

INTRODUCTION TO ECONOMICS

ECON 1011

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Chapter One: Basics of Economics

1.1 Definition of Economics

- ❖ The word “**Economics**” is originated from the ancient Greek word “**oeconomicus**” equivalent phrase “**household management**” or “**management of family affairs**”.
- ❖ There is **no universally accepted definition of economics** (its definition is controversial).
- ❖ Economic can be defined from different perspectives.

1) **Wealth Definition: Adam Smith (1723-90)**

- The formal definition of Economics can be traced back to the days of Adam Smith, a Scottish Economist, generally known as “**father of economics**”.
- Wrote a book entitled “An Inquiry into the Nature and Causes of Wealth of Nations”, in the year **1776**.
- Economics as a distinct subject started with his book.
- Economics is a science of wealth which studies the **process of production, distribution, consumption** and **accumulation of wealth**.

- ✓ According to Smith: **the great object of the political economy of every country is to increase the riches and power of that country.**
- ✓ In **a market economy**, the way in which production and distribution of wealth will take place is through the Smithian ‘**invisible hand**’ mechanism or the ‘**price system**’
- ✓ In general, economics is regarded by Smith as “**the science of wealth**”.

However, the Smithian wealth definition **did not served last long** and got criticisms by other group of economist(mainly by **Alfred Marshal**).

Critiques

- ✓ **The definition is too narrow**: Does not considered the major problems faced by a society, is condemned as ‘**the bread-and-butter science**’.
- ✓ **Emphasize on the material aspect of human life**, i.e., generation of wealth; ignored the non-material aspect of human life. Above all, as a science of wealth, it taught **selfishness** and **love for money**. Criticized as a “**dismal science** and **bastard science**”
- ✓ **Ignored Scarcity and Choice aspects**. Scarcity is the fundamental economic problem of any society, and thus, choice making is unavoidable.

2) Welfare Definition: Alfred Marshal (1842-1924)

- ❖ Alfred Marshall in his book ‘**Principles of Economics**’ published in 1890 placed emphasis on **human activities or human welfare rather than on wealth**. In UNDP perspective, human welfare is primarily a matter of **education**, **health** and **income**, as reflected in the HDI, a composite of **three social welfare variables** (a **long and healthy life**, **acquisition of knowledge** and a **decent standard of living**)).
- ❖ Marshall defines economics as “**a study of peoples’ activities/actions to achieve human welfare.**” OR “**a study of men as they live and move and think in the ordinary business of life** (economic activities carried out by peoples in order to exist).”
- ❖ He argued that economics, on one side, is **a study of wealth** and, on the other side, is **a study of man**.
- ❖ **Economics is a study of mankind in the ordinary business of life**; it examines that part of individual and social action which is most closely connected with the attainment and with the use of **the material requisites of well-being**.

- ❖ According to Marshall, **wealth is not an end in itself** as was thought by classical authors; **it is a means to an end**—the end of human welfare.

From his definition:

- Economics **is a social science since** it studies the actions of human beings.
- Economics studies the ‘**ordinary business of life**’ since it takes into account the money-earning and money-spending activities of man.
- Economics studies only **the ‘material’ part of human welfare** which is measurable in terms of the measuring rod of money. **It neglects other activities of human welfare not quantifiable in terms of money.**
- Welfare of mankind**, rather than acquisition of wealth, **is the primary objet of importance.**

Critiques

- ❖ The definition **focus on the material welfare**, **ignores the non material welfare**. Thus, the definition will be **too narrow**.

- ❖ Robbins argued that Marshall **could not establish a link between economic activities of human beings and human welfare**. There are various economic activities that are detrimental to human welfare. The production of **war materials**, **wine**, etc., are economic activities but **do not promote welfare of any society**.
- ❖ **Measuring welfare in terms of money is not valid**, as welfare is **abstract and subjective concept**.
- ❖ “Marshall’s welfare definition gives economics **a normative character**. However, Robbins argues Economics must be free from making value judgments, **Economics is a positive science** not a normative science.”
- ❖ Ignores the fundamental concepts/problems of **scarcity and choice**.

3) Scarcity definition: Lionel Robbins(1898-1984)

- ❑ Robbins defined Economics **in terms of allocation of scarce resources to satisfy human wants** in his book entitled “An Essay on the Nature and Significance of Economics Science” in 1932.

- ❖ According to Robbins, **neither wealth nor human welfare should be considered as the subject-matter of economics.**
- ❖ His definition runs in terms of scarcity: “**Economics is the science which studies human behaviour as a relationship between ends (outcomes, goals, destinations) and scarce means (resources) which have alternative uses.**”
- ❖ Economics is **fundamentally the study of scarcity and the problems to which scarcity gives rise.** Thus, the central focus of economics is on **opportunity cost** and **optimization.**
- ❖ By considering the basic economic problem, which is scarcity, Robbins brought Economics to nearer science and his definition is **the most accepted definition of Economics.**

However, the scarcity definition of Robbins is also not free of criticism.

- ✓ Argue Economics to be **as positive Economics.**
- ✓ Gave **less emphasis** to wealth and welfare

❖ Other contemporary Economists also defined Economics in their own way.

4) Growth Definition: Paul A. Samuelson(1915-2009)

- ❖ Paul Samuelson, an American economist defined Economics as “ **a science of how men and society choose, with or without money, to employ scarce productive resources which could have alternative uses, to produce various commodities over time, and distribute them for consumption, now and in the near future, among various people and groups in society.**”
- Samuelson regards economics as a social science which emphasized the problem of scarce resources and the idea of alternative uses of resources.
- He emphasized on the consumption and distribution of various commodities for the present and future economic growth thereby highlighting the study of macroeconomics.
- ✓ Samuelson lays emphasis on the use of modern technique of cost-benefit analysis to evaluate the development programme for the use of limited resources.
- ❑ Samuelson’s definition of economics has superiority over that of Robbins because of the **inclusion of time element** thereby making the scope of economics dynamics.

- ❖ Thus, the definition varies as the nature and scope of the subject grow over time.
- ❖ Despite all these, however, the formal and commonly accepted definition is as follow.
- ❖ “Economics is a social science which studies about efficient allocation of scarce resources so as to attain *the maximum fulfillment of unlimited human needs*. It is *a science of choice making*, it studies how people choose to use scarce or limited productive resources (land, labour, equipment, technical knowledge and the like) to produce various commodities.”

❖ From the above definition.

- ✓ Economics studies **about scarce resources**;
- ✓ It studies about **allocation of resources**;
- ✓ Allocation should be **efficient**: resources allocated according to their highest value use.
- ✓ Human **needs** and **wants** are **unlimited**.
- ✓ The aim (objective) of economics is to study **how to satisfy the unlimited human needs up to the maximum possible degree** by allocating the resources **efficiently**.

1.2 The Rationales of Economics

There are two fundamental facts

- 1) Human (society's) **material wants are unlimited**. **wants multiply—luxuries become necessities**.
- 2) Economic **resources are limited** (scarce).

❖ **Scarcity of resources is the fundamental economic problem to any society. In return, scarcity gives rise to the problem of choice.**

❖ Therefore, the basic economic problem is about **scarcity** and **choice** since there are only limited amount of resources available to produce the unlimited amount of goods and services we desire.

❖ Thus, **economics is the study of how human beings make choices to use scarce resources as they seek to satisfy their unlimited wants.** Therefore, **choice is at the heart of all decision-making.**

❖ As an individual, family, and nation, we confront difficult choices about how to use limited resources to meet our needs and wants.

❖ Economists study how these choices are made in various settings; evaluate the outcomes in terms of criteria such as **efficiency**, **equity**, and **stability**; and search for alternative forms of economic organization that might produce higher living standards or a more desirable distribution of material well-being.

1.3 Scope and Method of Analysis in Economics

1.3.1 Scope of Economics

- ❖ The field and scope of economics is expanding rapidly and has come to include a vast range of topics and issues.
- ❖ In the recent past, many new branches of the subject have developed, including **development economics**, **industrial economics**, **transport economics**, **welfare economics**, **environmental economics**, and so on.
- ❖ **However**, the core of modern economics is formed by its two major branches: **microeconomics** and **macroeconomics**. That means economics can be analyzed at micro and macro level.

A. Microeconomics: is concerned with the economic behavior of individual decision making units such as **households**, **firms**, **markets** and **industries**. In other words, it deals with **how households and firms make decisions** and how they **interact in specific markets**.

B. Macroeconomics: is a branch of economics that deals with the effects and consequences of **the aggregate behaviour of all decision making units** in a certain economy. In other words, it is an aggregative economics that examines the **interrelations among various aggregates**, their determination and the causes of fluctuations in them.

❖ It looks at the economy as a whole and discusses about the economy-wide phenomena.

❖ The distinctions between Microeconomics and Macroeconomics can

Microeconomics	Macroeconomics
✓ Studies individual economic units of an economy	✓ Studies an economy as a whole and its aggregates.
✓ Deals with individual (income, prices, outputs, etc.) economic variables.	✓ Deals with national income and output and general price level

Microeconomics

- ✓ Its central problem is **price determination** and **allocation of resources**.
 - ✓ Its main tools are the DD and SS of **particular commodities and factors**.
 - ✓ It helps to solve the central problem of what, how and for whom to produce in an economy so as to maximize profits
 - ✓ Discusses how the equilibrium of a consumer, a producer or an industry is attained
- Examples:** Individual income, individual **savings**, individual prices, an individual firm's **output**, individual **consumption**, etc.

Macroeconomics

- ✓ Its central problem is determination of level of **income** and **employment**.
 - ✓ Its main tools are aggregate DD and aggregate SS of an economy as a whole.
 - ✓ Helps to solve the central problem of **full employment of resources** in the economy.
 - ✓ Concerned and determination of equilibrium levels of income and employment at aggregate level
- Examples:** national income, national savings, general price level, national output, aggregate consumption, etc.

1.3.2 Method of Analysis: Positive and Normative Economics

A) Positive economics

❖ it is concerned with analysis of facts and attempts to describe the world as it is. It tries to answer the questions **what was**; **what is**; or **what will be**? It does not judge a system as good or bad, better or worse.

Examples:

- ✓ The food inflation for March 2020 inflation rate in Ethiopia is 26.90 percent
- ✓ Poverty and unemployment are the biggest problems in Ethiopia.
- ✓ The life expectancy at birth in Ethiopia is rising.

These statements are all **concerned with real facts and information**.

Any disagreement on positive statements can be checked by looking in to facts.

B) Normative Economics:

- ✓ It deals with the questions like, **what ought to be? Or what the economy should be?** It evaluates the **desirability of alternative outcomes** based on one's value judgments about what is good or what is bad. In this situation, what is good for one may not be the case for the other.

Normative analysis is a matter of opinion (subjective in nature) which cannot be proved or rejected with reference to facts.

Examples:

- ✓ Government should subsidize small scale enterprises, unemployment schemes/compensations.
 - ✓ Government should set a minimum wage rate
 - ✓ The poor should pay no taxes.
 - ✓ There is a need for intervention of government in the economy.
 - ✓ Females ought to be given a priority of job opportunity.
- Any disagreement on a normative statement can be solved **by voting**.

1.3.3 Inductive and deductive reasoning in economics

- ❖ The fundamental objective of economics, like any science, is the **establishment of valid generalizations about certain aspects of human behaviour**. Those generalizations are known as **theories**.
- ❖ **A theory** is **a simplified picture of reality**. Economic theory provides the basis for economic analysis which uses **logical reasoning**.
- ❖ There are two methods of logical reasoning: inductive and deductive.
- A) Inductive reasoning:** is a logical method of reaching at a correct general statement or theory based on several independent and specific correct statements.
- ✓ In short, it is the process of deriving a principle or theory by moving **from facts to theories** and **from particular to general economic analysis**.

❖ Inductive method involves the following steps.

1. Selecting problem for analysis
2. Collection, classification, and analysis of data
3. Establishing cause and effect relationship between economic phenomena

B) Deductive Reasoning: is a logical way of arriving at a particular or specific correct statement starting from **a correct general statement**. In short, it deals with conclusions about economic phenomenon from certain fundamental assumptions or truths or axioms through a process of logical arguments.

❖ The theory may agree or disagree with the real world and we should check the validity of the theory to facts by moving from general to particular.

❖ Major steps in the deductive approach include:

- 1) Problem identification
- 2) Specification of the assumptions
- 3) Formulating hypotheses
- 4) Testing the validity of the hypotheses

1.4 Scarcity, choice, opportunity cost and production possibilities frontier (PPF/PPC)

A) Scarcity

- ❖ The fundamental economic problem that any human society faces is the problem of scarcity.
- ❖ **Scarcity** refers to the fact that all economic resources that a society needs to produce goods and services are **finite** or **limited** in supply. But their being limited should be expressed in relation to human wants.
- ❖ Thus, the term **scarcity** reflects the **imbalance between our wants and the means to satisfy those wants**.

❖ Resources can be:

- 1) **Free resources:** if the amount available to a society is greater than the amount people desire at zero price. **Example:** sunshine
- 2) **Scarce (Economic) resources:** if the amount available to a society is less than what people want to have at zero price.

Examples:

- ✓ All types of **human resources:** **manual**, **intellectual**, **skilled** and **specialized labor**;
- ✓ **Most natural resources** like **land** (especially, fertile land), **minerals**, **clean water**, **forests** and **wild - animals**;
- ✓ All types of **capital resources** (like **machines**, **intermediate goods**, **infrastructure**); and
- ✓ All types of **entrepreneurial resources**

✓ **Economic resources** are usually classified into **four categories**.

- 1) **Labour:** refers to the **physical** as well as **mental efforts** of human beings in the production and distribution of goods and services. The reward for labour is called **wage**.
- 2) **Land:** refers to the **natural resources** or all the **free gifts of nature** usable in the production of goods and services. The reward for the services of land is known as **rent**.
- 3) **Capital:** refers to **all the manufactured inputs** that can be used to produce other goods and services. **Example:** **equipment, machinery, transport and communication facilities**, etc. The reward for the services of capital is called **interest**.
- 4) **Entrepreneurship:** refers to a special type of human talent that helps to organize and manage other factors of production to produce goods and services and takes risk of making losses. The reward for entrepreneurship is called **profit**.

Note: **Scarcity** does not mean **shortage**. Scarcity occurs if the amount available is less than the amount people wish to have **at zero price** while **shortage** of goods and services is when people are unable to get the amount they want **at the prevailing or on going price**.

✓ **Shortage** is a specific and short term problem but **scarcity** is a universal and everlasting problem.

2) Choice: If resources are scarce, then output will be limited. If output is limited, then we cannot satisfy all of our wants. Thus, choice must be made.

✓ **Due to the problem of scarcity, individuals, firms and government** are forced to choose as to **what output to produce, in what quantity, and what output not to produce**.

✓ In short, **scarcity implies choice. Choice, in turn, implies cost.**

✓ That means whenever choice is made, an **alternative opportunity** is sacrificed. This cost is known as **opportunity cost**.

3) Opportunity Cost: is the amount or value of the next best alternative that must be sacrificed (forgone) **in order to obtain one more unit of a product.**

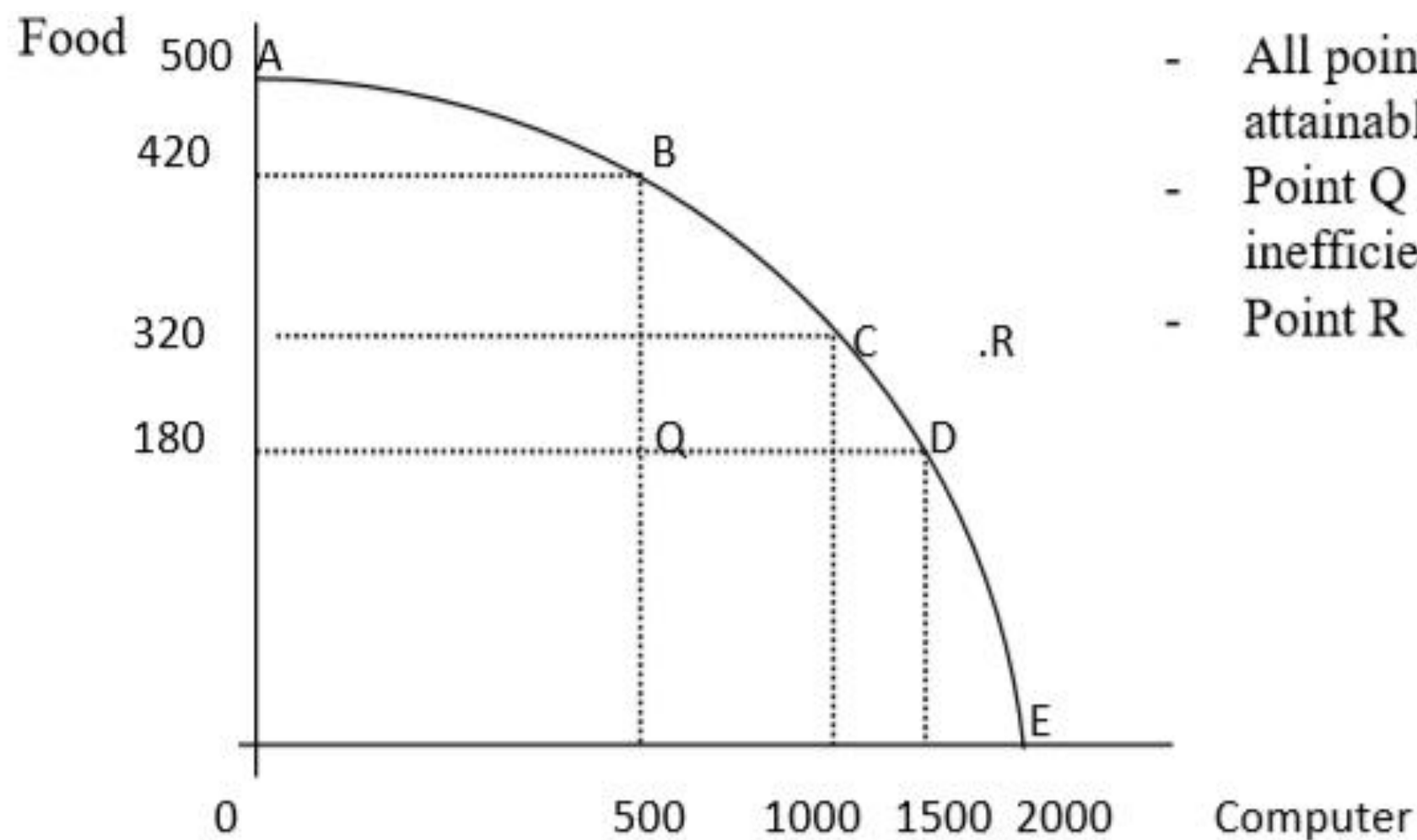
- ✓ When opportunity cost of an activity increases people substitute other activities in its place

Scarcity → choice → opportunity cost

4) The Production Possibilities Frontier or Curve (PPF/ PPC)

- ✓ **PPF/PPC** is a curve that shows the various possible combinations of goods and services that the society can produce given its resources and technology.
- ✓ Suppose **a hypothetical economy** produces food and computer given its limited resources and available technology (**table 1.1**).

Types of Product	Unit (Measurement)	Production Alternatives				
		A	B	C	D	E
Food	Metric tones	500	420	320	180	0
Computer	Number	0	500	1000	1500	2000



- All points on the PPF are attainable and efficient
- Point Q is attainable but inefficient
- Point R is unattainable

Figure 1.1: Production Possibilities Frontier

✓ The PPF describes **three important concepts**:

i) The concepts of scarcity: - the society cannot have unlimited amount of outputs even if it employs all of its resources and utilizes them in the best possible way.

ii) The concept of choice: - any movement along the curve indicates the change in choice.

✓ **The concept of opportunity cost**: - when the economy produces on the PPF, **production of more of one good requires sacrificing some of another product** which is reflected by the downward sloping PPF.

✓ Related to the opportunity cost we have a law known as the **law of increasing opportunity cost**. This law states that as we produce more and more of a product, the opportunity cost per unit of the additional output increases.

✓ This makes the shape of the PPF **concave to the origin**.

$$\text{Opportunity Cost} = \frac{\text{The amount of next best alternative sacrificed}}{\text{The amount of the good gained}}$$

Example: Referring to **table 1.1** or **Figure 1.1** above, if the economy is initially operating at point B, **what is the opportunity cost of producing one more unit of computer?**

Solution: Moving from production alternative **B** to **C** we have:

$$\text{Opportunity Cost(OP)} = \frac{\Delta Y}{\Delta X} = \frac{320-420}{1000-500} = \mathbf{0.2}, \text{ Implying, the economy gives up 0.2 metric tons of food per computer.}$$

5) Economic Growth and PPF/PPC

- ❖ **Economic growth** or an increase in the **total output level** occurs when one or both of the following conditions occur.
 - ✓ **Increase in the quantity or/and quality of economic resources**
 - ✓ **Advances in technology**

Economic growth is represented by outward shift of the PPF.

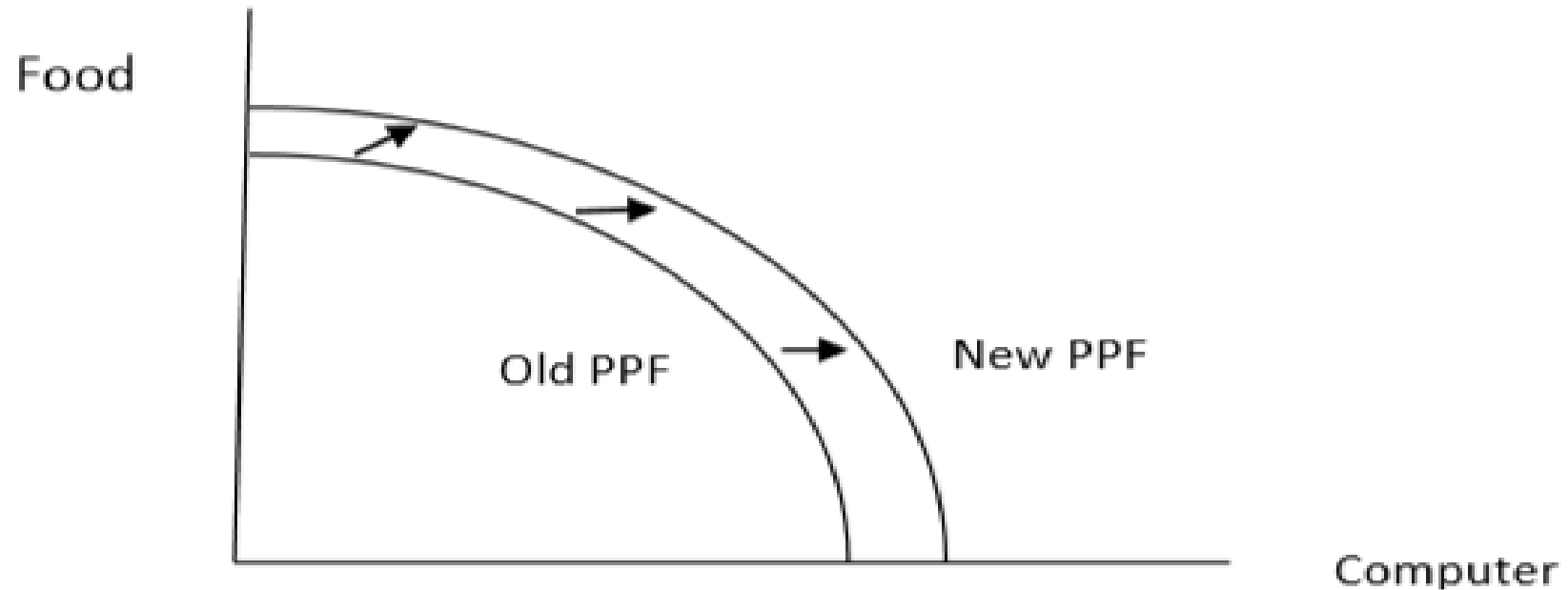


Figure 1.2: Economic growths with a new PPC

- ✓ An economy can grow because of an increase in productivity in **one sector of the economy**. **For example**, an improvement in technology applied to either food or computer would be illustrated by a shift of the PPF along the Y- axis or X-axis (**Asymmetric Growth**).

1.5 Basic Economic Questions

- ✓ **Economic problems** faced by an economic system **due to scarcity** of resources are known as **basic economic problems**.
- ✓ These problems **are common to all economic systems**.
- ✓ They are also known as **central problems of an economy**.
- ❖ **Therefore, any human society should answer the following three basic questions.**

What to Produce?

How to Produce?

For Whom to Produce?

A) What to Produce?

- ❖ This problem is also known as the **problem of allocation of resources**. It implies that every economy must decide which goods and in what quantities are to be produced.
- ❖ The economy must make choices such as **consumption goods** versus **capital goods**, **civil goods** versus **military goods**, and **necessity goods** versus **luxury goods**.
- ❖ As economic resources are limited we must reduce the production of one type of good if we want more of another type.
- ❖ **Generally**, the final choice of any economy is **a combination of the various types of goods** but **the exact nature of the combination depends upon the specific circumstances and objectives of the economy**.

B) How to Produce?

- ❖ This problem is also known as the **problem of choice of technique**: Choosing between alternative methods or techniques of production.
- ❖ **For example**, **cotton cloth** can be produced with hand looms, power looms, or automatic looms.
- ❖ Similarly, wheat can be grown with primitive tools and manual labour, or with modern machinery and little labour.
- ❖ **Broadly speaking**, the various techniques of production can be classified into two groups: **labor-intensive** techniques and **capital-intensive** techniques.
- ❖ The choice between different techniques depends **on the available supplies of different factors of production and their relative prices**.

C) For Whom to Produce

- ❖ This problem is also known as the problem of **distribution of national product**. It relates to how a material product is to be distributed among the members of a society.
- ❖ The economy must decide, **for example**, whether to produce for the benefit of the few rich people or for the large number of poor people.
- ❖ An economy that wants to benefit the maximum number of persons would first try to produce **the necessities** of the whole population and then to proceed to the production of **luxury goods**.
- ✓ **All these and other fundamental economic problems center around human needs and wants.** Many human efforts in society are directed towards the production of goods and services to satisfy human needs and wants.
- ✓ These human efforts result in **economic activities** that occur within the framework of an **economic system**.

1.6 Economic systems

- ❖ The way a society tries to answer the above fundamental questions is summarized by a concept known as **economic system**.
- ✓ **An economic system** is a **set of organizational and institutional arrangements** established **to answer the basic economic questions**.
- ✓ Customarily, we can identify **three types of economic system**.

These are:

Capitalism Economy
Command Economy and
Mixed Economy

READING ASSIGNMENT!

1.7 Decision making units and the circular flow model

- ✓ There are **three decision making units** in a **closed economy**. These are **households**, **firms** and **the government**.
- i) Household:** A household can be one person or more who live under one roof and **make joint financial decisions**.
- ✓ Households make two decisions.
 - a) Selling** of their resources, and
 - b) Buying** of goods and services
- ii) Firm:** A firm is a **production unit** that uses economic resources to produce goods and services.
- ✓ Firms also make two decisions:
 - a) Buying** of economic resources
 - b) Selling** of their products

iii) Government: A government is an organization that has legal and political power to control or influence households, firms and markets.

- ✓ provides some types of goods and services known as public goods and services for the society
- ✓ Purchase factors of production, goods and service from HH and Firms, respectively.
- ✓ Collects Tax from HH and Firms

❖ The three economic agents interact in two markets:

A) Product market: it is a market where goods and services are transacted/exchanged. That is, a market where households and governments buy goods and services from business firms.

B) Factor market (input market): it is a market where economic units transact/exchange factors of production (inputs). In this market, owners of resources (households) sell their resources to business firms and governments.

- ❖ The **circular-flow diagram** is a visual model of the economy that shows **how** money (Birr), economic resources and goods and services flows through markets among the decision making units.
- ❖ In the circular flow model, **Firms**, by selling goods and services to households, receive money in the form of **revenue** while **HHs** by supplying their resources to firms receive **income/Revenue**.
- ❖ The **gov't** to provide public services purchase goods and services from business firms through the product market with a given amount of expenditure(**G**). While it also needs resources required for the provision of the services. This resource is purchased from the factor market by making payments to the resource owners (**HHs**).
- ❖ The **main source of revenue** to the government is the **tax** collected from households and firms.

