Chapter 1 - 3
Introduction to Economics &
Central Problem of Economics

SYLLABUS CONTENT

Theme 1.1 Scarcity as the Central Economic Problem

1.1.1 Scarcity, choice and resource allocation
   a) Concept of scarcity and the inevitability of choices by economic agents (consumers, producers and governments)
   b) Concept of opportunity cost and the nature of trade-offs in the allocation of resources

1.1.2 Rational decision-making process by economic agents
   a) Understanding objectives of economic agents
      - Consumers – maximisation of utility
      - Producers – maximisation of profits
      - Governments – maximisation of social welfare
   b) Recognising constraints
   c) Gathering information and considering perspectives
   d) Weighing costs and benefits in decision-making*
   e) Recognising trade-offs
   f) Recognising intended and unintended consequences

Note:
* A marginalist approach to weighing costs and benefits is the expected approach. Cost-benefit analysis (CBA) is not required.
Chapter 1
Introduction to Economics
(Self-Study)

Theme 1.1:
Scarcity as the
Central Problem of Economics

1.1 What is Economics
1.2 Why Study Economics
1.3 Approach to studying Economics
1.4 Scope of Economics
1.5 Positive vs. Normative Economics
1.6 Summary

Chapter 1:
Introduction to Economics

Chapter 2:
Central Problem of Economics

Chapter 3:
Economic Systems
Relevant A Level Questions

Note: The following essay questions are for reference to check your understanding on concepts taught. The assessment mode for new H1 syllabus is case study format.

H1 A-LEVEL QUESTIONS IN RECENT YEARS

<table>
<thead>
<tr>
<th>Essays</th>
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<tbody>
<tr>
<td>2013 Q3</td>
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</table>
| ‘Market failures always exist, so reliance on the price mechanism alone is inevitably an unsatisfactory way of allocating scarce economic resources.’
  
(a) Explain how the price mechanism allocates scarce resources in the free market. [10] |

| N2009 Q3 |
| When societies are attempting to solve the central economic problem by improving the standard of living of their citizens at a rapid rate, they are always inclined to try to do it behind protectionist trade barriers.
  
(a) Using the concept of opportunity cost, explain the central economic problem that all societies have to solve. [10] |

| Case Study |
| N2014 Q2(b) |
| Using the concept of opportunity cost, explain why, even when used efficiently, a high level of investment might be regarded as undesirable. [4] |

H2 A-LEVEL QUESTIONS IN RECENT YEARS

| N2013 Q1 |
| Economics assumes rational decision-making by consumers, firms and government.
  
(a) Explain what is involved in rational decision-making both by consumers and by firms. [10]
  
(b) Discuss whether rational decision-making by consumers, firms and government always leads to an efficient allocation of resources. [15] |

| N2011 Q1 |
| Consumers and producers are generally assumed by economists to be motivated by self-interest.
  
(a) Explain how, according to economists, the pursuit of self-interest can help to address the problem of limited resources and unlimited wants. (10) |

| N2005 Q1 |
| (a) Explain two ways in which an economy might move from a point within its production possibility curve (PPC) to a point on it. [10]
  
(b) Discuss the most effective economic policies to move the PPC outwards. [15] |

| N2002 Q1 |
| (a) Explain how scarcity, choice and cost are related to the problems of consumers and producers. [12]
  
(b) Assess whether these concepts are of relevance for governments when making macroeconomic policy. [13] |

| N2000 Q1 |
| (a) What is meant by the basic economic problem of scarcity? [12]
  
(b) Discuss whether economic growth solves the problem of scarcity. [13] |

Note: Most questions on the Central Problem of Economics require some degree of linkages to concepts covered in other chapters, such as Economic Growth and Market Failure.
READ THIS FIRST!

<table>
<thead>
<tr>
<th></th>
<th>Very important! Being able to understand and apply the concepts labelled ⚠ is integral for your success in the A level examinations.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>These topics are bridging topics between 2 different topics. If you have difficulty understanding or linking certain topics together, reading up on these bridging topics might be helpful.</td>
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<tr>
<td></td>
<td>Our friendly busy bee will direct you to some thinking questions which will help you consolidate and apply the concepts you have read earlier.</td>
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<tr>
<td></td>
<td>Applications that helps broaden your perspective on Economics and attempt to apply the concepts and skills learnt</td>
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1.1 WHAT IS ECONOMICS?

Some of you might think that the study of Economics involves the following:

- “Economics is something about stocks right?”
- “You need to learn economics to work in banks right?”
- “Economics is about studying money”

Whilst these statements and beliefs are not entirely wrong, the study of economics involves these things and more. Economics can be defined as a social science that involves the study of how individuals and societies choose to allocate scarce resources among alternative uses in an attempt to satisfy their unlimited wants.
Some other definitions offered by famous economists include:

**Adam Smith (1723 - 1790)**
Moral Philosopher

Economics is an **inquiry** into the nature and the causes of the wealth of nations.

**John Maynard Keynes (1883-1946)**
British Economist

Economics is a **method**, not a doctrine. It is an apparatus of the mind, a **technique of thinking** which helps its possessor to draw correct conclusions.

“Economics is the science which studies human behaviour as a relationship between the ends and scarce means which have alternative uses.” Lionel Robbins (1935)

“Economics is the study of the use of scarce resources to satisfy unlimited wants.”
Richard Lipsey, Peter Steiner, Douglas Purvis and Paul Courant (1990)

“Economics is the study of how societies use scarce resources to produce valuable commodities and distribute them among different people.” Paul Samuelson and William Nordhaus (1992)

From the above definitions, we can conclude that

1) Economics is in itself, a **method of inquiry and way of thinking**, and
2) due to **scarcity of resources** as opposed to **unlimited human wants**, a **choice** has to be made which involves some trade-off or **opportunity cost**.
3) This decision may result in both **intended** and **unintended consequences**

**Economics as a science**

Like the natural sciences, Economics attempt to construct theories of **models** which are then used to explain or predict the behaviour.

Step 1: Models are constructed by making general hypotheses based on observable economic phenomena (induction).
Step 2: Apply model to **explain** economic phenomena.
Step 3: Apply model to **predict** future events while specifying the conditions under which the model can apply.
Step 4: Judge how successful the model is in explaining and predicting.
Step 5: Amend model if it is found to have poor explanatory and/or predictive ability.

