

# ST ANDREW'S JUNIOR COLLEGE 2024 JC1 H1 ECONOMICS

# Scarcity as the Central Economic Problem

The theme of the Central Economic Problem introduces you to the fundamental problem of economics. It provides an introduction to the study of economics and explains the importance of resource allocation in an economy. You may think that economics is all about the study of money, prices, unemployment, inflation and profit. However, you are only right to a certain extent.

Economics is about the decision-making of different economic agents (consumers, producers and governments) to make the best use of the limited resources that we have to meet unlimited wants. You will learn more about the different considerations that economic agents have before they make their decisions and how these decisions often have both intended and unintended consequences.



# Important concepts and tools and analysis

- Scarcity, choice and opportunity cost
- ♥ Production Possibility Curve (PPC)
- ♥ Marginalist principle
  - Marginal cost, marginal benefit
  - Maximisation of utility (for consumers)
  - Maximisation of profits: MR=MC (for producers)
  - Maximisation of social welfare: MSB=MSC (for government)



# Key questions to consider

- 1. What is the difference between positive economics & normative economics?
- 2. What is the Central Economic Problem and how does it relate to the concept of scarcity?
- 3. How can economic resources be broadly classified and what are the key characteristics of each category?
- 4. Why do economic agents like consumers, producers and the government need to make choices in the face of scarcity?
- 5. How are opportunity costs incurred when choices are made in the allocation of resources for the production and consumption of goods and services?
- 6. How do we allocate resources considering the challenges posed by the central economic problem- scarcity?
- 7. What is a PPC (Production Possibility Curve) and how does it illustrate the relationship between scarcity, choice and opportunity cost?
- 8. How would changes in the quantity and quality of resources and technology affect the PPC?
- 9. How do economic agents make decisions?

# Contents

lm	portant conce	epts and tools and analysis			
Ke	y questions to	o consider	1		
1. INTRODUCTION TO ECONOMICS					
	1.1. What is	Economics?			
	1.2. Microec	onomics and Macroeconomics			
	1.3. Positive	and Normative Economics			
2.	CENTRAL	ECONOMIC PROBLEM (CEP)	5		
	2.1. Scarcity		5		
	2.2. Choice		7		
	2.3. Opport	unity Cost	7		
	2.4. Summar	y of the Central Economic Problem (CEP)			
3.	RESOURC	E ALLOCATION			
	3.1. Three B	asic Economic Questions			
4.	THE PROD	DUCTION POSSIBILITY CURVE	11		
	4.1. Drawing	g a Production Possibility Curve			
	4.2. Usefulne	ess of the Production Possibility Curve			
	4.3. Shape a	of the Production Possibility Curve	14		
	4.3.1.	How is increasing opportunity cost of producing a good being illustrated on a production possibi 14	lity curve?		
	4.3.2.	Why is the opportunity cost increasing?			
	4.4. Economi	c Growth and the PPC			
	4.4.1.	How Potential Economic Growth can be Achieved			
5.	RATIONA	L DECISION-MAKING BY ECONOMIC AGENTS			
	5.1. Margina	alist Principle			
	5.2. Margino	al Analysis for Different Economic Agents			
	5.2.1.	Consumers use marginal analysis when purchasing goods and services			
	5.2.2.	Producers/firms use marginal analysis to decide on the output level			
	5.2.3.	Governments use marginal analysis when making policy decisions			
	5.3. Decision	-Making Approach			
6.	CONCLUS	5ION			
7.	CONCEPT MAP SUMMARY OF THE CENTRAL ECONOMIC PROBLEM				
8.	APPENDI	(			
	8.1. DIFFERE	NT ECONOMIC SYSTEMS			
	8.1.1.	Types of Economic Systems			



# **1. INTRODUCTION TO ECONOMICS**

# 1.1. What is Economics?

Welcome to the exciting and interesting world of economics! Most of you have not studied economics before but you will soon realise that it is a subject that surrounds your entire life.

Economics is a social science, which studies how individuals, governments, firms and nations make choices on allocating scarce resources to satisfy their unlimited wants.

Economics is the social science that studies the production, distribution and consumption of goods and services.

– Adam Smith\*

\*Adam Smith (1723-1790) is considered as the father of modern Economics. He was a Scottish philosopher and economist who is best known as the author of An Inquiry into the Nature and Causes of the Wealth Of Nations (1776), one of the most influential books ever written. The academic field of economics as we know it now has its roots in Adam Smith's The Wealth of Nations.

Economics is concerned with:

- The production of goods and services: (i) how much goods and services, as well as the types of goods and services the economy produces; (ii) how much each firm produces and; (iii) what techniques of production are used.
- The consumption of goods and services: (i) how much the population as a whole spends (and how much it saves); (ii) the pattern of consumption in the economy; (iii) how many people buy a particular item and; (iv) how people's consumption is affected by prices and other factors.

Ask people if they would like to have more money, and the vast majority would answer "Yes". They want more money so that they can buy more goods and services; and this applies not only to poor people but also to most wealthy people too. The point is that human wants are virtually unlimited. Yet the means of fulfilling human wants are limited. We are bound by constraints. At any one time, the world can only produce a limited amount of goods and services because it has a limited amount of resources.

What is Economics to you?



# **1.2. Microeconomics and Macroeconomics**

Economics can be broadly separated into two branches: microeconomics and macroeconomics. You will be focusing on microeconomics in JC1 and macroeconomics in JC2.

**Microeconomics** is the study of economic behaviour of individuals and firms. For instance, it examines how a firm determines its level of production and the price of its products. It also examines the determinants of the price of a good in the market, for example, a car.

