

Introduction to Economics

Chapter 1: Basics of Economics

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1.1. Introduction

- **Have you ever heard anything about Economics?**
- And you may have questions such as: What are resources? What does efficient allocation mean? What are human needs? What does demand mean? What is economics?
- **Definition of Economics**
 - The word economy comes from the Greek phrase —one who manages a household.
 - There is no universally accepted definition of economics (its definition is controversial). This is because different economists defined economics from different perspectives:
 - a. Wealth definition,
 - b. Welfare definition,
 - c. Scarcity definition, and
 - d. Growth definition

But, the formal and commonly accepted definition

- **Economics** is a social science which studies about efficient allocation of scarce resources so as to attain the maximum fulfillment of unlimited human needs.
- As economics is a science of choice, it studies how people choose to use scarce or limited productive resources (land, labour, equipment, technical knowledge and the like) to produce various commodities.

Therefore,

- Economics studies about scarce resources; allocation of resources; Allocation should be efficient; Human needs 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.

The Rationales of Economics

- There are two fundamental facts that provide the foundation for the field of economics.
 - 1) Human (society's) material wants are unlimited.
 - 2) Economic resources are limited (scarce).
- 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.
- Human beings as an individual, family, and nation, need to make choices to use scarce resources as they seek to satisfy their unlimited 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.

Scope and Method of Analysis in Economics

Scope of economics

- 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.

Scope and Method of Analysis in Economics (Cont..)

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

Positive and Normative analysis

- *Is economics a positive science or normative science, or both? What is your justification?*
- Economics can be analyzed from two perspectives: positive economics and normative economics.

Positive economics: 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.

Example:

- The current inflation rate in Ethiopia is around 14 percent.
- Poverty and unemployment are the biggest problems in Ethiopia.
- The life expectancy at birth in Ethiopia is rising.
- All the above statements are known as positive statements. These statements are all concerned with real facts and information.

Whereas,

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 since normative economics is loaded with judgments, 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.

Example:

- The poor should pay no taxes.
- There is a need for intervention of government in the economy.
- Females ought to be given job opportunities.
- Any disagreement on a normative statement can be solved by voting.

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.

But,

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

Scarcity, choice, opportunity cost and production possibilities frontier

- 1. Have you ever faced a problem of choice among different alternatives? If yes, what was your decision?*
 - 2. What is scarcity? Do you think that it is different from shortage? Why?*
- ▶ The central purpose of economic activity is the production of goods and services to satisfy consumer's needs and wants i.e. to meet people's need for consumption both as a means of survival and also to meet their ever-growing demand for an improved lifestyle or standard of living.

Scarcity, choice, opportunity cost and production possibilities frontier (Cont..)

1. Scarcity

- The fundamental economic problem that any human society faces is the problem of scarcity.
- The world's resources are finite – i.e. there are limited amounts of land, water, oil, food etc on this planet
- Scarcity means that economic agents (individuals, firms, governments) can only obtain a limited amount of resources at any given time. 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

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graph LR; Resources[Resources] --> Free[Free resources]; Resources --> Scarce[Scarce (economic) resources]; Free --- DefFree["A resource is said to be free if the amount available to a society is greater than the amount people desire at zero price. E.g. sunshine"]; Scarce --- DefScarce["A resource is said to be scarce or economic resource when the amount available to a society is less than what people want to have at zero price."];
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Free resources

A resource is said to be free if the amount available to a society is greater than the amount people desire at zero price. E.g. sunshine

Scarce (economic) resources

A resource is said to be scarce or economic resource when the amount available to a society is less than what people want to have at zero price.

Examples of scarce resources.

- 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.

- ❖ **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**.

- ❖ **Land:** refers to the natural resources or all the free gifts of nature usable in the production of goods and services.

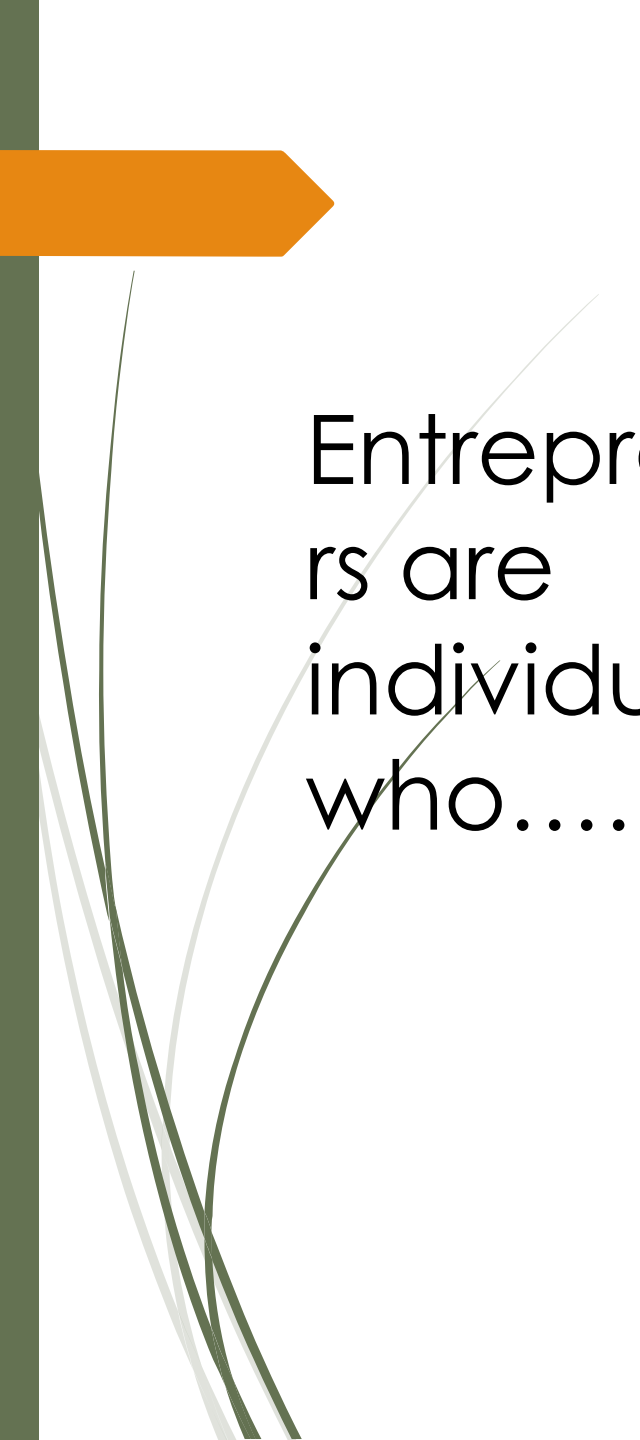
The reward for the services of land is known as **rent**.

- ❖ **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**.

- ❖ **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**.



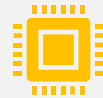
Entrepreneu rs are individuals who.....



Organize factors of production to produce goods and services.



Make basic business policy decisions.



Introduce new inventions and technologies into business practice.



Look for new business opportunities.



Take risks of making losses.

Scarcity does not mean shortage

- ▶ We have already said that a good is said to be scarce if the amount available is less than the amount people wish to have at zero price.
- ▶ But we say that there is shortage of goods and services 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**.

Scarcity, choice, opportunity cost and production possibilities frontier (Cont..)

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**.



Opportunity cost

- In a world of scarcity, a decision to have more of one thing, at the same time, means a decision to have less of another thing.
- The **value of the next best alternative** that must be sacrificed is, therefore, the **opportunity cost** of the decision.

Definition: 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.

For example, suppose the country spends all of its limited resources on the production of cloth or computer. If a given amount of resources can produce either one meter of cloth or 20 units of computer, then the cost of one meter of cloth is the 20 units of computer that must be sacrificed in order to produce a meter of cloth.