**Economics as a social science**

Economics is a study of human behaviour and you may rightly point out that human behaviour is highly complex and often unpredictable. However, the models you learn in Economics are still highly applicable because people **on average** will behave more predictably. This is because the random actions of individuals tend to offset each other for a more predictable group behaviour.

Even so, the complexity of human behaviour results in plenty of scope for competing models in economics; each making different assumptions and leading to different policy conclusions. In the A level Economics, you will be taught the more mainstream Economics models.
1.2 WHY STUDY ECONOMICS?

Since economics is a study of a subject that surrounds our life, it is an essential part of our life no matter where we go, who we are, and what we do. Some motivations include:

a) To learn ‘to think like an economist’ by considering the factors which influence our actions so as to make the best possible choice
b) To understand society: economic issues permeate society along with politics, etc.
c) To understand global affairs: international news headlines are filled with economic stories.
d) To be an informed voter: is the cost of living really rising rapidly? Is the Electronic Road Pricing (ERP) and Certificate of Entitlement (COE) a good scheme to help alleviate traffic congestion?
e) To apply the knowledge learnt for the formation of government policies so as to benefit the country and humanity.

Thinking like an economist means framing and organising a way to examine economic issues, policies and choices by using key concepts such as efficiency, incentives and equilibrium. The decision-making approach helps to facilitate this process.

Decisions are made by three key economic agents – consumers, producers and governments. Economic agents interact with one another at both the national and international levels. Each economic agent has their own objectives and seek to weigh the costs and benefits, to make decisions based on the given constraints.

1.3 SOME APPROACHES TO STUDYING ECONOMICS

There are a few points to note in approaching the study of Economics (i.e. If you want to do well in the subject, you have to pay attention to following):

a) Language used
   Economics has its own technical jargon. It is full of common words that have different meanings from everyday use. Understanding their meaning enables you to engage in stimulating discussion for this course.

b) Theories and assumptions
   The subject or discipline is about mastering economic concepts and economic analysis. These are the tools that economists rely upon to explain their theories. The 2 years spent on learning economics for the A levels is about acquiring a good knowledge of economic concepts, models and theories.

c) Diagrams and tables
   These help to illustrate the concepts being explained. An ability to draw and interpret these items is a skill absolutely necessary to acquire.
1.4 SCOPE OF ECONOMICS

The scope of Economics is very wide and there are two main types of branches of economics: microeconomics and macroeconomics.

Within these two major divisions, there is a diversity of areas of research: Industrial Organisation, Urban and Regional Economics, Econometrics, Economic Development, Labour Economics, Financial Economics, International Economics, Public Finance etc.

Positive and Normative Economics

Positive Economics

- Value-free approach to inquiry
- It is not a statement of anyone’s value judgement or subjective feelings
- A positive statement is a statement of fact. It may be right or wrong, but its accuracy can be tested or verified.
- For example, if the price of petrol goes up, people will buy less, ceteris paribus.

Normative Economics

- When we include value in our economic analysis, we enter the realm of normative economics.
- A normative statement contains value judgment, it cannot be proved or disproved by merely looking at facts.
- For example, if the prices of petrol increase and people will buy less, and insert the statement “so we should not allow the price of petrol to increase”, then we have expressed a value judgement.
Indicate whether the following are microeconomic and/or macroeconomic issues according to various newspaper headlines.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Micro / Macro</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Singapore economy grew by 2% in 2015.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Australia's unemployment rate stands at 5.8% in December 2015.</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Thai Beverage, the manufacturer of Chang Beer confirmed yesterday that it is planning a takeover of Singapore, Fraser and Neave (F&amp;N).</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>In order to curb the rising prices of property, the Singapore government introduce a series of measures such as increasing stamp duties and a cap on the maximum loan that buyers can take.</td>
<td></td>
</tr>
</tbody>
</table>

Indicate whether the following are normative (N) or positive (P) statement.

1. The best policy is one that will maximise the rate of economic growth for the country. (N)
2. Government policies give more emphasis on curing inflation rather than curing unemployment. (N)
3. The government ought to put more emphasis on curing inflation than on curing unemployment. (N)
4. It is fairer that MRT commuters pay the full cost of the journey rather than pay the subsidised cost. (N)
5. The privatisation of the telecommunication industry has led to a fall in price of mobile phone subscription plans. (N)

You may refer to the H1 Economics Website to check your answers.
1.5 The Framework of Economic Analysis

Economic agents face a problem of limited resources available to satisfy their unlimited wants. This is known as scarcity - the central problem of economics. There are four types of resources – land, labour, capital and entrepreneurship (these terms will be elaborated in Chapter 2). These resources are limited in nature hence restricting the wants that can be satisfied by each economic agent. Therefore, economic agents faced with these constraints, need to decide on their highest-ranked choice to achieve their objective which in general, is to maximise their well-being, satisfaction or self-interest. When they have established their choice, economic agents will face trade-offs.

Objectives of the key economic agents

<table>
<thead>
<tr>
<th>Consumers</th>
<th>Producers</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximisation of utility</td>
<td>Maximisation of profit</td>
<td>Maximisation of social welfare</td>
</tr>
</tbody>
</table>
The details of how each objective is determined will be illustrated in upcoming chapters.

**Figure 1: Framework for Economic Decision-Making**

In order for economic agents to achieve their individual objectives, the above decision making model can be used to explain their interaction with one another both at a national and international level. The decision-making process requires several considerations:
# Constraints
The limited resources arising from the problem of scarcity will influence the choices available to economic agents, who will then have to decide on their best-ranked choice to achieve their objective.

## Costs and benefits
Economic agents have to consider:
1. Monetary and non-monetary costs and benefits of each available choice when making their decision.
2. Opportunity cost – the value of the next best alternative foregone must also be considered.

Decide on the choice which offers the **maximum net benefits**.