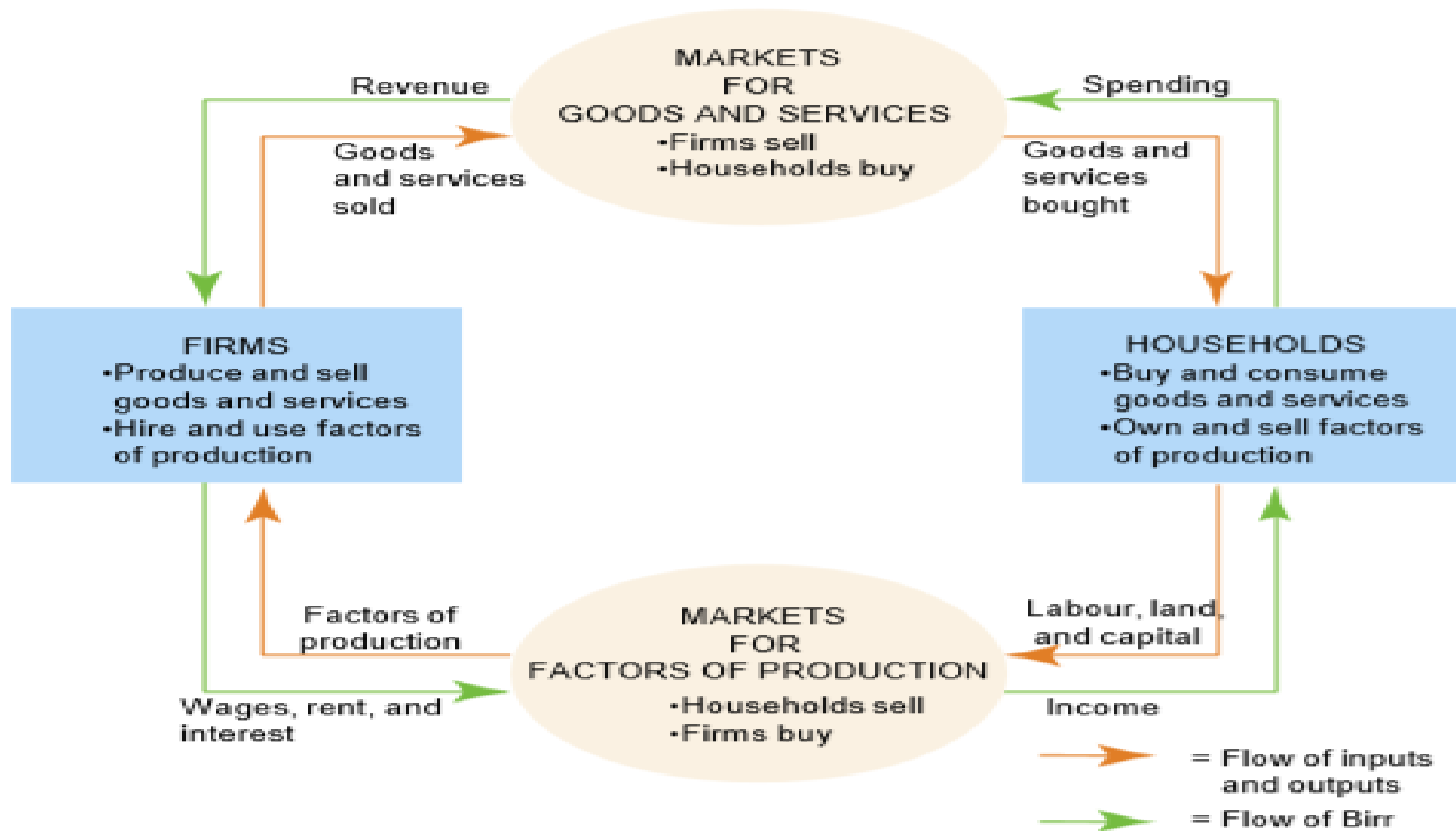


Fig 1.3 Two Sector Model

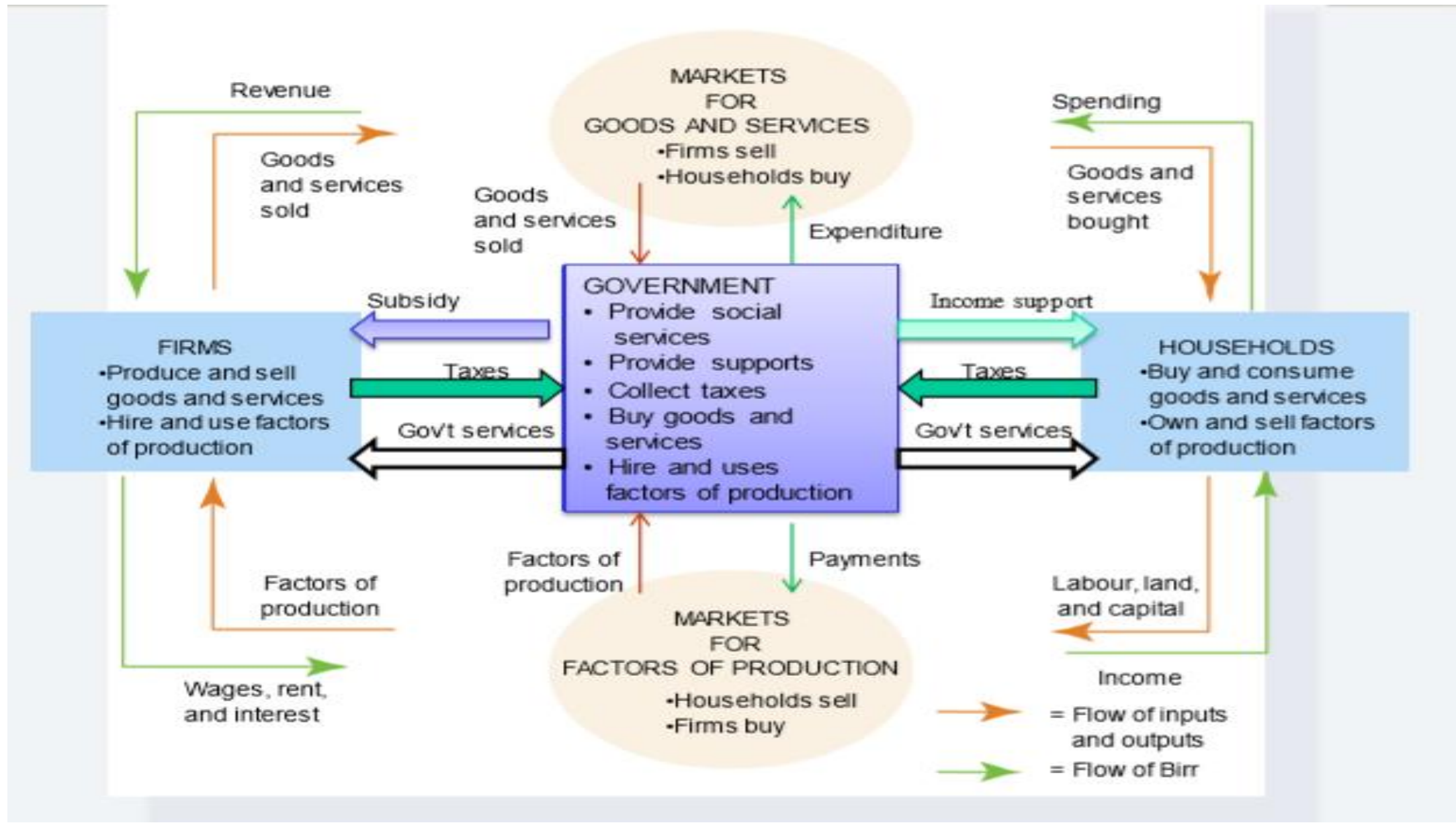


Fig 1.4 Three Sector Model

Chapter Two: Theory of Demand and Supply

2.1 Theory of Demand

- ❖ The theory of demand is related to the economic activities of consumers-consumption.
- ❖ The purpose of the theory of demand is to determine the various factors that affect demand.

What is demand in Economics?

- ❖ In economics the word “Demand” has a specific meaning, which is different from what we use it in our day to day activities.
- ❖ Demand refers to the amount of commodity which an individual buyer is willing and able to buy at a given price and during a given period of time.

- ❖ Thus, demand is different from **a mere desire**.
- ❖ Human wants are unlimited, and therefore, desires are many. But only a desire that is backed up by the **capacity to pay the price** for the commodity and **the willingness to buy it**, is termed as a **demand**.
- ❖ We may say **demand** refers to an **effective desire/wish**.

Demand = **ability to pay** + **willingness to pay** + **availability of the good**

- ❖ **Law of demand:** This is the **principle of demand**, which states that, **price of a commodity** and its **quantity demanded** are inversely related i.e., as price of a commodity increases (decreases) quantity demanded for that commodity decreases (increases), ceteris paribus.

2.1.1 Demand schedule (table), demand curve and demand function

These are **three ways of representing** the relationship that exists between price and the amount of a commodity purchased.

A) A demand schedule: is the relationship between price and quantity demanded in a **table form**.

Table 2.1: Individual household demand for orange per week

	A	B	C	D	E
Price (Per KG)	5	4	3	2	1
QD (Per Week)	5	7	9	11	13

B) Demand curve: is a graphical representation of the relationship between different quantities of a commodity demanded by an individual at different prices per time period.

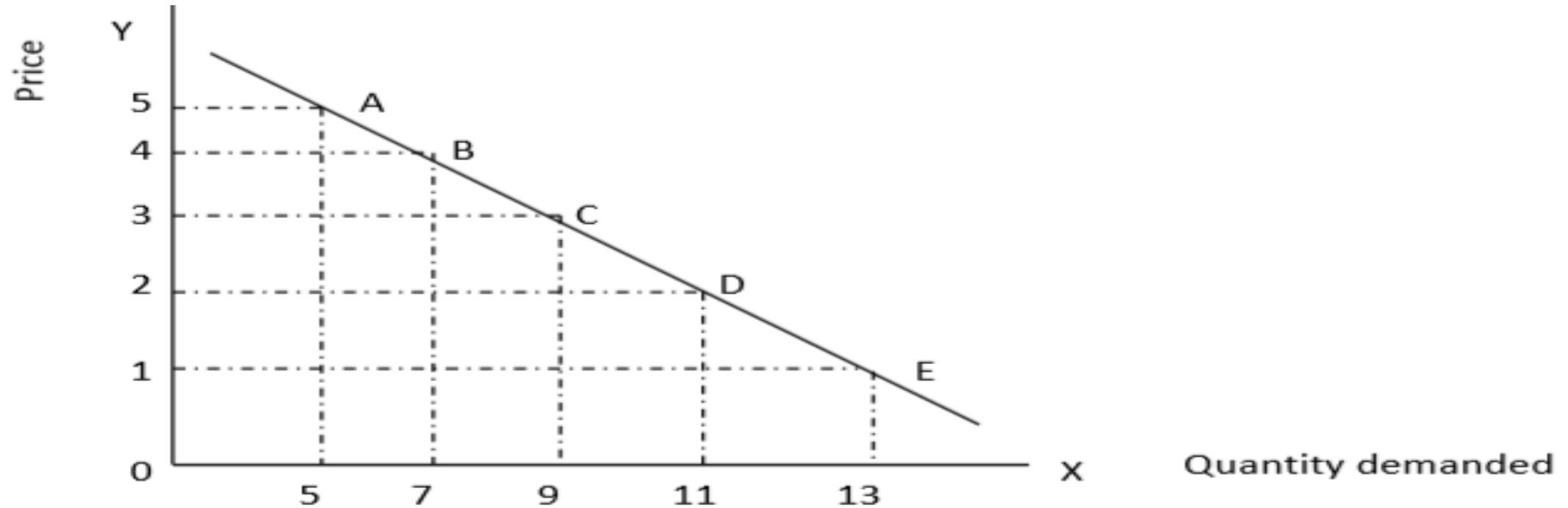


Figure 2.1: Individual demand curve

C) Demand function: is a **mathematical relationship** between price and quantity demanded, all other things remaining the same.

❖ A typical demand function is given by:

$$Q_D = f(p)$$

❖ **Example:** Let the demand function be $Q_D = a + bP$

Where $b = \frac{\Delta Q}{\Delta P}$, which is the slope of the demand curve.

For instance, if we move from point A to point B on figure 2.1 or Table 2.1, then,

$$b = \frac{\Delta Q}{\Delta P} = \frac{7-5}{4-5} = \frac{2}{-1} = \underline{\underline{-2}}$$

Thus, $Q_D = a - 2P$

To find a, let's substitute for Q_D and P at point A or B.

$$7 = a - 2(4); \quad a = 7 + 8 = 15$$

$Q_D = 15 - 2P$: The individual demand function

Market Demand: The **market demand schedule**, **curve** or **function** is derived by **horizontally adding the quantity demanded** for the product by all buyers **at each price**.

Example:

Table 2.2: Individual and market demand for a commodity

Prices	Individual Demands			Market Demand
	Consumer 1	Consumer 2	Consumer 3	
8	0	0	2	0
5	3	5	4	9
3	5	7	6	14
0	7	9	8	20

❖ The following graph depicts market demand curve **at price equal to three**.

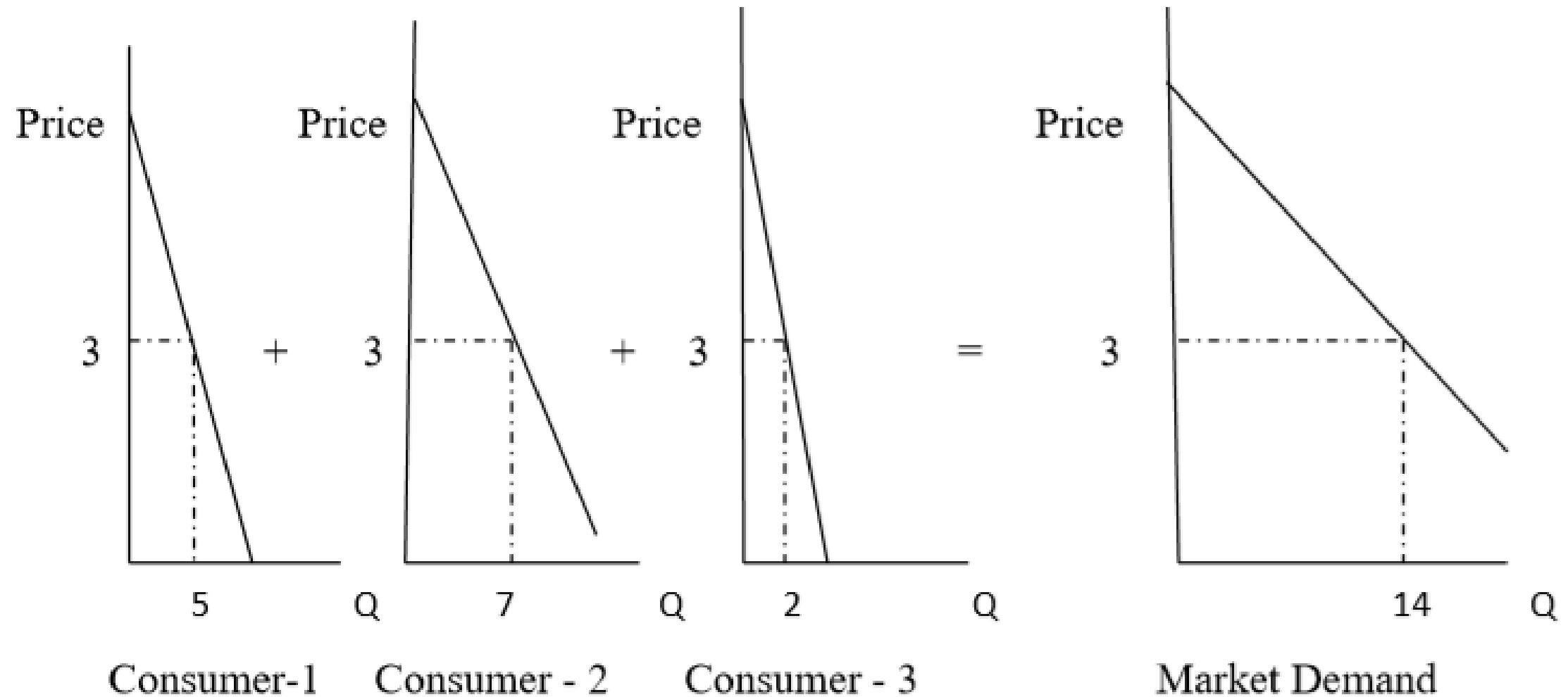


Figure 2.2: Individual and Market demand curve

Market Demand Function:

Example: Suppose the individual demand function of a product is given by:
 $P = 10 - Q/2$ and there are about **100 identical buyers** in the market.

Then the market demand function is given by:

$$P = 10 - \frac{Q}{2}$$

$$\frac{Q}{2} = 10 - P$$

$$Q = 20 - 2P$$

*Market Demand Function = Number of buyers * Individual Demand function*

$$Q_M = (20 - 2P)100$$

$$Q_M = 2000 - 200P$$

Thus, $Q_m = 2000 - 200p$: **Market Demand Function**

2.1.2 Determinants of demand

❖ The demand for a product is influenced by many factors. Some of these factors include:

A) Price of the product itself: The price of a commodity is the most important factor which affects the demand for a commodity.

❖ Other things remaining the same, if price increases, quantity demanded decreases, and if price decreases, quantity demanded increases (**Law of Demand**).

B) Income of the Consumer: Income of the consumer is also an important factor affecting the demand for a commodity. Generally, when income increases, demand also increases, and when income decreases, demand also decreases. This is true in the case of **normal goods**. However, in the case of **inferior goods**, with an increase in income their demand decreases and vice-versa.

On the basis of nature, goods can be classified into two types:

i) Normal Goods (Superior Goods): refer to those goods whose **income effect is positive** – i.e., all other factors remaining the same, as income increases, demand also increases and vice-versa.

For example: Cheese, Butter, Chocolates, Biscuits, etc.

ii) Inferior Goods: Inferior goods refer to those goods whose **income effect is negative** – i.e., all other factors remaining the same, as income increases, demand decreases and vice-versa. In general, inferior goods are **poor quality goods** with relatively lower price and buyers of such goods are expected to shift to better quality goods as their income increases.

For example: Some Chinese shoes, coarse cloth, leftover food etc.

C) Prices of Related Goods: Changes in the prices of related goods also affect the demand for a commodity.

❖ Related goods may be of two types:

i) Substitute Goods: are those goods which can be used in place of each other to satisfy a given want. That is why they are also called **competitive goods**.

❖ **For example**, Coffee and tea, Pepsi and Coca-Cola, pens and pencils, butter and oil, etc.

ii) Complementary Goods: are those goods which are used **together/jointly** to satisfy a given want. If two goods are complementary goods, a decline in the price of one would directly change the demand for the other commodity and vice-versa.

❖ **For example**, cars and petrol/fuel, pen and ink, tea and sugar are complements of each other.

D) Tastes and Preferences: If a consumer is accustomed to certain commodities, he will demand that commodity and this leads to increase in the demand for that commodity.

❖ When the taste of a consumer changes in favor of a good, her/his demand will increase and the opposite is true.

E) Consumer expectation of income and price

- ❖ **Higher price expectation** will increase demand while a lower future price expectation will decrease the demand for the good.

F) Number of buyer in the market(Population) and family size

- ❖ Since market demand is the horizontal sum of individual demand, an increase in the number of buyers will increase demand while a decrease in the number of buyers will decrease demand.

G) Climate/Weather: The demand for a commodity is also affected by climate.

- ❖ **For example**, demand for woolen clothes increases in cold seasons. On the other hand demand for coolers, cotton clothes etc., increases in hot seasons.

Generally, demand mainly depends upon **three factors**, namely. **Price of the commodity**; **Income of the consumer**, and **Price of related goods**.

- ❖ On the basis of the above three factors, demand can be classified into three types: **i) Price Demand**, **ii) Income Demand**, and **iii) Cross Demand**.

Change in Demand

- ❖ a change in any determinant of demand—except for the good's price causes the demand curve to **shift**. We call this **a change in demand**.

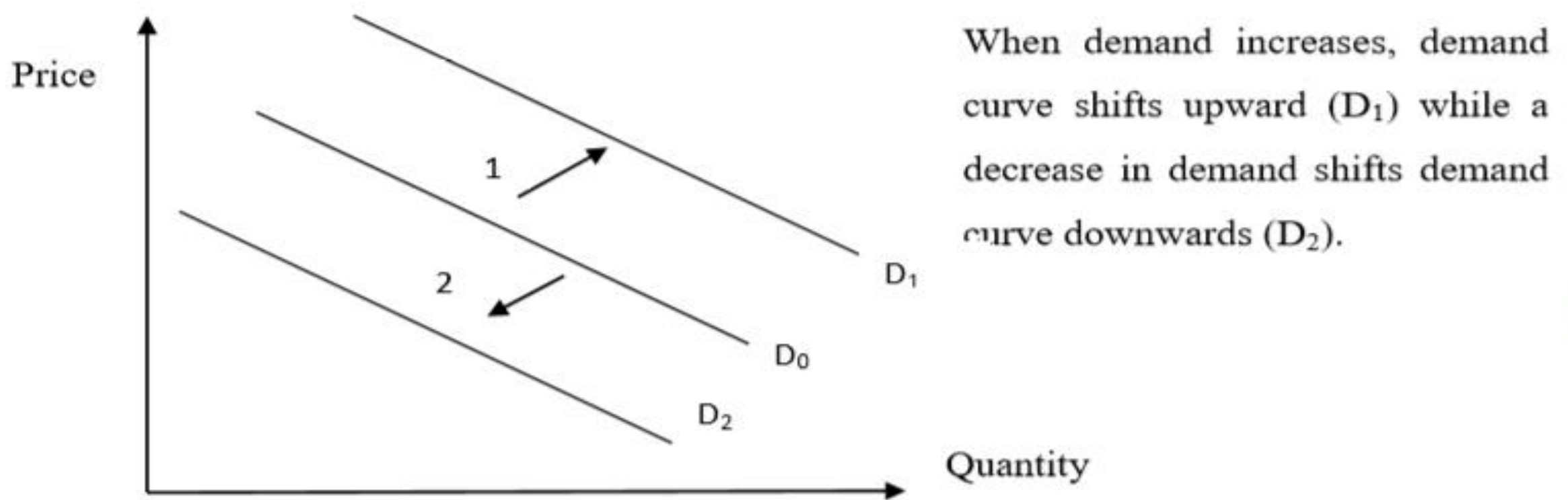


Figure 2.3: Shift in demand curve

- ❖ When we state **the law of demand**, we kept all the factors to remain constant except the price of the good under consideration.
- ❖ A change in any of the above listed factors except the price of the good will **change the demand**, while a change in the price, other factors remain constant will bring **change in quantity demanded**.
- ❖ A change in demand will shift the demand curve from its original location.
- ❖ For this reason those factors listed above other than price are called **demand shifters**.
- ❖ A change in own price is only a movement along the same demand curve.
- ❖ **Thus, a change in demand** is observed by **a shift in the demand curve**, while **a change in quantity demanded** is expressed by **a movement in the demand curve**.

2.1.3 Elasticity of demand

- ❖ In economics, the concept of elasticity is very crucial and is used to analyze the **quantitative relationship between price and quantity purchased or sold**.
- ❖ **Elasticity** is a measure of responsiveness of a dependent variable to changes in an independent variable.
- ❖ **Elasticity of demand** refers to the degree of responsiveness of quantity demanded of a good to a change in its price, or change in income, or change in prices of related goods.
- ❖ Commonly, there are three kinds of demand elasticity:
 - 1) **price elasticity**,
 - 2) **income elasticity**, and
 - 3) **cross elasticity**.

i) Price Elasticity of Demand

- ❖ **Price elasticity of demand:** refers to the degree of responsiveness of demand to change in price.
- ❖ It is a measure of how much the quantity demanded of a good responds to a change in the price of that good, computed as the percentage change in quantity demanded divided by the percentage change in price.
- ❖ **It indicates how consumers react to changes in price.**
- ❖ The greater the reaction the greater will be the elasticity, and the lesser the reaction, the smaller will be the elasticity.
- ❖ Demand for commodities like **clothes, fruit** etc. changes when there is even a small change in their price, whereas demand for commodities which are basic necessities of life, like **salt, food grains** etc., may not change even if price changes, or it may change, but not in proportion to the change in price.

❖ **Price elasticity demand** can be measured in two ways. These are **point** and **arc elasticity**.

A) Point Price Elasticity of Demand

❖ This is calculated to find elasticity at a given point, and given as:

$$e_d^p = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}} = \frac{\% \Delta Q_D}{\% \Delta P}$$

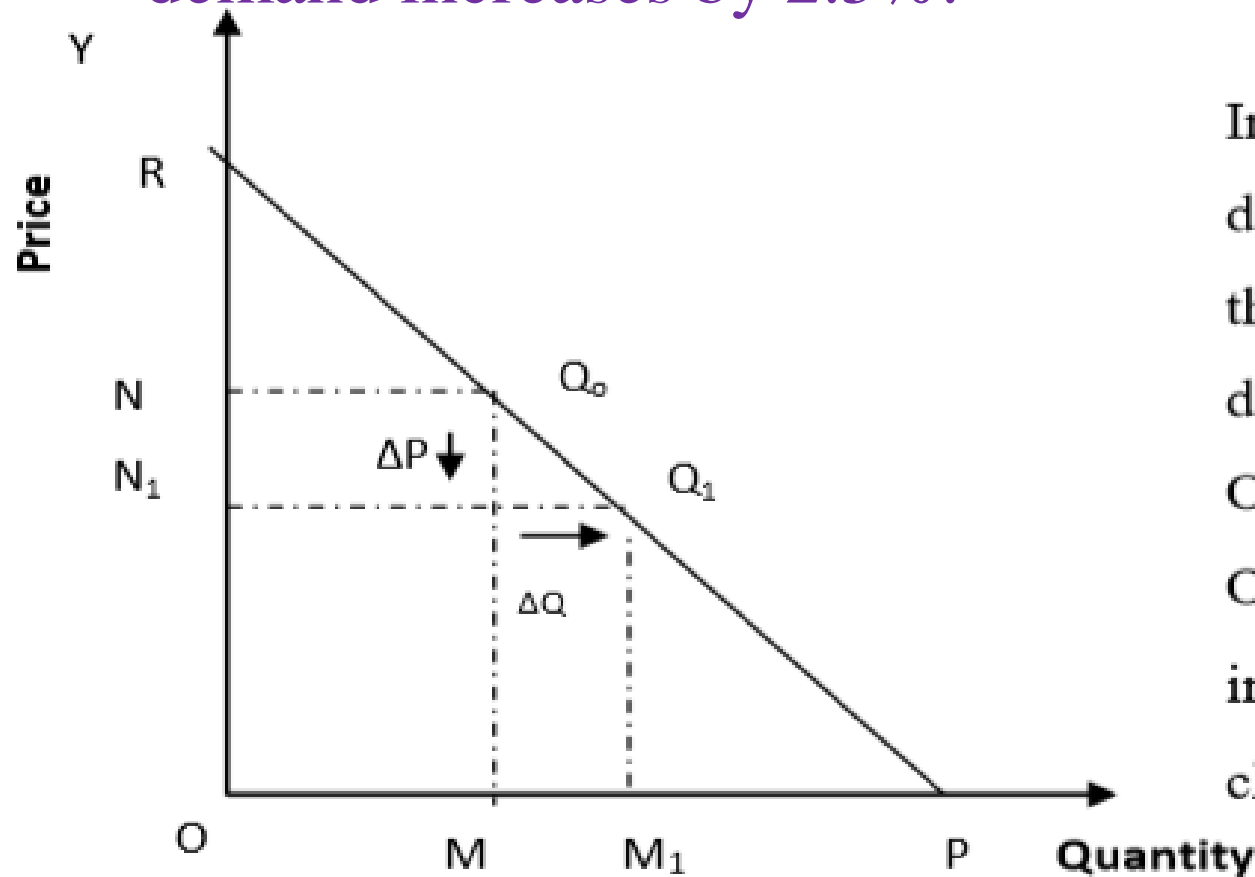
$$e_d^p = \frac{\frac{Q_2 - Q_1}{Q_1} * 100\%}{\frac{P_2 - P_1}{P_1} * 100\%} = \frac{Q_2 - Q_1}{P_2 - P_1} * \frac{P_1}{Q_1} = \frac{\Delta Q}{\Delta P} * \frac{P_1}{Q_1}$$

❖ In this method, we take a straight-line demand curve joining the two axes, and measure the elasticity between two points Q2 and Q1 which are assumed to be intimately close to each other.

❖ **Example:** Suppose the price of the commodity falls from Birr 5 to Birr 4 and quantity demanded increases from 100 units to 150 units. Given this, Compute point price elasticity of demand.

❖ **Solution:** $\frac{Q_2 - Q_1}{P_2 - P_1} * \frac{P_1}{Q_1} = \frac{150 - 100}{4 - 5} * \frac{5}{100} = \frac{250}{100} = -2.5$

❖ This implies that, at price = Birr 5, if price decreases by 1%, quantity demand increases by 2.5%.



In the diagram 'RP' is the straight-line demand curve, which connects both axes. In the beginning at the price ON the quantity demanded is OM. Then the price changes to ON₁ and the new quantity demanded will be OM₁. The symbol 'ΔP' represents the change in price while the symbol 'ΔQ' shows the change in quantity demanded.