When we say opportunity cost, we mean that:

- ✓ It is measured in goods & services but not in money costs
- ✓ It should be in line with the principle of substitution.

In conclusion, when opportunity cost of an activity increases people substitute other activities in its place.

The Production Possibilities Frontier or Curve (PPF/ PPC)

❑ ***The production possibilities frontier (PPF)*** is a curve that shows the various possible combinations of goods and services that the society can produce given its resources and technology.

To draw the PPF we need the following assumptions.

- A. The quantity as well as quality of economic resource available for use during the year is fixed.
- B. There are two broad classes of output to be produced over the year.
- C. The economy is operating at full employment and is achieving full production (efficiency).
- D. Technology does not change during the year.
- E. Some inputs are better adapted to the production of one good than to the production of the other (specialization).

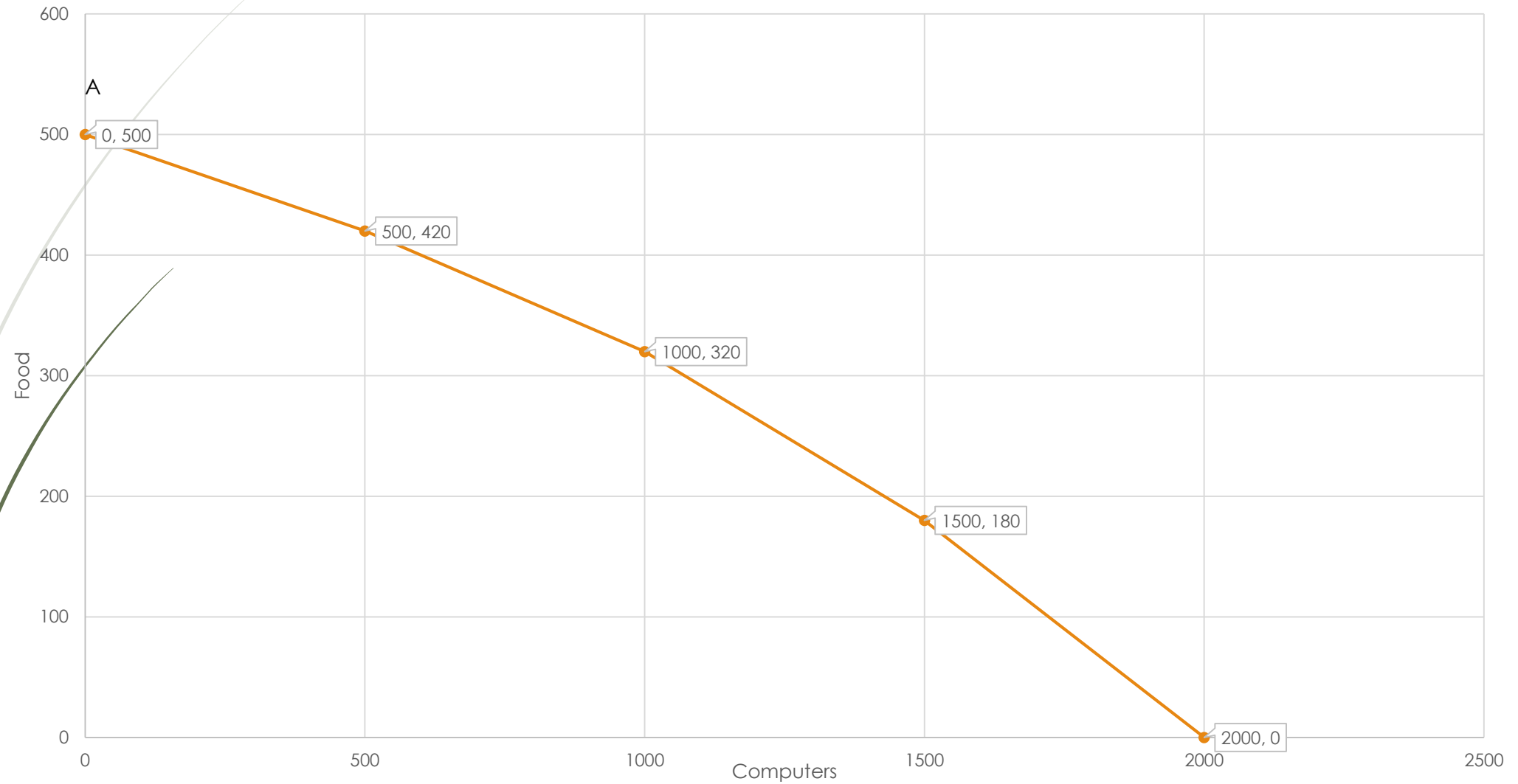
The Production Possibilities Frontier or Curve (PPF/ PPC)

- Suppose a hypothetical economy produces food and computer given its limited resources and available technology (table 1.1).

Table 1.1: Alternative production possibilities of a certain nation

Types of products	Unit	Production alternatives				
		A	B	C	D	E
Food	Metric ton	500	420	320	180	0
computers	Number	0	500	1000	1500	2000

We can also display the above information with a graph



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.
- iii) **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.

The Concept of Opportunity cost

- The reason why opportunity cost increases when we produce more of one good is that economic resources are not completely adaptable to alternative uses (specialization effect)

- *Opportunity cost of a good = $\frac{\text{the amount of the next best alternative sacrificed}}{\text{the amount of the good gained}}$*

Example: Referring to table 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:

- $OC = \frac{320 - 420}{1000 - 500} = \left| \frac{-100}{500} \right| = 0.2$ (The economy gives up 0.2 metric tons of food per computer)

Economic Growth and the PPF

- Economic growth or an increase in the total output level occurs when one or both of the following conditions occur.

1. Increase in the quantity or/and quality of economic resources.
2. Advancement in technology.

Economic growth is represented by outward shift of the PPF.

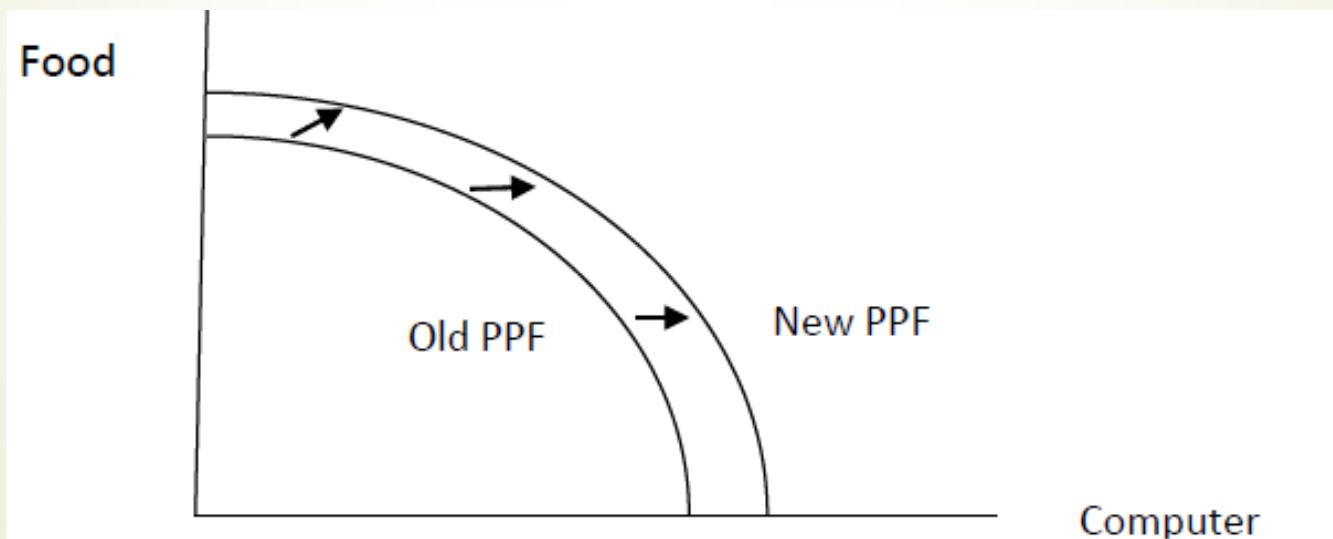


Figure 1.2: Economic growths with a new PPC

Economic Growth and the PPF (Cont..)