## Information
Economic agents gather quantitative and qualitative information on:
1. Costs and benefits of available choices
2. Trade-offs / opportunity cost
3. Intended consequences

## Perspectives
1. Consider perspectives of the other key economic agents who may be affected by the intended outcome.
   - Eg: Profit-driven producer needs to consider consumers’ perspectives before coming up with strategies
   - Eg: Government considers consumers and producers in policy decisions
3. Consider political and social perspectives

### Expected Outcomes

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intended</strong></td>
<td>These outcomes could be positive and/or negative consequences of an economic decision based on the assumption of rationality and unchanging economic conditions.</td>
</tr>
<tr>
<td><strong>Unintended</strong></td>
<td>Outcomes not intended in the economic decision. These could be anticipated or unanticipated.</td>
</tr>
<tr>
<td></td>
<td>Unanticipated outcomes occur when decisions are made with less than perfect information (due to the lack of complete information or inability to consider all perspectives). This is common when there are constant and unpredictable changes to local and global conditions.</td>
</tr>
</tbody>
</table>

The decision-making process becomes more complex when decisions change. This occurs when:

1. Intended outcomes are not achieved
2. Adverse unintended consequences arise
3. There are changes to the internal and external environment.

**Internal changes** refer to changes in the objectives and the considerations of the decision-making process (constraints, information, perspectives). **External changes** refer to changes in the external economic environment.
Consider how the economic decision-making process can be used by consumers when deciding whether to purchase a new car.

<table>
<thead>
<tr>
<th>Considerations to make a decision</th>
<th></th>
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<tbody>
<tr>
<td>Constraints</td>
<td></td>
</tr>
<tr>
<td>Weighing costs and benefits</td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td></td>
</tr>
<tr>
<td>Perspectives</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Outcomes from the decision</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intended consequences</td>
<td></td>
</tr>
<tr>
<td>Unintended consequences</td>
<td></td>
</tr>
</tbody>
</table>

Go ahead with decision or review decision?

**1.6 SUMMARY**

Economics is a social science that studies how individuals and societies allocate *limited resources* to the production of goods and services so as to satisfy consumers’ *unlimited wants*.

1. **Microeconomics** is the branch of economics that studies individual units: e.g. households, firms, and particular industries. It studies the interrelationships between these units in determining the pattern of production and distribution of goods and services.

2. **Macroeconomics** is the branch of economics that studies economic aggregates: e.g. the overall level of prices, output, and employment in the economy.

3. Positive statements are value-free statements that can be tested by an *appeal to the facts*.

4. Normative statement contains value judgment concerning what *ought to be*.

5. Economics is a social science that uses models to explain and predict economic phenomena.

6. The framework of economic analysis requires economic agents to go through the decision making process and come up with their choice on how to utilise scarce resources to achieve their objectives.
Chapter 2
Central Problem of Economics

Theme 1.1: Scarcity as the Central Problem of Economics

Chapter 1: Introduction to Economics

Chapter 2: Central Problem of Economics

Chapter 3: Economic Systems

Unlimited Wants → Limited Resources

leads to

Scarcity since resources have alternative uses, we are forced to make

Choices (by different economic agents)

resulting in

Opportunity Cost

illustrated by

Production Possibility Curve
2.2 SCARCITY, CHOICE AND OPPORTUNITY COST

As mentioned in Chapter 1, the common problem of each society is that our limited resources cannot satisfy our unlimited wants. This then makes it necessary for individuals and societies to choose. With every choice made, there is therefore some trade-off involved, known as the opportunity cost.

2.1.1 Scarcity

Scarcity refers to the situation where the limited resources available are unable to satisfy the unlimited human wants.

Note: Scarcity must not be confused with common words used in everyday context such as ‘a few’, ‘rare’, ‘minute’, ‘little’ or ‘shortage’.

Indeed, if you look around us you are likely to see lots of people, wide open spaces; forests and trees, open seas and other potentially useful resources. Yet economists describe such resources as ‘scarce’ - not in the absolute but RELATIVE sense. In other words when compared against or relative to our UNLIMITED wants, the available resources are insufficient to satisfy all wants, given the finite quantities of these resources.

Large economies such as the USA, China and India may have huge populations and vast amount of resources, yet relative to the wants of their own people, their available resources are never enough or sufficient to satisfy all wants. Hence economies large or small, rich or poor cannot escape from the problem of scarcity.
Scarcity vs. Shortages

Take note that scarcity is not the same as a shortage.

Shortages results to situation where supply is in sufficient to meet the demand. Such shortages can be eliminated over time (e.g. by increasing supply in the market) but scarcity can never be eliminated unless for some reasons, the resources available increase significantly or the wants decrease till the resources are able to satisfy all possible uses of the resource. Both of which are unlikely to happen.

a) Unlimited Wants

The wants are satisfied through the consumption of goods and services. Goods are tangible items (e.g. food, clothes, and houses) and services are intangible activities (e.g. banking, medical services) used to satisfy wants.

However, wants are unlimited due to the desire for ever higher levels of consumption. As soon as old wants are satisfied, new wants are created.

Unlimited Wants Example 1

You had a Nokia phone when you were 14 and you were happy with it for a while. However, the iPhone 4 came along and you wanted to upgrade and you were willing to do some chores in the household for extra pocket money to get an iPhone. Before you knew it, the iPad came along and you pleaded with your parents to get it for you as a study aid. Soon, your iPhone 5 felt too slow and clumsy and you eagerly waited for the iPhone 5S and worked in a convenience store to pay for it. You eventually got your iPhone 5S but you are now thinking if you should get an Android tablet or the iPad mini or upgrade to the iPhone 7.