**Macroeconomics** is the study of economy-wide phenomena resulting from group decisionmaking. As such, it deals with the economy as a whole. It involves the study of *aggregates* such as the general price level, unemployment rate and national income.

Try to answer the following question:

Which of the following is a topic of discussion in macroeconomics?

- a) an increase in the price of a pizza
- b) a decrease in the production of DVD players by a consumer electronics firm
- c) a decrease in Singapore's unemployment rate
- d) the entry of new firms into the IT software industry

# Key Question 1: What is the difference between positive economics & normative economics?

#### 1.3. Positive and Normative Economics

Statements in economics can be categorised into positive and normative economics. Knowing the difference allows you to **discern between objective and subjective statements** when you are presented with information and/or perspectives of different economic agents regarding an economic issue. This will allow you to make better decisions.

**Positive economics** can be defined as the branch of economics that describes and explains economic phenomena, focusing on facts and cause-and-effect relationships. It includes the development and testing of economic theories, and is sometimes referred to as *value-free (i.e., objective)* economics.

Examples of positive (objective) statements:

- 1. The government has reduced corporate taxes to 16.5%.
- 2. An increase in household income will lead to an increase in the demand for luxury goods.

Normative economics is a part of economics that expresses *value judgements*. This can be about what is deemed fair, what the outcome of the economy *should* be, and what policy measures *ought* to be used. These statements cannot be proven true or false.

Examples of normative (subjective) statements:

1. The government *should not* have reduced corporate taxes to 16.5%.



#### 2. The government *should* subsidise the production of cars.

In any discussion about economic issues, it is important to know whether you are arguing over positive or normative statements. If it is the latter, it is more difficult to settle the disputes. Your journey as an economics student will involve making both positive and normative statements.

Are these positive or normative statements?

- a) A bad coffee harvest will increase coffee prices and people will drink more tea.
- b) Greece should exit the European Union.
- c) The Singapore government should raise GST.
- d) Singapore's land mass is bigger than China's.

# 2. CENTRAL ECONOMIC PROBLEM (CEP)

Key Question 2: What is the Central Economic Problem and how does it relate to the concept of scarcity?

#### 2.1. Scarcity

Scarcity arises due to limited resources and unlimited wants.

The basic economic problem is that of *scarcity*. Human wants are unlimited but the means to fulfil those desires are limited. At any given time, the world can only produce a limited amount of goods and services because its resources are limited. The limitation of resources (also known as factors of production) and the existence of unlimited wants lead us to the central economic problem – *scarcity*.

Unlimited Wants: Consumption and Production

All human beings have needs and wants. The basic needs of human beings cause them to demand for basic necessities which are finite such as consumer goods and water. However, when we refer to wants, we refer to the insatiable human desire to consume goods and services. Even if all their needs are fulfilled, individuals will still have unlimited wants. For example, as technology advances, humans would demand newer models of handphones, cars, better houses, etc. Firms, also have unlimited wants such as wanting to build factories and equipping them with the most advanced technology for production. Even governments have unlimited wants such as wanting to build more schools and hospitals.

Limited Resources: Factors of Production (Economic Resources)

To satisfy human wants, the economy uses its resources to produce goods and services. A society's productive resources are also called factors of production. Economics is the study of how producers and society choose to employ scarce resources to produce goods and services and distribute them among various people and groups in society in order to satisfy their wants.



# Key Question 3: How can economic resources be broadly classified and what are the key characteristics of each category?

Factors of production are traditionally classified into 4 types:

#### 1. Land

Land refers to all the natural resources available, which could be renewable or non-renewable in nature. Renewable natural resources such as water and wind renew themselves at a fast enough rate for sustainable economic extraction, whereas non-renewable natural resources such as fossil fuels and mineral deposits (e.g., tin, coal) do not renew themselves at a fast enough rate to allow for sustainable economic extraction.

The income that resource owners earn in return for land resources is called rent.

2. Labour/Human capital

Labour refers to people, including their skills and abilities. It is the mental and physical effort of workers measured in terms of man-hours which is directed to the production of goods and services. The *quantity* of labour available for an economy consists of all those who are *able* and *willing* to work. It is the services of labour, not labour itself, which are bought and sold in the labour market. Human capital is the *quality* of the labour force i.e., the knowledge and skills that people develop and possess in order to produce goods and services more efficiently. Human capital can be improved through education and better healthcare.

The income earned by labour resources is called wages.

3. Capital\*

Capital (sometimes referred to as physical capital) refers to the stock of man-made physical resources used or are available for use in the production. Examples include factories, machinery, roads and tools that are used to produce goods and services. Infrastructure such as the nation's stock of railways, hospitals, schools, airports, water plants and telecommunication are also necessary for economic activities. Infrastructure is usually accumulated through investment by the government. Improving infrastructure may lead to improved economic growth and development.

\*Note: To non-economists or a layman, capital refers to funds (money) needed to run a business. In economics, however, money is merely a medium of exchange and is <u>not</u> classified as factor of production.

The income earned by owners of capital resources is called interest.

#### 4. Entrepreneurship

Entrepreneurship refers to the factor of production that takes overall responsibility and risk for the decision-making process in the firm so that all other factors of production (land, labour and capital) can be combined to provide a good or service. Entrepreneurship is very important. Without an entrepreneur, the other factors of production would remain idle or unemployed.

Profit is the income earned by entrepreneurs for bearing the risk of organising and combining factors of production to produce output.



Think about it: Can scarcity ever be eliminated?

