal, he would tend to overeat eat until he is uncomfortably full. This is despite knowing that he would be more comfortable if he ate less.

Loss aversion:

This is a cognitive bias that leads to economic agents making decisions that is based on avoidance of losses, rather than the possibility of making gains. This is because there is a tendency for people to experience losses as more painful than the pleasures that result from gains of the same magnitude. This fear of losing results in people trying to avoid losses in whatever way possible, including taking unnecessary risks or engaging in irrational behaviour.

Marketing campaigns such as trial periods and rebates take advantage of an individual's tendency to avoid losses. As the buyer incorporates that specific software or product into their lives, they are more likely to purchase it, as they want to avoid the loss they will feel once they give up the product. This tends to happen because scaling back, whether on software trials, expensive cars, or bigger houses, is an emotionally challenging decision.

Salience bias:

This describes the tendency for consumers to focus on items or information that are more noteworthy, and ignoring others that do not grab their attention. This could lead to people ignoring vital information and making impulsive or uninformed choices.

For example, air planes have always been one of the safest mode of transport since technology advancement. However, whenever the news broke about any deadly airplane accident, some consumers may delay travelling plans or avoid taking plane altogether as the flight accident is more noteworthy than the statistics of safe air travel.

Key Learning Points in Section 2:

- ✓ Economists consider the various aspects of the decision-making process to guide them in making the most efficient decision outcome.
- ✓ Decisions made may be non-rational, however, due to cognitive biases
- ✓ Economists apply the Marginal Principle when determining the optimum level of production (for firms) or consumption (for consumers).

3. PRODUCTION POSSIBILITY CURVE (PPC)

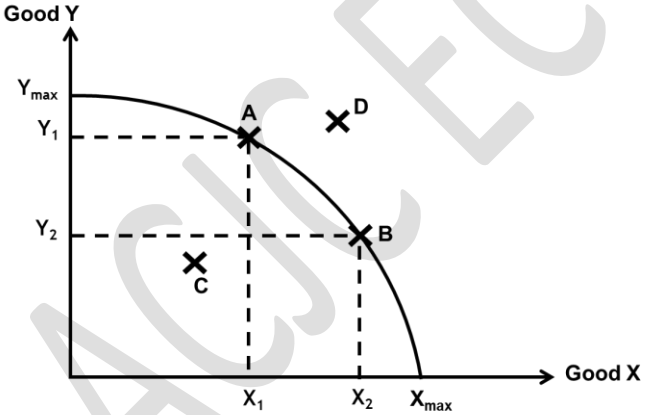
Having learnt that all countries face the fundamental problem of scarcity, we now look at how economists use the **production possibility curve** (**PPC**) as a diagrammatic tool to explain the concepts of scarcity, choice and opportunity cost.

SLS Lesson: "*The Production Possibility Curve (PPC)*"

3.1 Diagrammatic Representation

- The **PPC** represents all possible combinations of output of two goods that a country can produce within a specified time period, given the available resources and technology.
- Figure 2 below shows the production-possibility curve (PPC) of a country **producing two goods, X & Y.**
- In reality, most countries produce many goods and services. In drawing the PPC, the following assumptions are made:
  - The country produces only two goods.
  - The country has a fixed amount of resources and the level of technology is constant.
  - All factors of production are fully and efficiently employed.

Figure 1: The PPC of a country producing goods X and Y



Note that the y axis and x axis can also take other labels. For example:
- Agricultural goods vs. manufactured goods
- Consumer goods vs. capital goods

3.2 Productive Capacity

- **Productive capacity***:* At any given time and resources present, a country will be able to produce a certain maximum level of output of both goods.
- This maximum productive capacity is represented by the PPC boundary which stretches from Y_{max} to X_{max}.
- Using all resources to produce only Good X, the country can produce X_{max} with none of Good Y produced. Alternatively, it can produce only Good Y at $Y_{max,}$ with none of Good X produced.
- Alternatively, the country can choose to produce any combination of goods X and Y. Points A and B show two possible combinations of goods X and Y using the same amount of resources and level of technology, with all resources being fully and efficiently utilised.