Unlimited Wants Example 2

A poor couple may stay in a rented apartment, but as their income rises, they may want to move in a larger HDB flat, then on to a condominium and even landed property. While it is true for some households to remain satisfied with their current housing situation, a large number of households would want to ‘upgrade’ if they can afford to pay for better accommodation.
b) Limited Resources

Resources are means of production and they are finite in amount at any point in time. Hence, the quantity of output produced will also be limited. These resources basically refer to the four categories:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Description</th>
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</table>
| Land     | All natural resources or all productive resources made available to mankind by nature. These are categorized as renewable and non-renewable resources:  
- Renewable resource (such as wind and water) renew themselves at a fast enough rate for sustainable economic extraction.  
- Non-renewable natural resources (such as fossil fuels and mineral ores) do not renew themselves fast enough to allow sustainable economic extraction. |
| Labour   | Any human effort, both mental and physical, used in the production of goods and services. The quality of labour depends on human capital, which is the knowledge and skill that people obtain from education, on-the-job training and work experience. |
| Capital  | Some stock of physical assets (such as tools, instruments and machines) which are man-made to aid in current production. It is not meant for satisfying wants directly but it is used to produce goods which are demanded directly by consumers. So in Economics, capital is **not necessarily money** it can be physical, human or financial. In this case, we are concerned with physical capital. |
| Entrepreneurship | The human resource that organizes land, labour and capital in production. Entrepreneurs come up with new ideas about what and how much to produce, make business decisions, and bear risks that arise from these decisions. Without entrepreneurship, virtually no business organisation can operate. |
With reference to the 4 key factors of production, explain the resource constraints facing our country Singapore. The first factor of production, ‘land’ is written as a starting point for your reference.

<table>
<thead>
<tr>
<th>Land</th>
<th>Land is acutely scarce in Singapore. With only ______ sq km and a population of 5.4 million (3rd highest population density in the world), there is competing demand in the form of industrial, commercial and residential uses.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour</td>
<td></td>
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<tr>
<td>Capital</td>
<td></td>
</tr>
<tr>
<td>Entrepreneurship</td>
<td></td>
</tr>
</tbody>
</table>
Question: What would you consider as the ideal outcome when deciding on how best to use scarce resources?

2.1.2 Choice

**Because resources are scarce, they have alternative uses. Therefore, individuals and societies must make choices among the alternative uses so as to maximise the use of resources to achieve the highest possible level of satisfaction.**

The term economists use to describe this goal or objective is known as welfare maximization.

For all economies, there are **3 fundamental choices to make**:

a) **What and how much to produce?**
   This is a decision on the types of goods to produce as well as how much of each good to produce. It is a problem concerning the **allocation of scarce resources** among its alternative uses. For example, the government has to choose between producing more military equipment or building more hospitals.

b) **How to produce?**
   This is a **decision on the method of production**, i.e. whether a labour-intensive method or capital-intensive method of production should be used. The choice of the method of production will not only vary according to the **aim of the producer**, but also on the resources available to him. Most economies would aim to choose the most (cost) efficient method of production so as to utilise scarce resources to the fullest.

c) **For whom to produce?**
   How will the chosen output be divided among all the members of society? E.g. Who is entitled to the goods and in what quantities? Is the output distributed to those who need them or those who can pay for them?

Please read Chapter 3.4 for more details.

How choices are made to answer the 3 questions above depends on the type of economic system adopted by the country. There are basically three types of systems: free market, command economy and the mixed economy (refer to Chapter 3).

2.1.3 Opportunity Cost

**Opportunity costs measure the cost of making a choice, in terms of the next best alternative forgone.**

You may not realize it but you instinctively use the concept of opportunity cost every day. Indeed, decisions are made every day: What to wear, what to study, what to eat and so on. Each time you make a decision, you are, in effect, rejecting available alternative choices.

And so, the real or opportunity cost of the decision you made is the **next best alternative forgone**. Opportunity costs exist simply because choices have to be made amongst alternative uses of available scarce resources.
If someone offers to take you out for a free lunch, is it really FREE?

Eg 1: Opportunity Cost from consumers’ perspective

A smartphone consumer with a limited budget is considering whether to buy the latest model of the iPhone to maximize his satisfaction. In doing so, he gives up the choice to buy the latest model of the Samsung Galaxy smartphone or any other smartphones. If buying the Samsung mobile phone was his next best alternative, this would be the opportunity cost he incurs from buying the iPhone.

Eg 2: Opportunity Cost from producers’ perspective

A producer or farmer decides to utilize his existing land resource to grow rice this year for production purposes to maximize profits. This piece of land could be used to grow other crops such as sugarcane or palm oil. If growing sugarcane is the next best alternative, he will have to forego the benefits from this choice when he chooses to grow rice on his plot of land.

Eg 3: Opportunity Cost from government’s perspective

The Singapore government spent $225 million building Singapore’s longest man-made waterway in Punggol New Town to maximize social welfare. This $225 million could have been put to other uses like building hospitals, schools or improving transport infrastructure. In making the choice between these options, the Singapore government would have considered issues like the welfare of Singapore citizens, productivity, the state of existing infrastructure etc. As such, the opportunity cost of the Punggol Waterway could be the building of more schools.

Opportunity costs can only arise in a situation where resources available to meet these wants are limited. Thus, there are exceptional cases where there is zero opportunity cost:

A free good is a good that is not scarce and is abundant in nature. Thus, there is no need to give up anything to get it as no scarce resources are used to produce it. Since their opportunity cost of production is zero, their prices are also zero.

Examples of free goods are air, dead leaves and sand in the desert. A brochure advertising beauty services is not a free good as the paper could be used for some other purpose such as for newspaper or writing paper. “Free gifts” such as free shampoo samples are also not free good in the economic sense.

The opposite of a free good is an economic good. An economic good is scarce in nature, hence, opportunity costs are incurred when providing it and their prices are usually positive.

In Summary: The Central Problem of Economics is about scarcity → choice → opportunity costs.
A student decides to stay in her room to do some revision for her coming economics test rather than going to the cinema. What is the opportunity cost of her decision?

A. The enjoyment she would have derived from a visit to the cinema.
B. The improvement in the mark she obtains for her economics test.
C. The cost of the extra electricity she uses.
D. The money she would have spent in the cinema.

Now, can you think of any example to explain scarcity, choice and opportunity cost? Explain to your peer(s)!
2.1.4 Law of Increasing Opportunity Cost

The Law of Increasing Opportunity Cost states that as more of a particular good is produced, larger and larger quantities of the alternative good must be sacrificed, i.e., the opportunity cost of its production rises.

Almost every activity that you can think of is one that involves an increasing opportunity cost. This is because the resources present in the economy are not perfectly homogeneous or equally suited in the production of all goods. Some resources are just better suited for the production of some good than they are for other goods. (Refer to Section 2.2.5)

For example, production workers with many years of experience working with F&N are very good at producing canned soft drinks but not so good at making earphones. As production of earphones increases, we will have to redeploy workers from F&N to Sony. However, F&N increasingly loses its experienced workers who are not adept at producing earphones. As a result, we will have to bear with more and more units of canned drinks being sacrificed for every additional earphone produced. Hence, we say that the opportunity cost of producing earphones (in terms of canned soft drinks) increases.