## 2.2. Choice



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Key Question 4: Why do economic agents like consumers, producers and the government need to make choices in the face of scarcity?

Given the problem of scarcity as explained above, economic agents would inevitably need to make choices because factors of production/resources are limited. As economic agents choose how to allocate scarce factors of production/ resources, trade-offs are made.

We focus on three groups of economic agents: (1) Consumers; (2) Producers and (3) the Government.

To make a rational choice, economic agents must be aware of the constraints that they are operating within. Economic agents must factor in the costs and benefits of the choices available. Finally, economic agents actively consider information and different perspectives to weigh costs and benefits. We will touch on this more in Section 4.

# 2.3. Opportunity Cost

Key Question 5: How are opportunity costs incurred when choices are made in the allocation of resources for the production and consumption of goods and services?

Scarcity forces people to make choices and for every choice made, an **opportunity cost** is incurred.

Opportunity cost refers to the value of the <u>next best</u> alternative foregone when a choice is made.

Therefore, opportunity cost can be seen as the cost of using resources for a certain purpose, measured in terms of the net benefits that could have been derived from the next best alternative foregone. It is important for an economy to allocate resources efficiently to minimise the opportunity costs incurred.

\* Example of Opportunity Cost to a Consumer

Suppose you choose to spend an extra hour watching television. What is your opportunity cost? When you spend an additional hour watching television, there are many other things you



could have done in that one hour. You could have slept, gone for a meal or read a book. If you consider reading a book to be your <u>next best</u> alternative, then the opportunity cost of watching television for an additional hour would be the net benefit of reading a book.

\* Example of Opportunity Cost to a Producer

Suppose a farmer decides to grow coffee on his piece of land. What is his opportunity cost? When he grows coffee, there are many other cash crops that he could have grown on that same piece of land. He could have grown tea, corn, bananas, etc. If he considers growing tea to be his *next best* alternative, then the opportunity cost of growing coffee with the piece of land would be the net benefit of growing tea.

• Example of Opportunity Cost to a Government

Suppose the government decides to allocate \$5 billion of the government budget to national defence. What is its opportunity cost? When it allocates \$5 billion to national defence, there are many other essential sectors of the economy that the funds could have been allocated to. It could have allocated the funds to the sectors of healthcare, education, housing, transport, etc., instead. If the government considers allocating the funds to education to be its <u>next best</u> alternative, the opportunity cost of spending on national defence would be the net benefit of spending on education.



### 2.4. Summary of the Central Economic Problem (CEP)



How would questions that require you to explain the concepts of scarcity, choice and opportunity cost look like? Have a look at the following questions: These questions correspond to **Sect A Qns 1 & 2** of your Scarcity as the Central Economic Problem Tutorial package.

#### Section A

2023 H1 DHS Prelim

1a Explain what the opportunity cost of the US\$187.6 billion invested by the [2]
 US government to fund public health programmes might be.

#### 2015 H<br/>1 & H2 HCI Prelim

2. Use the concept of opportunity cost to explain the theoretical relationship [3] between interest rates and level of savings.



## 3.1. Three Basic Economic Questions



Key Question 6: How do we allocate resources considering the challenges posed by the central economic problem – scarcity?

The existence of scarcity creates the basic economic problem faced by every society. To solve this basic problem, every society must answer these three basic economic questions.

#### 1. What and how much to produce?

Since producers face the **constraint** of not having enough resources to produce all the goods and services the society desires, producers must make a choice and decide what goods or services to produce, and in what quantity they should produce. For example, which consumer goods should be produced? How much of the available resources should be devoted to each of the consumer good? For each unit of the good or service sold, the producer receives revenue (monetary benefits) in return and incurs the monetary costs of hiring the available resources to produce the unit of the good or service. Because resources are scarce, each decision that the producer makes about what and how much to produce also comes at an opportunity cost.

In a free market economy, **consumer sovereignty** is also of utmost importance in deciding what and how much to produce. Consumer sovereignty is defined as the power of consumers to decide what gets produced in the society through their spending on goods and services. Consumers will signal to producers their preferences for what they are keen to purchase through prices. The more consumers value the good, the higher the prices they are willing to pay for it. This price thus serves as a **signal** or **information** to producers to know what they should be producing in the society. Hence producers are considering the **perspectives** of the consumers.

After accounting for the various considerations, producers will undertake their decisions and produce the type and quantity of output that offers the maximum net benefit.

#### 2. How to produce?

After deciding on what and how much to produce, the producer must next decide how the goods should be produced. Producers will have to decide the following:

- What combination of resources is the most efficient in the production of the goods?
- Is it possible to use more skilled labour or machinery and less unskilled labour?
- What techniques of production are going to be adopted?

Producers will make these decisions based on his objective: to maximise profits or to maximise revenue or to maximise output, etc. When all resources are fully and efficiently employed, and the economy is producing at its maximum capacity, the economy is said to have been productively efficient.

For note taking



#### 3. For whom to produce?

Who gets the goods? Generally, people who are willing and able to pay for the good get it. So, income plays a big role in determining the distribution of the good. In a market economy where price has a distributive function, and because individuals and businesses purchase commodities with their incomes, the higher the income of an individual, the more goods and services one can consume. Hence, more resources may be allocated by the producers to producing goods for the higher income group. This may not always be desirable and government intervention is required to redistribute the allocated resources and goods amongst the different income groups.

In the next chapter, we will learn how the free market can help allocate resources efficiently to address these 3 questions.