Figure 2.4: Point elasticity of demand

NOTE: It should be remembered that **the point elasticity of demand on a straight line is different at every point.**

B) Arc price elasticity of demand

- ❖ The main drawback of the point elasticity method is that it is applicable only when we have information about even the **slight changes in the price** and the quantity demanded of the commodity.
- ❖ But in practice, we do not acquire such information about minute changes. We may possess demand schedules in which there are **big gaps in price as well as the quantity demanded.**
- ❖ In such cases, there is an alternative method known as **arc method** of elasticity measurement.
- ❖ When **elasticity of demand is measured over a finite range** or ‘arc’ of a demand curve, it is called **arc elasticity of demand.**

- ❖ In arc price elasticity of demand, **the midpoints of the old and the new values** of both price and quantity demanded are used.
- ❖ It measures a portion or a segment of the demand curve between the two points.
- ❖ The formula for measuring arc elasticity is given below.

$$\epsilon_d^a = \frac{\text{Change in quantity demanded}}{\text{Sum of the original and new quantity demanded}} \div \frac{\text{Change in price}}{\text{Sum of the original and new prices}}$$

$$\epsilon_d^a = \frac{Q_2 - Q_1}{Q_2 + Q_1} \div \frac{P_2 - P_1}{P_2 + P_1} = \frac{\Delta Q}{\Delta P} * \frac{P_2 + P_1}{Q_2 + Q_1}$$

Example: Assuming the previous hypothetical example, compute the arc elasticity of price demand.

Solution: In terms of the above formula,

$$\epsilon_d^a = \frac{\Delta Q}{\Delta P} * \frac{P_2 + P_1}{Q_2 + Q_1} = \frac{150 - 100}{4 - 5} * \frac{4 + 5}{150 + 100} = \frac{45}{-25} = \frac{-9}{5} = \mathbf{1.8}$$

- ❖ The arc elasticity formula is used if the change in price is **relatively large**.
- ❖ It is a more accurate measure of elasticity than point elasticity method.

❖ From Price elasticity of Demand, we can have the following points

- ✓ Elasticity of demand is **unit free** because it is a ratio of percentage change.
- ✓ Elasticity of demand is **usually a negative number** because of **the law of demand**. If the price elasticity of demand is **positive** the product is **inferior/giffen goods**.
- ✓ If $|\epsilon| > 1$, demand is said to be **elastic** and the product is **luxury** product.
- ✓ If $0 < |\epsilon| < 1$, demand is **inelastic** and the product is **necessity**.
- ✓ If $|\epsilon| = 1$, demand is **unitary elastic**.
- ✓ If $|\epsilon| = 0$, demand is said to be **perfectly inelastic**.
- ✓ If $|\epsilon| = \infty$, demand is said to be **perfectly elastic**.

Determinants of Price Elasticity of Demand

- i) **The availability of substitutes:** the more substitutes available for a product, the more elastic will be the price elasticity of demand.
- ii) **Time:** In the long- run, price elasticity of demand tends to be elastic. Because: More substitute goods could be produced. People tend to adjust their consumption pattern.
- iii) **The proportion of income consumers spend for a product:-**the smaller the proportion of income spent for a good, the less price elastic will be.
- iv) **The importance of the commodity in the consumers' budget :**
 - ✓ **Luxury goods:** tend to be more elastic. **Example:** gold.
 - ✓ **Necessity goods:** tend to be less elastic. **Example:** Salt.

V) Number of use of the commodity:

The higher the number of use of the commodity the higher will be the elasticity.

Example: Electricity.

vi) **Habits of the consumers:** **Example:** Cigarette Smokers

ii. Income Elasticity of Demand

- ❖ It is a measure of responsiveness of quantity demanded to **change in income**.

$$\eta_d^I = \frac{\frac{Q_2 - Q_1}{Q_1} * 100\%}{\frac{M_2 - M_1}{M_1} * 100\%} = \frac{Q_2 - Q_1}{M_2 - M_1} * \frac{M_1}{Q_1} = \frac{\Delta Q}{\Delta M} * \frac{M_1}{Q_1}$$

- ❖ Accordingly,

- ✓ If $\eta_d^I > 1$, the good is **luxury good**.
- ✓ If $1 < \eta_d^I < \infty$, (and positive), the good is **necessity good**
- ✓ If $\eta_d^I < 0$, (negative), the good is **inferior good**.

Example: Suppose a consumer has money income of Birr 1000 and he purchases 4 kg of wheat. If his money income goes up to Birr 1200, he is now prepared to buy 5 kg of wheat. Compute the point income elasticity of demand.

Solution:

$\boxed{?}^I_d = \frac{Q_2 - Q_1}{M_2 - M_1} * \frac{M_1}{Q_1} = \frac{5 - 4}{1200 - 1000} * \frac{1000}{4} = \frac{1000}{400} = 1.25$, implies for a 1 percent increase in income there is a 1.25 percent increase in the demand of the commodity and the commodity is normal(luxury).

iii) Cross Elasticity of Demand

- ❖ Measures how much the demand for a product is affected by a change in the price of another good(related good).
- ❖ The formula used to compute cross elasticity is:

$$\boxed{?}^{xy}_d = \frac{\frac{Q_{x2} - Q_{x1}}{Q_{x1}} * 100\%}{\frac{P_{y2} - P_{y1}}{P_{y1}} * 100\%} = \frac{Q_{x2} - Q_{x1}}{P_{y2} - P_{y1}} * \frac{P_{y1}}{Q_{x1}} = \frac{\Delta Q_X}{\Delta P_Y} * \frac{P_{y1}}{Q_{x1}}$$

According to the values of ϵ_d^{xy} ,

- i) If ϵ_d^{xy} is **positive**, the goods are **substitute goods**.
- ii) If ϵ_d^{xy} is **negative**, the goods are **complementary goods**.
- iii) iii) If ϵ_d^{xy} is **zero**, the goods are **unrelated goods**.

Example: Suppose that when the price of a good Y increases from 10 birr to 15 birr, then the quantity demanded of a good X has decreased from 1500 units to 1000 units. Compute the cross price elasticity of demand.

Solution:

$$\epsilon_d^{xy} = \frac{Q_{x2} - Q_{x1}}{P_{y2} - P_{y1}} * \frac{P_{y1}}{Q_{x1}} = \frac{1000 - 1500}{15 - 10} * \frac{10}{1500} = \frac{-500}{5} * \frac{1}{150} = -0.667,$$
 implying for a percent increase in the price of a good Y, there is 0.667 percent decrease in the quantity demanded of price good X. The two good are complementary.

2.2 THEORY OF SUPPLY

- ❖ Supply indicates various quantities of a product that sellers (producers) are willing and able to provide at different prices in a given period of time, other things remaining unchanged.
- ❖ The law of supply: states that, **ceteris paribus**, as price of a product increase, quantity supplied of the product increases, and as price decreases, quantity supplied decreases.

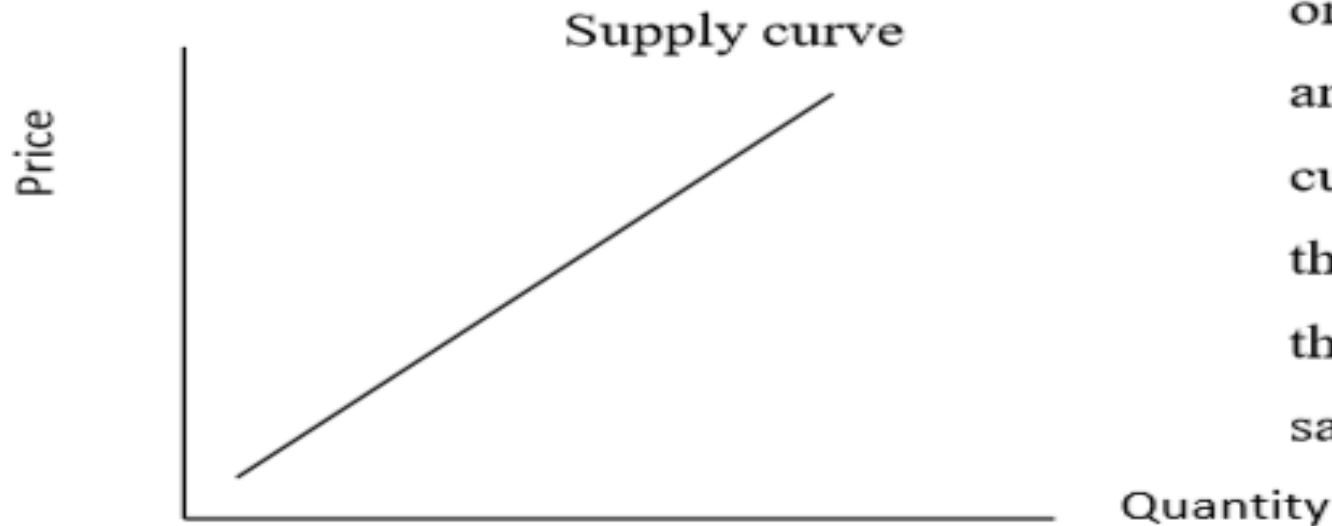
2.2.1 Supply schedule, supply curve and supply function

- ❖ A supply schedule is a tabular statement that states the different quantities of a commodity offered for sale at different prices.

Table 2.3: an individual seller's supply schedule for **butter**

Price (birr per KG)	30	25	20	15	10
QS(KG/Week)	100	90	80	70	60

- ❖ **A supply curve:** conveys the same information as a supply schedule. But it shows the information graphically rather than in a tabular form.



In this diagram the quantities of oranges are measured along X axis and prices along Y axis. The supply curve slopes upward as we go from the left to the right. This means, as the price rises, more is offered for sale and vice-versa.

Figure 2.5 supply curve

- ❖ **Supply Function: Mathematical representation.** The supply function of a commodity can be briefly expressed in the following functional relationship:

$$S = f(P),$$

Where S is quantity supplied and P is price of the commodity.

Market supply: It is derived by **horizontally adding the quantity supplied** of the product by all sellers at each price.

Table 2.4: Derivation of the market supply of good X

Price per unit	Quantity supplied by seller 1	Quantity supplied by seller 2	Quantity supplied by seller 3	Market supply per week
5	11	15	8	34
4	10.5	13	7	30.5
3	8	11.5	5.5	25
2	6	8.5	4	18.5
1	4	6	2	12

2.2.2 Determinants of supply

❖ Apart from the change in **price** which causes a change in quantity demanded, the supply of a particular product is determined by:

i) Input Price:

❖ An **increase in the price of inputs** such as labour, raw materials, capital, etc. causes **a decrease in the supply** of the product which is represented by a leftward shift of the supply curve.

ii) State of Technology

❖ Technological advancement enables a firm to produce and supply more in the market. This shifts the supply curve outward.

iii) Price of Related Goods: An increase in the price of other, related goods induces the firms to produce more of those other goods, leading to a reduction in the supply of the goods whose price has remained unchanged.

iv) Objectives of the Firm: Beside/apart from to the primary profit maximization objective, firms could have such as objectives of **maximum sales, maximum employment, more production**, etc. In this case, the supply will be increasing.

V) Weather condition

❖ A change in weather condition will have an impact on the supply of a number of products, especially **agricultural products**.

Vi) Sellers' expectation of price of the product:

vii) Number of sellers in the market

vii) Taxes & Subsidies (Fiscal Policy)

viii) Other factors: Market access (infrastructural development), political stability. etc.

2.2.3 Elasticity of supply

- ❖ It is the **degree of responsiveness of the supply to change in price**. It may be defined as the percentage change in quantity supplied divided by the percentage change in price.
- ❖ As the case with price elasticity of demand, we can measure the price elasticity of supply using point and arc elasticity methods.
- ❖ However, a simple and most commonly used method is **point method**.

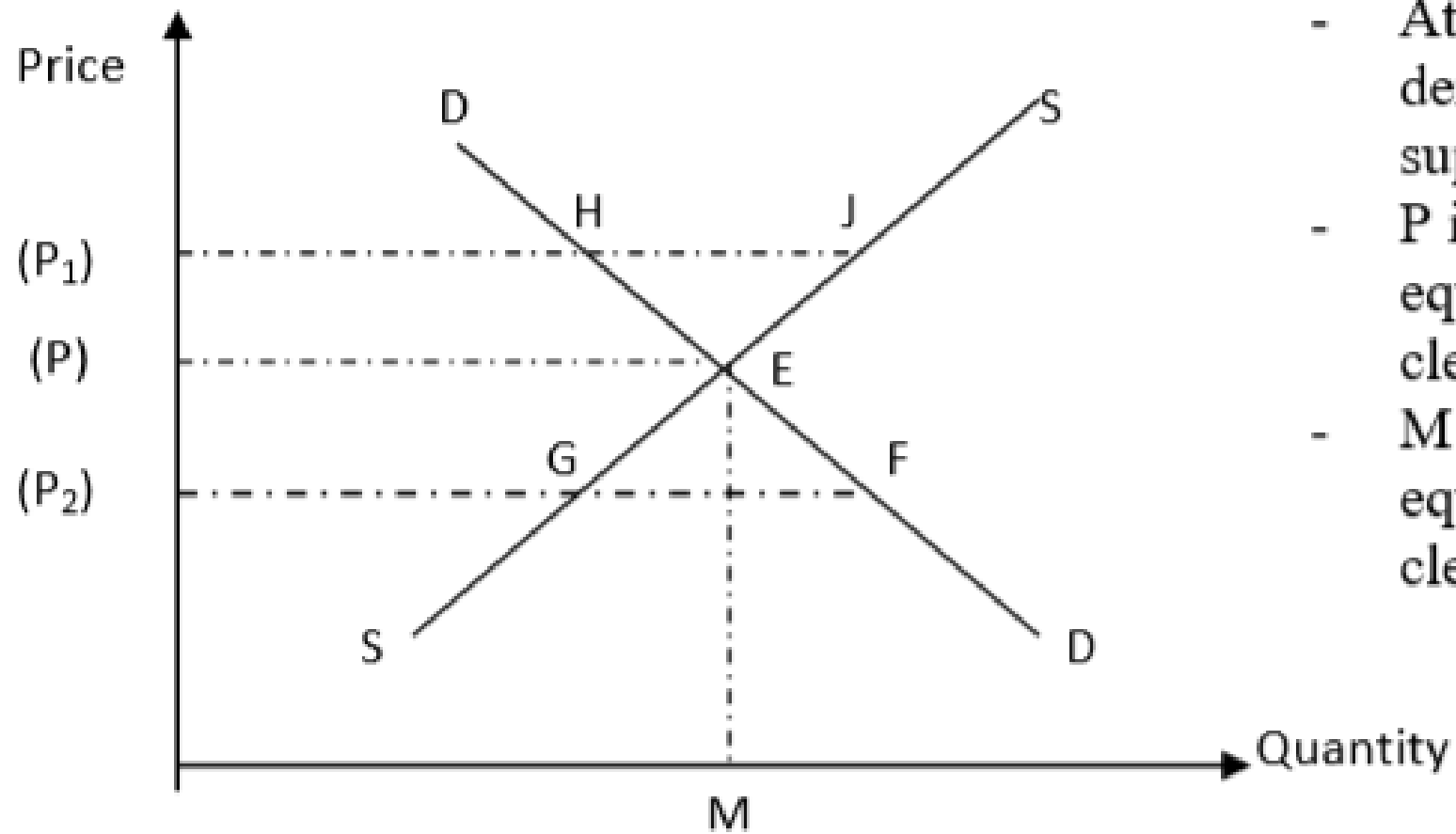
$$e_s^p = \frac{\text{percentage change in quantity supplied}}{\text{percentage change in price}} = \frac{\% \Delta Q_s}{\% \Delta P}$$

$$e_s^p = \frac{\frac{Q_2 - Q_1}{Q_1} * 100\%}{\frac{P_2 - P_1}{P_1} * 100\%} = \frac{Q_2 - Q_1}{P_2 - P_1} * \frac{P_1}{Q_1} = \frac{\Delta Q}{\Delta P} * \frac{P_1}{Q_1}$$

- ❖ Given the value of e_s^p , like elasticity of demand, price elasticity of supply can be **elastic**, **inelastic**, **unitary elastic**, **perfectly elastic** or **perfectly inelastic**.

2.3 Market equilibrium

Market equilibrium occurs when **market demand = market supply**.



- At point 'E' market demand equals market supply (equilibrium point)
- P is the market equilibrium (market clearing) price.
- M is the market equilibrium (market clearing) quantity.

Figure 2.7: market equilibrium

Example: Given market demand: $Q_d = 100 - 2P$, and market supply:
 $P = (Q_s / 2) + 10$

- a) Calculate the market equilibrium price and quantity
- b) Determine, whether there is surplus or shortage at $P = 25$ and $P = 35$

Solution:

- a) At equilibrium, $Q_d = Q_s$

$$100 - 2P = 2P - 20$$

$$4P = 120$$

$$P^* = 30 \text{ and } Q^* = 40$$

- b) $Q_d(\text{at } P = 25) = 100 - 2(25) = 50$ and

$$Q_s(\text{at } P = 25) = 2(25) - 20 = 30$$

Therefore, there is a **shortage** of: $50 - 30 = 20$ units

$$Q_d(\text{at } P = 35) = 100 - 2(35) = 30 \text{ and}$$

$$Q_s(\text{at } p = 35) = 2(35) - 20 = 50$$

Therefore, there is a **surplus** of: $30 - 50 = -20$ units.

Effects of shift in demand and supply on equilibrium

What will happen to the equilibrium price and quantity ?

i) When demand changes and supply remains constant

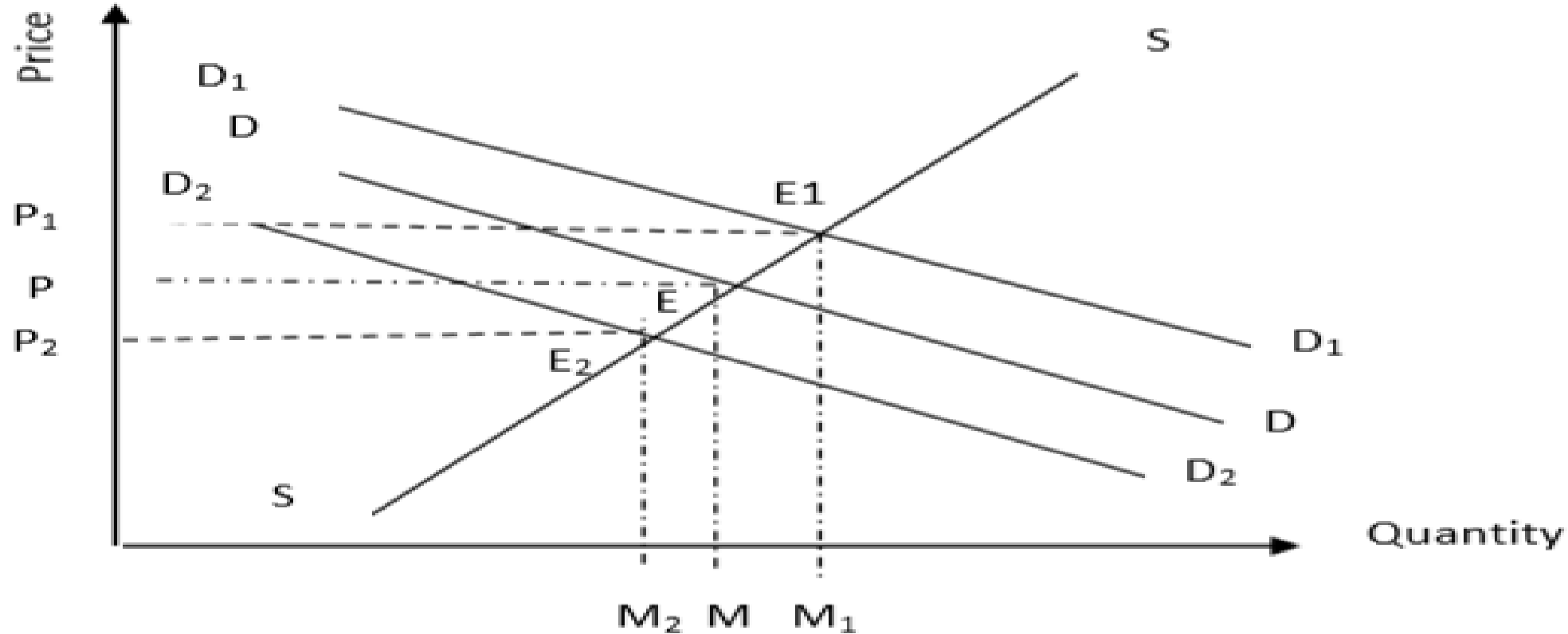


Figure 2.8: The effect of change in demand on market equilibrium

❖ Thus, supply being given, a decrease in demand reduces both the equilibrium **P** and **Q** and vice versa.

ii. When supply changes and demand remains constant

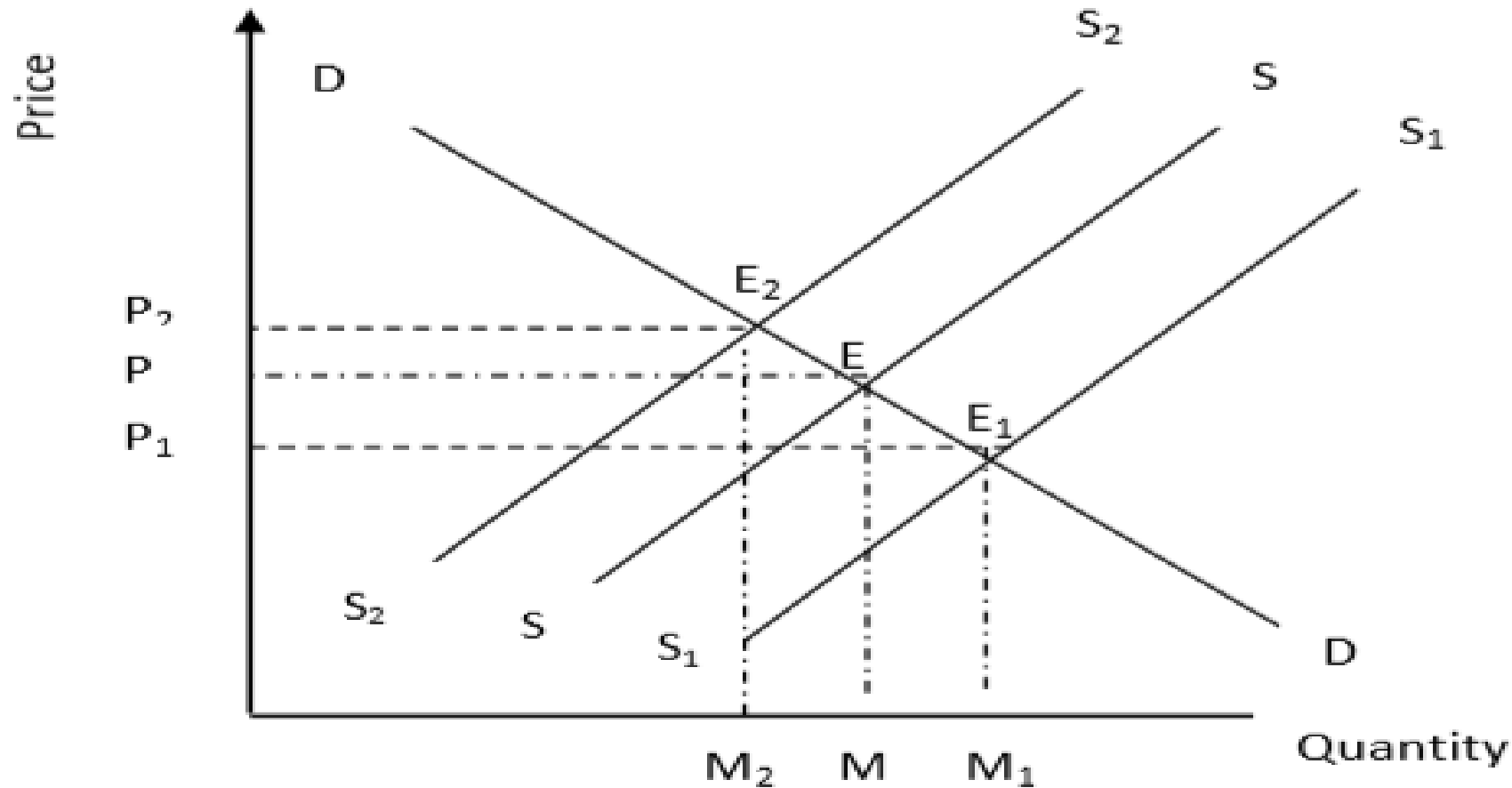


Figure 2.9: The effect of change in supply on market equilibrium

- ❖ **Thus**, give the demand, an increase in supply **reduces the equilibrium P** and **increases the equilibrium Q** , and vice versa.

III) Effects of combined changes in demand and supply

- ❖ When both demand and supply **increase**, the quantity of the product **will increase definitely**. But it is **not certain** whether the **price** will rise or fall.
- ❖ **Three Scenarios:**
 - 1) If an increase in **demand** is more than an increase in supply, then the **price goes up**.
 - 2) if an increase in **supply** is more than an increase in demand, the **price falls**.
 - 3) If the increase in **demand and supply** is same, then the **price remains the same**.
- ❖ Besides, when demand and supply **decline**, the **quantity decreases**.
- ❖ But the will depend upon **the relative fall in demand and supply**.
change in price

❖ **In this case too, there will be three Scenarios:**

- 1) When the **fall in demand is more than the fall in supply**, the **price will decrease**.
- 2) When the **fall in supply is more than the fall in demand**, the **price will rise**.
- 3) If both demand and supply decline in **the same ratio**, there is **no change in the equilibrium price**, but the quantity decreases.

Therefore, when both supply and demand change, the effect on the equilibrium price depends on the proportion of change(relative change) in demand and change in supply.

Quiz(10%)

I) The market demand for a product is given as: $p = 20 - 1/4Q_d$ and the market supply for the product is given as: $p = \frac{1}{5}Q_s + 2$.

- A) Compute the market clearing price and market clearing quantity. (4%)
- B) What happens to the equilibrium levels of price and quantity in (A),
- i) if both market demand and market supply decline in the same ratio or proportion. (2%)
 - ii) If the decline in market supply is more than the decline in market demand. (2%)
 - iii) If the decline in market demand is more than the decline in market supply. (2%)

NB: Properly demonstrate your Answers for questions in (B) using Graphs.
(Otherwise, will not be evaluated)

Chapter Three: Theory of Consumer Behaviour

- ❖ **Consumer theory** is based on what people like, so it begins with something that we can't directly measure, but must infer.
- ❖ That is, **consumer theory** is based on the premise that we can infer what people like from the choices they make.
- ❖ **Consumer behaviour** can be best understood in **three steps**.
 - 1) **First**, by examining **consumer's preference**, we need a practical way to describe how people prefer one good to another.
 - 2) **Second**, we must take into account that consumers face **budget constraints** — they have limited incomes that restrict the quantities of goods they can buy.
 - 3) **Third**, we will put **consumer preference** and **budget constraint** together to determine consumer choice.

3.1 Consumer preferences

- ❖ A consumer makes **choices** by **comparing bundle of goods**.
- ❖ Given any two consumption bundles, the consumer either decides that one of the consumption **bundles is strictly better than the other**, or decides that she is **indifferent** between the two bundles.
- ❖ In order to tell whether one bundle is preferred to another, we see how the consumer behaves in choice situations involving two bundles.
- ❖ **If she always chooses X when Y is available**, then it is natural to say that this consumer prefers X to Y. We use the symbol \succ to mean that one bundle is strictly preferred to another, so that **$X \succ Y$** should be interpreted as saying that the consumer **strictly prefers X to Y**, in the sense that she definitely wants the X-bundle rather than the Y-bundle.
- ❖ If the consumer is **indifferent between two bundles** of goods, we use the symbol \sim and write **$X \sim Y$** .

- **Indifference** means that the consumer would be just as satisfied, according to her own preferences, consuming the bundle X as she would be consuming bundle Y .
- If the consumer **prefers or is indifferent between the two bundles** we say that she weakly prefers X to Y and write $X \succeq Y$.
- The relations of **strict preference**, **weak preference**, and **indifference** are **not independent concepts**; the relations are themselves related.
- **For example:**
 - ✓ if $X \succeq Y$ and $Y \succeq X$, we can conclude that $X \sim Y$. That is, if the consumer thinks that X is at least as good as Y and that Y is at least as good as X , then she must be **indifferent between the two** bundles of goods.
 - ✓ **Similarly**, if $X \succeq Y$ but we know that it is not the case that $X \sim Y$, we can conclude that $X \succ Y$. This just says that if the consumer thinks that X is at least as good as Y , and she is not indifferent between the two bundles, then she thinks that **X is strictly better than Y** .