- 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. This is called *asymmetric growth* (figure 1.3).

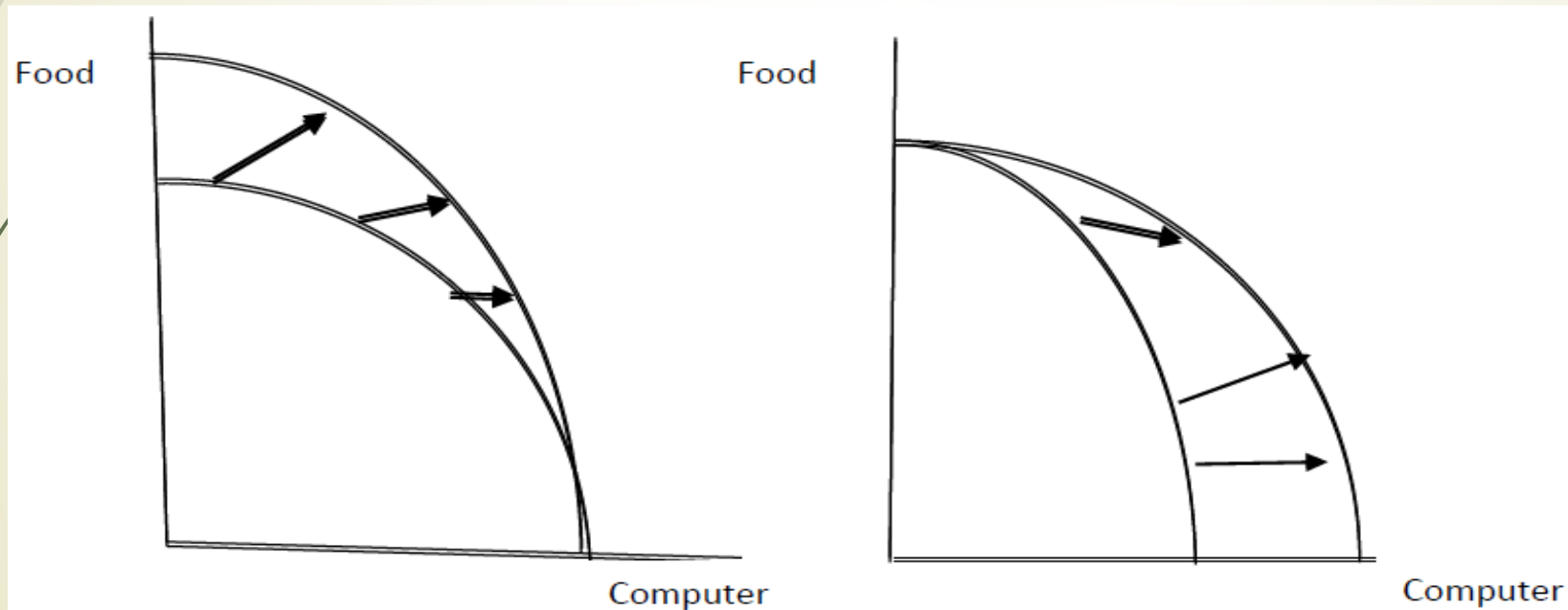


Figure 1.3: improvements in technology and quantity and/or quality of resources on national output

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?

- 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.

How to Produce?

- This problem is also known as the *problem of choice of technique*.
- Once an economy has reached a decision regarding the types of goods to be produced, and has determined their respective quantities, the economy must decide how to produce them - choosing between alternative methods or techniques of production.
- Broadly speaking, the various techniques of production can be classified into two groups: **labour-intensive techniques** and **capital-intensive techniques**.

A labour-intensive technique involves the use of more labour relative to capital, per unit of output.

A capital-intensive technique involves the use of more capital relative to labour, per unit of output.

- The choice between different techniques depends on the available supplies of different factors of production and their relative prices.
- Making good choices is essential for making the best possible use of limited resources to produce maximum amounts of goods and services.

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.

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 means by which societies or governments organize, regulate and distribute available resources, services, and goods across a geographic region or country.
- ▶ Therefore, we can also say that it is a set of organizational and institutional arrangements established to answer the basic economic questions.

Types of Economic Systems

- ▶ There are many economies around the world. Each has its own distinguishing characteristics, although they all share some basic features.
- ▶ Each economy functions based on a unique set of conditions and assumptions.
- ▶ Customarily, we can identify four types of economic system.
- ▶ These are traditional, capitalism, command and mixed economy.

Traditional Economic System

- ▶ The traditional economic system is based on goods, services, and work, all of which follow certain established trends.
- ▶ It relies a lot on people, and there is very little division of labor or specialization.
- ▶ Some parts of the world still function with a traditional economic system. It is commonly found in rural settings in second- and third-world nations, where economic activities are predominantly farming or other traditional income-generating activities.
- ▶ There are usually very few resources to share in communities b/c either few resources occur naturally in the region or access to them is restricted in some way.
- ▶ The traditional system, unlike the other three, lacks the potential to generate a surplus.
- ▶ Nevertheless, precisely because of its primitive nature, the traditional economic system is highly sustainable.
- ▶ In addition, due to its small output, there is very little wastage compared to the other three systems.

Capitalist Economy (*free market economy* or *market system* or *laissez faire*.)

- Capitalism is the oldest formal economic system in the world. It became widespread in the middle of the 19th century.
- In this economic system, all means of production are privately owned, and production takes place at the initiative of individual private entrepreneurs who work mainly for private profit.
- Government intervention in the economy is minimal. The government exercises little control over resources, and it does not interfere with important segments of the economy. Instead, regulation comes from the people and the relationship between supply and demand.
- The market economic system is mostly theoretical. Because, a pure market system doesn't really exist.
 - Well, all economic systems are subject to some kind of interference from a central authority. For instance, most governments enact laws that regulate fair trade and monopolies.
- From a theoretical point of view, a market economy facilitates substantial growth. Arguably, growth is highest under a market economic system.

Features of Capitalistic Economy

- **The right to private property:** is a fundamental feature of a capitalist economy. Economic or productive factors such as land, factories, machinery, mines etc. are privately owned.
- **Freedom of choice by consumers:** Consumers can buy the goods and services that suit their tastes and preferences. Producers produce goods in accordance with the wishes of the consumers. This is known as **the principle of consumer sovereignty**.
- **Profit motive:** Entrepreneurs, are guided by the motive of profit-making.
- **Competition:** In a capitalist economy, competition exists among sellers or producers of similar goods to attract customers. Among buyers, there is competition to obtain goods. Among workers, the competition is to get jobs. Among employers, it is to get workers and investment funds.
- **Price mechanism:** All basic economic problems are solved through the price mechanism.
- **Minor role of government:** The government does not interfere in day-to-day economic activities and confines itself to defense and maintenance of law and order.
- **Self-interest:** Each individual is guided by self-interest and motivated by the desire for economic gain.
- **Inequalities of income:** There is a wide economic gap between the rich and the poor. A market economy's greatest downside is that it allows private entities to amass a lot of economic power, particularly those who own resources of great value. The distribution of resources is not equitable because those who succeed economically control most of them.
- **Existence of negative externalities:** A negative externality is the harm, cost, or inconvenience suffered by a third party because of actions by others. In capitalistic economy, decision of firms may result in negative externalities against another firm or society in general.