2.2 THE PRODUCTION POSSIBILITY CURVE (PPC)

The problems of scarcity, choice and opportunity cost can all be illustrated by the Production Possibility Curve. The PPC is also known as the Production Possibility Frontier / Boundary or the Transformation Curve.

2.2.1 Definition of the PPC

The Production Possibility Curve shows all the different maximum attainable combinations of goods and services that can be produced in an economy, when all available resources are fully and efficiently used at a given state of technology.

2.2.2 Assumptions of the PPC

The PPC is based on at least 5 assumptions:

- The economy only produces two goods or services.
- Resources are fully employed and efficiently utilised.
- There is no change in the level of technology.
- Production is observed over a specific time period, e.g. one year.
- The quantity and quality of the resources used remain the same over the specific time period.
2.2.3 Graphical representation of the PPC

Table 1 shows the combinations of the maximum amount of consumer goods and capital goods* that can be produced in a year when all the resources are efficiently employed.

Table 1: Possible combinations of consumer goods and capital goods the economy can produce

<table>
<thead>
<tr>
<th>Combinations</th>
<th>Consumer goods (billion units)</th>
<th>Capital goods (billion units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>45</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>40</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>D</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>E</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

* Consumer goods are goods which are produced for consumption by households. Capital goods (investment goods) are goods which are used for the production of other goods.

Graphically, we can represent the table above as the PPC below:

![Graphical representation of the PPC](image)

Referring to Figure 1, PPC for the economy is shown by the curve AE:

**Point A** represents the maximum amount of consumer goods produced per year if all the economy’s resources are used efficiently in the production of consumer goods.

**Point E** represents the maximum amount of capital goods produced per year if all the economy’s resources are used efficiently in the production of capital goods.

**Points B, C and D** (along the curve) show the combinations of the maximum amount of consumer goods and capital goods that can be produced with efficient use of all available resources. Points on the PPC illustrate full employment of all available resources.

**Point I is inside the PPC.** It is attainable but it represents an inefficient combination because resources are not fully employed or used inefficiently (i.e. the economy is experiencing unemployment or underemployment). In this case, more of one or both goods can be produced by increasing the level of employment or using the resources more efficiently.
**Point U is outside the PPC.** It is preferred to points on or inside the PPC. However, such a combination of goods cannot be achieved given the present amount of resources and the current level of technology. Hence, this combination is unattainable.

### 2.2.4 Scarcity, Choice, Opportunity Cost and the PPC

The PPC can be used to illustrate three economic concepts:

- **Scarcity** – The concept of scarcity is illustrated by the fact that combinations outside the PPC cannot be attained. The whole area between the 2 axes represents all the possible combinations of the 2 goods. Although the economy may want a combination such as U, the present amount of resources and the level of technology make it impossible to produce such a combination. Thus, the economy faces scarcity.

- **Choice** – Combinations of goods found on the PPC are attainable but the economy can only have one of these alternative combinations as resources cannot be used to produce all at the same time. A decision to produce at point B would mean that the combinations such as A, C, D and E cannot be considered. The choice of which combination to produce at would depend on the country’s priority.

- **Opportunity Cost** – The downward sloping nature of the PPC illustrates opportunity cost as to get more of one good, the economy must make do with less of the other good. Referring to Figure 1, if we move progressively from point A to E, more and more resources are transferred out of the production of consumer goods into the production of capital goods. This results in more and more units of consumer goods being given up to obtain each successive unit of capital goods. The converse is true when we move from point E to A.

A movement from production at point A to point B, for example, involves giving up 5 billion units of consumer goods in exchange for 1 billion units of capital goods. We say that the opportunity cost of producing the extra 1 billion units of capital goods is 5 billion units of consumer goods.

### 2.2.5 Shape of the PPC and Opportunity Cost

**a) Concave PPC**

The standard PPC is usually concave to the origin, due to the Law of Increasing Opportunity Cost. Referring to Figure 2, it can be observed that the opportunity cost of the 1st unit of capital goods is 5 units of consumer goods. To obtain the 2nd unit of capital goods, 10 units of consumer goods have to be forgone. The 3rd unit of capital goods requires sacrificing 12 units of consumer goods and so on. Thus, it can be seen that the opportunity cost increases as we want additional units of capital goods.
The opportunity cost increases because resources in the economy are not perfectly homogeneous or equally suited in the production of all goods. Some resources are just better suited for the production of some good than they are for other goods.

At point A, all the available resources are used to produce consumer goods. As we move from point A to point B, we will have to transfer resources out from the production of consumer goods to the production of capital goods.

However, resources that are least suited for production of consumer goods will be deployed first. Hence, to produce the 1st unit of capital goods, the opportunity cost is only 5 units of consumer goods. As the production of capital goods increases, resources that is increasingly more suitable for consumer goods production has to be re-deployed. This leads to more and more units of consumer goods being sacrificed. i.e. increasing opportunity cost.

Since the slope of the PPC represents the opportunity cost of an additional unit of the good on the horizontal axis, the increasing opportunity cost gives rise to a PPC that becomes steeper and steeper as we move from point A to E.

**b) Straight-line PPC**

A straight-line PPC illustrates constant opportunity cost. Constant opportunity cost refers to the situation where the rate at which the good is exchanged for another is constant. It is only possible if all units of the resource are equally skilled or homogenous in the production of all the goods, i.e. all units of resources are equally adaptable (perfectly transferable) to all types of production.

![Figure 3: A straight-line PPC](image_url)

Consider an economy where each worker is able to produce either 20 units of consumer goods or 10 units of capital goods (equally efficient). Assume further that this economy has only 5 workers.

If all of them are put to the task of producing consumer goods, the total units of consumer goods produced will be 100. When the first worker is re-deployed to produce capital goods instead, the number of units of consumer goods produced will fall to 80 while the production of capital goods will increase by 10. The 10 units of capital goods produced are at the sacrifice of 20 units of
consumer goods. If another worker is again re-deployed to produce capital goods, the number of units of consumer goods sacrificed will still be the same. The opportunity cost of 10 more units of capital goods produced is the same regardless of the level of capital goods that have already been produced, i.e. 20 units of consumer goods. The opportunity cost is constant.