3.2 The concept of utility

- ❖ Economists use the term **utility** to describe the **satisfaction** or **pleasure** derived from the consumption of a good or service.
- ❖ In other words, utility is the power of the product to satisfy human wants.
- ❖ Given any two consumption bundles X and Y, the consumer definitely wants the X-bundle than the Y-bundle if and only if the utility of X is better than the utility of Y.

Do you think that utility and usefulness are synonymous?

✓ **In defining utility**, it is important to bear in mind **the following points.**

1) **Utility** and **Usefulness** are not synonymous.

For example: Paintings by Picasso may be useless functionally but offer great utility to art lovers.

❖ Hence, **usefulness is product centric** whereas **utility is consumer centric.**

- 2) **Utility is subjective. Vary from person to person.** That means, the utility that two individuals derive from consuming the same level of a product may not be the same. **For example:** non-smokers do not derive any utility from cigarettes.
- 3) **Utility** can be **different at different places** and **time**.
For example: the utility that we get from drinking coffee early in the morning may be different from the utility we get during lunch time.

3.3 Approaches of measuring utility

- ✓ **Two major approaches** to measure utility: **cardinal** and **ordinal** approaches.
- ❖ The cardinalist school postulated that **utility can be measured objectively**.
- ❖ According to the **ordinalist** school, **utility is not measurable in cardinal numbers** rather the consumer can rank or order the utility he derives from different goods and services.

3.3.1 The cardinal utility theory

❖ According to the **cardinal utility** theory, utility is measurable by arbitrary unit of measurement called **utils** in the form of 1, 2, 3 etc.

For example: we may say that consumption of an orange gives Bilen 10 utils and a banana gives her 8 utils, and so on.

❖ From this, we can assert that **Bilen** gets more satisfaction from **orange** than from **banana**.

3.3.1.1 Assumptions of cardinal utility theory

❖ The cardinal approach is based on the following **major assumptions**.

1) Rationality of consumers. The **main objective** of the consumer is to maximize his/her satisfaction given his/her limited budget or income. Thus, in order to maximize his/her satisfaction, the consumer has to be rational.

2) Utility is cardinally measurable.

3) Constant marginal utility of money. A given unit of money deserves the same value at any time or place it is to be spent.

4) Diminishing marginal utility (DMU). The utility derived from each successive units of a commodity diminishes. In other words, the marginal utility of a commodity diminishes as the consumer acquires larger quantities of it.

5) The total utility of a basket of goods depends on the quantities of the individual commodities.

❖ If there are **n commodities** in the bundle with quantities **$X_1, X_2, X_3, \dots, X_n$** , the total utility is given by:

$$TU = f(X_1, X_2, X_3, \dots, X_n)$$

3.3.1.2 Total and marginal utility

A) Total Utility (TU)

- ❖ is the **total satisfaction** a consumer gets from consuming some specific quantities of a commodity **at a particular time**.
- ❖ As the consumer consumes **more of a good** per time period, his/her **total utility increases**.

- ❖ **However**, there is **a saturation point** for that commodity beyond which the consumer will not be capable of enjoying any greater satisfaction from it.

B) Marginal Utility (MU)

- ❖ is the **extra satisfaction** a consumer realizes from an additional unit of the product.
- ❖ In other words, marginal utility is the **change in total utility** that results from the consumption of one more unit of a product.
- ❖ Graphically, it is **the slope of total utility**.
- ❖ Mathematically, marginal utility is:

$$MU = \frac{\Delta TU}{\Delta Q}$$

- ❖ where, ΔTU is the change in total utility, and ΔQ is the change in the amount of product consumed.

Example: Lets consider a hypothetical example given in **Table 3.1** below.

Table 3.1: Total and marginal utility

Quantity	Total Utility(TU)	Marginal Utility(MU)
0	0	-
1	10	10
2	18	8
3	24	6
4	28	4
5	30	2
6	30	0
7	28	-2

❖ **Graphically**, the above data can be depicted as follows.

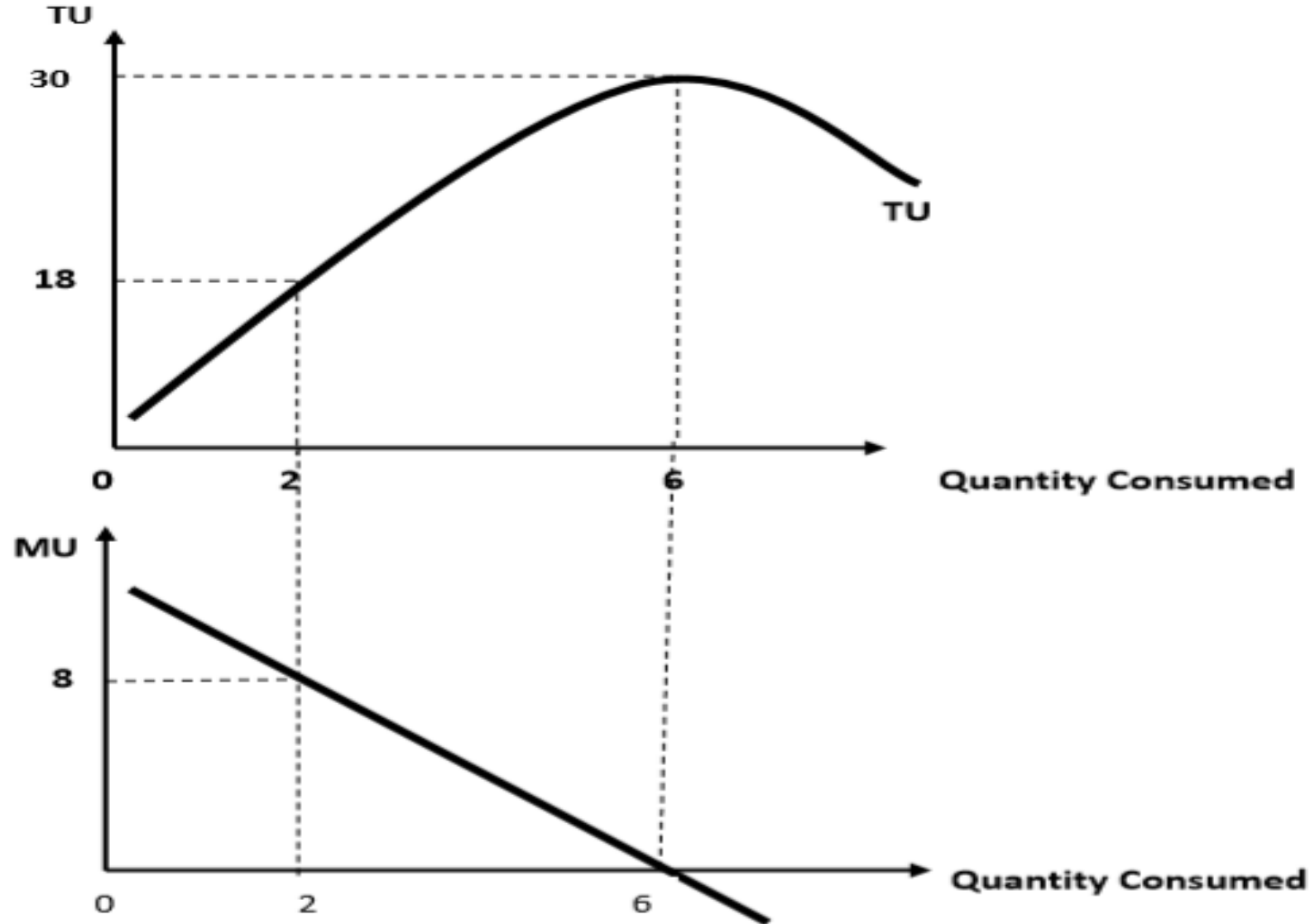


Figure 3.1: Total and marginal utility curves

- ❖ The **total utility first increases**, reaches the **maximum** (when the consumer consumes 6 units) and **then declines** as the quantity consumed increases.
- ❖ On the other hand, the **marginal utility continuously declines** (even becomes zero or negative) as quantity consumed increases.
- ❖ **From** the graph of **TU** and **MU**:
 - ✓ When **TU** is **increasing**, **MU** is **positive**.
 - ✓ When **TU** is **maximized**, **MU** is **zero**.
 - ✓ When **TU** is **decreasing**, **MU** is **negative**.

3.3.1.3 Law of diminishing marginal utility (LDMU)

Is the utility you get from consumption of the first orange the same as the second or the third orange?

- ❖ The **law of diminishing marginal utility** states that as the quantity consumed of a commodity increases per unit of time, **the utility derived from each successive unit decreases**, consumption of all other commodities remaining constant.
- ❖ In other words, the **extra satisfaction** that a consumer derives **declines** as he/she consumes more and more of the product **in a given period of time**.
- ❖ The **LDMU** is based on the following assumptions.
 - ✓ The **consumer** is **rational**
 - ✓ The consumer consumes **identical** or **homogenous product**. The commodity to be consumed should have **similar quality**, **color**, **design**, etc.
 - ✓ There is **no time gap/constant** in consumption of the good
 - ✓ The consumer **taste/preferences remain unchanged**

3.3.1.4 Equilibrium of a consumer

- ❖ The objective of a rational consumer is to maximize total utility.
- ❖ As long as the additional unit consumed brings a positive marginal utility, the consumer wants to consume more of the product because total utility increases.
- ❖ However, the consumer has income/budget constraint.

A) The case of one commodity

- ❖ The equilibrium condition of a consumer that consumes a single good X occurs when the marginal utility of X is equal to its market price.

$$MU_x = P_x$$

Proof

Given the **utility function**:

$$U = f(X)$$

- ❖ If the consumer buys commodity X, then his expenditure will be $P_x Q_x$.
- ❖ The consumer maximizes the **difference between his utility and expenditure.**

$$\max(U(Q_x) - P_x Q_x)$$

- ❖ The **necessary condition** for maximization is equating the derivative of a function to zero.
- ❖ **Thus,** $\frac{dU(Q_x)}{dQ_x} - \frac{dP_x Q_x}{dQ_x}$
- ❖ **Because ,** $\frac{dU(Q_x)}{dQ_x} = MU_x$

$$MU_x = P_x$$

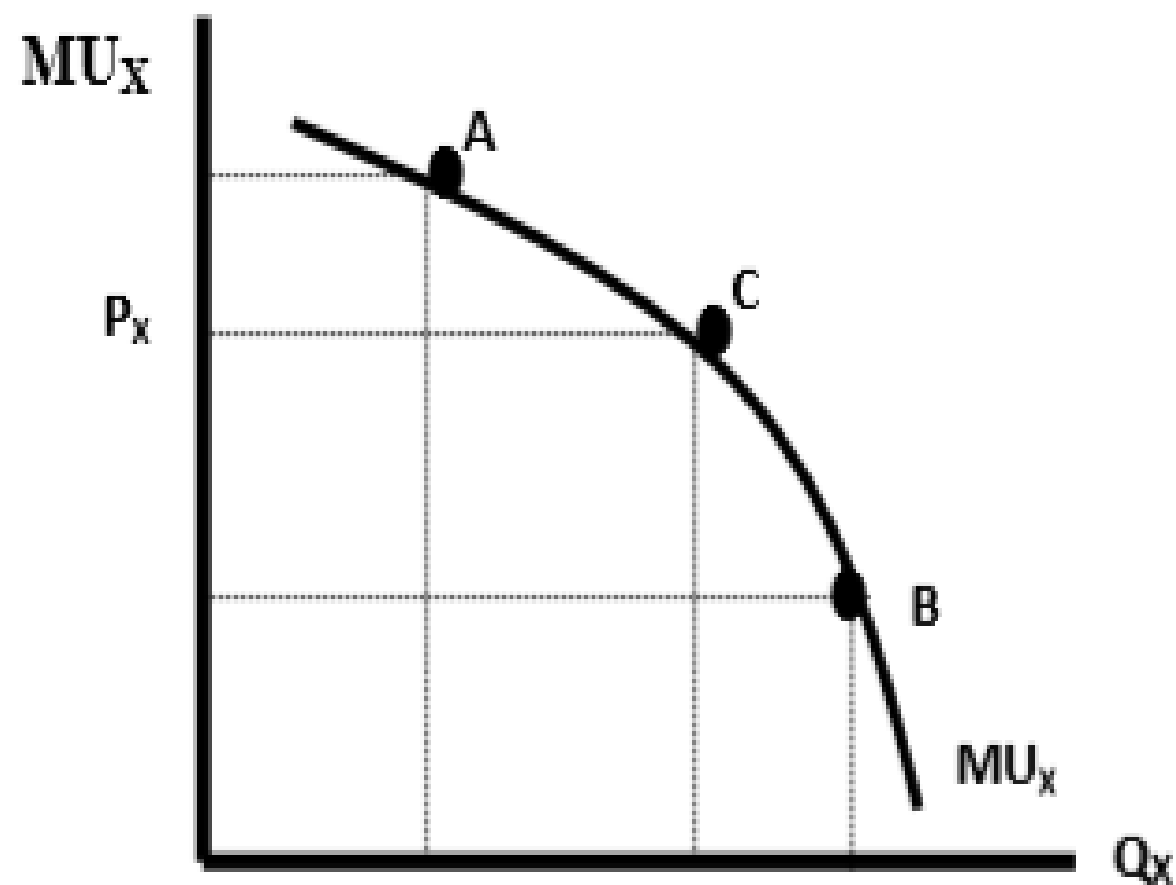


Figure 3.2: Equilibrium condition of consumer with only one commodity

- ❖ At any point **above point C** (like point A) where $MU_x > P_x$, it pays the consumer to consume more.
- ❖ When $MU_x < P_x$ (like point B), the **consumer should consume less of X**.
- ❖ At point C where $MU_x = P_x$ the consumer is at equilibrium.

B) The case of two or more commodities

- ❖ For the case of two or more goods, the consumer's equilibrium is achieved when the marginal utility per money spent is equal for each good purchased and **his money income available for the purchase of the goods is exhausted**.
- ❖ That is,
$$1) \frac{MU_x}{P_x} = \frac{MU_y}{P_y} = \dots = \frac{MU_n}{P_n}$$
$$2) P_x Q_x + P_y Q_y + \dots + P_n Q_n = M$$
- ❖ Where, **M** is the **income** of the consumer.

Example: Suppose Saron has $M=7$ two goods: **banana** and **bread**. The unit price of banana = 1 Birr and the unit price of a loaf of bread = 4 Birr.

Table 3.2: Utility schedule for two commodities

<i>Income = 7 Birr, Price of banana = 1 Birr, Price of bread = 4 Birr</i>							
<i>Banana</i>				<i>Bread</i>			
<i>Quantity</i>	<i>TU</i>	<i>MU</i>	<i>MU/P</i>	<i>Quantity</i>	<i>TU</i>	<i>MU</i>	<i>MU/P</i>
0	0	-	-	0	0	-	-
1	6	6	6	1	12	12	3
2	11	5	5	2	20	8	2
3	14	3	3	3	26	6	1.5
4	16	2	2	4	29	3	0.75
5	16	0	0	5	31	2	0.5
6	14	-2	-2	6	32	1	0.25

- ❖ The **equilibrium state** must satisfy the two conditions stated before.
- ❖ Accordingly, the equilibrium level of consumption for **Saron** will be:
Banana = 3 units, and
Bread = 1 loaf of bread.
- ❖ At this combination $P_x Q_x + P_y Q_y = M$
 That is $(1*3) + (4*1) = 7$
- ❖ Given this, the total utility that Saron derives from this combination can be given by:

$$TU = TU1 + TU2$$

$$TU = 14 + 12 \quad TU = 26$$
- ❖ Given her **fixed income** and the **price level of the two goods**, **no combination of the two goods will give her higher TU than this level of utility.**

Limitation of the cardinal approach

- 1) The assumption of cardinal utility is doubtful because **utility may not be quantified**. Utility cannot be measured absolutely (objectively).
- 2) The assumption of **constant MU of money** is **unrealistic** because as income increases, the **marginal utility of money changes**.

3.3.2 The ordinal utility theory

- ❖ In the ordinal utility approach, **it is not possible for consumers to express the utility of various commodities they consume in absolute terms, like 1 util, 2 utils, or 3 utils.**
- ❖ **However**, it is possible to express the **utility in relative terms**.
- ❖ The consumers **can rank commodities in the order of their preferences** as 1st, 2nd, 3rd and so on.
- ❖ **Therefore**, the consumer need not know in specific units the utility of various commodities to make his choice.

- ❖ It suffices for him to be able to **rank the various baskets of goods** according to the satisfaction that each bundle gives him.

3.3.2.1 Assumptions of ordinal utility theory

- ❖ The ordinal approach is based on the following assumptions.
 - 1) **Consumers are rational:** they maximize their satisfaction or utility given their income and market prices.
 - 2) **Utility is ordinal:** utility is not absolutely (cardinally) measurable. Consumers are required only to order or rank their preference for various bundles of commodities.
 - 3) **Diminishing marginal rate of substitution:** The marginal rate of substitution **is the rate at which a consumer is willing to substitute one commodity for another commodity** so that his total satisfaction remains the same.

4) The **total utility** of a consumer is measured by the amount (quantities) of all items he/she consumes from his/her consumption basket.

5) **Consumer's preferences are consistent.**

For example: if there are three goods in a given consumer's basket, say, X, Y, Z and if he prefers X to Y and Y to Z, then the consumer is expected to prefer X to Z. This property is known as **axioms of transitivity**.

❖ The **ordinal utility approach** is explained with the help of **indifference curves**.

❖ **Therefore**, the ordinal utility theory is also known as the **indifference curve approach**.

3.3.2.2 Indifference set, curve and map

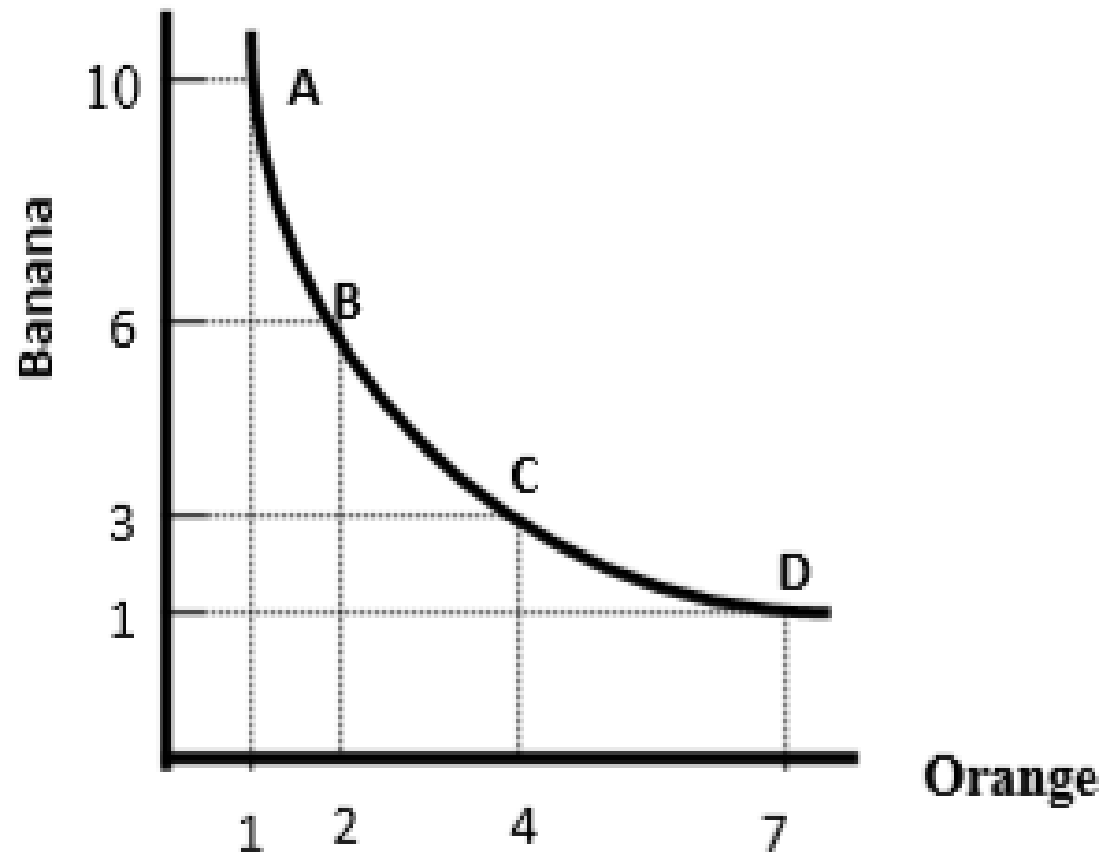
❖ **Indifference set/ schedule:** is a combination of goods for which the consumer **is indifferent**. It shows the **various combinations of goods** from which the consumer derives the **same level of satisfaction**.

Example: Consider a consumer who consumes two goods **X** and **Y**.

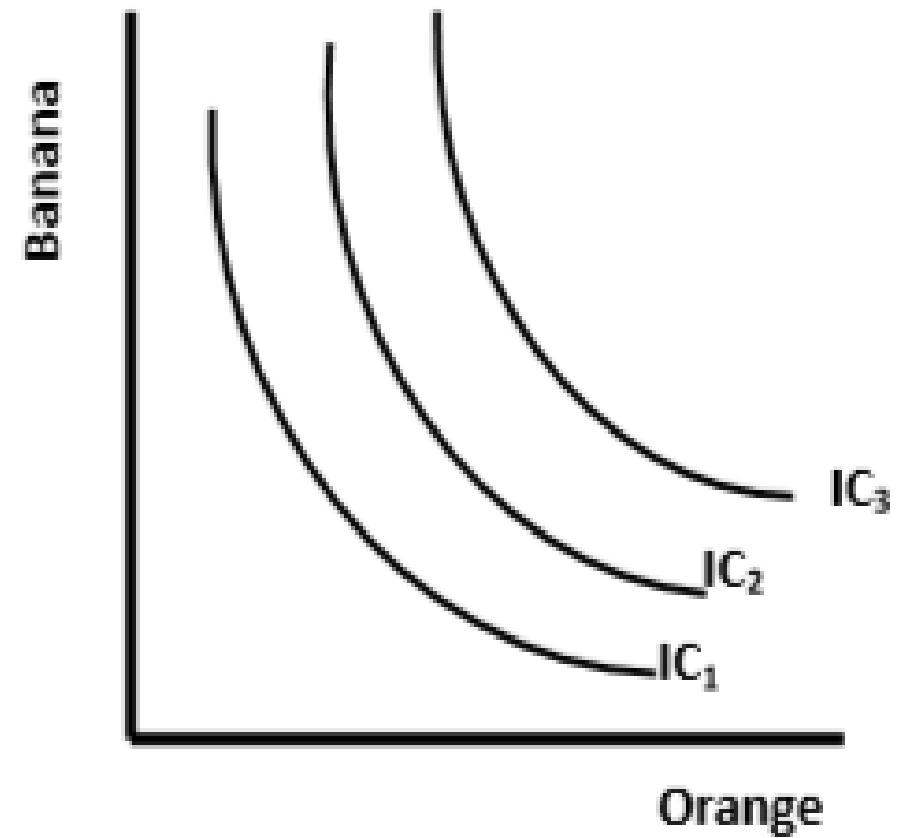
Table 3.3: Indifference schedule

Bundle(Combination	A	B	C	D
Orange	1	2	4	7
Banana	10	6	3	1

- ❖ In table 3.3 above, each combination of good **X** and **Y** gives the consumer equal level of total utility.
- ❖ Thus, the individual is indifferent whether he consumes combination A, B, C or D.
- ❖ **Indifference curve:** graphical expression of indifference set/schedule. It shows different combinations of two goods which yield the same utility (level of satisfaction) to the consumer.
- ❖ **Indifference map:** A set of indifference curves.



i) Indifference curve



ii) Indifference map

Figure 3.3: Indifference curve and indifference map

3.3.2.3 Properties of indifference curves

- 1) **Indifference curves** have **negative slope** (downward sloping to the right). because the consumption level of one commodity can be increased only by reducing the consumption level of the other commodity.
- 2) **Indifference curves** are **convex to the origin**.
 - ✓ The convexity of indifference curves is the reflection of **the diminishing marginal rate of substitution**. implies that the **commodities can substitute** one another but **are not perfect substitutes**.
- 3) **A higher indifference curve** is always preferred to **a lower one**.
- 4) **Indifference curves never cross each other** (cannot intersect).
 - ✓ The assumptions of consistency and transitivity will rule out the intersection of indifference curves.

Figure 3.4 shows the **violations of the assumptions of preferences** due to the intersection of indifference curves.

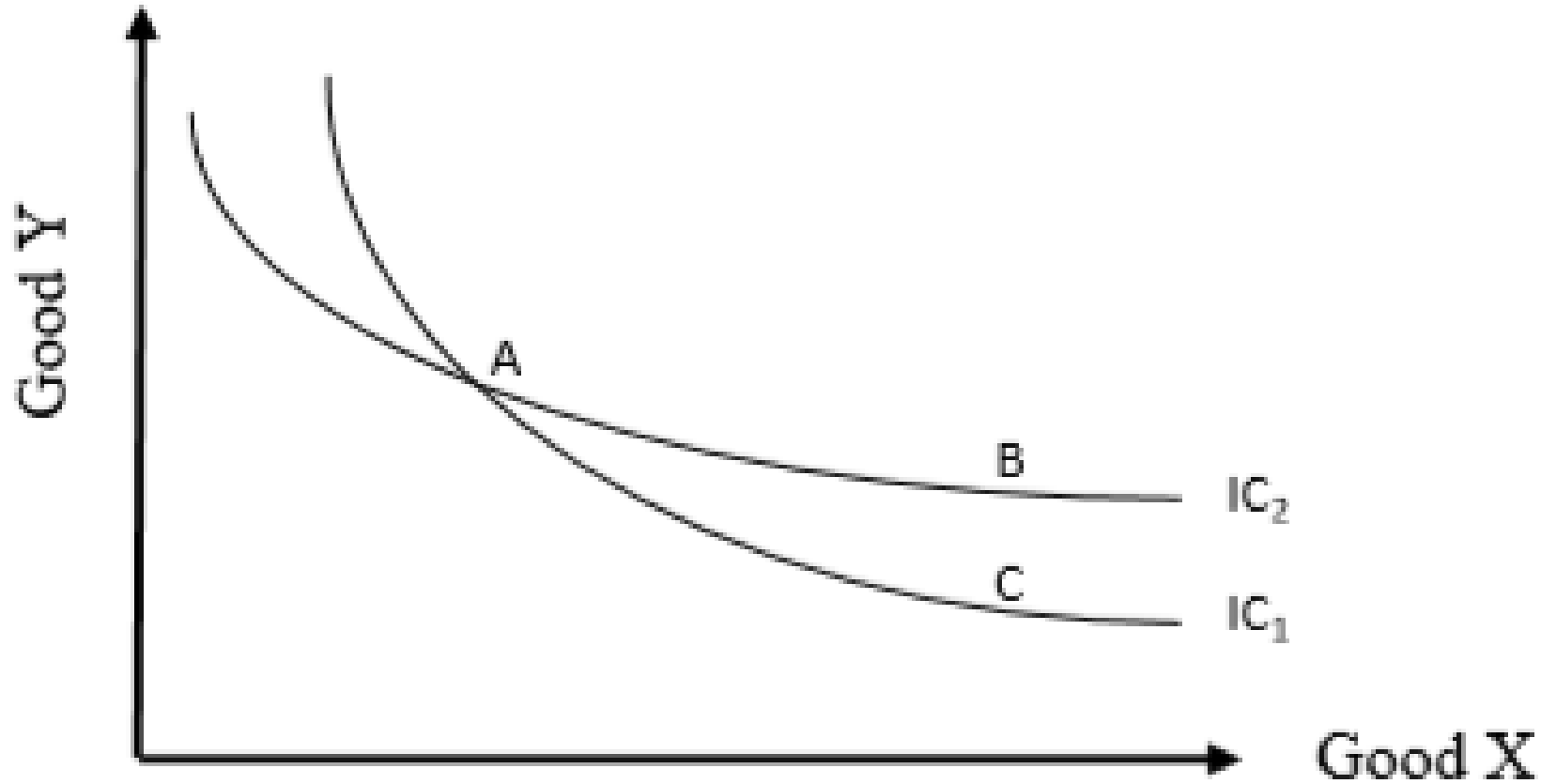


Figure 3.4: Intersection of indifference curves

Note : The intersection of indifference curves the same bundles of commodities give different utility.