Advantages of Capitalistic Economy

- **Flexibility or adaptability:** It successfully adapts itself to changing environments.
- **Decentralization of economic power:** Market mechanisms work as a decentralizing force against the concentration of economic power.
- **Increase in per-capita income and standard of living:** Rapid growth in levels of production and income leads to higher per-capita income and standards of living.
- **New types of consumer goods (eg,..invention of new goods):** Varieties of new consumer goods are developed and produced at large scale.
- **Growth of entrepreneurship:** Profit motive creates and supports new entrepreneurial skills and approaches.
- **Optimum utilization of productive resources:** Full utilization of productive resources is possible due to innovations and technological progress.
- **High rate of capital formation:** The right to private property helps in capital formation.

Disadvantages of Capitalistic Economy

- **Inequality of income:** Capitalism promotes economic inequalities and creates social imbalance.
- **Unbalanced economic activity:** As there is no check on the economic system, the economy can develop in an unbalanced way in terms of different geographic regions and different sections of society.
- **Exploitation of labour:** In a capitalistic economy, exploitation of labour (for example by paying low wages) is common.
- **Negative externalities:** are problems in capitalistic economy where profit maximization is the main objective of firms. If economic makes sense for a firm to force others to pay the impacts of negative externalities such as pollution.

Command Economy (planned system)

- ▶ Command economy is also known as **socialistic economy**.
- ▶ In a command system, there is a dominant, centralized authority – usually the government – that controls a significant portion of the economic structure.
- ▶ The command economic system is **common in communist societies** since production and distribution decisions are the preserve of the government.
- ▶ In the recent past, socialism has lost its popularity and most of the socialist countries are trying free market economies.
- ▶ In theory, the command system works very well as long as the central authority exercises control with the general population's best interests in mind.

Main Features of Command Economy

- **Collective ownership:** All means of production are owned by the society as a whole, and there is no right to private property.
- **Central economic planning:** Planning for resource allocation is performed by the controlling authority according to given socio-economic goals.
- **Strong government role:** Government has complete control over all economic activities.
- **Maximum social welfare:** Command economy aims at maximizing social welfare and does not allow the exploitation of labour.
- **Relative equality of incomes:** Private property does not exist in a command economy, the profit motive is absent, and there are no opportunities for accumulation of wealth.

All these factors lead to greater equality in income distribution, in comparison with capitalism.

Advantages of Command Economy

- **Absence of wasteful competition:** There is no place for wasteful use of productive resources through unhealthy competition.
- **Balanced economic growth:** Allocation of resources through centralized planning leads to balanced economic development. Different regions and different sectors of the economy can develop equally.
- **Elimination of private monopolies and inequalities:** Command economies avoid the major evils of capitalism such as inequality of income and wealth, private monopolies, and concentration of economic, political and social power.

Disadvantages of Command Economy

- **Absence of automatic price determination:** Since all economic activities are controlled by the government, there is no automatic price mechanism.
- **Absence of incentives for hard work and efficiency:** The entire system depends on bureaucrats who are considered inefficient in running businesses.

There is no financial incentive for hard work and efficiency. The economy grows at a relatively slow rate.

- **Lack of economic freedom:** Economic freedom for consumers, producers, investors, and employers is totally absent, and all economic powers are concentrated in the hands of the government.
- **Red-tapism:** it is widely prevalent in a command economy because all decisions are made by government officials.

Mixed Economy

- It combines the characteristics and advantages of the market and command economies and allows private and public sectors to co-exist.

Main Features of Mixed Economy

- Co-existence of public and private sectors:** Their respective roles and aims are well-defined. Industries of national and strategic importance, such as heavy and basic industry, defense production, power generation, etc. are set up in the public sector, whereas consumer-goods industry and small-scale industry are developed through the private sector.
- Economic welfare:** Economic welfare is the most important criterion of the success of a mixed economy.
 - The public sector tries to remove regional imbalances, provides large employment opportunities and seeks economic welfare through its price policy. Government control over the private sector leads to economic welfare of society at large.
- Economic planning:** The government uses instruments of economic planning to achieve co-ordinated rapid economic development, making use of both the private and the public sector.
- Price mechanism:** The price mechanism operates for goods produced in the private sector, but not for essential commodities and goods produced in the public sector. Those prices are defined and regulated by the government.
- Economic equality:** Private property is allowed, but rules exist to prevent concentration of wealth. Limits are fixed for owning land and property. Progressive taxation, concessions and subsidies are implemented to achieve economic equality.

Advantages of Mixed Economy

- **Private property, profit motive and price mechanism:** All the advantages of a capitalistic economy, such as the right to private property, motivation of profit, and control of economic activity through the price mechanism, are available in a mixed economy. At the same time, government control ensures that they do not lead to exploitation.
- **Adequate freedom:** Mixed economies allow adequate freedom to different economic units such as consumers, employees, producers, and investors.
- **Rapid and planned economic development:** Planned economic growth takes place, resources are properly and efficiently utilized, and fast economic development takes place because the private and public sector complement each other.
- **Social welfare and fewer economic inequalities:** The government's restricted control over economic activities helps in achieving social welfare and economic equality.

Disadvantages of Mixed Economy

- **Ineffectiveness and inefficiency:** A mixed economy might not actually have the usual advantages of either the public sector or the private sector. The public sector might be inefficient due to lack of incentive and responsibility, and the private sector might be made ineffective by government regulation and control.
- **Economic fluctuations:** If the private sector is not properly controlled by the government, economic fluctuations and unemployment can occur.
- **Corruption and black markets:** if government policies, rules and directives are not effectively implemented, the economy can be vulnerable to increased corruption and black market activities.

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.

Government also provides some types of goods and services known as **public goods and services** for the society. (public goods: in economics is a good that is both non-excludable and non-rivalrous, in that individuals cannot be excluded from use or could benefit from without paying for it, and where use by one individual does not reduce availability to others or the good can be used simultaneously by more than one person.)

The three economic agents interact in two markets:

- **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.

- **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.