3.3 Attainable and Unattainable Points

- The PPC can be used to explain how the concepts of **scarcity** and **productive efficiency** can be applied to a country.
- **Combination of goods at points ON the PPC** represent maximum attainable output combinations. When all resources are fully and efficiently employed (i.e. country is at full employment), the country can produce on the PPC, e.g. **points A or B**.
    - If the country is producing on the PPC, it also means that the country is productively efficient. This refers to a situation where **goods are produced at the minimum average cost possible for the given output size**.
    - While all points on the PPC are productively efficient, only one point on the PPC is allocatively efficient. This is the point which **maximises the society's welfare as it is fully aligned to the society's tastes and preferences**.
- **Combination of goods at points WITHIN the PPC**, e.g. point C, shows there is unemployment in the economy. Combinations lying within the PPC are attainable but the country is not employing its resources fully or efficiently or both. Thus, the country is productively inefficient.
- **Combination of goods at points OUTSIDE the PPC** such as **D,** represents unattainable combination of output because there is insufficient resources needed to produce the goods, or the technology required to produce these combinations are not available to the country.
    - These points illustrate the concept of **scarcity** as society would wish to produce at those levels but is not able to, owing to limited resources.

We will revisit these efficiency concepts when we learn more on market failure and firms and decisions in topics 3 and 4.

3.4 Movement of Resources between Uses

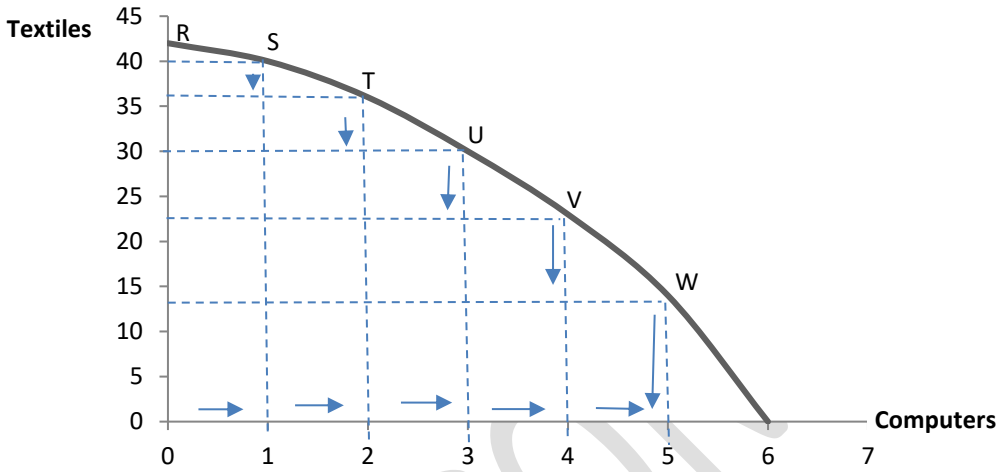
3.4.1 Choice and Opportunity Cost

- The PPC can be used to explain how the basic concepts of **choice** and **opportunity cost** are applied to a country.
- **As mentioned earlier,** points within the PPC indicate situations of unemployment and inefficiency in the economy. From within the PPC, the country can produce more of both goods without having to forgo either Good X or Good Y, i.e. without incurring an opportunity cost.
- **Moving from one point** (e.g. A) **to another point** (e.g. B) **on the same PPC** would involve a trade-off. The country has to forego some of good Y in order to obtain more of good X. We can relate this to the opportunity cost of moving from A to B. Thus, the opportunity cost of increasing production of good X from X_1 to X_2 is represented by Y_1Y_2. For any point on the PPC, to produce more of one good, e.g. good X, the country has to forego some units of good Y because resources need to be shifted away from the production of good Y to produce good X.

3.4.2 Increasing Opportunity Cost of Production

Figure 2 and Table 1 below are graphical and numerical representation respectively of the PPC of country M producing Textiles and Computers.

Figure 2: PPC of Country M showing increasing opportunity cost of producing each additional unit of computer



- **R, S, T, U, V** and **W** on the PPC are combinations of production choices that country M may decide on.

Table 1: Numerical illustration of opportunity cost on PPC

Combinations	Computers (units)	Textiles (units)	Opp. Cost of 1 unit of computer (units of textile forgone)
R	0	42	-
S	1	40	2
T	2	36	4
U	3	30	6
V	4	23	7
W	5	14	9

From Figure 2 and Table 1:

- **Moving from R → S:** an increase of an additional unit of computer (0→1) means that country M would have to forego 2 units of Textiles.
  - Additionally, we should take note that country M is actually shifting resources away from textile production into computer production.
- Moving from **S → T**: A marginal increase (1→2) of computers leads to a fall of 4 units of Textiles.
- Moving from **V → W**: a marginal increase (4→5) of computers leads to fall of 9 units of Textiles.