# 4. THE PRODUCTION POSSIBILITY CURVE



Key Question 7: What is a PPC (Production Possibility Curve) and how does it illustrate the relationship between scarcity, choice and opportunity cost?

The **production possibility curve** (PPC) is a useful tool when explaining the concepts of scarcity, choice, trade-offs and opportunity cost. The PPC is sometimes called the production possibility boundary/frontier.

### 4.1. Drawing a Production Possibility Curve

The production possibility curve (PPC) shows all combinations of the maximum quantities of two goods that can be produced by an economy with a given amount of resources fully and efficiently employed at a given state of technology in a given time period.

Inherent in the definition of a production possibility curve are the following **assumptions**:

- **1.** There is a fixed amount of factors of production.
- 2. Factors of production are fully and efficiently utilised at the frontier.
- 3. The level of technology is constant.
- 4. Only two goods, e.g., capital goods and consumer goods, are produced.

Assume a simple economy only producing two goods: capital goods and consumer goods. Table 1 below shows possible combinations of consumer goods and capital goods that can be produced in this economy.



Options	Units of capital goods	Units of consumer goods	Units of consumer goods that must be given up to produce 1 more unit of capital goods
А	0	20	-
В	1	19	1
С	2	17	2
D	3	13	4
E	4	8	5
F	5	0	8

#### Table 1: Points on a Production Possibility Curve

These combinations are illustrated in Figure 1.



Figure 1 shows an economy faced with a PPC that is <u>concave to the origin (shape</u>). In this economy, if all resources are fully and efficiently utilised in the capital goods industry, the economy would be producing 5 units of capital goods and no consumer goods (Point F). If all resources are fully and efficiently utilised in the consumer goods industry, the economy would be producing 20 units of consumer goods and no capital goods (Point A). Points A and F are the extreme possibilities when the country chooses to completely specialise in the production of only one good.

Conversely, if the economy were to divide its resources between the two industries, it could produce the different combinations of consumer goods and capital goods, as seen by Points B, C, D and E.



# 4.2. Usefulness of the Production Possibility Curve

With reference to Figure 1, the production possibility curve illustrates four concepts:

- Scarcity is indicated by the unattainable combinations outside the boundary (Point G). The country currently does not have the necessary resources or the level of technology needed to produce that combination of capital goods and consumer goods. An economy cannot produce at points beyond the production possibility curve.
- Choice is illustrated by the need to choose among the alternative attainable combinations along the curve (Points A, B, C, D, E or F). If the economy wants more capital goods by choosing combination E instead of C or D, then it must be prepared to produce less consumer goods.
- Trade-off refers to how many units of consumer goods need to be given up to produce one more unit of capital goods (movement from Point A towards Point F).

For example, to produce one more unit of capital goods (movement from Point A to Point B), one unit of consumer goods would need to be sacrificed. This trade-off is also the opportunity cost of producing one more unit of capital goods since in this model, producing consumer goods is the next best alternative to producing capital goods. There exists a trade-off because given that the limited amount of resources have been fully and efficiently employed, the economy would have to reallocate some resources e.g., labour and capital away from the production of consumer goods towards the production of capital goods instead.

• **Opportunity cost** can be illustrated by the downward slope of the production possibility curve.

The production possibility curve is drawn concave to the origin to illustrate the concept of <u>increasing</u> opportunity cost. For more details, refer to Section 4.3 on the *Shape of the production possibility curve*.

Efficiency

The PPC can be used to illustrate two concepts of efficiency:

a) Productive Efficiency

Productive efficiency is defined as the situation when all the available resources in an economy are fully and efficiently employed to achieve the maximum output possible.

For an economy to operate on its production possibility curve, it must utilise all its resources efficiently. If the economy produces any output combinations that lie on the production possibility curve, such as A, B, C, D, E or F, the economy is said to be <u>productively efficient</u>.

However, if the economy is operating inside the PPC, such as Points M and X, some resources are under-employed or unemployed and the economy is said to be productively inefficient.



#### **b)** Allocative Efficiency

Allocative efficiency is defined as the allocation of resources to produce the combination of goods and services most wanted by society i.e., where society's welfare is maximised.

Out of all the points on the production possibility curve, <u>only one point</u> is allocatively efficient. The exact point will depend on the consumption patterns of the society.

## 4.3. Shape of the Production Possibility Curve

# 4.3.1. How is increasing opportunity cost of producing a good being illustrated on a production possibility curve?

A concave production possibility curve as shown in Figure 1 on page 12 will illustrate the increasing opportunity cost of producing a good.

Suppose the economy initially fully specialises in the production of consumer goods (Point A).

To produce the <u>first</u> unit of capital goods, 1 unit of consumer goods must be given up. (Movement from Point A to Point B)

To produce the <u>second</u> unit of capital goods, 2 units of consumer goods must be given up. (Movement from Point B to Point C)

Hence, the opportunity cost of the second unit of capital goods is greater than the opportunity cost of the first unit of capital goods (in terms of the units of consumer goods that must be sacrificed). Further increases in the production of capital goods come at a higher and higher opportunity cost of consumer goods. For instance, to produce the fifth unit of capital goods, 8 units of consumer goods must be sacrificed!

# Does this increasing opportunity cost apply to the production of each additional unit of food as well?

AA/I



## 4.3.2. Why is the opportunity cost increasing?

This increasing opportunity cost to produce more units of capital goods is due to the fact that <u>the factors of production are not homogeneous</u>. That is, resources are not equally well suited to the production of capital goods and consumer goods.