A Two sector model

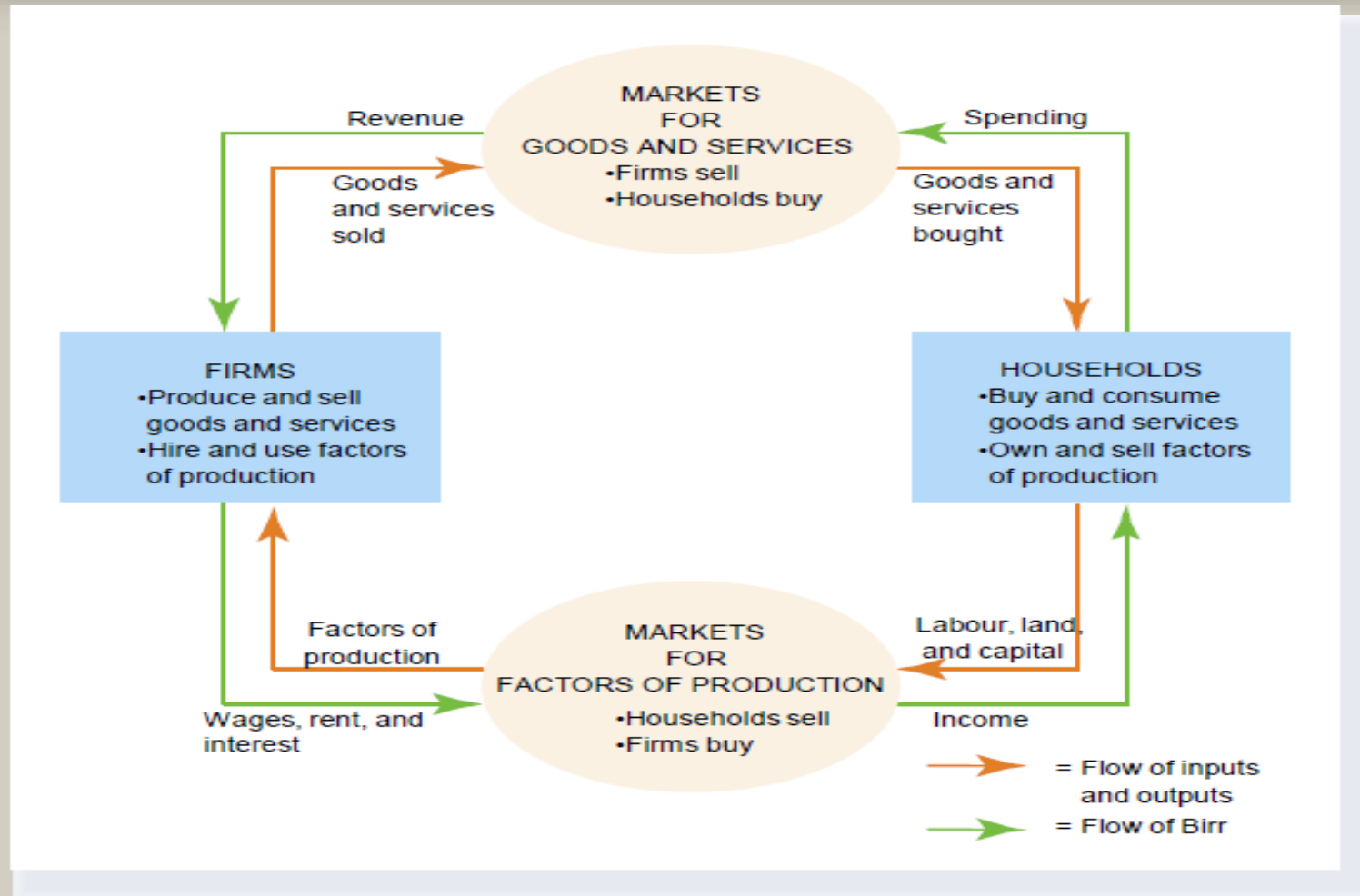


Figure 1.4: Circular flow of income with two sector model

A Three sector model

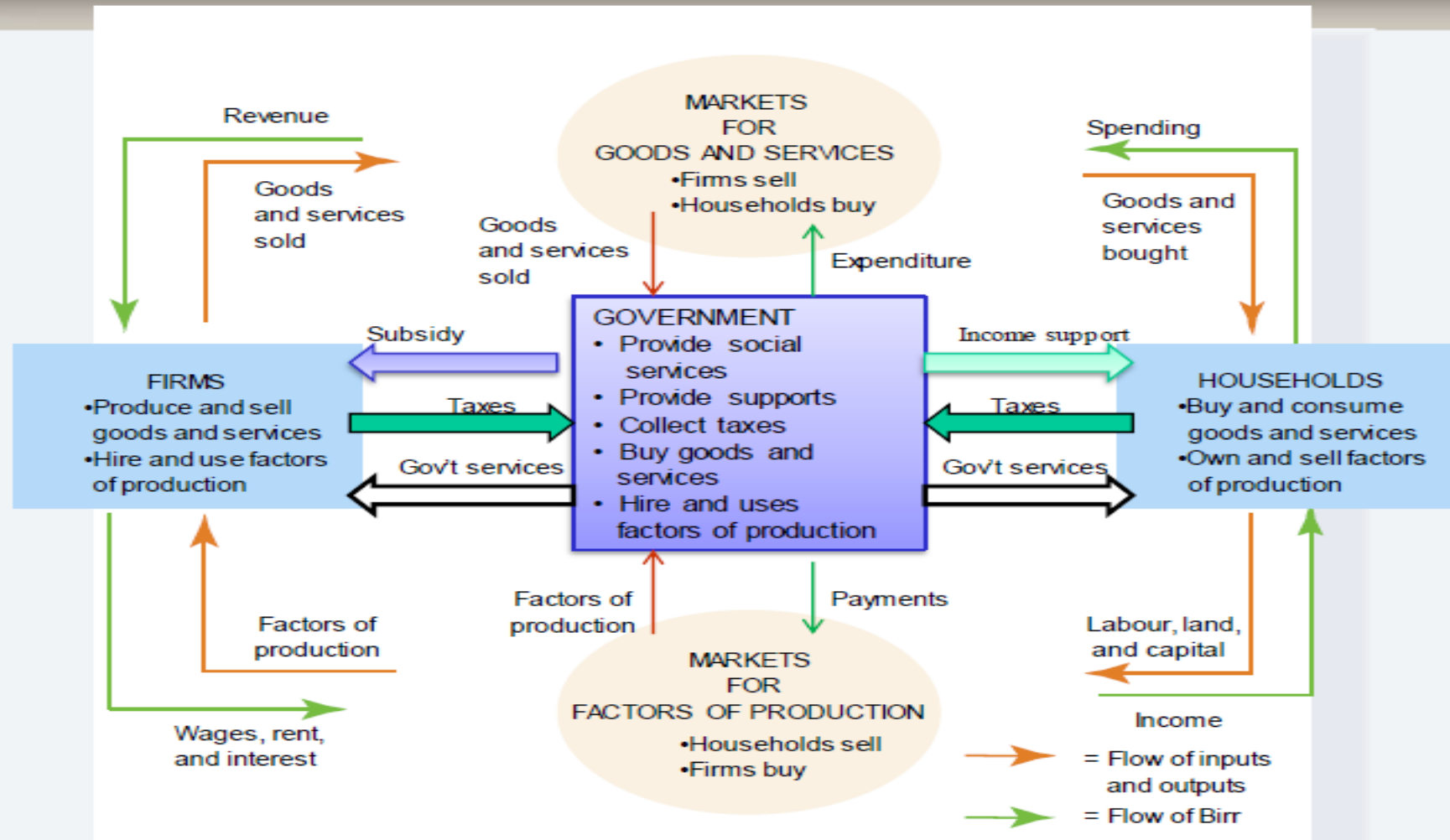


Figure 1.5: Three sector circular flow of resources

Introduction to Economics

Chapter 2: Theory of Demand and Supply

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2. The Price Mechanism

- ▶ When the problem of what, how and for whom are determined by market forces it is said the “price mechanism” is operating.

2.1. Theory of Demand

Questions

1. *Are demand and want similar? Why?*
2. *Why can't we purchase all that we need or we desire to have?*
3. *Can we say that, with a decrease in the price of a commodity, a consumer normally buys more of it? Why?*
4. *Explain why demand curves always slope downwards from left to right. Are there any exceptions to this?*

2.1 Theory of Demand (Cont....)

- Demand:
 - Describes the behavior of consumers
 - But in economics it has a specific meaning, which is different from what we use it in our day to day activities.
 - States that the consumer must be willing and able to purchase the commodity, which he/she desires.
 - His/her desire should be backed by his/her purchasing power.
 - More specifically, **demand** refers to various quantities of a commodity or service that a consumer would purchase at a given time in a market at various prices, given other things unchanged (*ceteris paribus*).

2.1 Theory of Demand (Cont....)

- ▶ The **quantity demanded** of a particular commodity depends on the price of that commodity.
- ▶ **Law of demand:** 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

- The relationship that exists between price and the amount of a commodity purchased can be represented by a **table (schedule) or a curve or an equation**.
- **Demand schedule** can be constructed for any commodity if the list of prices and quantities purchased at those prices are known.
- An individual demand schedule is a list of the various quantities of a commodity, which an individual consumer purchases at various levels of prices in the market.
- A **demand schedule** states the relationship between price and quantity demanded in a table form.