3.3.2.4 Marginal rate of substitution (MRS)

- ❖ **Marginal rate of substitution** is a rate at which consumers are **willing to substitute one commodity for another** in such a way that the consumer remains on the same indifference curve.
- ❖ It shows **a consumer's willingness to substitute one good for another** while he/she is indifferent between the bundles.
- ❖ **MRS of X for Y ($MRS_{X,Y}$)** is defined as the number of units of commodity **Y that must be given up** in exchange **for an extra unit of commodity X** so that the consumer maintains the same level of satisfaction.
- ❖ Since one of the goods is sacrificed to obtain more of the other good, the **MRS is negative**.
- ❖ Hence, usually we take the absolute value of the slope.

$$MRS_{XY} = \frac{\text{Number of units of Y given up}}{\text{Number of units of X gained}} = \frac{\Delta Y}{\Delta X}$$

Let's consider the following indifference curve

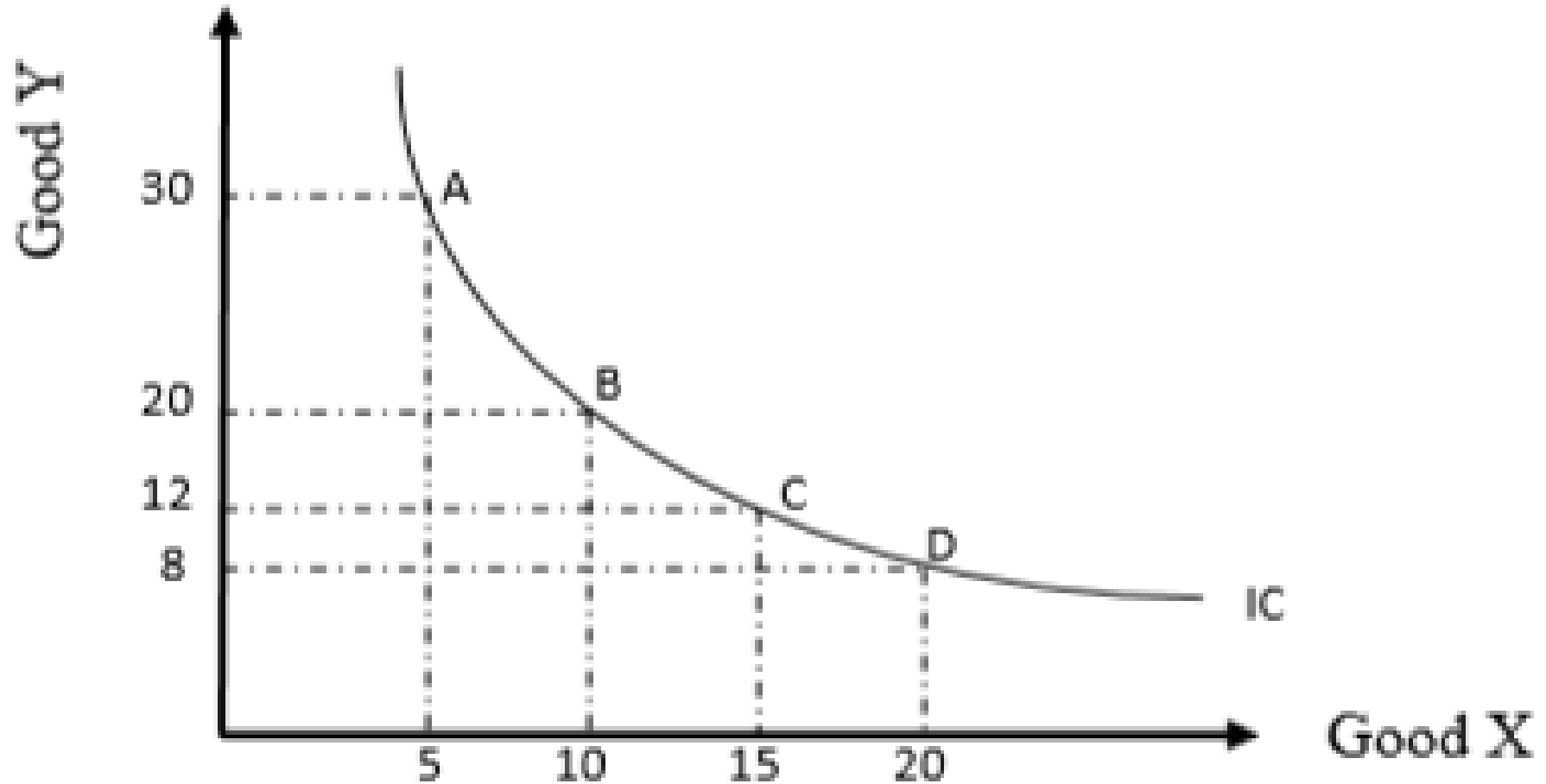


Figure 3.5: Indifference curve for two products X and Y

- ❖ From the above graph, $MRS_{X,Y}$ associated with the movement from point **A** to **B**, point **B** to **C** and point **C** to **D** is **2.0**, **1.6**, and **0.8** respectively.
- ❖ That is, for the same increase in the consumption of good X, the amount of good Y the consumer is willing to sacrifice diminishes.
- ❖ This **principle of marginal rate of substitution** is reflected by the **convex shape of the indifference curve** and is called **diminishing marginal rate of substitution**.
- ❖ It is also possible to derive MRS using the **concept of marginal utility**.
- ❖ $MRS_{X,Y}$, is related to MU_X and MU_Y as follows:

$$MRS_{X,Y} = \frac{MU_x}{MU_y}$$

Proof: Suppose the **utility function for two commodities** X and Y is defined as:

$$U = f(X, Y)$$

❖ Since **utility is constant along an indifference curve**, the **total differential of the utility function will be zero**.

$$dU = \frac{\partial U}{\partial X} dX + \frac{\partial U}{\partial Y} dY = 0$$

$$MU_X dX + MU_Y dY = 0$$

$$\frac{MU_X}{MU_Y} = -\frac{dY}{dX} = MRS_{X,Y}$$

Example: Suppose a consumer's utility function is given by $U(X, Y) = X^4 Y^2$
Find $MRS_{X,Y}$.

Solution: $MRS_{X,Y} = \frac{MU_X}{MU_Y}$; $MU_X = \frac{\partial U}{\partial X} = 4X^3 Y^2$ and $\frac{\partial U}{\partial Y} = 2X^4 Y$

$$MRS_{X,Y} = \frac{4X^3 Y^2}{2X^4 Y} = 2 \frac{Y}{X}$$

3.3.2.5 The budget line or the price line

- ❖ Indifference curves only tell us about consumer preferences for any two goods but they cannot show which combinations of the two goods will be bought.
- ❖ In reality, the consumer is constrained by his/her income and prices of the two commodities.
- ❖ This constraint is often presented with the help of the budget line.
- ❖ The budget line is a set of the commodity bundles that can be purchased if the entire income is spent.
- ❖ It is a graph which shows the various combinations of two goods that a consumer can purchase given his/her limited income and the prices of the two goods.

- ❖ In order to draw a budget line facing a consumer, we consider the following assumptions.
 - ✓ There are **only two goods** bought in quantities, say, **X** and **Y**.
 - ✓ Each consumer is confronted with **market determined prices**, **P_x** and **P_y** .
 - ✓ The consumer has a **known and fixed money income (M)**.
- ❖ Assuming that the consumer spends all his/her income on the two goods (X and Y), we can express the budget constraint as:

$$P_x Q_x + P_y Q_y = M$$

- ❖ By rearranging the above equation, we can derive the following general equation of a budget line:

$$Q_y = \frac{M}{P_y} - \frac{P_x}{P_y} Q_x$$

Graphically,

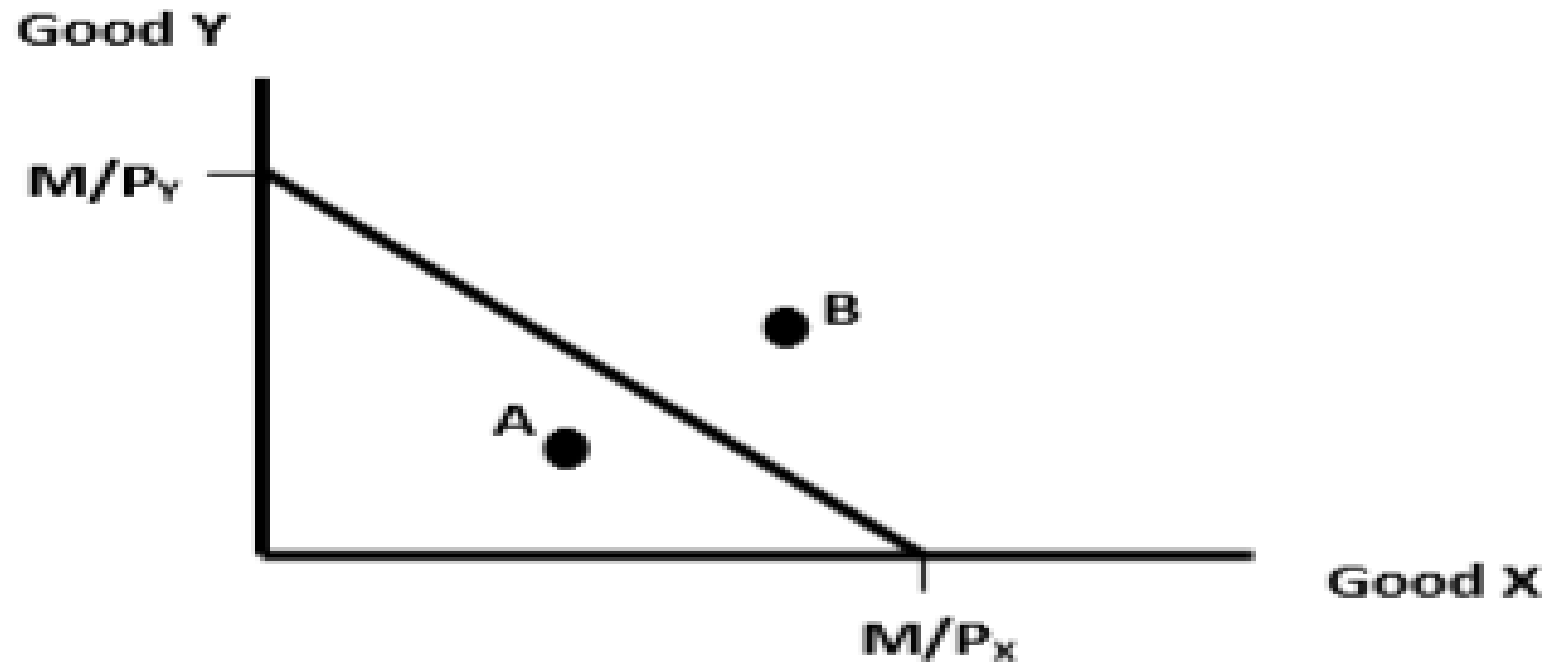


Figure 3.6: The budget line

Note:

- ✓ The slope of the budget line is given by $-\frac{P_X}{P_Y}$
- ✓ Any combination of the two goods within the budget line (such as point A) or **along the budget** line is **attainable**.
- ✓ Any combination of the two goods outside the budget line (such as point B) is unattainable (**unaffordable**).

Example: A consumer has \$100 to spend on two goods X and Y with prices \$3 and \$5 respectively. Derive the budget line equation and sketch the graph.

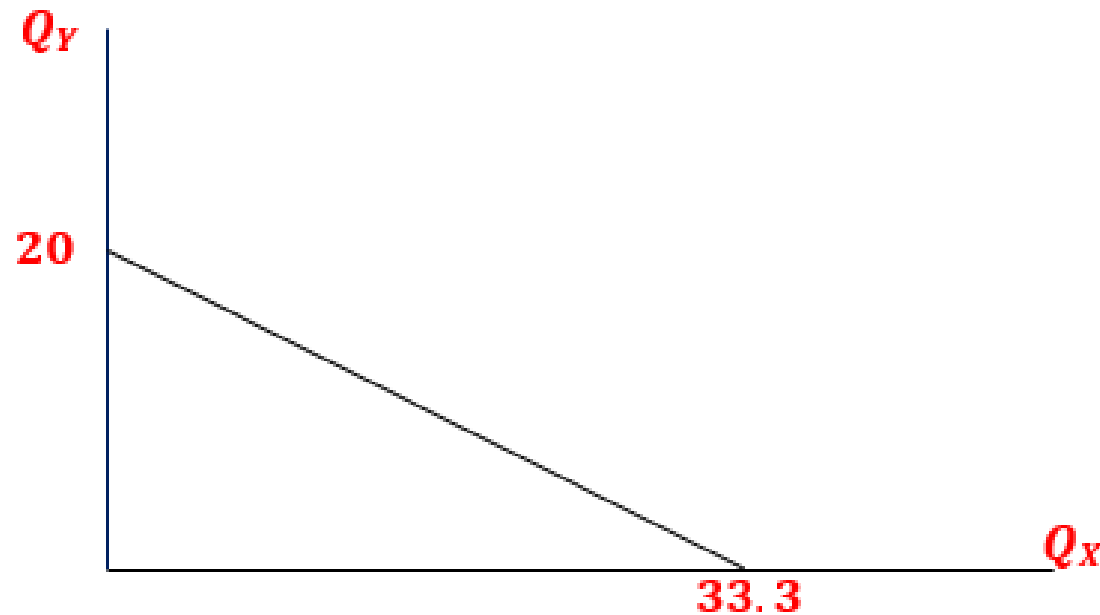
Solution:

$$P_x Q_x + P_y Q_y = M$$

$$3Q_x + 5Q_y = 100$$

$$5Q_y = 100 - 3Q_x$$

$$Q_y = \frac{100}{5} - \frac{3}{5}Q_x ; Q_y = 20 - \frac{3}{5}Q_x$$



Note: A budget is drawn for **given prices** and **fixed consumer's income**. Hence, the changes in prices or income will affect the budget line.

- ❖ **Change in income:** If the income of the consumer changes (keeping the prices of the commodities unchanged), the budget line also shifts (changes).
- ❖ **Increase in income causes** an **upward/outward shift** in the budget line that allows the consumer to buy more goods and services and,
- ❖ **decreases in income** causes in the budget line that leads the consumer to buy less quantity of **a downward/inward shift** he two goods.
- ❖ It is important to note that the **slope of the budget line** (the ratio of the two prices) does not change when income rises or falls.

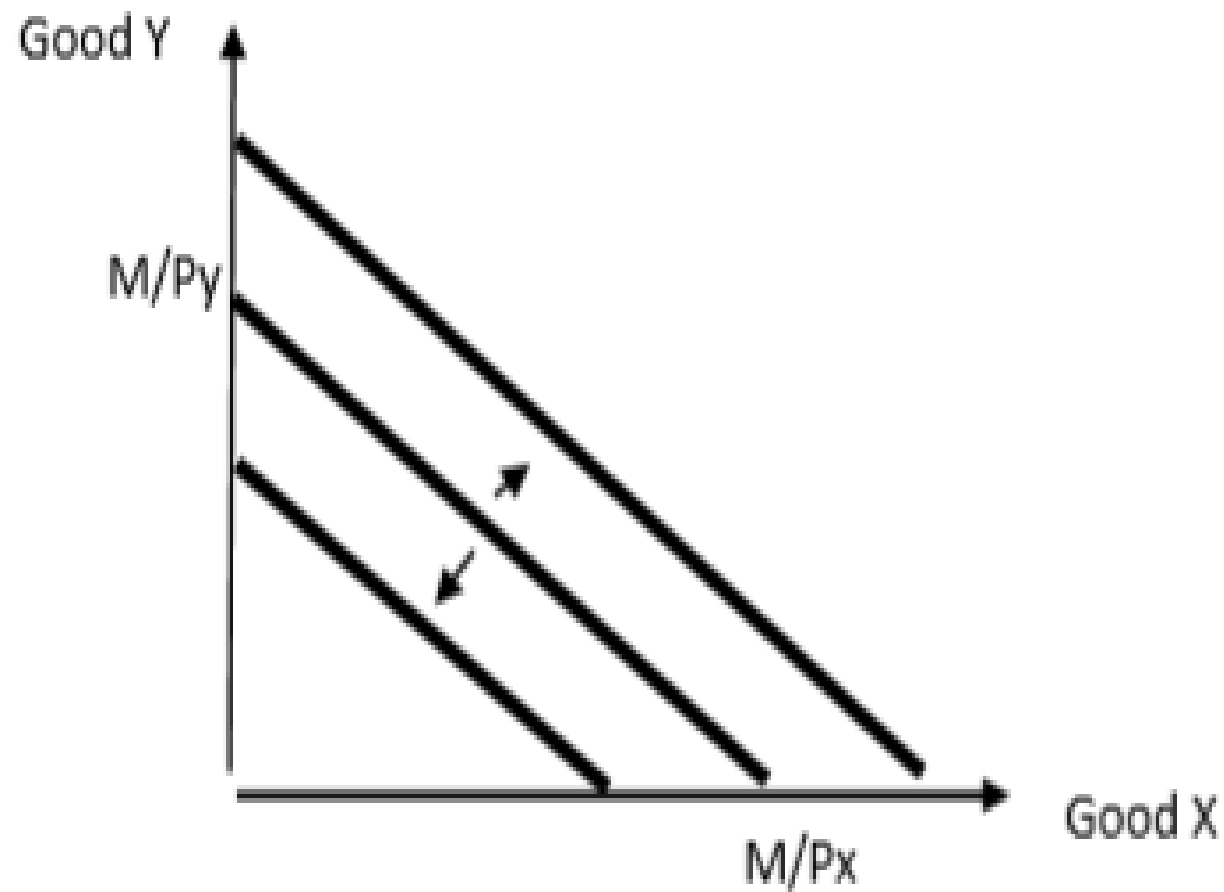


Figure 3.7: Effects of increase (right) and decrease (left) in income on the budget line

Change in prices:

- ❖ An **equal increase(proportion)** in the prices of the two goods **shifts the budget line inward**. Since the two goods become expensive, the consumer can purchase the lesser amount of the two goods.
- ❖ An **equal decrease(proportion)** in the prices of the two goods, on the other hand, shifts the **budget line out ward**. Since the two goods become cheaper, the consumer can purchase the more amounts of the two goods.

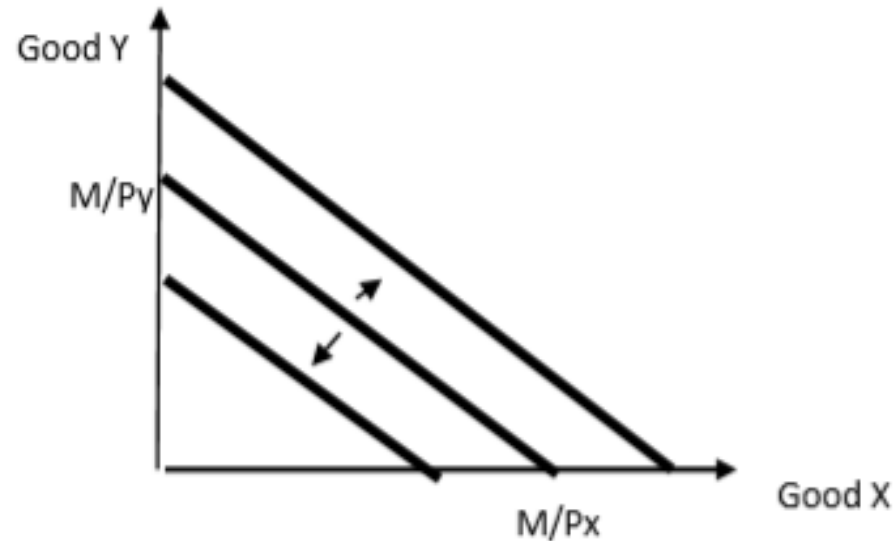


Figure 3.8: Effect of **proportionate increase** (inward) and decrease (out ward) in the prices of both goods

- ❖ **An increase or decrease** in the price of one of the two goods, keeping the price of the other good and income constant, **changes the slope of the budget line** by affecting only the intercept of the commodity that records the change in the price.
- ❖ **For instance**, if the price of good X decreases while both the price of good Y and consumer's income remain unchanged, the horizontal intercept moves outward and makes the budget line flatter. The reverse is true if the price of good X increases.
- ❖ On the other hand, if the **price of good Y decreases** while both the price of good X and consumer's income remain unchanged, the vertical intercept moves upward and makes the **budget line steeper**. The reverse is true for an increase in the price of good Y.

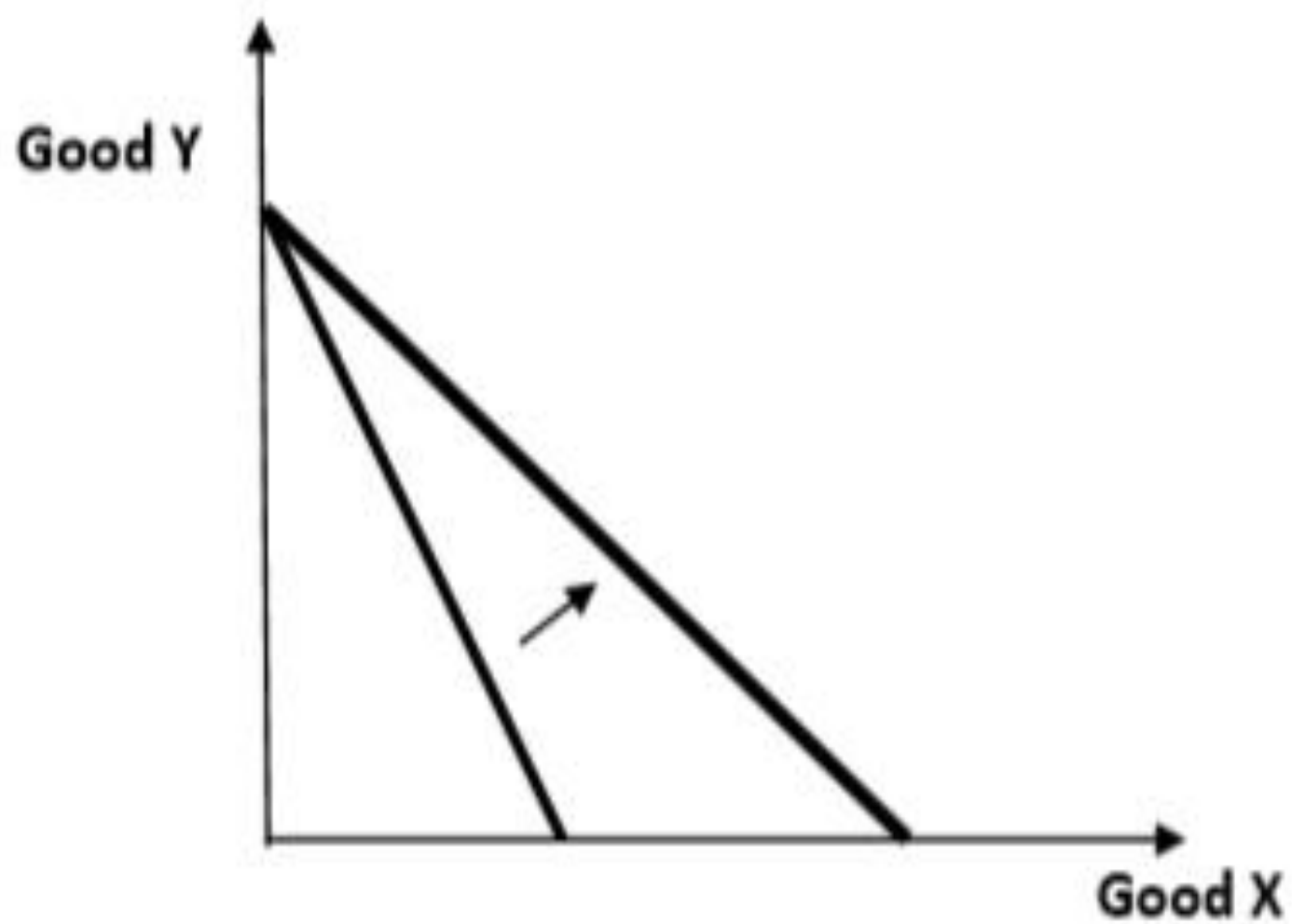


Figure 3.9: Effect of decrease in the price of only good X on the budget line

3.3.2.6 Equilibrium of the consumer

- ❖ The **preferences of a consumer** (what he/she wishes to purchase) are indicated **by the indifference curve**.
- ❖ The **budget line** specifies different combinations of two goods (say X and Y) the **consumer can purchase** with the limited income.
- ❖ **Therefore**, a rational consumer tries to attain the highest possible indifference curve, given the budget line.
- ❖ This occurs at the point where **the indifference curve is tangent** to the budget line so that the **slope of the indifference curve** ($MRS_{X,Y}$) is equal to **the slope of the budget line** ($-\frac{P_X}{P_Y}$).

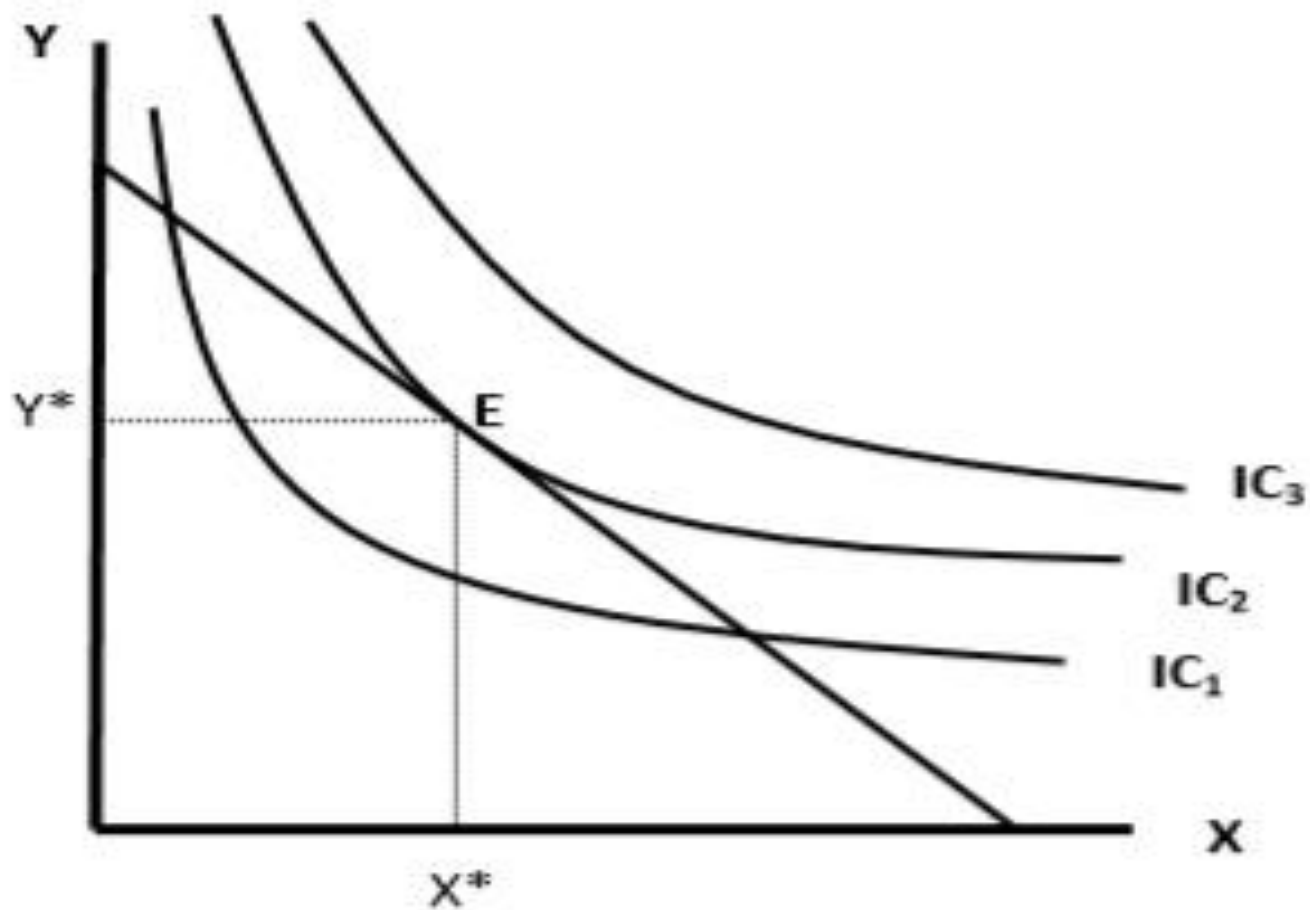


Figure 3.10: Consumer equilibrium under indifference curve approach

- ❖ In figure 3.10, **the equilibrium** of the consumer is at **point E**, where the budget line is tangent to the highest attainable indifference curve (IC₂).

❖ **Mathematically**, consumer optimum (equilibrium) is attained at the point where:

Slope of indifference curve = Slope of the budget line

$$MRS_{X,Y} = - \frac{P_X}{P_Y}$$

→ $\frac{MU_X}{MU_Y} = - \frac{P_X}{P_Y}$

Example: A consumer consuming two commodities X and Y has the utility function $U(X,Y) = XY + 2X$. The prices of the two commodities are 4 birr and 2 birr respectively. The consumer has a total income of 60 birr to be spent on the two goods.

- a) Find the utility maximizing quantities of good X and Y.
- b) Find $MRS_{X,Y}$ at equilibrium.