As more and more units of capital goods are produced, more factors of production that are better suited to consumer goods production <u>but poorly suited to capital goods production</u> must be reallocated to produce more capital goods. For example, farmers are being made to produce capital goods instead of consumer goods (e.g. food). In other words, the opportunity cost of shifting resources into capital goods production would rise as more units of consumer goods would need to be forgone for every additional unit of capital goods produced.

How will the shape of the production possibility curve change if resources are homogeneous and are perfect substitutes for each other? (i.e., any unit of a factor of production is equally productive in producing consumer goods as well as capital goods.) Try sketching it out in the box below.

The straight-line production possibility curve implies that the opportunity cost of one product in terms of the other is constant as we move along the PPC.

In other words, the number of units of consumer goods needed to be given up to produce 1 more unit of capital goods is always the same as we move along the PPC. For example, if the opportunity cost of producing on unit of capital goods is 4, it always costs 4 units of consumer goods to get 1 more unit of capital goods.



# 4.4. Economic Growth and the PPC

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	Actual Growth	Potential Growth
Definition	Actual increase in the production of goods and services	Increase in the <b>productive</b> <u>capacity</u> of an economy to produce goods and services
How does it occur?	When the current idle/unemployed factors of production are now put to use due to the increase in demand for goods and services	<ol> <li>An increase in the quantity of the factors of production</li> <li>An increase in the quality of the factors of production</li> <li>An improvement in technology</li> </ol>
How is it illustrated on the PPC?	Movement of a point closer to PPC e.g., moving from Point M to Point X or moving from Point M to point E in Figure 1	Outward shift of PPC to the right from PPC1 to PPC2



Figure 1: A Concave Production Possibility Curve (reproduced)



# 4.4.1. How Potential Economic Growth can be Achieved



Key Question 8: How would changes in the quantity and quality of resources and technology affect the PPC?

#### 1. Increase in the quantity and/or quality of resources

An increase in the quantity and/or quality of factors of production can result in potential economic growth which causes an outward shift of the PPC. Note that while an outward shift of the PPC is achieved, this does not necessarily mean that there is an increase in actual output. That would require a movement of the current point of the actual output towards the new PPC.

a. Increase in the quantity and quality of land

	Increase in quantity of land	Increase in quality of land
How is it	- Discovery, development and use of	- Make existing land more
achieved?	new natural resources	productive with introduction of
	- Process of land reclamation	new extraction methods or applications of fertilisers or
		irrigation systems

#### **b.** Increasing the quantity and quality of labour resources

	Increase in quantity of labour	Increase in quality of labour	
How is it	- Hiring foreign labour, increasing	- Increase in the general level of	
achieved?	retirement age, increasing female	education and training of workers	
	labour participation rate or the	through courses and on-the-job	
	influx of immigrants will increase the	training to boost the productivity	
	stock of human capital	of labour resources	

#### c. Increasing the quantity and quality of capital

	Increase in quantity of capital	Increase in quality of capital
How is it	- Increase in the stock of capital	- Achieved with new technology
achieved?	goods such as machinery, tools,	such as the invention of more
	factories, infrastructure and	powerful computers with faster
	telecommunications to increase the	processing power, thus improving
	productive capacity	productivity



#### • Opportunity Cost of Capital Accumulation

**Capital accumulation** refers to the production of new capital goods over and above those that are used for replacement purposes. Holding the labour force constant, capital accumulation implies that each worker has more capital goods to work with and hence becomes more productive.

While capital accumulation promotes growth and higher future living standards, there is an opportunity cost involved which is a lowering of the current standard of living as fewer consumer goods are being produced today.

The trade-off between capital goods and consumer goods can be illustrated by the movement along productive possibility curve (e.g. from Point C to E) in Figure 1 on page 16. The economy must make a choice of producing fewer capital goods and more consumer goods (Point C) or producing more capital goods and fewer consumer goods (Point E).

The society that selects Point E will enjoy fewer consumer goods today. Thus, it is less able to satisfy wants today and has a lower current standard of living as compared to choosing Point C instead. However, it might experience greater future economic growth, and is more able to satisfy future wants and enjoy higher future standard of living since they would have more capital goods for production.

If Point C is chosen, capital accumulation is moderate. This can result in the economy moving to a higher production possibility curve (from PPC1 to PPC2) at a later period.

If Point E is chosen, there is a greater capital accumulation, and the economy moves to an even higher production possibility curve (i.e., higher than PPC2) at a later period.

	Increase in quantity of entrepreneurs	Increase in quality of entrepreneurs
How is it achieved?	Provide opportunities for the entrepreneurs to earn profits through: - Technological change which leads to the development of new products and methods, thus creating new profitable	- Provide a greater variety and level of entrepreneurial education opportunities e.g., most of our local universities offer entrepreneurship education (such as NUS Enterprise) to actively promote entrepreneurship
	avenues of investments for the entrepreneurs - A well-developed financial market provides potential	- Provide research facilities which help to foster a culture of innovation such as the development of one-north by JTC to host a cluster of world class research facilities to support the growth of Biomedical Sciences,

#### d. Increase in quantity and quality of entrepreneurs



Infocomm Technology, Media, Physical entrepreneurs with access to funds necessary to embark on Sciences and Engineering in Singapore new business ventures А well-developed Provides government facilities which infrastructure provides offer business advice and assistance to the supporting facilities existing entrepreneurs (such as roads and communication networks) which facilitates production and increases profits А favourable social. political and economic climate gives entrepreneurs who are risk takers more confidence in the economy to establish new firms and invest in new capital

#### 2. Technological progress

Technological progress helps to improve the quality of factors of production. It should lead to potential economic growth, and the economy moves to a higher production possibility curve.