Demand

Table 2.1 Individual household demand for orange per week

Combinations	A	B	C	D	E
Price per kg	5	4	3	2	1
Quantity demand/week	5	7	9	11	13

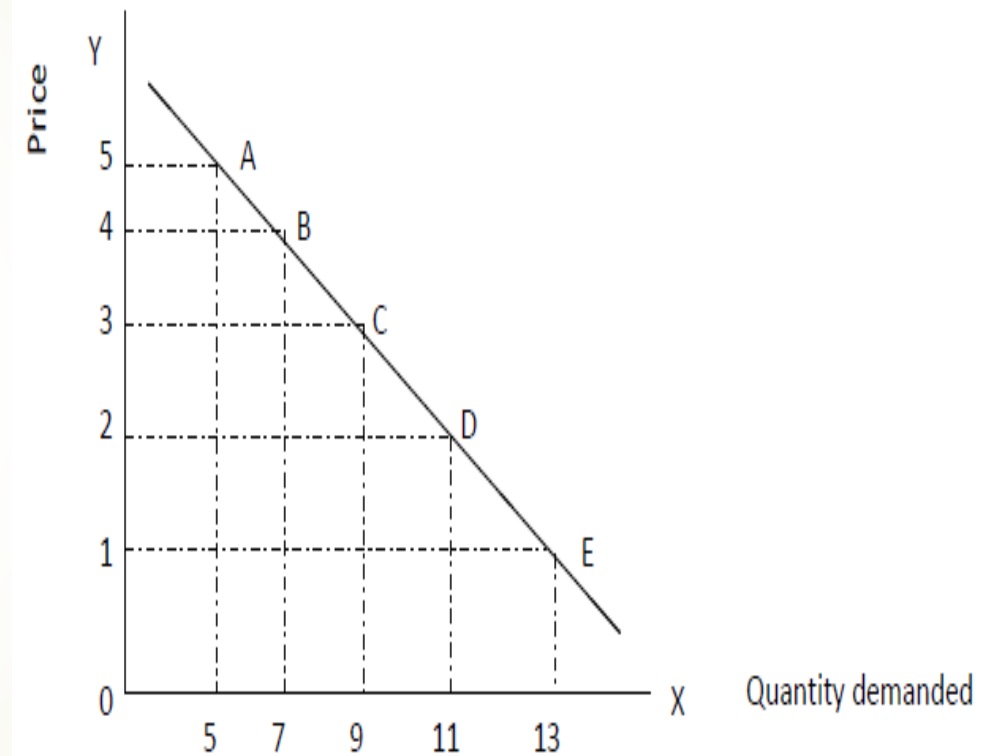


Figure 2.1: Individual demand curve

Demand function

- Is a mathematical relationship between price and quantity demanded, all other things remaining the same. A typical demand function is given by:

$$Q_d = f(P)$$

- where Q_d is quantity demanded and P is price of the commodity, in our case price of orange.

Example: Let the demand function be $Q = a + bP$

$$b = \frac{\Delta Q}{\Delta P} \quad (\text{e.g. moving from point A to B on figure 2.1 above})$$

$$b = \frac{7-5}{4-5} = -2, \text{ where } b \text{ is the slope of the demand curve}$$

$Q = a - 2P$, to find a , substitute price either at point A or B.

$7 = a - 2(4)$, $a = 15$ (Therefore, $Q = 15 - 2P$ is the demand function for orange in the above numerical example)

Market Demand

- **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.

Table 2.2: Individual and market demand for a commodity

Price	Individual demand			Market demand
	Consumer-1	Consumer-2	Consumer-3	
8	0	0	0	0
5	3	5	1	9
3	5	7	2	14
0	7	9	4	20

Market Demand (Cont..)

The following graph depicts market demand curve at price equal to 3

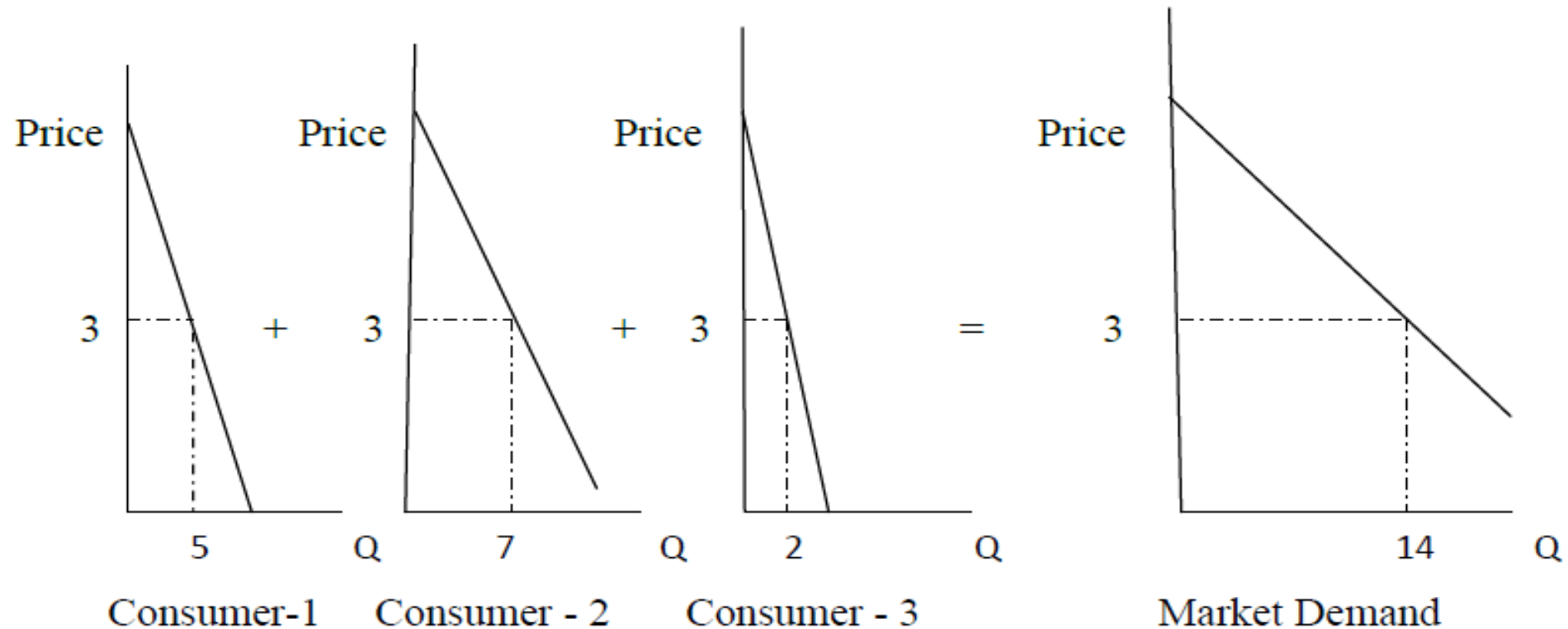


Figure 2.2: Individual and Market demand curve

Numerical 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:

$$P= 10 - Q /2 \Leftrightarrow$$

$$Q /2 =10-P \Leftrightarrow$$

$$Q= 20 - 2P \text{ and}$$

$$Q_m = (20 - 2P) 100 = 2000-200P$$

2.1.2 Determinants of Demand

➤ The demand for a product is influenced by many factors.