- This also means that at this level of computer production, more resources have to be taken away from the production of textiles towards producing that same marginal unit of computer.
- Thus, the quantity of textiles that have to be given up increases as country M marginally increase their production of computers.
- This demonstrates the situation of **increasing opportunity cost** as the country chooses to keep marginally increasing units of one good.
- **PPC is concave** (to the origin) due to increasing opportunity cost because resources are imperfect substitutes.
    - Some resources are better suited for the production of some goods than they are for others**.** Hence, for every additional unit of Good X, more and more resources from the production of Good Y have to be transferred to the production of Good X because these resources are becoming less suitable for the production of X, thereby increasing the opportunity cost of producing each additional unit of Good X.
    - For example, resources used to produce textiles cannot be easily converted into the production of computers.

The PPC illustrates the microeconomic issues of scarcity, choice and opportunity cost:

- **Scarcity** – illustrated by unattainable points outside of the PPC
- **Choice** - illustrated by the different combinations available among the alternative attainable points along the PPC.
- **Opportunity cost** - illustrated by the negative slope of the boundary (downward-sloping) i.e. need to give up textiles in order to produce more computers.
    - There is increasing opportunity cost due to resources being imperfect substitutes - illustrated by the PPC which is concave to the origin.

3.5 Shifts of the PPC

- An **outward shift of the PPC** shows that the country now has a greater capacity to produce more output, to attain more wants and enjoy a higher standard of living. When the entire PPC shift outwards, the country can be said to enjoy **potential economic growth**.
- If PPC shows all the combination of output that a country can possibly produce given the amount of resources and technology, then the PPC can shift outwards when there is:
    - An increase in the **quantity** resources. For example, when government increase the number of foreign workers into the country, the labour force size increases.
    - An increase in the **quality** of resources. For example, the Singapore government places heavy emphasis on productivity and skills training for our labour, to ensure that our labour force remains competent and of high quality.

- Improvement in the **technology.** For example, government strives to develop the nationwide 5G network in Singapore. This not only enables the wave of new transformative tech products to be developed (e.g. smart toothbrushes, self-driving cars) but also makes communication with cloud platforms faster and easier, supporting more businesses and infrastructures.

Key Learning Points in Section 3:

- ✓ Through the understanding of PPC, it showcases the problem of scarcity facing each economy as the country has to decide on the combination of output that the country wants to produce, based on the limited resources and level of technology the country has.

4. Applications of Production Possibility Curve (PPC)

Apart from helping us to illustrate the basic economic problems of scarcity, choice and opportunity costs, the PPC is useful in presenting diagrammatical illustration of the following real world economic issues. (*These issues will be revisited and discussed in detail under the macroeconomic model.)*

4.1 Attainable Standard of Living

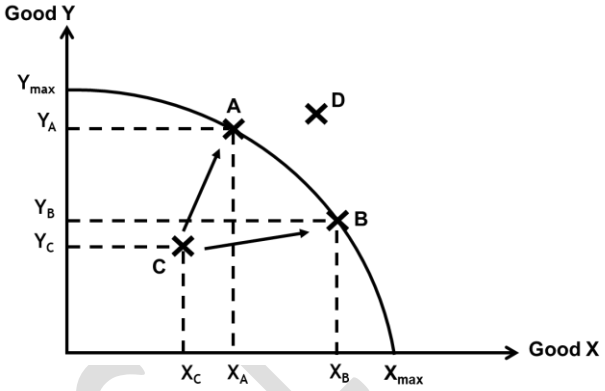
- **Standard of living** in a country refers to the quality of life which the population enjoys. It depends partly on the level of output produced by the country, which will also determine the level of earnings/income made by individuals (and hence their ability to afford more goods and services), and the mix of goods and services produced.
- The position of PPC is used to differentiate between attainable and unattainable wants, given the existing amount of resources and current state of technology. To achieve the highest standard of living possible, a country must produce at combination of goods on the PPC (i.e. at a point on the PPC) where all resources are fully and efficiently employed. When a country achieves full employment and resources are efficiently employed, it means that the population enjoys the highest national output or income and hence standard of living possible.
- The PPC illustrates the productive capacity of a country. However, it is possible for people in the country to consume more than what the country produces (i.e. consume outside the PPC). The ability of the country to consume can be made higher through **international trade.** For example, a country can produce more than what the country needs of one good and export this good in exchange for imports of other goods which the country is less efficient in producing them.
- Therefore, points outside the PPC which were previously unattainable in production may become attainable in consumption through international trade.