Solution:

a) The budget constraint of the consumer is given by:

$$4Q_x + 2Q_y = 60$$

$$Q_y = \frac{60}{2} - \frac{4}{2}Q_x ; Q_y = 30 - 2Q_x \dots\dots\dots \text{Budget Line}$$

✓ Thus, the slope of the budget line = 2

✓ **Slope of the IC** = $MRS_{X,Y} = \frac{MU_X}{MU_Y} = \frac{Y+2}{X}$

✓ **At Equilibrium: Slope of the IC** = slope of the budget line

$$\frac{Y+2}{X} = 2; Y+2 = 2X ; \qquad Y = 2X$$

✓ Substituting this in the budget equation results

$$Y = 14 \text{ and } X = 8$$

$$\text{b) } MRS_{X,Y} = \frac{MU_X}{MU_Y} = \frac{Y+2}{X} = \frac{14+2}{8} = \frac{16}{8} = 2$$

Chapter Four:

The Theory of Production and Cost

- ❑ This chapter has **two major sections**:
- ✓ The **first part** will introduce you to the **basic concepts of production and production function, classification of inputs, essential features of short run production functions and the stages of short run production.**
- ✓ The **second part** mainly deals with the difference between **economic cost and accounting cost, the characteristics of short run cost functions, and the relationship between short run production functions and short run cost functions.**

4.1 Theory of production in the short run

4.1.1 Definition of production

- ✓ **Raw materials** yield **less satisfaction** to the consumer by themselves.
- ✓ For a better utility, **raw materials** **has to be transformed into outputs**.
- ✓ **However**, transforming raw materials into outputs requires inputs such as **land**, **labour**, **capital** and **entrepreneurial ability**.
- ❖ **Production** is **the process of transforming inputs into outputs**.
- ✓ The end products of the production process are **outputs** which could be **tangible (goods)** or **intangible (services)**.

4.1.2 Production function

- ❖ **Production function** is a technical relationship between **inputs** and **outputs**.
- ❖ It shows the maximum output that can be produced with fixed amount of inputs and the existing technology.

- ✓ A production function may take the form of an **algebraic equation**, **table** or **graph**.
- ✓ A general equation for production function can, for instance, be described as:

$$Q = f(X_1, X_2, X_3, \dots, X_n)$$

Where, **Q** is **output** and **$X_1, X_2, X_3, \dots, X_n$** are different **types of inputs**.

□ Inputs are commonly classified as **fixed inputs** or **variable inputs**.

❖ **Fixed inputs** are those inputs whose quantity cannot readily be changed when market conditions indicate that an immediate adjustment in output is required.

❖ In fact, **no input is ever absolutely fixed** but may be fixed during an immediate requirement.

Examples: **Buildings**, **land** and **machineries** etc.

✓ Their quantity **cannot be manipulated** easily in a short period of time.

- ❖ **Variable inputs** are those inputs whose quantity **can be altered almost instantaneously** in response to desired changes in output.
 - ✓ That is, their quantities can easily be diminished when the market demand for the product decreases and vice versa.
 - ✓ The best example of variable input is **unskilled labour**.
- **In economics, short run** refers to a period of time in which **the quantity of at least one input is fixed**.
 - ✓ In other words, **short run** is a time period which is **not sufficient** to **change the quantities of all inputs** so that at least one input remains fixed.
- **Note: short run periods of different firms have different durations.**
 - ✓ Some firms can change the quantity of all their inputs within a month while it takes more than a year for other types of firms.

- ❖ Consider a firm that uses two inputs: **capital** (fixed input) and **labour** (variable input).
- ❖ Given the assumptions of short run production, the firm can increase output only by increasing the amount of labour it uses.
- ❖ Hence, its **production function** can be given by:

$$Q = f(L)$$

where, **Q** is **output** and **L** is the **quantity of labour**.

- ❖ The **production function** shows **different levels of output** that the firm can produce by **efficiently utilizing** different units of labour and the fixed capital.
- ❖ In the above short run production function, the **quantity of capital** is **fixed**.
- ❖ **Thus**, output can change only when the amount of labour changes.

4.1.3 Total, average, and marginal product

- ✓ In production, the contribution of a variable input can be described in terms of **total**, **average** and **marginal product**.

A) Total product (TP)

- ✓ it is the *total amount of output* that can be produced by efficiently utilizing **specific combinations of the variable input and fixed input**.
- ✓ Increasing the variable input (while some other inputs are fixed) can increase the total product **only up to a certain point**.
- ✓ **Initially**, as we combine more and more units of the variable input with the fixed input, **output continues to increase**.
- ✓ **But eventually**, if we employ more and more unit of the variable input **beyond the carrying capacity of the fixed input**, output tends to decline.

- ✓ **In general**, the TP function in the short-run follows a certain trend: **it initially increases at an increasing rate**, then **increases at a decreasing rate**, **reaches a maximum point** and **eventually falls** as the quantity of the variable input rises.
- ✓ This tells us what shape a total product curve assumes.

B) Marginal Product (MP)

- ❖ it is the change in output attributed **to the addition of one unit of the variable input** to the production process, other inputs being constant.
- ❖ **For instance**, the change in total output resulting from employing additional worker (holding other inputs constant) is the marginal product of labour (**MPL**).
- ❖ In other words, **MPL** measures the **slope of the total product curve** at a given point.

$$MP_L = \frac{\Delta Q}{\Delta L} = \frac{dTP}{dL}$$

- ✓ In the **short run**, the marginal product of the variable input **first increases**, reaches its maximum and then **decreases to the extent of being negative**.
- ✓ That is, as we continue to combine more and more of the **variable input** with the **fixed input**, the marginal product of the variable input **increases initially** and **then declines**.

C) Average Product (AP)

- ✓ is the level of output that **each unit of input produces**, on the average.
- ✓ It tells us the **mean contribution of each variable input** to the total product.
- ✓ **Mathematically**, the average product of labour (APL), for instance, is given by:

$$AP_L = \frac{TP}{L}$$

- ✓ **AP_L** first increases, **reaches its maximum** value and **eventually declines**.

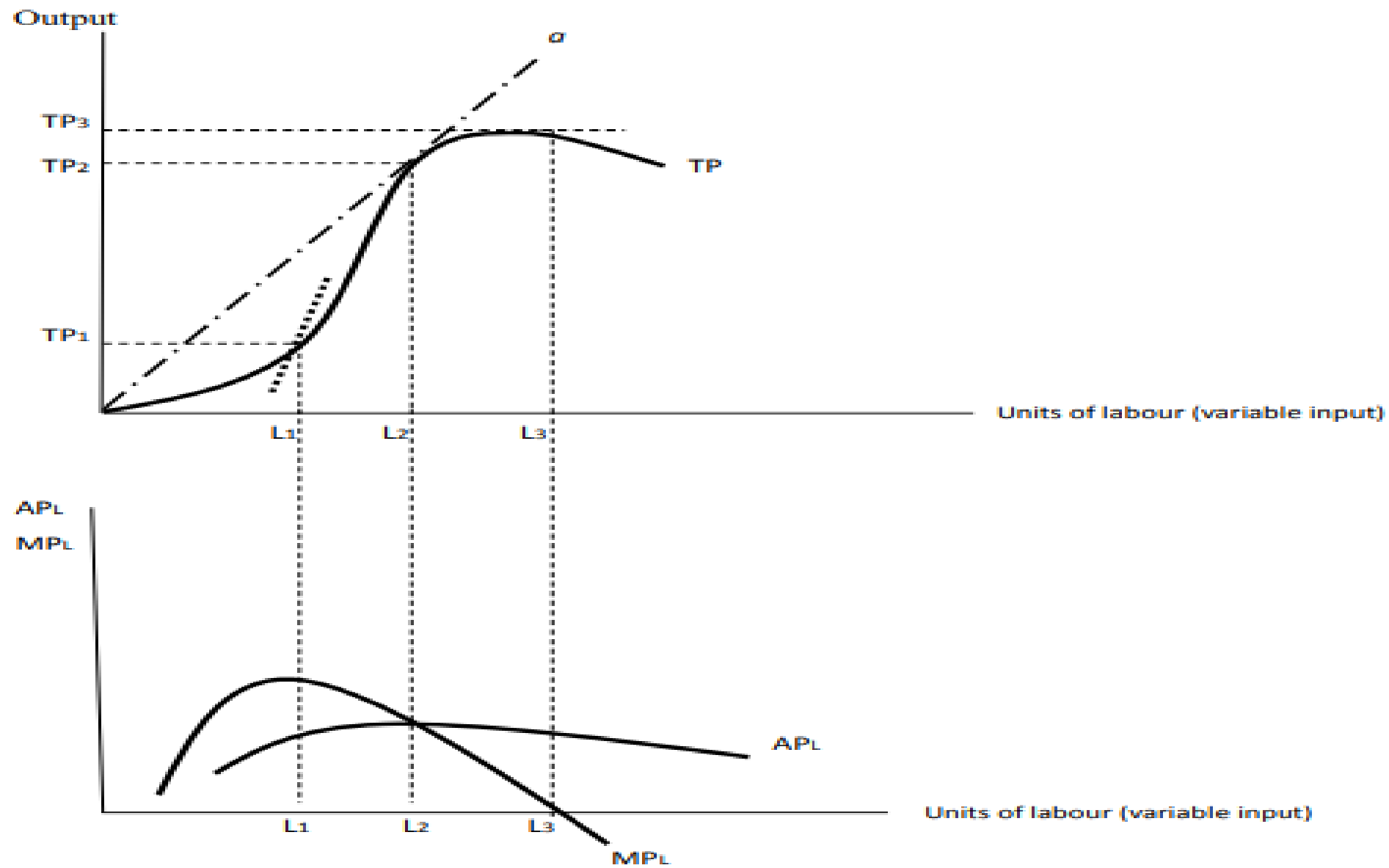


Figure 4.1: Total product, average product and marginal product curves

- ❑ The **AP curve** can be measured by the **slope of rays originating from the origin to a point on the TP curve (see figure 4.1).**
- ❖ For example, the **AP_L** at **L_2** is the ratio of **TP_2** to **L_2** = **Slope of ray a.**
- ❑ The **RELATIONSHIP** between **MP_L** and **AP_L** can be stated as follows.
 - ✓ When **A_PL** is increasing, **$MP_L > AP_L$.**
 - ✓ When **A_PL** is at its maximum, **$MP_L = AP_L$.**
 - ✓ When **A_PL** is decreasing, **$MP_L < AP_L$.**

Example: Suppose that the short-run production function of certain cut-flower firm is given by: **$Q = 4KL - 0.6K^2 - 0.1L^2$** , where, **Q** is quantity of cut-flower produced, **L** is labour input and K is fixed capital input (**K=5**).

- a) Determine the **AP_L** function.
- b) At what level of labour does the total output of cut-flower reach the maximum?
- c) What will be the maximum achievable amount of cut-flower production?

Solution:

$$a) AP_L = \frac{Q}{L} = \frac{4KL - 0.6K^2 - 0.1L^2}{L} = 4K - \frac{0.6K^2}{L} - 0.1L = 20 - \frac{15}{L} - 0.1L = \frac{20L - 15 - 0.1L^2}{L}$$

b) The total product level (Max Q) occurs when $MP_L = 0$.

$$MP_L = \frac{dTP}{dL} = \frac{d(20L - 15 - 0.1L^2)}{dL} = 20 - 0.2L = 0$$
$$0.2L = 20; \quad L^* = 100$$

Hence, total output will be the maximum when 100 workers are employed.

c) Substituting the optimal values of labor (L=100) and capital (K=5) into the original production function (Q):

$$Q_{max} = 4\bar{K}L^* - 0.6\bar{K}^2 - 0.1L^{*2} = 4(\bar{5})(100)^* - 0.6(\bar{5})^2 - 0.1(100)^{*2}$$
$$= 2000 - 15 - 1000 = 985$$

$$Q_{max} = 985$$

4.1.4 The law of variable proportions/LDMR

- ✓ The **law of variable proportions** states that as successive units of a variable input(say, labour) are added to a fixed input (say, capital or land), beyond some point the extra, or **marginal, product that can be attributed to each additional unit of the variable resource will decline**.
- ✓ **For example**, if additional workers are hired to work with a constant amount of **capital equipment**, output will **eventually rise by smaller and smaller amounts as more workers are hired**.
- Assumptions of LDMR
 - ✓ **technology is fixed** and thus the techniques of production do not change.
 - ✓ **all units of labour are assumed to be of equal quality**.
 - ✓ Each successive worker is presumed to have the **same innate ability, education, training**, and **work experience**.

- ✓ **Marginal product** ultimately diminishes **not because successive workers are less skilled or less energetic** rather it is because more workers are being used relative to the amount of plant and equipment available.
- ✓ The law starts to operate after the **marginal product curve reaches its maximum** (this happens when the number of workers exceeds L_1 in **figure 4.1**).
- ✓ This law is also called the **law of diminishing marginal returns(LDMR)**.

4.1.5 Stages of production

- ✓ We are not in a position to determine the specific number of the variable input (labour) that the firm should employ because this depends on several other factors than the productivity of labour.
- ✓ **However**, it is possible to determine the ranges **over which the variable input (labour) be employed**.
- ✓ To this end, economists have defined **three stages of short run production**.

Stage I: This stage of production covers the range of variable input levels over which the **average product (APL) continues to increase**.

- ✓ It goes from the origin to the point where the **APL is maximum**, which is the **equality of MPL and APL** (up to L_2 level of labour employment in figure 4.1).
- ✓ This stage is **not an efficient region of production** though the MP of variable input is positive.
- ✓ **The reason** is that the variable input (the number of workers) is **too small** to efficiently run the fixed input so that **the fixed input is under-utilized (not efficiently utilized)**.

Stage II: It ranges from the point where AP_L is at its maximum (**MPL=APL**) to the point where **MPL is zero** (from L_2 to L_3 in figure 4.1).

- ✓ Here, as the labour input increases by one unit, **output still increases but at a decreasing rate**.

- ✓ Due to this, the **second stage of production** is termed as **the stage of diminishing marginal returns.**
- ✓ The reason for decreasing average and marginal products is due to the **scarcity of the fixed factor.**
- ✓ That is, **once the optimum capital-labour combination is achieved**, employment of additional unit of the variable input will cause the output to increase at a slower rate.
- ✓ As a result, the **marginal product diminishes.**
- ✓ This stage is the **efficient region of production.**
- ✓ Additional inputs are contributing positively to the total product and MP of successive units of variable input is declining (indicating that the fixed input is **being optimally used**).
- ✓ Hence, **the efficient region of production** is where the **marginal product of the variable input is declining but positive.**

Stage III: In this stage, **an increase in the variable input is accompanied by decline in the total product.**

- ✓ Thus, the total product curve slopes downwards, and the **marginal product of labour becomes negative.**
- ✓ This stage is also known as the **stage of negative marginal returns** to the variable input.
- ✓ The cause of negative marginal returns is the fact that **the volume of the variable inputs is quite excessive relative to the fixed input; the fixed input is over-utilized.**
- ✓ Obviously, a rational firm should not operate in **stage III** because additional units of variable input are contributing negatively to the total product (MP of the variable input is negative).
- ✓ In **figure 4.1**, this stage is indicated by the employment of **labour beyond L_3 .**

4.2 Theory of costs in the short run

4.2.1 Definition and types of costs

- ✓ To produce goods and services, firms need **factors of production** or simply **inputs**.
- ❖ To acquire these inputs, they have to buy them from resource suppliers.
- ❖ **Cost** is, therefore, the monetary value of inputs used in the production of an item.
- ❖ Economists use the term —**profit** differently from the way accountants use it.
- ❖ To the accountant, **profit** is the firm's **total revenue less its explicit costs** (accounting costs).
- ❖ To the economist, **profit** is **total revenue** less **economic costs** (explicit and implicit costs).

- ❖ **Accounting cost** is the monetary value of all purchased inputs used in production; it ignores the cost of non-purchased (self-owned) inputs.
- ❖ It considers only direct expenses such as wages/salaries, cost of raw materials, depreciation allowances, interest on borrowed funds and utility expenses (electricity, water, telephone, etc.).
- ❖ These costs are said to be explicit costs.
- ❖ **Explicit costs** are out of pocket expenses for the purchased inputs.
- ❖ If a producer calculates her cost by considering only the costs incurred for purchased inputs, then her profit will be an accounting profit.

$$\begin{aligned}\text{Accounting profit} &= \text{Total revenue} - \text{Accounting cost} \\ &= \text{Total revenue} - \text{Explicit cost}\end{aligned}$$

- ✓ In the real world economy, entrepreneurs may use some resources which may not have direct monetary expense since the entrepreneur can own these inputs himself or herself.

- ✓ **Economic cost** of producing a commodity considers the monetary value of all inputs (**purchased** and **non-purchased**).
- ✓ Calculating economic costs will be difficult since there are no direct monetary expenses for non-purchased inputs.
- ✓ The monetary value of these inputs is obtained **by estimating their opportunity costs in monetary terms**.
- ✓ The estimated **monetary cost for non-purchased** inputs is known as **implicit cost**.
- ✓ **Example:** if Mr. X quits a job which pays him Birr 10, 000.00 per month in order to run a firm he has established, then the **opportunity cost of his labour** is taken to be Birr **10,000.00** per month (the salary he has forgone in order to run his own business).
- ✓ Therefore, **economic cost** is given by the sum of **implicit cost** and **explicit cost**.

Economic profit = Total revenue – Economic cost (Explicit cost + Implicit cost)

- ✓ **Economic profit** will give the **real profit of the firm** since all costs are taken into account.
- ✓ **Accounting profit** of a firm **will be greater than economic profit** by the amount of implicit cost.
- ✓ **If all inputs are purchased from the market, accounting and economic profit will be the same.**
- ✓ However, if implicit costs exist, then accounting profit will be larger than economic profit.

4.2.2 Total, average and marginal costs in the short run

- ❖ A cost function shows the total **cost of producing a given level of output**; can be described using **equations, tables** or **curves**.
- ❖ A cost function can be represented using an equation as follows:

$$C = f(Q),$$

where **C** is the total cost of production and **Q** is the level of output.

- ❖ In the short run, total cost (TC) can be broken down into two – **total fixed cost (TFC)** and **total variable cost (TVC)**.
- ❖ By **fixed costs** we mean costs which do not vary with the level of output.
- ❖ They are regarded as fixed because these costs are **unavoidable** regardless of the level of output.
- ❖ The firm **can avoid fixed costs** only if he/she stops operation (shuts down the business).
- ❖ The fixed costs may include **salaries of administrative staff**, **expenses for building depreciation** and **repairs**, expenses for **land maintenance** and the **rent of building** used for production.
- ❖ **Variable costs**, on the other hand, include all costs which directly vary with the level of output.
- ✓ if the firm produces zero output, the variable cost is zero.

Example: **cost of raw materials**, the **cost of direct labour** and the **running expenses of fuel**, **water**, **electricity**, etc.

❑ **In general**, the short run total cost is given by the sum of total fixed cost and total variable cost. That is,

$$TC = TFC + TVC$$

❖ Based on the definition of the short run cost functions, let's see what their shapes look like.

A) Total fixed cost (TFC): Total fixed cost is denoted by **a straight line parallel to the output axis**.

✓ This is because such costs do not vary with the level of output.

B) Total variable cost (TVC): The total variable cost of a firm has an **inverse S-shape**.

✓ The shape indicates the **law of variable proportions** in production.

✓ At the initial stage of production with a given plant, as more of the variable factor is employed, **its productivity increases**.

✓ Hence, the **TVC increases at a decreasing rate**.

- ✓ This continues until the optimal combination of the fixed and variable factor is reached.
- ✓ Beyond this point, as increased quantities of the variable factor are combined with the fixed factor, the productivity of the variable factor declines, and the TVC increases at an increasing rate.

C) Total Cost (TC): The total cost curve is obtained by vertically adding TFC and TVC at each level of output.

- ✓ The shape of the TC curve follows the shape of the TVC curve, i.e. the TC has also an inverse S-shape.
- ✓ It should be noted that when the level of output is zero, TVC is also zero which implies $TC = TFC$.

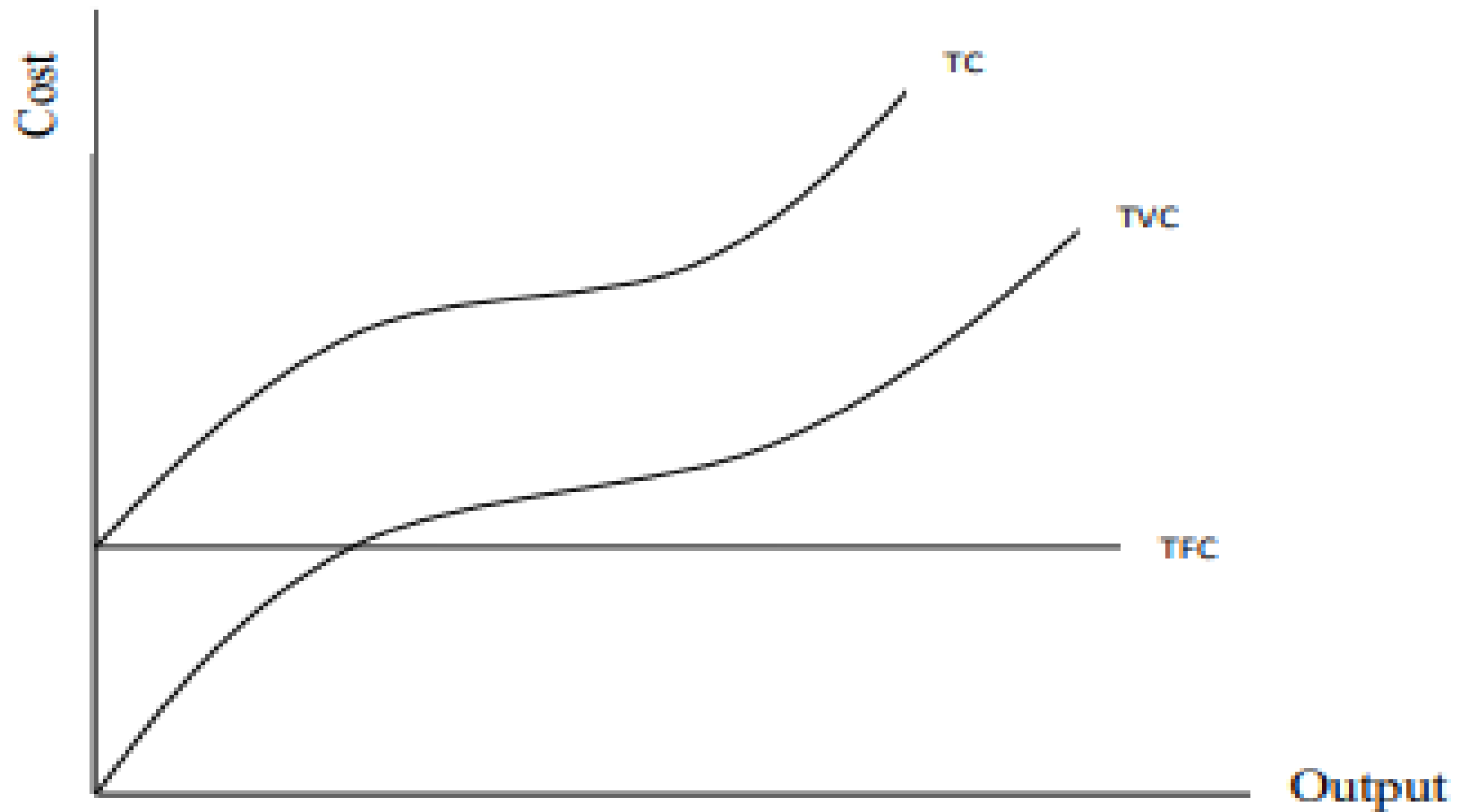


Figure 4.2: *Short run TC, TFC and TVC curves*

Per unit costs

- ✓ From total costs functions we can derive **per-unit costs**.
- ✓ These are even more **important in the short run analysis of the firm**.

a) **Average Fixed Cost (AFC)**

- ✓ is **total fixed cost per unit of output**.
- ✓ It is calculated by dividing TFC by the corresponding level of output.
- ✓ **The curve declines continuously** and approaches both axes asymptotically.

$$AFC = \frac{TFC}{Q}$$

b) **Average Variable Cost (AVC)**

- ✓ Average variable cost is **total variable cost per unit of output**.
- ✓ It is obtained by dividing total variable cost by the level of output.

$$AVC = \frac{TVC}{Q}$$

- ✓ The short run **AVC** falls initially, **reaches its minimum**, and then starts to increase.
- ✓ Hence, the AVC curve has **U-shape** and the reason behind is the **law of variable proportions**.

c) Average total cost (ATC) or (AC)

- ✓ is the total cost per unit of output.
- ✓ It is calculated by dividing the total cost by the level of output.

$$AC = \frac{TC}{Q}$$

- ✓ Equivalently, **$AVC = \frac{TFC+TVC}{Q} = AFC + AVC$**
- ✓ Thus, AC can also be given by **the vertical sum of AVC and AFC**.

D) Marginal Cost (MC)

- ❖ Marginal cost is defined as the additional cost that a firm incurs to produce one extra unit of output.
- ❖ In other words, it is the change in total cost which results from a unit change in output.
- ❖ Graphically, MC is the slope of TC function.

$$MC = \frac{dT C}{dQ}$$

- ❖ In fact, MC is also a change in TVC with respect to a unit change in the level of output.

$$MC = \frac{dTVC + dTFC}{Q} = \frac{dTVC}{dQ}, \quad \text{since } \frac{dTFC}{dQ} = 0$$

- ❖ Given inverse S-shaped TC and TVC curves, MC initially decreases, reaches its minimum and then starts to rise.
- ❖ From this, we can infer that the reason for the MC to exhibit U-shape is also the law of variable proportions.

❖ In summary, **AVC**, **AC** and **MC** curves are all U-shaped due to the law of variable proportions.