In reality, it is almost impossible for resources to be homogenous or equally efficient. For example, it is not likely that you will find all the workers in the toy industry to be equally skilled as the workers in the production of computers.

2.2.6 Economic growth and the PPC

Economic growth is defined as the expansion or increase in an economy’s level of output or Gross Domestic Product (GDP) over time.

In theory, economic growth is made up of actual growth and potential growth. There is a distinction made between the two types of economic growth. Actual growth refers to the expansion in the current output and potential growth refers to the expansion of the productive capacity of the economy over time. Actual growth can be represented by a movement of a point within the PPC to a point nearer to or onto the PPC. Potential growth is represented by shifting of the whole PPC outwards.

2.2.6.1 Actual growth

When the economy is producing at a point inside the PPC as illustrated in Figure 4, the economy is not fully utilising its resources. Governments can decide to achieve actual growth by encouraging greater use of existing resources (i.e. reducing unemployment of resources) and by utilising its resources more efficiently (i.e. reducing underemployment of resources), resulting in increase output of both capital and consumer goods as shown in Fig. 4. Therefore the intended consequences of this decision is actual growth and fall in unemployment and under-employment of resources.

Details on the policies that reduce unemployment will be discussed in Chapter #14.

2.2.6.2 Potential growth

Figure 4: Movement of point inside the Production Possibility Curve
Governments can decide to achieve potential growth. This is represented by an outward shift of the PPC if the quantity and/or quality of resource increases the production of both goods (Refer to Figure 5). If the altered resource is suited only to the production of 1 good, the shift in the PPC will be pivotal (Refer to Figure 6 for the case of the resource suited for production of capital goods).

The main sources of potential growth include:

a) **Increase in the quantity of available resources**:
   An increase in the total supply of resources will lead to an increase in the ability to produce more goods and services. The increase in resource supply can come about through the following situations:

   - **Labour** – encourage population growth as a larger population would mean a larger potential workforce, or encourage greater participation of the population by women and retirees. This may involve a change in the society’s view on the role of women (e.g. in Japan in recent years), raising the age of retirement, or lowering the minimum legal age to join the workforce. In Singapore, we depend on foreign labour to augment our labour force.

   - **Land** – more intensive exploration resulting in new discovery of mineral deposits.

   - **Capital** – capital refers to any man-made aid for production. An economy’s future Production Possibility Curve depends on its stock of human and physical capital in the present day. The more capital goods an economy produces in one period, the more output those capital goods can produce in the next period, thus increasing next period’s PPC. To produce more capital goods this period, an economy must reduce current consumption. In fact, the choice is typically between producing goods for current consumption and producing goods for future production and consumption.

PPC can also be used to better understand the benefits of trade: improvement SOL in Theme 3.2
b) Improvement in the quality of available resources:

**Labour**
- Improvement in skills of the workforce through higher education and training. E.g. Skills Redevelopment Programme
- Giving out incentives such as higher wages, performance bonus and fringe benefits to encourage hard work and greater effort

**Land**
- Application of fertilizers
- Irrigation schemes

**Capital**
- **Technological improvement** – This includes discovery of new methods of production. Such changes are only possible with greater expenditure on research and development to allow for a higher rate of inventions and innovations.

### 2.2.6.3 Economic Growth and Opportunity Cost (or Trade-offs)

The PPC is useful in illustrating the idea of *trade-offs* and *opportunity cost* when a government decides on how to allocate resources over time. For instance, there will be a trade-off between the goods being currently produced and the potential growth of an economy.

Both Figures 7 and 8 show the PPCs of countries A and B. Assume that currently, the two countries face the same initial PPC (PPC\(_{\text{current}}\)). The citizens of Country A prefer more of current consumption and hence, choose to produce at point C of the PPC\(_{\text{current}}\). As a result, their maximum possible combinations of goods will not be much greater in the future. Hence, the future PPC will only shift out by very little. This means that higher current consumption raises *current* level of welfare (or standard of living) but it comes with a trade off in terms of slower improvement in *future* standard of living. The increase in current standard of living is an *intended consequence* arising from the decision to allocate resources to boost current consumption, while the slower improvement in future living standards may be an *unintended consequence*. 

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In contrast, the citizens in Country B produce at point D on their PPC current. They are willing to forgo more of current consumption. This leads to greater productive capacity and therefore a larger outward shift of the future PPC. But their current standard of living may not be very high compared to Country A. Therefore the intended consequence of the decision made by Country B is lower current standard of living and higher future standard of living.

Draw and label an appropriate Production Possibility Curve (PPC) for each of the given scenarios below. Illustrate any changes in the curve:

**Scenario 1**
Singapore’s early economic development in the 1960’s emphasised a great deal on investment. A large amount of funds was put to use in increasing capital stock and investments especially in the manufacturing sector. This allowed her to enjoy strong economic growth in subsequent years.

**Scenario 2**
In 2004, the South Asian tsunami destroyed nearly 60% of fishing fleet and about 40% industrial infrastructure in Northern Sumatra.
2.3 SUMMARY

1. The central economic problem is that of scarcity. Given that there is a limited supply of factors of production, it is impossible to provide everybody with everything they want.

2. As resources have alternative uses, choices have to be made.

3. With every choice made, opportunity cost will be incurred.

4. The concepts of scarcity, choice, opportunity cost can be illustrated by the Production Possibility Curve.

5. Points on the PPC illustrate full and efficient employment of resources whilst points inside the PPC illustrate unemployment and/ or underemployment or inefficient use of resources.

6. Concave (to the origin) and straight-line PPC illustrate increasing and constant opportunity cost respectively.

7. The PPC can be used to illustrate both actual and potential economic growth.
Applications to the real world

CASE FILE

S’pore ‘needs to base its growth on productivity and innovation’

Nation bound by small size, so can’t increase size of labour force to boost growth: Ong Ye Kung

Pearl Lee

Singapore’s economic growth cannot be achieved through mixpower-led growth, but should be based on productivity and innovation, Minister for Education (Higher Education and Skills) Ong Ye Kung said yesterday.