Note: In JC2, H2 students will learn how international trade improves standard of living as a country specialises in producing goods which incur a relatively lower opportunity cost than her trading partners. The country will thus export these goods in exchange for more units of imports.

4.2 Economic Growth, Unemployment & Underemployment

- The PPC is a useful tool in illustrating:
  - **Economics growth** refers to economic growth measures the increase (or change) in the amount of output a country produces within a period of time (usually a year) as compared to the previous period.

Figure 3: Actual Economic Growth in an Economy



- When the country moves from producing on point C to anywhere closer to the PPC, for example to point A, the country enjoys greater amount of both Good X and Good Y, hence experiencing economic growth. If the country chooses to move to point B instead (more of Good X but the same quantity of Y), it would still enjoy **economic growth** as there are now more of good X to be enjoyed without having to trade-off good Y.

  Thus, when the country moves from a point within the PPC to a point on the PPC, the country enjoys **actual economic growth**.
- A country can **reduce its unemployment of resources** when the country experiences greater production of output. Firms will hire more labour and buy more capital goods to produce more output. As a result, more resources are utilised. This can be illustrated by a movement of combination of goods from point C to say, points A or B on the PPC in Figure 4 above.
- **Contrastingly, when country moves from point A to C,** the country produces less amount of both Good X and Good Y. Producers cut down on their production and thus resulting in greater unemployment of resources.
- **Point C** may also indicate **underemployment of resources**. Even though resources are employed, but they are not utilised to their

maximum potential. For example, an engineering graduate being employed as a taxi driver.

- Thus, points within the PPC indicates presence of **unemployment and/or under-employment of resources in the economy.**

> **Exams Tips:**
> A change in unemployment does **NOT** shift the PPC. This is because there is no change in the total quantity of resources available.

4.3 Trade-off between Consumption and Investment

- Essentially, goods are produced for consumption or investment.
- **Consumption goods** are consumed by households to satisfy their needs and wants. Consumption boosts current standard of living**.**
- **Capital goods** are man-made goods for the purpose of further production (e.g. machinery, plants, infrastructure & buildings), and hence enable the producers the ability to expand production and contribute to further economic growth**.** Future economic growth of the country is thus expected to increase. The expenditure on capital goods is termed investment.

Figures 4a and 4b below illustrate the impact of additional investment (increasing capital goods production) on the country's PPC:

Figure 4: Impact of capital goods on economic growth

Figure 4a: Potential growth as a result of being at point A

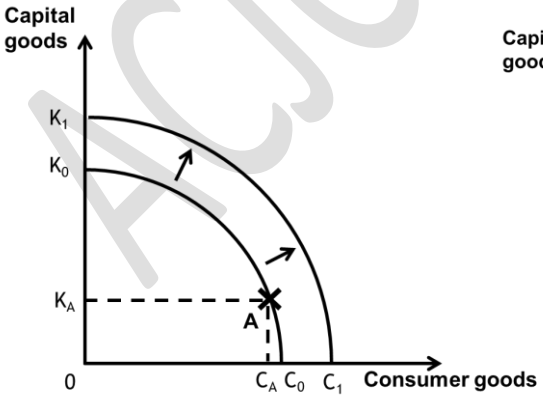
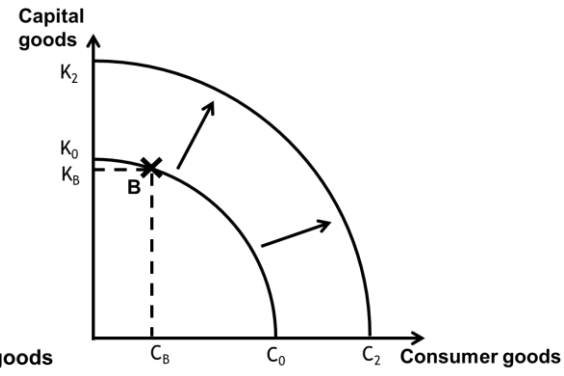


Figure 4b: Potential growth as a result of being at point B



- Figures 4a and 4b above illustrate the consequences of resource allocation on the **current and future standard of living**. When a country places more emphasis on consumption, current standard of living will improve but its future rate of economic growth would be lower (Figure 4a) than would have been the case if it had used more resources for investment (Figure 4b).
- Figure 4b illustrates a larger outward shift of the PPC because the production of more capital goods will generate a greater productive

capacity in the economy and create greater or higher potential economic growth. **With this increase in potential economic growth, there can be more consumption goods produced in the future. Economic growth can thus be sustained in the long-run.**

Think about this:
What do you think a government should prioritise: measures to improve current living standards or measures to improve future living standards?