- Sources of technological progress
  - o Advances in science e.g., discovery of new drought-resistant crops
  - New applications of technology such as the combination of hydraulic fracturing and horizontal drilling technology to extract oil and natural gas
  - o Improvements in management methods e.g., artificial intelligence management
- How can technological progress be accelerated?
  - $\circ$  Increase in education and training of the population
  - o Transfer of technology through direct aid or foreign direct investments
- Effects of technological progress
  - Aids in increasing the quantity and quality of all factors of production
  - $\circ$  Increases the productivity of resources and lowers the cost of production
  - Increases the productive capacity of the economy as the maximum possible output that the economy can produce from all the available productive resources will be increased
  - $\circ~$  Reflected by outward shift (parallel shift or pivotal shift) of production possibility curve



- Effect on PPC when technological progress improves the economy's ability in producing both consumer goods and capital goods
  - Technology progress can raise the productivity and quality of all factors of production. This means that the economy can generally produce more goods and services (in this case, consumer goods and capital goods)
  - Represented by a parallel outward shift of the production possibility curve from XX to YY in Figure 2



# Figure 2: A Shift of the PPC due to Technological Progress

- Effect on PPC when technological progress only improves the economy's ability in producing consumer goods
- Suppose, for example, technological advances create a new machine that can produce more consumer goods. This raises productivity in the consumer goods industry but there is no reason that productivity in the capital goods industry should increase.
- This can be represented by a pivotal shift of the production possibility curve from AF to AF' in Figure 3.



# Figure 3: A Shift of the PPC due to an increase in productivity only in the consumer goods industry



What may cause the production possibility curve to shift inwards?



r A A

How would questions that require you to explain the concept of the production possibility curve (PPC)look like? Have a look at the following questions. This question corresponds to Sect A Qns 1b & 3 of your Scarcity as the Central Economic Problem Tutorial package.

Section A

2023 H1 DHS Prelim

1b Using a PPC diagram, explain the likely impact of the above investment in [2] public health programmes on the US economy.

2023 H1 JPJC Prelim

3 Using the Production Possibility Curve diagram, explain why even when used [5] efficiently, such a high level of investment might be regarded as undesirable.



# 5. RATIONAL DECISION-MAKING BY ECONOMIC AGENTS

Key Question 9: How do economic agents make decisions? What are some considerations they have?

How should you decide on the number of hours that you should spend studying for your economics test?

In Economics, we make decisions by thinking at the margin. The margin refers to the edge or the border where we must decide whether to study for one more hour or purchase one more unit of a particular good.

# 5.1. Marginalist Principle

The Marginalist Principle states that when economic agents make **rational** decisions, they do so by considering the **marginal** cost and **marginal** benefit of that decision. As long as marginal benefits exceed marginal costs of consuming or producing an additional unit of a good, the decision should be made to consume or produce that additional unit of the good.

Going back to the question at the start of this section, how do you make a rational decision on the number of hours that you should spend studying?

What you have to do is to weigh up the marginal costs and marginal benefits of an additional hour of study. An extra hour of study will give you better grades (marginal benefit). But the same extra hour of study will mean that you have to give up an hour of sleep (marginal cost). If you value the better grades that you can achieve from the additional hour of study more than the satisfaction derived from that hour of sleep (MB>MC), you should spend the additional hour studying.

You would then apply the same decision-making process for each subsequent additional hour of study. However, the marginal benefit derived from each additional hour of studying is decreasing. For example, in a test of a maximum score of 100, the first hour of studying may yield you a score of 50 marks, the second hour may yield you an additional 20 marks, the third hour may only yield you an additional 10 marks. In contrast, the marginal cost incurred for each additional hour of studying is increasing. The marginal cost of losing the first hour of sleep from studying may be low but for each additional hour of sleep that you lose, it becomes increasingly difficult for you to concentrate and focus on the lesson the next day.

Hence, you should study till the hour when the value derived from the improvement in grades due to the additional hour of study is equal to the satisfaction obtained from spending the same additional hour sleeping.

You should not continue to study after this hour because the value derived from the improvement in grades due to the additional hour of study is lower than the satisfaction obtained from spending the same additional hour sleeping instead (MB<MC).

Thus, the optimal number of hours that you should be spending to study occurs when the marginal benefit is equal to the marginal cost.



An optimal decision in consumption or production is made when the marginal benefit is equal to marginal cost (MB=MC).

# 5.2. Marginal Analysis for Different Economic Agents

All economic agents – consumers, producers and the government – are **motivated by self-interest** and they utilise the marginalist principle to make decisions. However, the way that the marginalist principle is being utilised differs across economic agents as they have different assumed objectives.

#### 5.2.1. Consumers use marginal analysis when purchasing goods and services

<u>Consumers aim to maximise utility.</u> Utility is the level of satisfaction a consumer derives from the consumption of a good or service. Marginal private benefit is the additional utility derived from the consumption of an additional unit of the good or service [i.e., Marginal Utility]. Marginal private cost is the additional cost incurred in the consumption of the additional unit of the good or service.

- ♣ If MPB > MPC, it is rational to choose to consume more of that good or service.
- If MPB < MPC, it is rational not to consume the additional unit of the good or service.

The optimal quantity of goods or services to consume occurs when MPB=MPC.

# 5.2.2. Producers/firms use marginal analysis to decide on the output level

<u>A producer/ firm aims to maximise profits.</u> Marginal revenue is the additional revenue received by firm from the sale of an additional unit of a good or service produced. Marginal cost is the additional cost incurred by firms in producing the additional unit of the good or service.