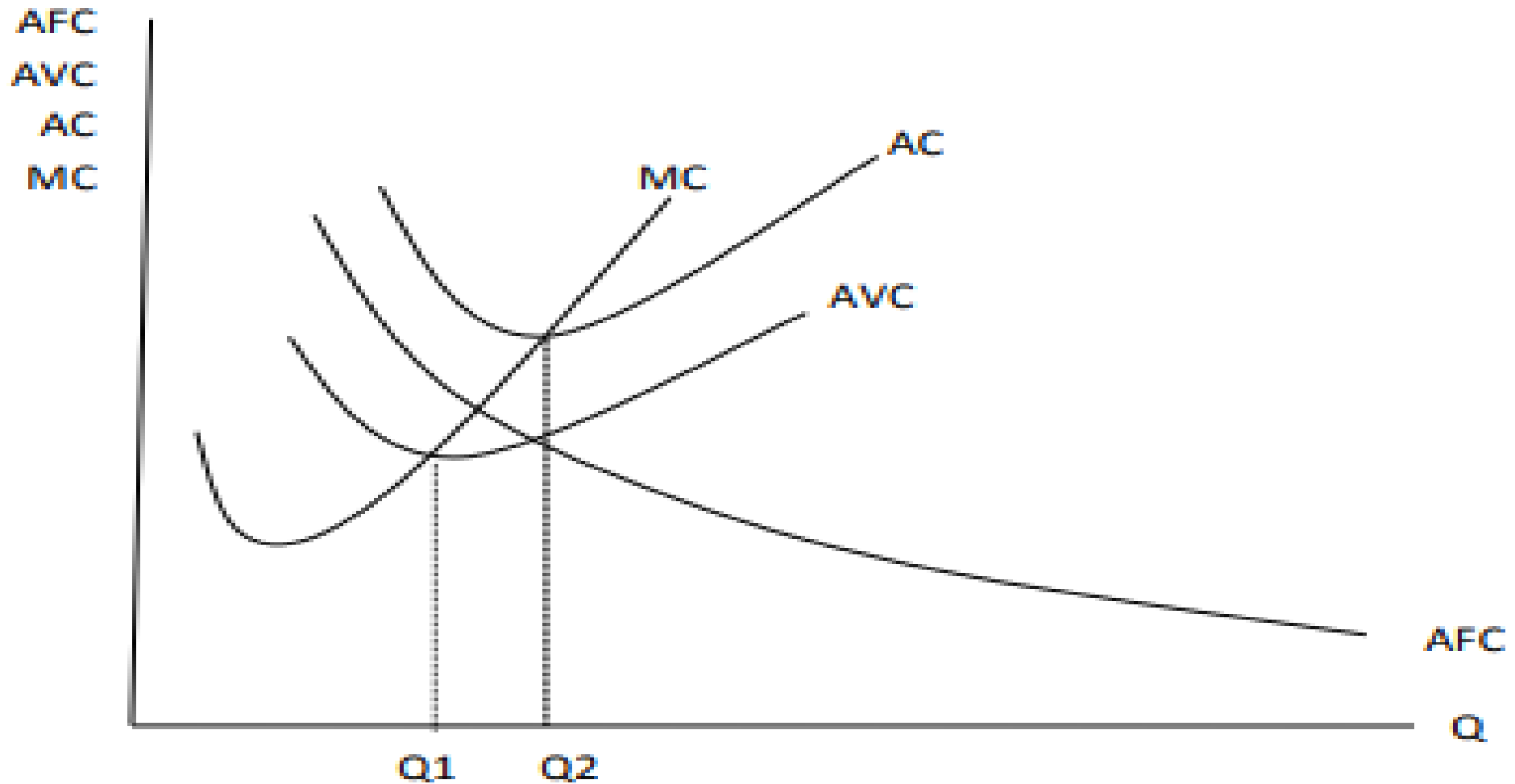


Figure 4.3: Short run *AFC*, *AVC*, *AC* and *MC* Curves

- ✓ In the above figure, **the AVC curve reaches its minimum point at Q_1** level of output and **AC reaches its minimum point at Q_2** level of output.
- ✓ The **vertical distance between AC and AVC**, that is, **AFC** decreases continuously as output increases.
- ✓ It can also be noted that the **MC curve passes through the minimum points of both AVC and AC curves.**

Example: Suppose the short run cost function of a firm is given by:

$$TC = 2Q^3 - 2Q^2 + Q + 10$$

- Find the expression of **TFC** & **TVC**
- Derive the expressions of **AFC**, **AVC**, **AC** and **MC**
- Find the levels of output that minimize **MC** and **AVC** and then find the minimum values of **MC** and **AVC**

Solution:

Given $2Q^3 - 2Q^2 + Q + 10$

A) $TFC = 10$; and $TVC = 2Q^3 - 2Q^2 + Q$

B) $AFC = \frac{TFC}{Q} = \frac{10}{Q}$

$$AVC = \frac{TVC}{Q} = \frac{2Q^3 - 2Q^2 + Q}{Q} = 2Q^2 - 2Q + 1$$

$$AC = \frac{TC}{Q} = \frac{2Q^3 - 2Q^2 + Q + 10}{Q} = 2Q^2 - 2Q + 1 + \frac{10}{Q}$$

$$MC = \frac{dTC}{dQ} = \frac{d(2Q^3 - 2Q^2 + Q + 10)}{dQ} = 6Q^2 - 4Q + 1$$

C) To find the minimum value of MC, $\frac{dMC}{dQ} = 0 = 12Q - 4 = 0$

$$Q = 1/3$$

✓ Thus, MC is minimized when $Q = 0.33$

- ✓ The **minimum value of MC** will be:

$$MC = 6Q^2 - 4Q + 1 = 6\left(\frac{1}{3}\right)^2 - 4\left(\frac{1}{3}\right) + 1 = 0.33$$

- To find the **minimum value of AVC**, $\frac{dAVC}{dQ} = 0 = 4Q - 2 = 0$

$$Q = 0.5$$

- ✓ AVC is minimized at **$Q = 0.5$** .
- ✓ The **minimum value of AVC** will be:

- $AVC = 2Q^2 - 2Q + 1$

$$AVC = 2(0.5)^2 - 2(0.5) + 1 = 0.5 - 1 + 1 = 0.5$$

4.2.3 The relationship between short run production and cost curves

- ❖ Suppose a firm in the **short run** uses labour as a variable input and capital as a fixed input.
- ❖ Let the price of labour be given by **w**, which is constant.
- ❖ Given these conditions, we can derive the relation between **MC** and **MPL** as well as the relation between **AVC** and **APL**.

i) MC and MP of Labour

$$\mathbf{MC} = \frac{dT\mathbf{C}}{dQ} = \frac{\Delta T\mathbf{VC}}{\Delta Q}, \text{ Where } T\mathbf{VC} = w * L$$

$$\text{Thus, } \mathbf{MC} = \frac{\Delta(w*L)}{\Delta Q} = w \frac{\Delta L}{\Delta Q}; \text{ but } \frac{\Delta L}{\Delta Q} = \frac{1}{MP_L}$$

➤ Therefore, $\mathbf{MC} = \frac{w}{MP_L}$

- ✓ The expression $MC = \frac{w}{MP_L}$ shows that MC and MP_L are inversely related.
- ✓ When initially MPL increases, **MC decreases**; when MPL is at its maximum, MC must be at a minimum and when finally MPL declines, MC increases.

II) AVC and AP of Labour

$$AVC = \frac{TVC}{Q}, \text{ Where } TVC = w * L$$

$$\text{Thus, } AVC = \frac{(w*L)}{Q} = w \frac{L}{Q}; \text{ but } \frac{L}{Q} = \frac{1}{AP_L}$$

$$\text{Therefore, } AVC = \frac{w}{AP_L}$$

- ✓ This expression also shows **inverse relation between AVC and APL**.
- ✓ When APL increases, AVC decreases; when APL is at a maximum, AVC is at a minimum and when finally APL declines, AVC increases.

✓ Graphically,

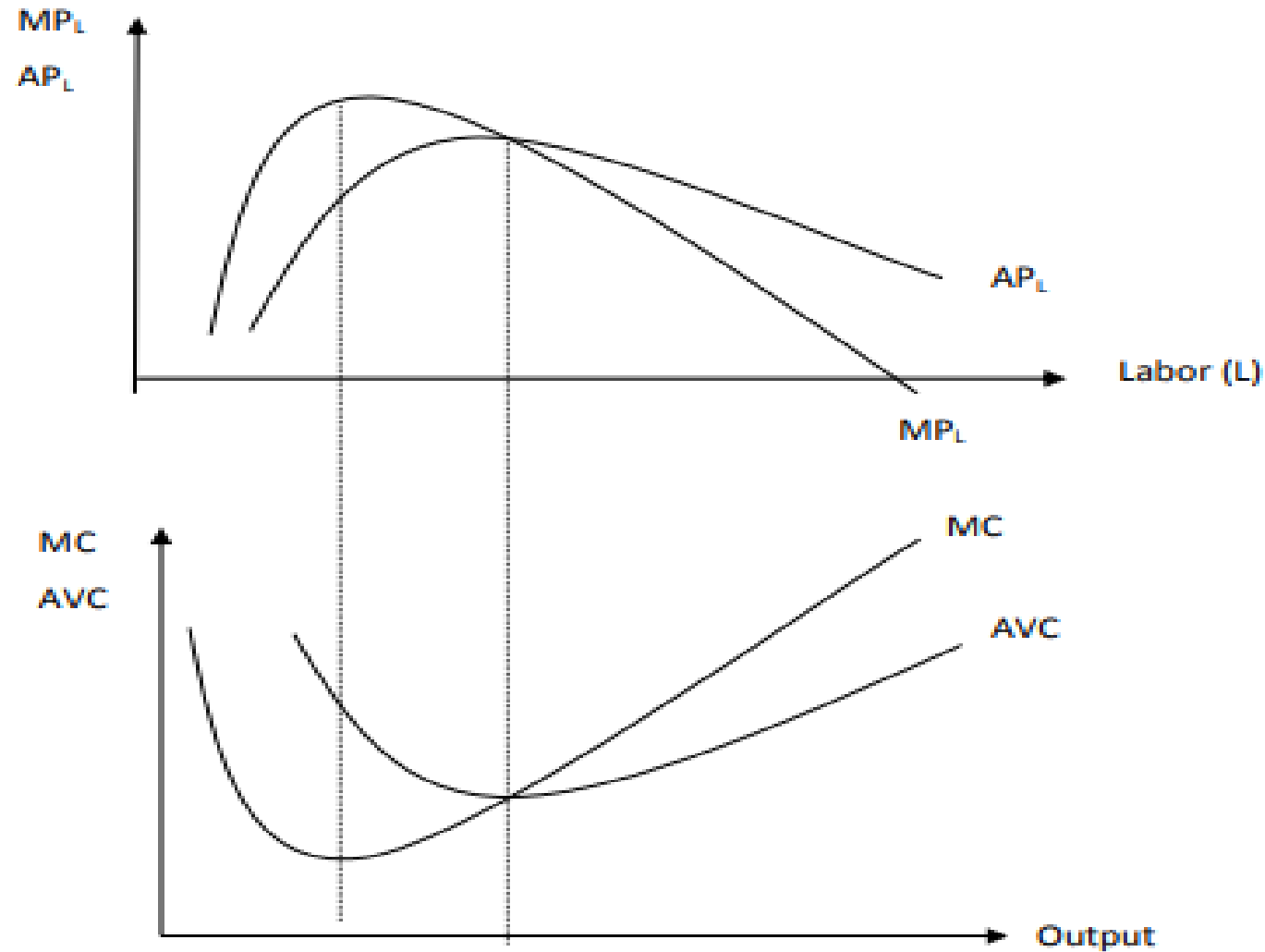


Figure 4.4: relationship between short run production and cost curves

□ From the above figure, we can conclude that the **MC** curve is the mirror image of **MPL** curve and **AVC** curve is the mirror image of **APL** curve.

Chapter Five: Market Structure

- ❑ This chapter discusses how a particular firm makes a decision to achieve its profit maximization objective.
- ✓ A firm's decision to achieve this goal is dependent on the type of market in which it operates.
- ❑ To this effect we distinguish between four major types of markets:
 - ✓ perfectly competitive market,
 - ✓ monopolistically competitive market,
 - ✓ oligopolistic market, and
 - ✓ pure monopoly market.

5.1. The concept of market in physical and digital space

- ✓ Comprehensive definition of market according to American Marketing Association (1985) is the process of planning and executing the conception, pricing, promotion, and distribution of goods, services and ideas to create exchanges.

❑ So market describes **place** or **digital space** by which goods, services and ideas are exchanged to satisfy consumer need.

Digital marketing is the marketing of products or services using **digital technologies**, mainly on the **internet** but also including **mobile phones**, **display advertising**, and **any other digital media**.

✓ Digital marketing channels are systems on the internet that can create, accelerate and transmit product value from producer to the terminal consumer by digital networks.

Physical market is a set up where buyers can physically meet their sellers and purchase the desired merchandise from them in exchange of money.

✓ In physical marketing, marketers will effortlessly reach their target local customers and thus they have more personal approach to show about their brands.

✓ The **choice of the marketing** mainly depends **on the nature of the products and services**.

- ❑ In simple words, we may define market as “a structure in which the buyers and sellers of a commodity remain in contact.”
- ❖ Markets are classified into different types on the basis of factors such as:
 - ✓ the **degree of competition** among firms in a market,
 - ✓ the **number of buyers and sellers**, the nature of the commodity,
 - ✓ the **mobility of goods and factors of production**, and
 - ✓ the knowledge of buyers and sellers about prices in the market(**Information**)

5.2. Perfectly competitive market

- ✓ **Perfect competition** is a market structure in which there are a large number of producers (firms) producing a homogeneous product so that no individual firm can influence the price of the commodity.
- ✓ In this type of market, the **price is determined by the industry** (aggregate of all the firms producing the same product) through the forces of demand and supply

5.2.1 Assumptions of perfectly competitive market

A market is said to be pure competition (perfectly competitive market) if the following assumptions are satisfied.

1. Large number of sellers and buyers:

- ✓ under perfect competition the number of sellers is assumed to be too large that the share of each seller in the total supply of a product is very small.
- ✓ Therefore, no single seller can influence the market price by changing the quantity supply.
- ✓ Similarly, the number of buyers is so large that the share of each buyer in the total demand is very small and that no single buyer or a group of buyers can influence the market price by changing their individual or group demand for a product.
- ✓ Therefore, in such a market structure, sellers and buyers are not price makers rather they are price takers, i.e., the price is determined by the interaction of the market supply and demand forces.

2. Homogeneous product

- ✓ Products sold in the market are homogeneous – i.e., they are **identical** in all respects, including **quality**, **colour**, **size**, **weight**, **design**, etc.
- ✓ Buyers perceive **no actual** or **real differences between the products** offered by different firms.
- ✓ Product of each firm is regarded as **a perfect substitute** for the products of other firms.
- ✓ Therefore, **no firm can gain any competitive advantage** over the other firm.

Example: Chemical inputs

3. Free entry and exit

- ✓ There is **no restriction** or **market barrier** on entry of new firms to the industry, and no restriction on exit of firms from the industry.
- ✓ A firm may enter the industry or quit it **on its accord**.

3. Perfect mobility

- ✓ factors of production are free to move from one firm to another throughout the economy.
- ✓ No **hindrance** or **obstruction**.
- ✓ This means that **labour can move from one job to another** and from one region to another.
- ✓ Capital, raw materials, and other factors are not monopolized.

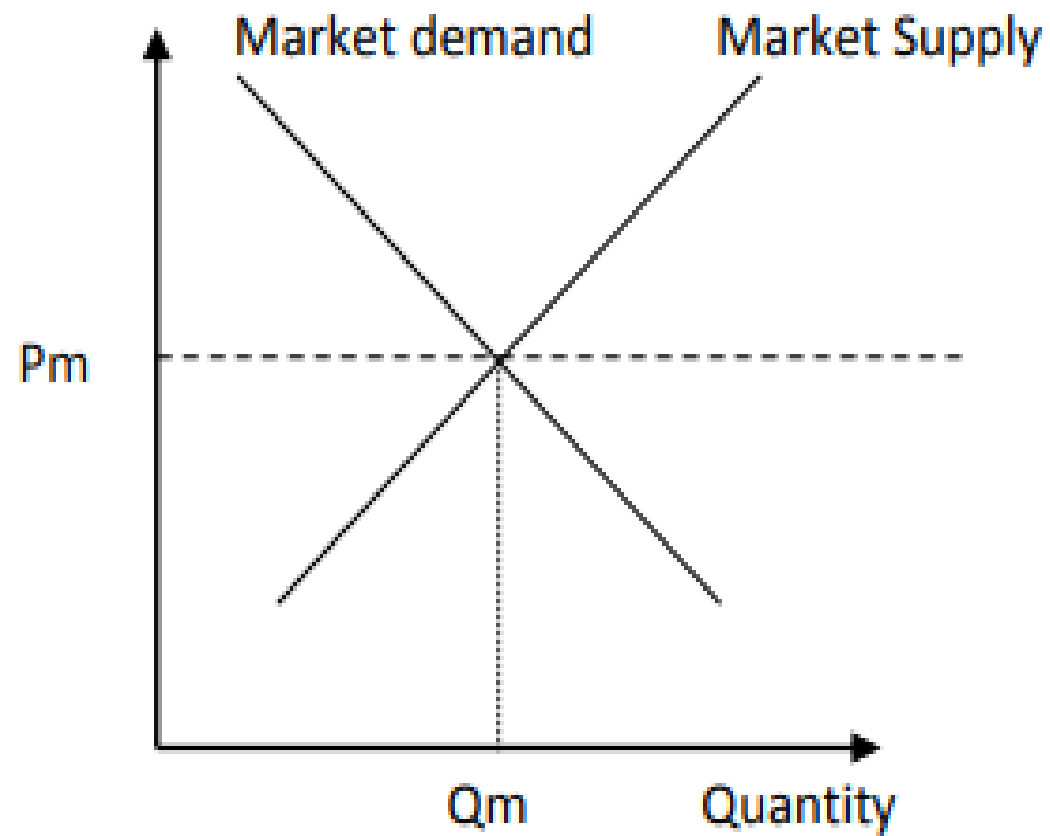
5. Perfect knowledge about market conditions:

- ✓ all the buyers and sellers have **full information** regarding the prevailing and future prices and availability of the commodity.

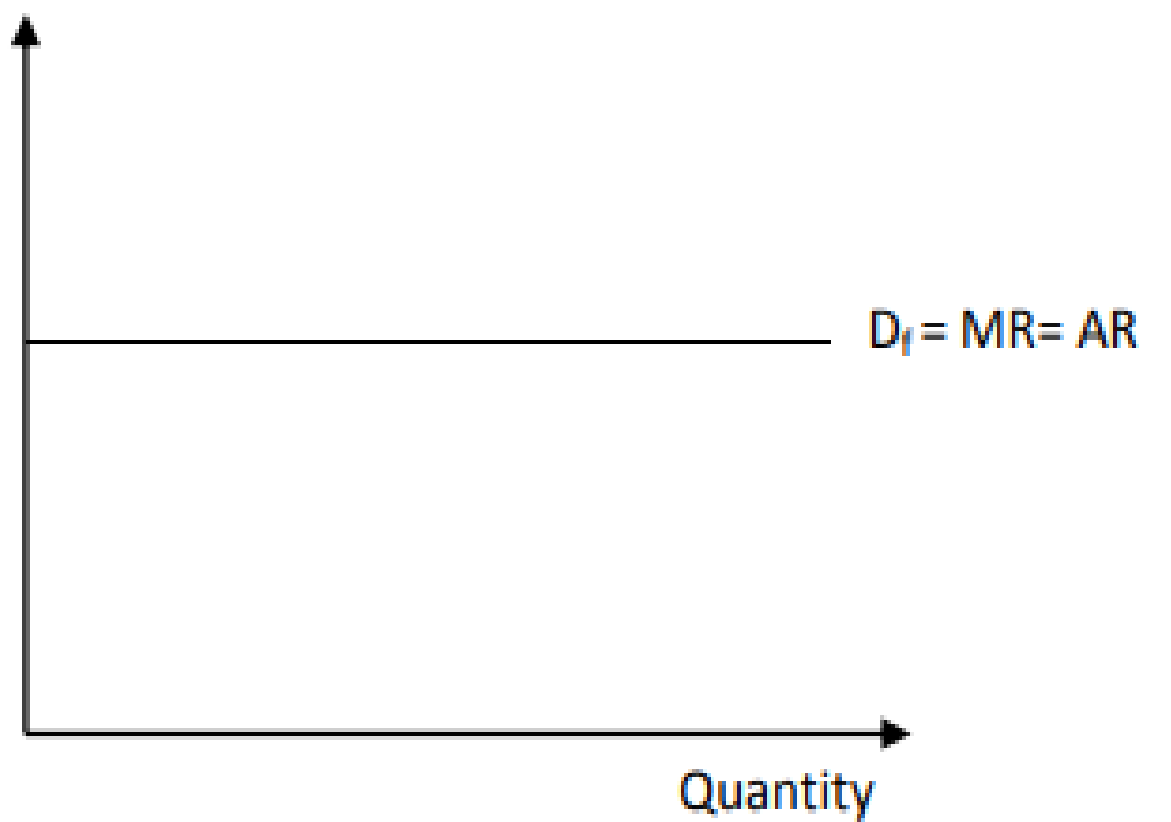
6. No government interference:

- ✓ Government does not interfere in any way with the **functioning of the market**.
- ✓ There are **no discriminator taxes** or **subsidies**, **no allocation of inputs** by the procurement, or any kind of direct or indirect control.

- ✓ That is, the government follows the free enterprise policy.
- ✓ Where there is intervention by the government, it is intended to correct the market imperfection.
- ✓ From these assumptions, **a single producer(firm)** under perfectly competitive market is **a price-taker**.
- ✓ That is, at the market price, **the firm can supply whatever quantity it would like to sell**.
- ✓ Once the price of the product is determined in the market, the producer takes the price (P_m in the **figure 5.1**) as given.
- ✓ Hence, the demand curve **D_f** that the firm faces in this market situation is **a horizontal line** drawn at the equilibrium price, **P_m**



(a): Market demand and supply



(b): Demand curve of a firm

Figure 5.1: Individual and market demand curve

- ❑ The **main objective** of a firm is **profit maximization**.
 - ✓ If the firm has to incur a loss, it aims to minimize the loss.
 - ✓ **Profit** is the difference between total revenue and total cost.
- ❖ **Total Revenue (TR)**: it is the total amount of money a firm receives from a given quantity of its product sold.
 - ✓ It is obtained by multiplying the unit price of the commodity and the quantity of that product sold.

$$TR = P \times Q$$

where P = price of the product Q = quantity of the product sold.

- ❖ **Average Revenue (AR)**: it is the revenue per unit of item sold.
 - ✓ It is calculated by dividing the total revenue by the amount of the product sold.

$$AR = \frac{TR}{Q} = \frac{P \cdot Q}{Q}; AR = P$$

- ✓ Therefore, the firm's demand curve is also **the average revenue curve**

- ❖ **Marginal Revenue:** it is the additional amount of money/ revenue the firm receives by selling one more unit of the product.
- ✓ In other words, it is the change in total revenue resulting from the sale of an extra unit of the product.
- ✓ It is calculated as the ratio of the change in total revenue to the change in the sale of the product.

$$\mathbf{MR} = \frac{\Delta TR}{\Delta Q} = \frac{\Delta P \cdot Q}{\Delta Q} = \frac{P \Delta Q}{\Delta Q} = \mathbf{P}$$

- Thus, in **a perfectly competitive market**, a firm's **average revenue, marginal revenue** and **price of the product** are equal.

$$\text{i.e. } \mathbf{AR = MR = P = D_f}$$

- Since the **purely competitive firm** is **a price taker**, it will maximize its economic profit **only by adjusting its output.**
- In the short run, the firm has **a fixed plant.**

- ✓ Thus, it can adjust its output only through changes in the amount of **variable resources**.
- ✓ It adjusts its variable resources to achieve the output level that maximizes its profit.
- There are **two ways** to determine the level of output at which a competitive firm will realize **maximum profit** or minimum loss.
 - ✓ One method is to compare **total revenue** and **total cost**
 - ✓ the other is to compare **marginal revenue** and **marginal cost**.

A) Total Approach (TR-TC approach)

- ✓ In this approach, a firm maximizes total profits in the short run **when the (positive) difference** between total revenue (TR) and total costs (TC) is **greatest**.

$$\text{Total Profit} = \text{Total Revenue} - \text{Total Cost}$$

$$TP = TR - TC$$

Note: The profit maximizing output level is Q_e because it is at this output level that the vertical distance between the **TR** and **TC** curves (or profit) is maximized.

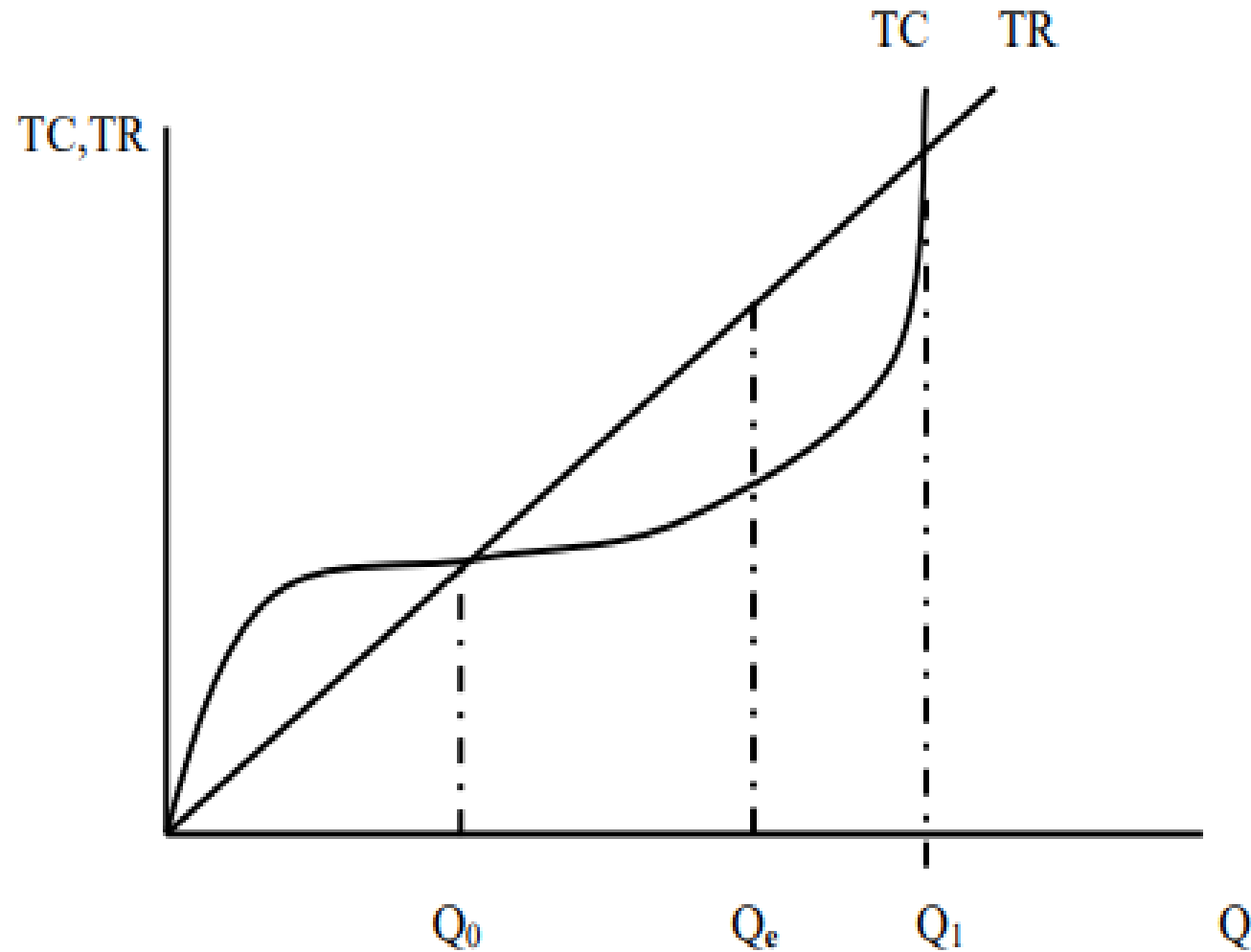


Figure 5.2: Total revenue and total cost approach of profit maximization

B) Marginal Approach (MR-MC)

- ✓ In the short run, the firm will maximize profit or minimize loss by producing the output at which marginal revenue equals marginal cost.
- ✓ More specifically, the **perfectly competitive firm maximizes** its at the output when the following two conditions are met:
 - ✓ **short-run total profits**
 - i) **$MR = MC$**
 - ii) The **slope of MC is greater than slope of MR**; or **MC is rising** (that is, slope of MC is greater than zero).

✓ Mathematically, $\Pi = TR - TC$

Π is maximized when $\frac{d\Pi}{dQ} = 0$

That is $\frac{d\Pi}{dQ} = \frac{dTR}{dQ} - \frac{dTC}{dQ} = 0, MR - MC = 0;$

$MR = MC \dots \dots \dots (First\ Order\ Condition(FOC))$

Then,

$$\frac{d^2\Pi}{d^2Q} < 0; \frac{d^2\Pi}{d^2Q} = \frac{d^2TR}{d^2Q} - \frac{d^2TC}{d^2Q} < 0,$$

$$\frac{d^2\Pi}{d^2Q} < \frac{dMR}{dQ} - \frac{dMC}{dQ} < 0$$

$$\frac{dMR}{dQ} = \text{Slope of } MR; \text{ and } \frac{dMC}{dQ} = \text{Slope of } MC$$

□ Therefore, **Slope of MC > slope of MR** ---...**Second order condition (SOC)**

□ Slope of **MC > 0** (because the **slope of MR is zero**)

Graphically, the marginal approach can be shown as follows.