Some of these factors are:

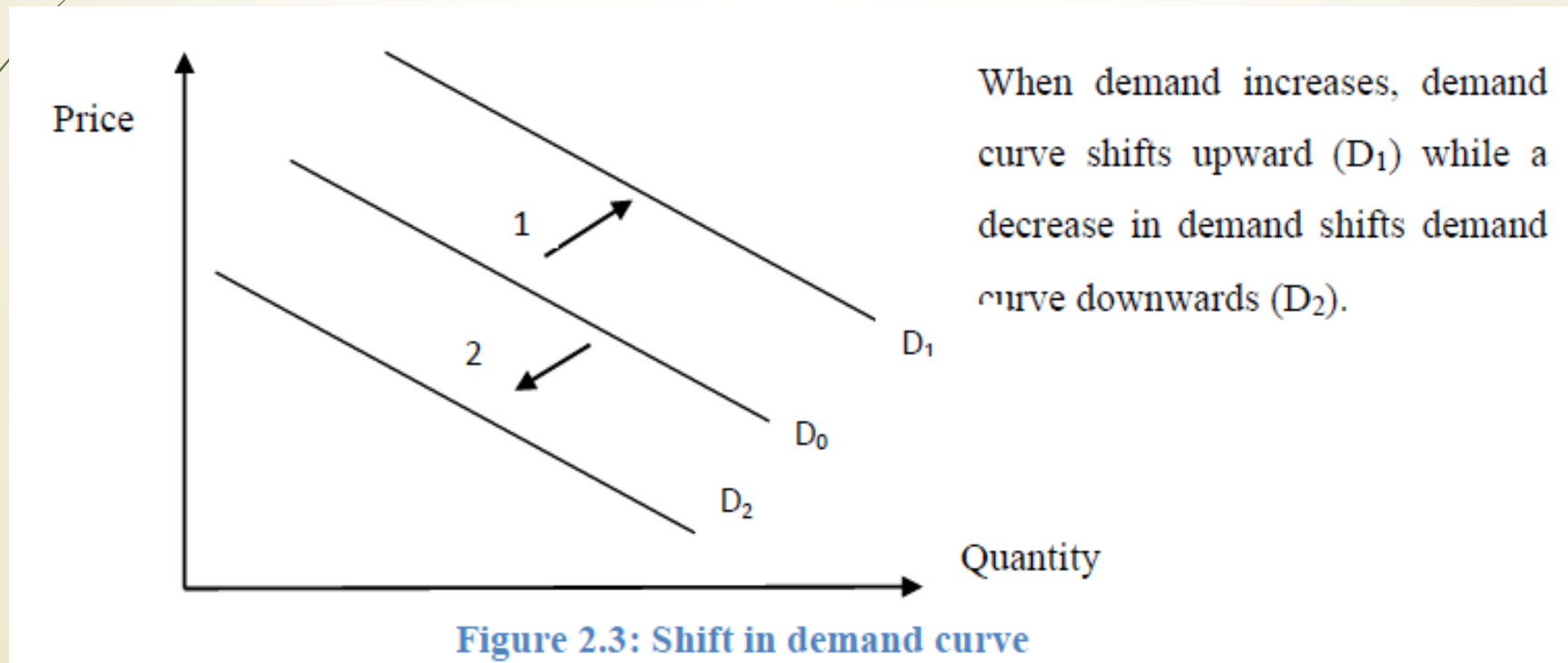
- I. Price of the product
- II. Taste or preference of consumers
- III. Income of the consumers
- IV. Price of related goods
- V. Consumers expectation of income and price
- VI. Number of buyers in the market

2.1.2 Determinants of Demand (cont..)

- ▶ When we state the law of demand, we kept all the factors to remain constant except the price of the good.
- ▶ 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.

Changes in Demand

- If buyers choose to purchase **more at any price**, the demand curve **shifts rightward—an increase in demand**.
- If buyers choose to purchase **less at any price**, the demand curve **shifts leftward—a decrease in demand**.



How does each factor affect demand

I. Taste or preference

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

II. Income of the consumer

- Goods are classified into two categories depending on how a change in income affects their demand.
- These are **normal goods** and **inferior goods**.
 - Normal Goods are goods whose demand increases as income increase,
 - Inferior goods are those whose demand is inversely related with income.

How does each factor affect demand(Cont..)

III. Price of related goods

- ▶ Two goods are said to be related if a change in the price of one good affects the demand for another good.
- ▶ There are two types of related goods.
 - ▶ These are **substitute** and **complimentary goods**.
 - ▶ Substitute goods are goods which satisfy the **same desire of the consumer**.
 - ▶ For example, tea and coffee or Pepsi and Coca-Cola are substitute goods.
 - ▶ If two goods are substitutes, then price of one and the demand for the other are directly related.

How does each factor affect demand(Cont..)

- ▶ Complimentary goods, on the other hand, are those goods which are jointly consumed.

- ▶ For example, car and fuel or tea and sugar are considered as compliments.

- ▶ If two goods are complements, then price of one and the demand for the other are inversely related.

IV. 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.

V. Number of buyer in the market

- ▶ 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.

2.1.3 Elasticity of demand

- ▶ The **concept of elasticity** is very crucial and is used to analyze the quantitative relationship between price and quantity purchased or sold.
- ▶ In general, Elasticity is a measure of responsiveness of a dependent variable to changes in an independent variable.
- ▶ Accordingly, we have the concepts of **elasticity of demand and elasticity of supply**.
- ▶ **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: price elasticity, income elasticity, and cross elasticity.

I. Price Elasticity of Demand

- ▶ Price elasticity of demand means **degree of responsiveness of demand to 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.
- ▶ Price elasticity of demand 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.
 - ▶ 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.

I. Price Elasticity of Demand (Cont..)

- 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. The price elasticity of demand can be determined by the following formula.

$$E_d^P = \frac{\text{Percentage change in quantity demanded}}{\text{percentage change in price}} = \frac{\% \Delta Q_d}{\% \Delta P}$$

$$\text{where } \% \Delta Q_d = \frac{Q_1 - Q_0}{Q_0} \times 100 \text{ and}$$

$$\% \Delta P = \frac{P_1 - P_0}{P_0} \times 100$$

$$\text{Thus, } E_d^P = \frac{\frac{Q_1 - Q_0}{Q_0} \times 100}{\frac{P_1 - P_0}{P_0} \times 100} = \frac{Q_1 - Q_0}{P_1 - P_0} \cdot \frac{P_0}{Q_0} = \frac{\Delta Q}{\Delta P} \cdot \frac{P_0}{Q_0}$$