He was giving a speech at an upcoming event on how Singapore can grow its economy for a more certain, challenging future.

Source: Straits Times, 25 Jan 2017

Question: “Nation bound by small size, so (we) can’t increase size of labour force to boost growth”. Using a PPC diagram, explain an alternative way that was suggested in the article for Singapore to boost economic growth. [5]
Chapter 3
Economic Systems (Self-Study)

Theme 1.1:
Scarcity as the Central Problem of Economics

Chapter 1: Introduction to Economics
Chapter 2: Central Problem of Economics
Chapter 3: Economic Systems

3.2 Command Economy
3.3 Market Economy
3.4 Mixed Economy

3.2.1 Features
3.3.1 Features
3.3.2 Workings of Price mechanism
3.1 INTRODUCTION

3.1.1 Basic Economic Problem

The fundamental economic problem confronting all societies is to decide on the “best” allocation of scarce resources between alternative uses. Thus, the function of an economy is to address this basic economic problem that arises from unlimited human wants and limited resources to produce the goods and services to satisfy such wants. In the context of scarcity, resource allocation boils down to making the following choices:

a) What and how much to produce
b) How to produce
c) For whom to produce

In the next section, we shall study how these choices are made in the context of different economic systems.

3.1.2 Different Economic Systems

An economic system is a complex network of individuals, organizations, and institutions in a society whose decisions determine the ways in which the scarce resources are used to produce goods and services and the manner in which these outputs are distributed for consumption. As the ways in which these choices are made vary from country to country, these give rise to different economic systems.

3.2 THE COMMAND ECONOMY

The command economy, known as the centrally planned economy, is where supply and price are regulated by Central Planning Committee (CPC), appointed by the government rather than by market forces. Government planners decide which goods and services are produced and how they are distributed. The former Soviet Union and North Korea would be examples of the command economy.

3.2.1 Features of a Command Economy

a) Factors of Production are owned by the state
All important means of production except labour are publicly owned and directly controlled by a centralized authority. This is because of the desire for more equal income distribution. Private ownership of resources tends to create greater inequality. In a command economy, no individual can own land or a business.
b) Centralised Planning
All economic activities are divided, controlled by an appointed planning group – the CPC. Economic decisions on what and how much, how and for whom to produce are made by this group. Decision-making is centralised.

- **What and how much to produce**
  The question of what and how much to produce is usually determined by the various political and social objectives set by the government for a given period of time (usually between 10 to 15 years). Production does not respond to changes in prices.

- **How to produce**
  This is again determined by the CPC / government. Usually, the CPC appoints managers for its factories. As these managers are paid a fixed salary, they therefore may not have the incentive to ensure that the least costly method of production is being used, as they are merely concerned with meeting production quotas.

- **For whom to produce**
  The goods and services will be produced and distributed to the people according to the aims of the CPC / government. For example, the government may want to produce and distribute the goods according to the needs of the people or to give more to those who produce more as an incentive. The system of distribution could be done through direct means, like food coupons or an indirect one, like wages.

### 3.3 THE MARKET ECONOMY

The market economy is also known as free enterprise, laissez faire, or free market economy. This is a system of allocating resources based only on the interaction of market forces, such as supply and demand. The most basic feature of the market economy is the use of the price mechanism for allocating resources to the various uses. Adam Smith (refer to Appendix 1), one of the Founding Fathers of economics described the “invisible hand of the price mechanism” in which the hidden-hand of the market operating in a competitive market through the pursuit of self-interest will allocate resources in society’s best interest. This behaviour is also known as 'rational decision making'. A true market economy is free of governmental influence, collusion and other external interference. This remains a view held by free-market economists who believe in the virtues of an economy with minimal government intervention.

#### 3.3.1 Features of a Market Economy

a) **Private ownership of property**
   The basic raw materials, the productive assets of the society and the goods produced in the economy are predominantly privately owned.

b) **Freedom of choice and enterprise**
   Individuals are free to choose according to their own interest. Entrepreneurs are free to enter or leave any industry. Owners of resources are free to use them where they see fit. Workers are free to enter or leave any occupations for which they are qualified. Consumers are free to spend the income as they wish.

c) **Self-interest is the primary motive**
   All economic agents such as individuals, firms, and resource owners seek to promote their own self-interests. Producers aim to maximise profits with a given amount of expenditure on resources. In fact, maximisation of profits is one of the significant features of a market economy.
Consumers aim to maximise their utility (satisfaction) from the consumption of goods and services given their limited income. Resource owners attempt to maximise the factor income on the units of factors that they owned. Through all these self-seeking behaviours, a system that needs no planning is developed and functions as if an invisible hand was guiding the economy.

d) Competition
Since the markets in this economic system are highly competitive, prices are kept down and they act as an incentive for firms to become more efficient. More efficient use of resources by firms will lead to greater value for money for the consumers.

e) Limited role for the government
In a pure market economy, the government does not interfere with the working of the market. In reality, the complete absence of the government is unlikely. Thus, the government exists only to provide the legal framework for the economy.

f) Reliance on the workings of the price mechanism
Price is the sole co-coordinating mechanism for allocating resources and organising production. Solutions to the 3 basic economic problems of what and how much, how and for whom to produce are worked out through the price mechanism.

3.3.2 The workings of the price mechanism

The price mechanism describes the means by which millions of decisions taken by consumers and businesses interact to determine the allocation of scarce resources between competing uses. The demand and supply decisions of consumers and producers are transmitted to each other through their effects on prices via the price mechanism. The prices that result are the prices that both consumers and producers have to accept. Price serves two important functions, namely signalling and rationing.

Note: The workings of the price mechanism will be further explained and demonstrated in Chapters #4 to #6.

- What is to be produced?
Consumers will indicate to producers what and how much they desire through the price they are willing and able to pay for the good and service. It is in the self-interest of consumers to pay only according to the satisfaction they derived from each additional unit of the good to maximise utility. The more urgent the want or greater the desire to have the good, the higher the price consumers are willing to pay since they place higher value on each additional unit of the good. Higher prices signal higher level of profits for the producers. Given that it is in the producer’s self interest to maximise profits, they will have the incentive to produce the goods and services that command high prices. This result in resources being channelled to produce goods and services in accordance to society’s tastes and preferences.