- ♣ If MR > MC, it will be rational for a car manufacturer to produce and sell the additional car.
- If MR < MC, it will not be rational for a car manufacturer to produce and sell the additional car.</li>

The optimal quantity of cars to produce occurs when MR=MC.

# 5.2.3. Governments use marginal analysis when making policy decisions

<u>A government aims to maximise social welfare.</u> The government compares marginal social benefits and marginal social costs when deciding whether to build infrastructure.

The planned Cross Island MRT line is expected to cut through the part of the Central Catchment Nature Reserve (CCNR). Conservationists have suggested an alternative route which would preserve the CCNR and be available for a much larger number of residents. However, the alternative route would lead to longer journey times, an increase in costs and private land purchases as well as a possibly more difficult engineering task. If the marginal social benefit outweighs the marginal social cost, the decision is clear – to proceed with the alternative route for the Cross Island MRT.



Table 2 summarises the assumed objectives, and what marginal benefits and costs mean to each economic agent.

Economic agent	Assumed objective	Marginal Benefit	Marginal Cost
Consumers			
Producers			
Government			

Table 2: Assumed objectives of economic agents and marginal benefits/costs

# 5.3. Decision-Making Approach

Economic decision-making is a core skill for all economic agents including you. All economic agents face the central economic problem of scarcity and will thus need to make decisions to identify their highest-ranked choice aimed at maximising their objectives or self-interest subjected to the constraints faced, while accepting the trade-offs in their decisions.

Figure 4 shows the A-level Economics Curriculum Shape. It shows the knowledge, skills and values that you will be able to develop through the A-level Economics Curriculum. It also highlights that you will learn through the inquiry of contemporary issues and trends at the domestic, regional and global levels. **The Decision-Making Approach** is at the centre of the Curriculum Shape to emphasise the core decision-making skill and that economic agents make decisions based on their respective objectives.

In this section, we will briefly cover the essential considerations of the Decision-Making Approach. As we dive deeper into economics, you will find this approach is an indispensable framework of every topic studied in the A-Level syllabus. Figure 5 shows the considerations of the Decision-Making Approach.





Figure 5: Decision-Making Approach



In order to achieve specific objectives, economic agents need to deliberate the various choices available while taking the following into consideration:

- Constraints Due to the fundamental economic problem of scarcity, choices have to be made. Hence, economic agents consider the constraints they are currently experiencing to determine the choices available to them. Based on these choices, economic agents will decide on their best-ranked choice that enables them to maximise their self-interest. Constraints can take the form of budget constraints, technological constraints, manpower constraint etc.
- Costs and benefits Benefits to consumers are the satisfaction or utility derived from their consumption decision while costs to consumers are the implicit and explicit costs of their consumption decisions. Implicit cost includes opportunity cost, defined as the value of the next best alternative forgone, while explicit cost refers to the monetary payment. To producers, the benefits are the revenue from their production decisions while the costs are the implicit and explicit costs of their production decisions. Governments often take the perspective of the society as a whole, and benefits from economic decisions can be reaped in the form of societal goals, such as economic growth and equity. Governments are also concerned about external cost to third parties.
- Information In order to make sound decisions, economic agents gather information, both quantitative and qualitative, on the potential costs and benefits of their decision.
- Perspectives When a decision is made by an economic agent, its outcome is likely to affect others. Hence, when making a decision, an economic agent needs to consider the impact on and reaction of others. This may in turn affect the intended outcomes of the decision. The profit-driven producer considers the perspective of the consumer in analysing the potential effectiveness of strategies employed, while governments consider the perspectives of stakeholders (households and firms) in their policy decisions.

Decision-Making in economics is often used to tackle or mitigate an economic issue and the impact of such decisions can be analysed in terms of intended consequences and unintended consequences.

- Intended consequences of the economic decision The intended positive and/or negative consequences of an economic decision are assumed to occur because economists assume rational behaviour and economic conditions remain unchanged.
- Unintended consequences of the economic decision Unintended consequences refer to additional benefits or costs incurred and other resulting positive or negative outcomes that were not considered before the decision was made. This might occur because economic agents may not have made their decisions under perfect information conditions, due to an inability to have access to complete information or when economic conditions change.

In order to maximise their self-interest, economic agents would have to undertake **an iterative process** of economic decision-making to achieve the intended outcomes.

Changes – The aims, constraints, costs, benefits, information and perspectives of economic agents can change over time. When changes occur, the economic decision undertaken by an



agent may no longer be optimal, calling for a revisit of the decision-making process to ensure that the intended outcomes can be achieved.

The table below illustrates how the key considerations of the Decision-Making Approach in Figure 5 above can be used to answer the following question.

In light of growing concerns over land clearing methods that contribute to forest fires and haze in Indonesia, should local Indonesian firms adopt more environmentally friendly methods of production?

Considerations	Explanation	
Constraints	The decision to adopt more environmentally friendly methods of production depends on alternative production options available. If there is limited availability of cleaner production options, firms will continue their usual practice. The ability to adopt more environmentally friendly methods of production depends on existing levels of funding to purchase the necessary equipment and technical knowledge. The firm will not adopt cleaner methods of production if it does not have sufficient means and the will to do so.	
Benefits	By adopting cleaner methods of production, the firm may experience an increase in revenue due to greater support from environmentally-conscious consumers.	
Costs	The cost of switching to a different production technique can be very high. This can cause the firm to lose its cost competitiveness as it will need to charge higher prices for its products.	
Information	Information on the potential increase in revenue from the support of environmentally-conscious consumers will help the firm make better decisions on whether the additional benefits will outweigh the eventual costs of making the switch. Also, sufficient information on the cleaner production method is important so the firm can accurately assess whether the method will be viable.	