Key Learning Points in Section 4:

- ✓ The aim of every economy is to achieve the best possible standard of living **with a given level of resources and technology**.
- ✓ A country is capable of producing more goods and services and achieving higher standard of living if it is able to expand its production capacity (i.e. expand the PPC) by increasing the quantity of resources and/or improving the quality of the resources and/or level of technology.
- ✓ To achieve best standard of living currently possible, country needs to achieve full employment.
- ✓ To raise the future standard of living, country needs to achieve both potential and actual economic growth.
- ✓ To achieve potential economic growth, country must increase the amount and/or improve the productivity of resources.
- ✓ The use of resources for consumption and investment has effects on current standard of living and future rate of economic growth.

Learning Reflection

Congratulations! You have completed this lecture topic.
How much have you understood?

Below are the checklists which you may use to assess how much you have understood.

	Content Checklist: Are you able to do the following?	***Checked***
1a. 1b.	Explain the central economic problem (i.e. scarcity) using the key concepts in this topic. Identify, define, and give examples of the different types of economic resources.	
2a. 2b.	Explain the concept of opportunity cost. Explain how scarcity results in opportunity cost incurred.	
3a. 3b. 3c.	Explain the marginal principle. Use the marginal principle to explain how consumers and firms decide on their consumption and production points, respectively. Use the decision making framework to explain how a decision is made.	
4.	Draw a PPC diagram and use it to explain the concepts of scarcity, choice, and opportunity cost.	
5.	Explain the meaning and significance of points within, on and outside the PPC (in terms of whether they are attainable and efficient).	
6.	Use the PPC to illustrate and explain the meaning of these macroeconomic terms: full employment, unemployment, underemployment, economic growth, standard of living.	

Annex

Article: Cross Island MRT Line to run under nature reserve

SINGAPORE - The upcoming Cross Island MRT Line that will stretch from Changi to Jurong Industrial Estate will run under the Central Catchment Nature Reserve (CCNR).
The Land Transport Authority (LTA) had previously considered two options - the direct alignment option to build the line under the nature reserve, or the skirting option, to build the line around the nature reserve.

Here are four reasons behind the decision:
1. Reduces commuting time by six minutes
The line under the CCNR will reduce travel time for commuters by six minutes, as compared with the skirting option.

2. Reduces public transport fares by 15 per cent on the direct route
LTA said the decision to build directly under the reserve could lower public transport fares by 15 per cent on average. The shorter and more direct route would cost commuters less, made possible under the current distance-based fares.

3. Lowers construction cost by about $2 billion
Building under the reserve could cost taxpayers $2 billion less compared with the alternative skirting option. Previously, an independent panel of advisers engaged by LTA had said the skirting alignment would result in more engineering challenges compared with the direct alignment. Residents living in the area around the CCNR had also voiced concerns in the past that skirting the nature reserve would affect them.

4. Lower energy consumption
In the longer term, LTA said the direct alignment decision could prove to be more environmentally friendly as it had lower energy consumption as compared with the skirting option.

LTA said the Government has considered the concerns expressed by all stakeholders and the findings of the comprehensive two-phased Environmental Impact Assessment (EIA). "LTA has been and is fully committed to implementing all practicable environmental mitigation measures recommended by the EIA. We will continue to engage and address feedback from stakeholders during the design and construction phase," it said.

Source: The Straits Times, 4 December 2019

YouTube Video:

- Cross Island MRT line: How safe is it? - The Straits Times, 6 December 2019 https://www.youtube.com/watch?v=n6uTaj1u3Xk

Other readings & perspectives:

- *Cross Island Line: Nature groups worry move may influence other future projects*- The Straits Times, 5 December 2019: https://www.straitstimes.com/singapore/environment/nature-groups-worry-move-may-influence-other-future-projects
- *Cross Island Line will improve connectivity across island*- The Straits Times, 5 December 2019 https://www.straitstimes.com/singapore/transport/crl-will-improve-connectivity-across-island
- *What's wrong with Cross Island Line running directly under Central Catchment Nature Reserve?* – Mothership, 9 December 2019 https://mothership.sg/2019/12/environmental-concerns-cross-island-line-explained/