The sequence in which the price mechanism works as a signal to dictate what and how much to produce is as follows:
- If a particular product proves to be increasingly popular with consumers, then demand will outstrip supply at the existing price. A shortage will develop and the price of that product will increase. This rise in price makes production more profitable and will serve as a signal to producers that they need to expand production to meet the higher demand.
Price movements therefore act as a **signal** to producers that they need to expand or reduce production to meet the higher or lower demand. Prices will rise and fall to reflect **shortages** and **surpluses** respectively.

Decisions about selling by producers and decisions about buying by consumers are based on these signals. Consumers consider their budget constraint, weigh the costs and benefits, interpret existing information and consider the producers’ perspectives before deciding on what they would like producers to produce. Producers receiving the price signal consider their available resources, costs and benefits, gather data and consider the consumer’s perspectives before deciding on what and how much to produce (allocation of resources).

**How to produce**

In order to maximise profits, the producers must not only **maximise revenue**, they have to also **minimise costs**, i.e. produce at the lowest possible costs. Therefore, producers need to maximise the use of each factor (e.g. labour, land, and capital) so as to achieve the highest return per dollar of expenditure. So producers must produce at the lowest cost if they are to survive in the market place. This then determines how goods are produced.

**For whom to produce**

In order to get a good from the market, consumers must be able and willing to pay for it. The amount of money they can spend is determined by their wealth and income. The amount of goods produced is usually insufficient to meet the demand of all those who have the ability to buy. Competition among consumers will drive up the price of a good. This will eliminate those who are unable or unwilling to pay the higher price for the good. In this way, prices serve to **ration** (and distribute) the goods to those who can afford to pay the highest possible market price.

Thus, the three questions of what (and how much) to produce, how to produce and for whom to produce are addressed through the price mechanism.

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**3.4 THE MIXED ECONOMY**

The mixed economy is a system in which resources are allocated partly via the price mechanism and partly by the government. Production is still carried out under private enterprises but the government steps in to regulate activities when necessary.

In reality, all economies in the world are a mixed of both systems. This is especially true with the collapse of command economy and the triumph of free market economy in the 1980s. This has set the trend for market reforms to take place as countries such as Russia and China start to move away from central planning towards embracing market economy.

**What is economic freedom?**

Economic freedom is the fundamental right of every human to control his or her own labour and property. In an economically free society, individuals are free to work, produce, consume, and invest in any way they please, with that freedom both protected by the state and unconstrained by the state. In economically free societies, governments allow labour, capital and goods to move...
freely, and refrain from coercion or constraint of liberty beyond the extent necessary to protect and maintain liberty itself.

Which are the countries are ranked highly/lowly on economic freedom? You can check them from http://www.heritage.org/index/ranking.

### 3.5 CONCLUSION

In a free market economy, the pursuit of self-interest encourages the use of resources in line with consumers’ preferences. The producers’ aim to maximise profits will cause them to produce those goods that can fetch higher prices. Hence, there will be minimum wastage of resources in terms of producing goods that are not wanted.

Moreover, in their effort to maximize profits, producers will choose the least costly method of production thus avoiding wastage of resources. As resources are privately owned, there are strong incentives for producers to innovate and find better ways of using these resources.

In view of the above arguments, the market economy is said to be efficient with the allocation of scarce resources. However, the reality is far from the ideal because of the existence of market failure, which call for government intervention to regulate the market, assuming that the government can help. (Market Failure will be covered later in the year).

### 3.6 SUMMARY

1) The economic systems of different countries vary according to the extent to which they rely on the market or the government to allocate resources.
2) For a command economy, the central authority makes all the economic decisions. The central authority answers to the questions of what and how much, how and for whom to produce.
3) In the market economy, there is little government interference and economic decisions are decided by the interplay of demand and supply forces. Price changes act as the mechanism to eliminate any surpluses and shortages.
4) All real-world economies are a mixture of the market and command economies. Governments intervene in market economies in various ways in order to correct the failings of the free market. The degree and form of government intervention depend on the aims of governments and the nature of the problems they are attempting to tackle.

**Recommended Readings**

Sexton, Robert L. (2005). “Exploring Economics”. 3rd edition. Chapter 1 (sections 1.1 – 1.3 and 1.6), chapter 2 (sections 2.1 – 2.2 and 2.6) and chapter 3 (sections 3.1, 3.3 and 3.4).

APPENDIX 1: The Father of Economics: Adam Smith

"It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their interest."

*Adam Smith, "The Wealth of Nations" (1776)*

Adam Smith was born in Kirkcaldy, Fife, Scotland. The exact date of his birth is unknown. However, he was baptized on June 5, 1723. Smith was the Scottish political economist and philosopher, who became famous for his influential book "The Wealth of Nations" written in 1776.

In 1751 Smith was appointed as Professor of Logic at Glasgow University, transferring in 1752 to the Chair of Moral Philosophy. His lectures covered the field of ethics, rhetoric, jurisprudence and political economy, or "police and revenue." In 1759 he published "Theory of Moral Sentiments", embodying some of his Glasgow lectures. This work was about those standards of ethical conduct that hold society together, with emphasis on the general harmony of human motives and activities under a beneficent Providence.

Smith moved to London in 1776, where he published "An Inquiry into the Nature and Causes of the Wealth of Nations," which examined in detail the consequences of economic freedom. It covered such concepts as the role of self-interest, the division of labour, the function of markets, and the international implications of a laissez-faire economy. "The Wealth of Nations" established economics as an autonomous subject and launched the economic doctrine of free enterprise.

Smith laid the intellectual framework that explained the free market and still holds true today. He is most often recognized for the expression "the invisible hand," which he used to demonstrate how self-interest guides the most efficient use of resources in a nation's economy, with public welfare coming as a by-product. To underscore his laissez-faire convictions, Smith argued that state / government and personal efforts to promote social good are ineffectual compared to unbridled market forces.

In 1778 he was appointed to a post of Commissioner of Customs in Edinburgh, Scotland. He died there on July 17, 1790, after an illness. At the end it was discovered that Smith had devoted a considerable part of his income to numerous secret acts of charity.