Perspectives	In deciding whether to adopt cleaner methods of production, the firm needs to consider the social landscape, for example the attitudes of firms and consumers towards the haze situation. If consumers and other firms are apathetic to the situation, there might be less incentive for the firm to switch. However, if most firms in the industry are adopting cleaner methods of production, the firm will have a greater incentive to portray a positive image.
Intended consequences	After switching to cleaner production methods to demonstrate corporate social responsibility, the firm could have created a more positive image. They could benefit from higher demand by environmentally conscious consumers. The firm could even earn higher profits.
Unintended consequences	After switching to cleaner production methods, the firm may realize that it is unable to achieve its previous level of output. With less goods to sell, they may earn less revenue, and lose market share and customer loyalty, which adversely affects both short and long run profitability.
Changes	Changes such as new legislation enacted by governments against environmentally harmful methods of production may spur firms to adopt cleaner methods of production.

How would an A-level question that requires the use of the rational decisionmaking by economic agents look like? Have a look at the following question. This question corresponds to Sect A Qn 6 of your Scarcity as the Central Economic Problem Tutorial package.

# 2018 H1 MI BT

With reference to Extract 3, explain the factors affecting the governments' [7] decision to embark on the high-speed rail project and comment on whether this is a rational decision made by the governments.

# 6. CONCLUSION

Understanding the **Central Economic Problem** is core to understanding future topics in economics. In the next topic, we will be considering how scarce resources are allocated via the 'free market'. Since the problem of scarcity necessitates choice, we will also be making further use of the decision-making approach by considering how consumers and producers might make different decisions from the government.

For a greater understanding of different economic systems, please refer to the Appendix.

Unlike consumers and producers, the government is assumed to have two microeconomic objectives: efficiency and equity. This will be covered further under the theme of Market Failure.

#### 1. Economic efficiency

A society is considered to have achieved economic efficiency when it is productively and allocatively efficient in the use of resources.

- Productive efficiency: A situation where firms are producing the maximum output for a given amount of inputs, or where firms are producing a given output at the least cost.
- Allocative efficiency: A situation where resources are allocated in a manner to produce the combination of goods and services <u>most</u> wanted by society.
- 2. Equity

A distribution of income or resources that is considered to be fair or just.

When we move into macroeconomics in JC2, we will focus on separate **macroeconomic objectives** of the government.

The macroeconomic objectives of the government include:

- 1. Sustainable and inclusive economic growth
- 2. Full employment
- 3. Price Stability

The economic objectives of the government will be discussed in greater detail in subsequent chapters.









# 8. APPENDIX



Introduction to Economic Systems

Faced with the problem of scarcity, societies need to make decisions on how to allocate their scarce resources among competing wants by considering what and how much to produce, how to produce and for whom to produce.

How these three fundamental questions are answered may differ from one country to another, giving rise to different economic systems.

An economic system performs several functions:

- Allocation of resources what and how much to produce;
- Organisation of production **how** to produce;
- ♣ Distribution of goods and services who gets the goods and services;

At one extreme of the continuum, there is the centrally planned or command economy. At the other extreme, we have the free market economy.

In reality, however, all economies are a mixture of these two – some elements of the free market economy and some elements of government intervention. It is the degree of mix that distinguishes one type of economy from another.

In the next section, we shall look at the key features of the different types of economic systems.

# 8.1.1. Types of Economic Systems

#### 1. Centrally Planned or Command Economy

A centrally planned or command economy is usually associated with a socialist or communist economic system where land and capital are collectively owned. In such an economy, all economic decisions are undertaken by the central authorities. The state decides on what and how much to produce, how to produce and plans the distribution of output between consumers accordingly.

#### 2. The Free Market Economy

It is an economy where all economic decisions are taken by individual households and firms without any government intervention.

#### Key characteristics of a free-market economy:

- <u>Private ownership of resources</u>: Individuals have the right to own and control resources like land and capital and enjoy the income earned from the use of these factors of production.
- Freedom of choice: Consumers are free to decide what to buy with their income and firms are free to decide what to sell and produce using any production methods.
- <u>Competition</u>: Firms are free to compete with one another. There may be a large number of buyers and sellers with no influence over market demand and supply or a few dominant

sellers who have the market power to control market price. Regardless of the number of sellers, firms are free to compete using pricing strategies or non-price strategies.

- <u>Pursuit of self-interest</u>: The pursuit of self-interest drives economic activities. Firms aim to
  maximise profits, consumers to maximise satisfaction and workers to maximise wages.
- Working of the price mechanism: The price mechanism i.e. the forces of demand and supply are used to influence resource allocation. The rationing device used by the society to allocate resources effectively and answer the three economic questions is the price mechanism, which we will look at in the next topic.

#### 3. The Mixed Economy

A mixed economy is one where economic decision are made partly by the government and partly through the market. The government intervenes to correct some of the failures of the free-market economy. It may step in to control relative prices of goods and services, relative incomes of individuals and firms, and pattern of production and consumption. It could also intervene to correct macroeconomic problems such as slow economic growth, unemployment, inflation and trade imbalances. These issues will be discussed in greater details in subsequent topics.

Figure 6 below shows the level of government intervention in various economies in the world today.



Source: Fig 1.6, Economics, 7th Edition, John Sloman

# Figure 6: Spectrum of economic systems