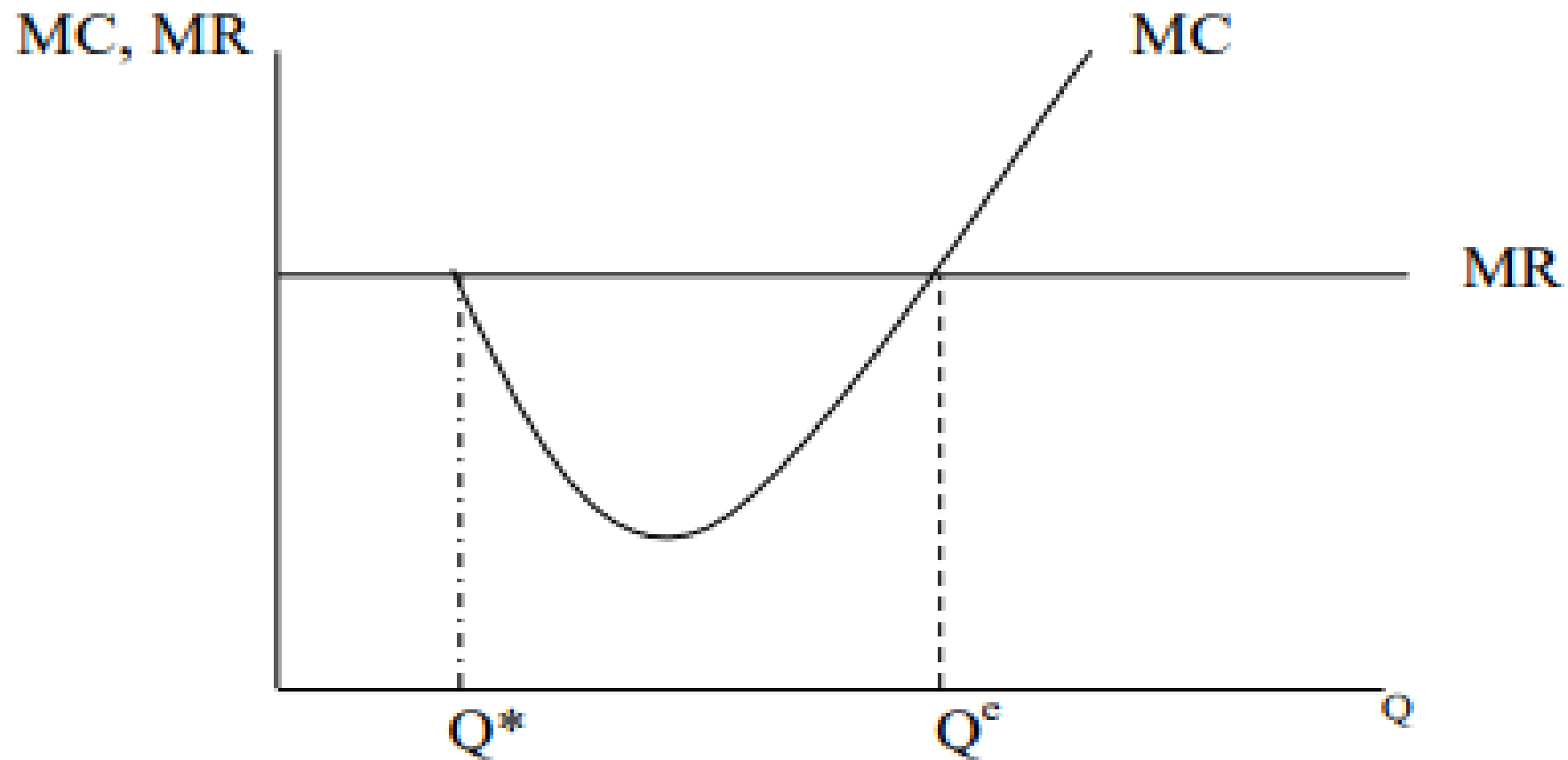


Figure 5.3: *Marginal approach of profit maximization*

- ✓ The profit maximizing output is Q^e , where $MC = MR$ and **MC curve is increasing**.
- ✓ At Q^* , $MC = MR$, but since **MC is falling** at this output level, it is not equilibrium output.
- Whether the firm in the short-run gets positive or zero or negative profit depends **on the level of ATC at equilibrium**.
- ✓ Thus, depending on the relationship between price and ATC, the firm in the short-run may earn **economic profit**, **normal profit** or **incur loss** and decide to **shut-down business**.

i) **Economic/positive profit**

- ✓ If the **AC** is below the **market price at equilibrium**, the firm earns a positive profit equal to **the area between the ATC curve and the price line up to the profit maximizing output**.

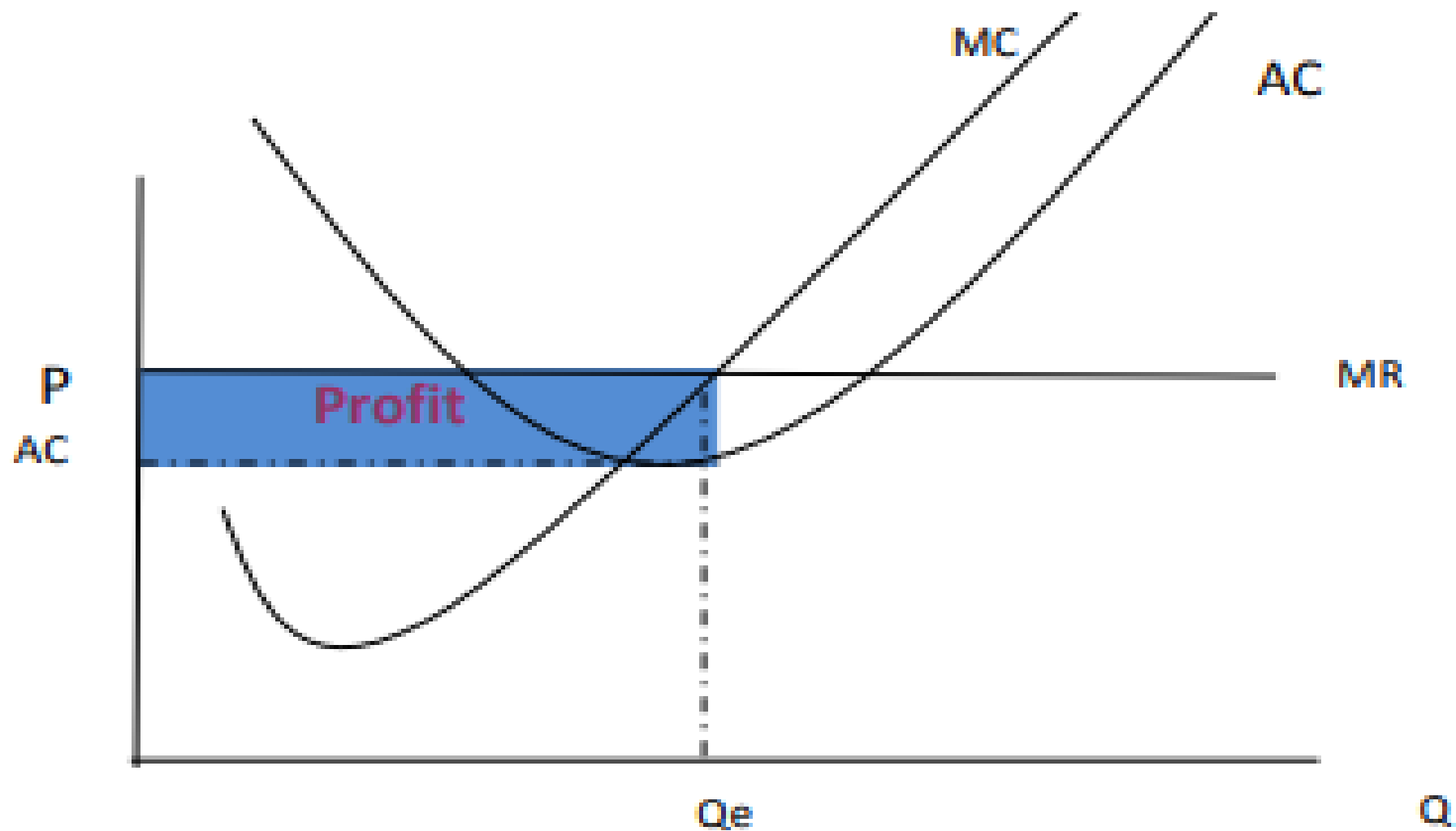


Figure 5.4: Economic profit a firm

ii) Loss

- ✓ If the **AC** is above the market price at equilibrium, the firm earns a **negative profit** (incurs a loss) equal to the area between the **AC curve** and the price line.

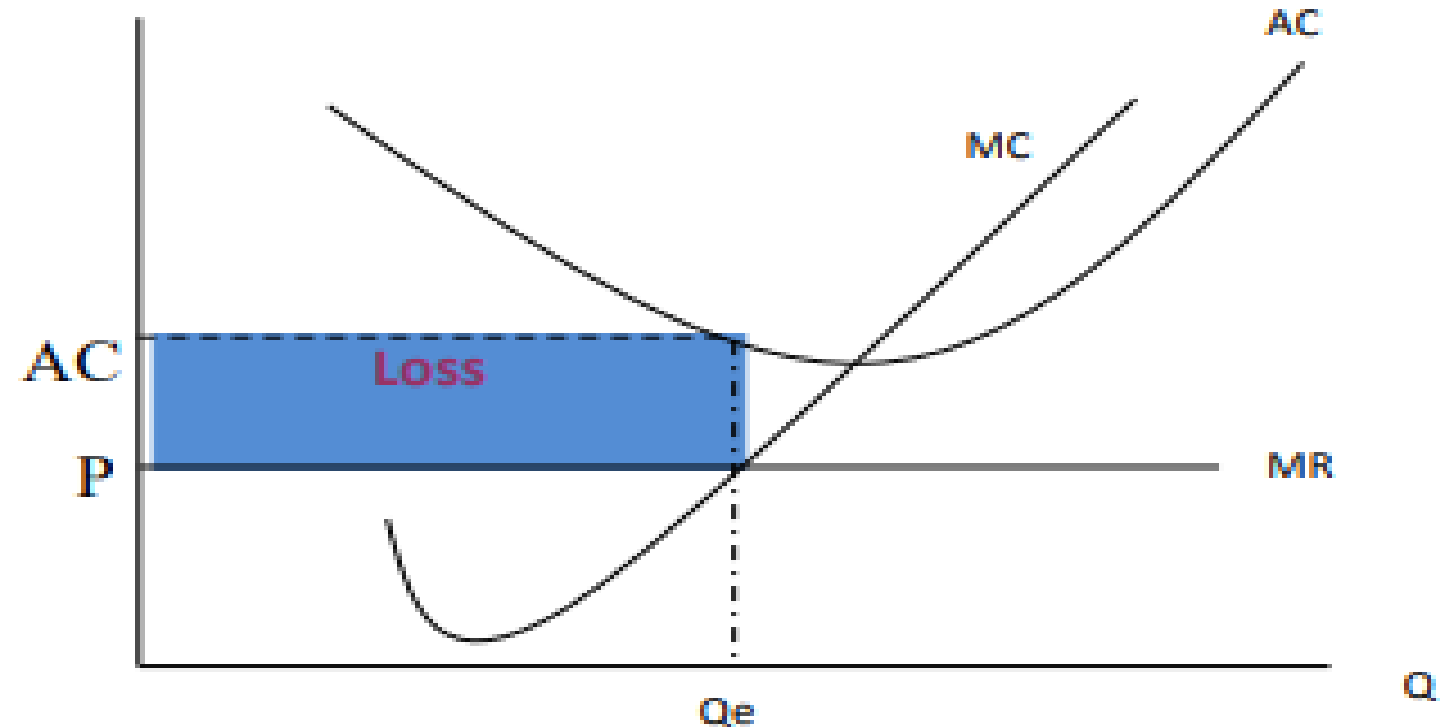


Figure 5.6: A firm incurring a loss

iii) Normal Profit (zero profit) or break- even point

- ✓ If the **AC** is equal to the **market price at equilibrium**, the firm gets zero profit or normal profit.

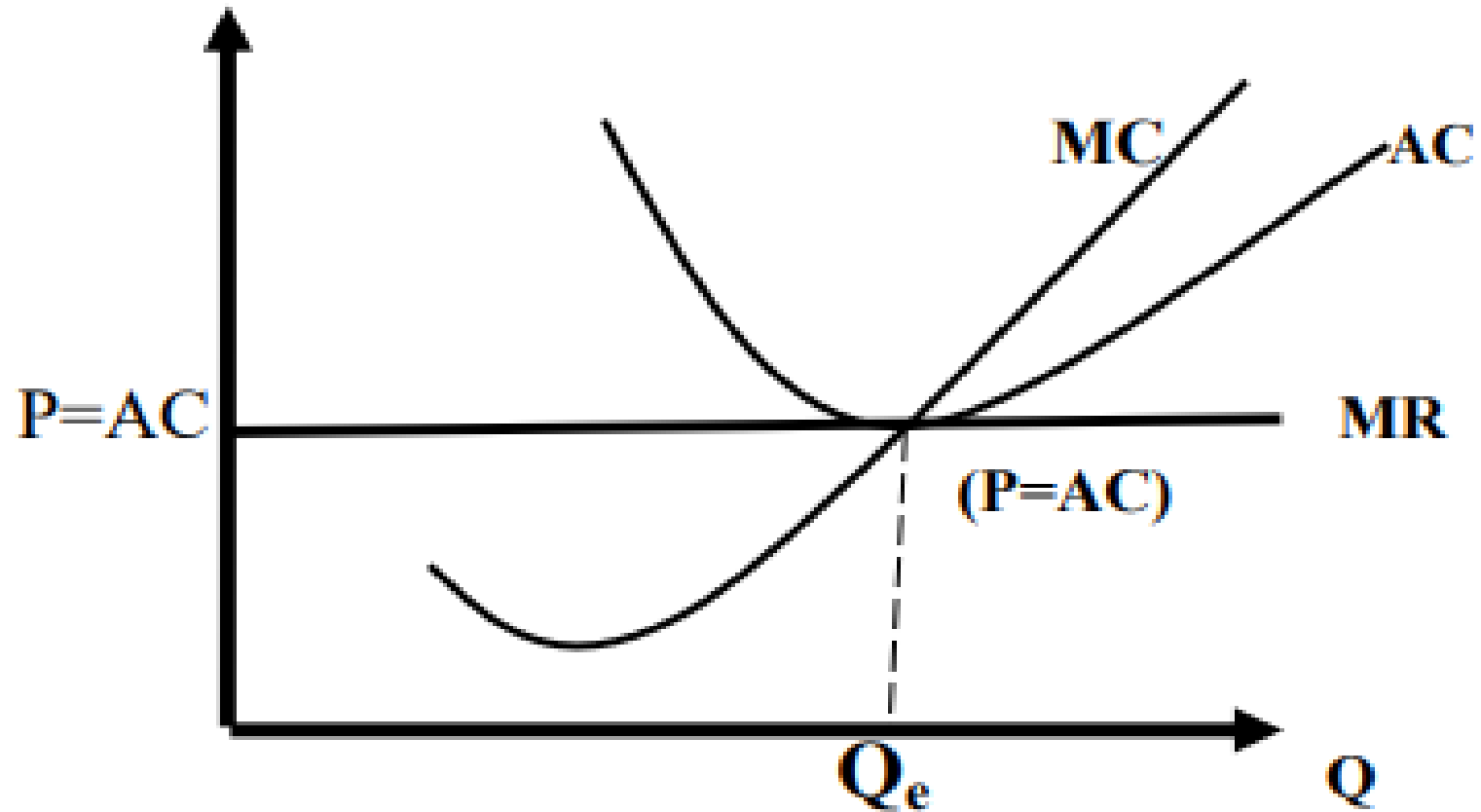


Figure 5.7: A firm earning a normal profit

• iv) Shutdown Point

- ✓ The firm will not stop production simply because AC exceeds price in the short-run.
- ✓ The firm will continue to produce irrespective of the existing loss **as far as the price is sufficient to cover the average variable costs (AVC)**.
- ✓ This means, if P is larger than AVC but smaller than AC , **the firm minimizes total losses**.
- ✓ But if P is smaller than AVC , the firm minimizes total losses by shutting down.
- ✓ Thus, **$P = AVC$** is the **shutdown point for the firm**.

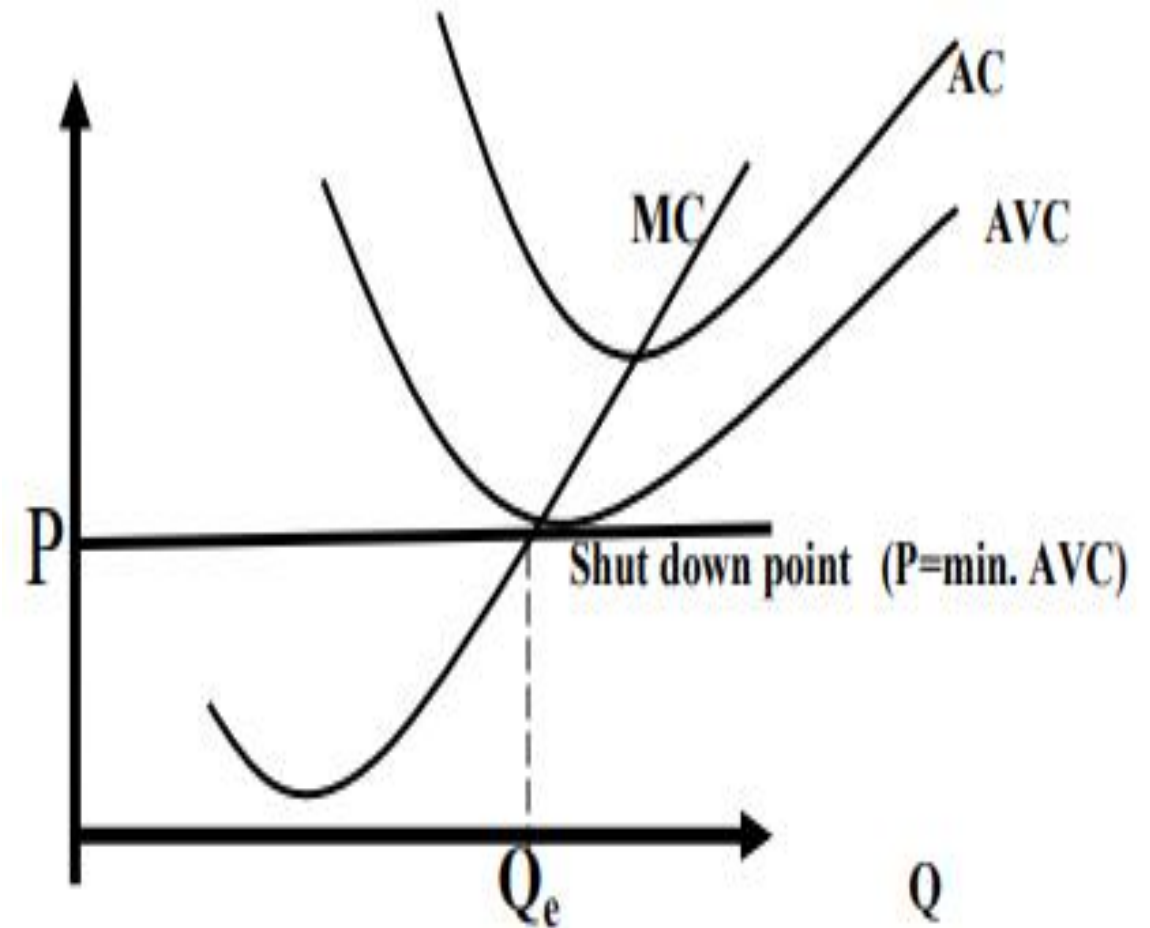


Figure 5.8: A shut down point

Example: Suppose that the firm operates in **a perfectly competitive market**. The market price of its product is \$10. The firm estimates its cost of production with the following cost function: **$TC = 2 + 10Q - 4Q^2 + Q^3$**

- A) What level of output should the firm produce to maximize its profit?
- B) Determine the level of **profit at equilibrium**.
- C) What **minimum price** is required by the firm to stay in the market?

Solution

Given: **$P = \$10$** and **$TC = 2 + 10Q - 4Q^2 + Q^3$**

A) The profit maximizing output is that level of output which satisfies the following condition:

- i) $MC = MR$ &***
- ii) MC is rising***

- ✓ Thus, we have to find **MC** & **MR** first.
- ✓ MR in a perfectly competitive market is equal to the market price.
- ✓ Hence, **MR=10**

$$\text{❖ Alternatively, } \mathbf{MR} = \frac{dTR}{dQ} = \frac{dP*Q}{dQ} = \frac{d(10Q)}{dQ} = 10$$

$$\text{❖ } \mathbf{MC} = \frac{dTC}{dQ} = \frac{d(\mathbf{2+10Q-4Q^2+Q^3})}{dQ} = \mathbf{10 - 8Q + 3Q^2}$$

- ✓ At equilibrium, **MC = MR**

$$10 - 8Q + 3Q^2 = 10$$

$$Q(-8 + 3Q) = 0$$

$$\mathbf{3Q = 8 \text{ and } Q = 0}$$

$$\mathbf{Q = \frac{8}{3}; Q = 0}$$

- ✓ Now we have obtained **two different output levels** which satisfy the **first order (necessary) condition** of profit maximization.

- ✓ To determine which level of output maximizes profit we have to use the **second order test** at the two output levels.
- ✓ That is, we have to see which output level satisfies the second order condition of **increasing MC**.
- ❖ To see this first we determine the **slope of MC**.

$$\text{Slope of MC} = \frac{dMC}{dQ} = -8 + 6Q$$

- ✓ At **$q = 0$** , slope of MC is $-8 + 6(0) = -8$ which is **negative**, implying that marginal cost is decreasing at $q = 0$.
- ✓ Thus, **$q = 0$** is not equilibrium output because it doesn't satisfy the second order condition.
- ✓ At **$q = 8/3$** , slope of MC is $-8 + 6(8/3) = 8$, which is **positive**, implying that MC is increasing at **$q = 8/3$**
- ✓ **Thus, the equilibrium output level is $q = 8/3$**

B) Above, we have said that the firm maximizes its profit by producing $8/3$ units.

- ✓ To determine the firm's equilibrium profit we have to calculate the **total revenue** that the firm obtains at this level of output and the **total cost** of producing the equilibrium level of output.

$$\mathbf{TR} = \text{Price} * \text{Equilibrium Output} = \$ 10 * 8/3 = \mathbf{\$ 80/3}$$

- ✓ TC at $q = 8/3$ can be obtained by substituting $8/3$ for q in the TC function, i.e.,

$$\mathbf{TC = 2 + 10\left(\frac{8}{3}\right) - 4(8/3)^2 + \left(\frac{8}{3}\right)^3 = 19.18}$$

- ✓ Thus the equilibrium (maximum) profit is

$$\begin{aligned}\mathbf{\Pi} &= \mathbf{TR - TC} \\ \mathbf{\Pi} &= \mathbf{26.67 - 19.18 = \$ 7.48}\end{aligned}$$

C) To stay in operation the firm needs the price which equals **at least the minimum AVC**.

- ✓ Thus, to determine the minimum price required to stay in business, we have to determine the **minimum AVC**.
- ✓ AVC is minimal when **derivative of AVC** is equal to zero.

$$\text{That is: } \frac{dAVC}{dQ} = 0$$

❖ Given the TC function: **$TC = 2 + 10Q - 4Q^2 + Q^3$** , **$TVC = 10Q - 4Q^2 + Q^3$** .

$$\checkmark \text{ Then, } AVC = \frac{TVC}{Q} = \frac{10Q - 4Q^2 + Q^3}{Q} = 10 - 4Q + Q^2$$

$$\checkmark \frac{dAVC}{dQ} = \frac{d(10 - 4Q + Q^2)}{dQ} = -4 + 2Q = 0$$

$$Q = 2$$

- ✓ Thus, **AVC** is minimum when output is equal to **2 units**.

5.2.3 Short run equilibrium of the industry

- ✓ Since the **perfectly competitive firm** always produces where $P = MR = MC$ (as long as P exceeds AVC), the **firm's short-run supply curve** is given by the **rising portion of its MC curve above its AVC**, or shutdown point (see figure 5.7).
- ✓ The **industry/market supply curve** is a **horizontal summation** of the **supply curves of the individual firms**.
- ✓ Industry supply curve can be obtained by multiplying the individual supply at various prices by the number of firms, if firms have **identical supply curve**.
- ✓ An industry is in equilibrium in the short-run when market is cleared at a given price i.e. when the total **supply = total demand** for its product, the prices at which market is cleared is **equilibrium price**.
- ✓ When an industry reaches **at its equilibrium**, there is **no tendency to expand or to contract the output**.

5.3. Monopoly market

5.3.1. Definition and characteristics

- ✓ This is at the opposite end of the spectrum of market structures.
- ✓ Pure monopoly exists when **a single firm** is **the only producer of a product** for which there are no close substitutes.
- The main characteristics of this market structure include:

1. Single seller

- ✓ A pure or absolute monopoly is a one firm industry
- ✓ A single firm is the only producer of a specific product or the **sole supplier of the product**, and
- ✓ The **firm** and the **industry** are synonymous.

2. No close substitutes

- ✓ the monopolist's **product is unique** in that there are **no good or close substitutes**.
- ✓ From the buyer's view point, there are no reasonable alternatives.

3. Price maker

- ✓ the individual firm exercises a considerable **control over price** because it is responsible for, and therefore controls, the total quantity supplied.
- ✓ Confronted with the usual **down ward sloping demand curve** for its product, the monopolist **can change product price** by changing the quantity of the product supplied.

4. Blocked entry

- ✓ A pure monopolist has **no immediate competitors** because **there are barriers**, which keep potential competitors from entering in to the industry.
- ✓ These barriers may be **economic**, **legal**, **technological** etc.
- ✓ Under conditions of **pure monopoly**, **entry is totally blocked**.

5.3.2. Sources of monopoly

- ✓ The emergence and survival of monopoly is attributed to the factors which prevent the entry of other firms in to the industry.
- ✓ The **barriers** to entry are therefore the **sources of monopoly** power.
- The major sources of barriers to entry are:
 - i) **Legal restriction**
 - ✓ Some monopolies are created by **law** in **public interest**.
 - ✓ Such monopoly may be created in both public and private sectors.
 - ✓ Most of the state monopolies in the public utility sector, including postal service, **Natural gas companies**, telegraph, telephone services, **radio** and **TV** services, **generation** and **distribution of electricity**, **rail ways**, **airlines** etc... are **public monopolies**.

ii) Control over key raw materials

- ✓ Some firms acquire monopoly power from their traditional control over certain **scarce and key raw materials** that are essential for the production of certain other goods.
- ✓ **For example, Aluminum Company of America** had monopolized the **aluminum industry** because it had acquired control over almost all sources of bauxite supply; such monopolies are often called **raw material monopolies**.

iii) Efficiency

- ✓ a primary and technical reason for growth of monopolies is **economies of scale**.
- ✓ The most efficient plant (**probably large size firm**), which produces at minimum cost, can eliminate the competitors by curbing down its price for a short period and can acquire monopoly power.
- ✓ Monopolies created through efficiency are known as **natural monopolies**.

iv) Patent rights

- ✓ Patent rights are granted by the government to a firm to produce **commodity of specified quality** and **character** or to use specified rights to produce the specified commodity or to use the specified technique of production.
- ✓ Such monopolies are called to **patent monopolies**.

5.4. Monopolistically competitive market

- ✓ This market model can be defined as the market organization in which there are relatively **many firms selling differentiated products**.
- ✓ It is the blend of **competition** and **monopoly**.
- ✓ The competitive element arises from the existence of **large number of firms** and **no barrier to entry or exit**.

❑ This market is characterized by:

(i) Differentiated product

- ✓ the product produced and supplied by many sellers in the market is **similar but not identical in the eyes of the buyers.**
- ✓ **A variety of the same product.**
- ✓ The difference could be in **style**, **brand name**, in **quality**, or others.
- ✓ Hence, the **differentiation of the product could be real** (eg. quality) or fancied (e.g. difference in packing).

(ii) Many sellers and buyers

- ✓ there are many sellers and buyers of the product, but their number is not as large as that of the perfectly competitive market.

(iii) Easy entry and exit

- ✓ like the PCM, there is no barrier on new firms that are willing and able to produce and supply the product in the market.

- ✓ On the other hand, if any firm believes that it is not worth to stay in the business, it may exit.

(iv) Existence of non-price competition

- ✓ Economic rivals take the form of non-price competition in terms of product quality, advertisement, brand name, service to customers, etc.
- ✓ A firm spends money in advertisement to reach the consumers about the relatively unique character of its product and thereby get new buyers and develop brand loyalty.
- ✓ Many retail trade activities such as clothing, shoes, soap, etc are in this type of market structure.

5.5. Oligopoly market

- ✓ This is a market structure characterized by:

i) Few dominant firms

- ✓ there are few firms although the exact number of firms is undefined. Each firm produces a significant portion of the total output.

ii) Interdependence

- ✓ since few firms hold a significant share in the total output of the industry, each firm is affected by the price and output decisions of rival firms.
- ✓ Therefore, the distinguishing characteristic of oligopoly is the **interdependence among firms** in the industry.

iii) Entry barrier

- ✓ there are considerable obstacles that hinder a new firm from producing and supplying the product.
- ✓ The barriers may include **economies of scale**, **legal**, **control of strategic inputs**, etc.

iv) homogenous or differentiated Product

- ✓ If the product is homogeneous, we have **a pure oligopoly**.
- ✓ If the product is differentiated, it will be **a differentiated oligopoly**.

V) Lack of uniformity in the size of firms

- ✓ Firms differ considerably in size.
 - ✓ Some may be small, others very large.
 - ✓ Such a situation is **asymmetrical**.
 - ✓ **Non-price competition:** firms try to avoid price competition due to the fear of price wars and hence depend on non-price methods like advertising, after sales services, warranties, etc.
 - ✓ This ensures that firms can influence demand and build brand recognition.
- ❑ A special type of oligopoly in which there are **only two firms** in the market is known as **duopoly**.

Summarized Differences of the FOUR MARKETS

Characteristics	Market models			
	Pure Competition	Monopolistic Competition	Oligopoly	Pure Monopoly
Number of firms	Large	Many	Few	One or Single
Type of product	Homogeneous	Differentiated	Homogeneous or differentiated	Unique, no close substitutes
Control over price	None	Some, but within rather narrow limits	Limited by mutual interdependence and collusion	Significant
Condition of entry	Very easy	Relatively easy	Considerable barriers/obstacles	Blocked
Examples	Agricultural products	Clothes, Shoes	Steel, Automobiles	Local utilities