A. Point price elasticity of demand (Cont...)

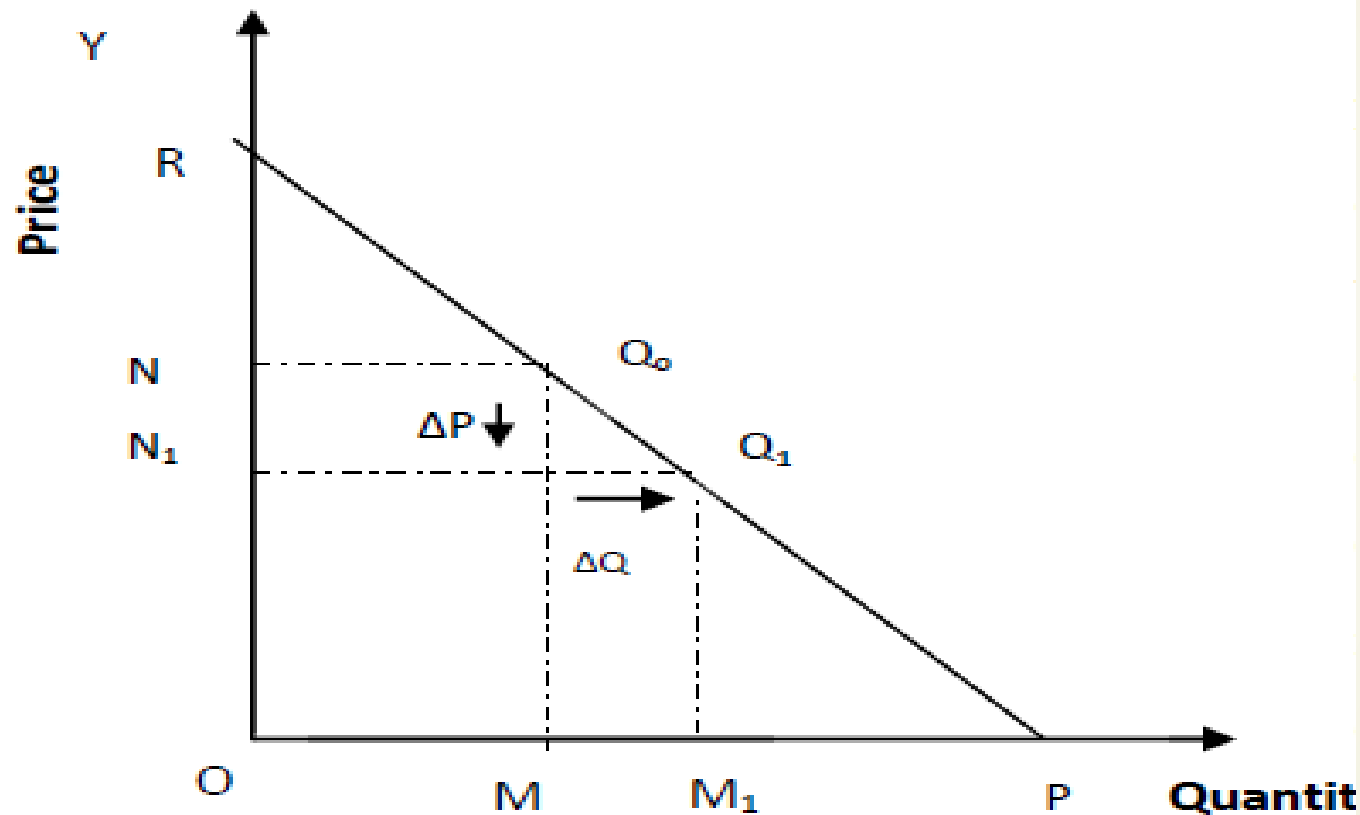


Figure 2.4: Point elasticity of demand

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.

B. Arc price elasticity of demand (Cont..)

- 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.
- An arc is a portion of a curve line, hence, a portion or segment of a demand curve.
- Here, Q_0 = Original quantity demanded
- Q_1 = New quantity demanded
- P_0 = Original price
- P_1 = New price

$$E_d = \frac{\text{Change in quantity demanded}}{\text{Original quantity plus new quantity demanded}} \div \frac{\text{Change in price}}{\text{Original price plus new price}}$$

Symbolically, the formula may be expressed thus:

$$E_d = \frac{Q_1 - Q_0}{Q_0 + Q_1} \div \frac{P_1 - P_0}{P_0 + P_1}$$

B. Arc price elasticity of demand (Cont...)

- ▶ We can take a numerical example to illustrate arc elasticity. Suppose that the price of a commodity is Br. 5 and the quantity demanded at that price is 100 units of a commodity. Now assume that the price of the commodity falls to Br. 4 and the quantity demanded rises to 110 units. In terms of the above formula, the value of the arc elasticity will be

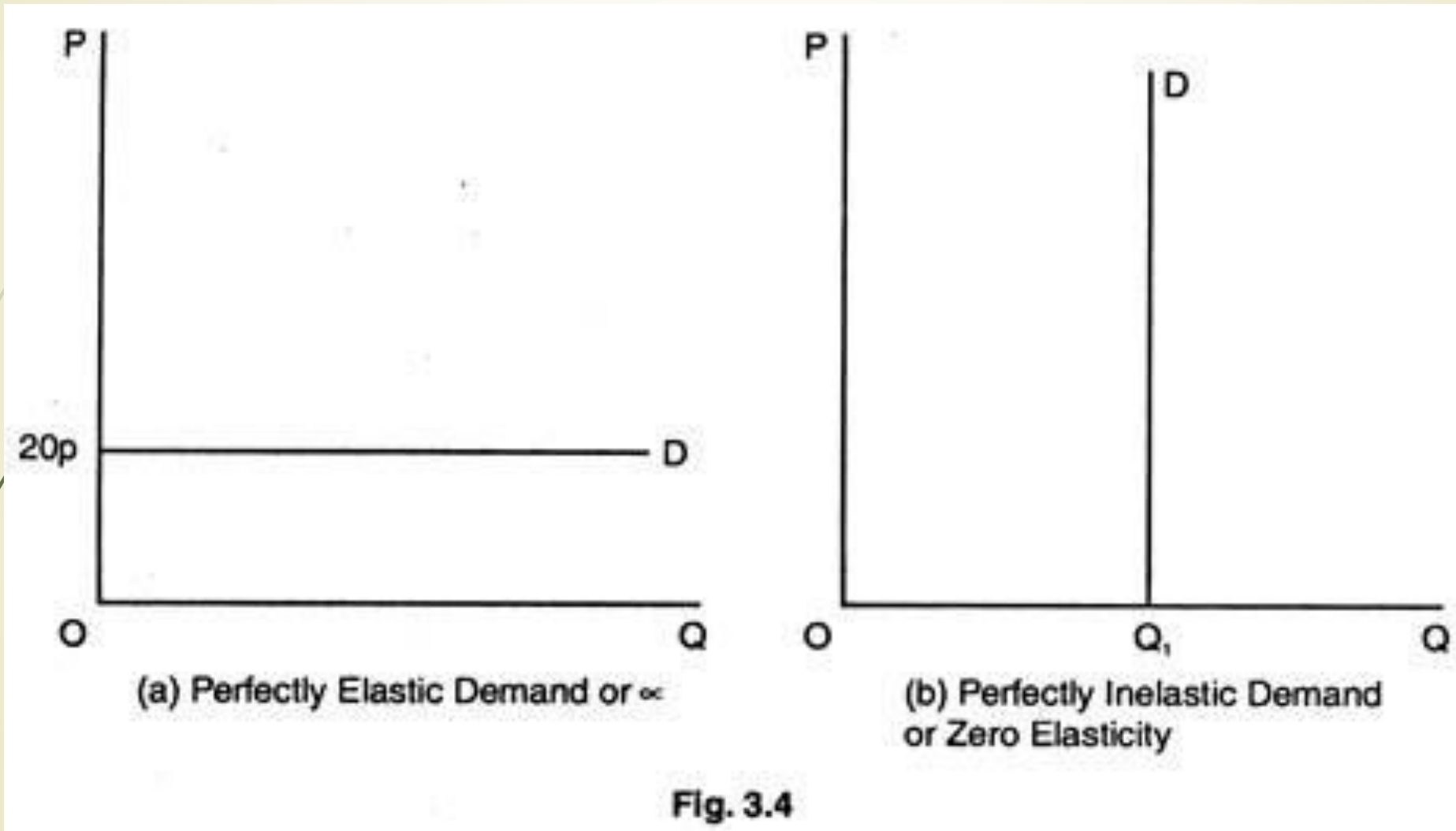
$$Ed = \frac{110-100}{110+100} \div \frac{4-5}{4+5} = \frac{10}{210} \div \frac{-1}{9} = \frac{-9}{21} = \frac{-3}{7}$$

B. Arc price elasticity of demand (Cont...)

Note that:

- 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.
 - i) If $\varepsilon > 1$, demand is said to be elastic and the product is luxury product
 - ii) If $0 \leq \varepsilon < 1$, demand is inelastic and the product is necessity
 - iii) If $\varepsilon = 1$, demand is unitary elastic.
 - iv) If $\varepsilon = 0$, demand is said to be perfectly inelastic.
 - v) If $\varepsilon = \infty$, demand is said to be perfectly elastic.

B. Arc price elasticity of demand (Cont...)



Determinants of price Elasticity of Demand

- The following factors make price elasticity of demand elastic or inelastic other than changes in the price of the product.
 - 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.

Determinants of price Elasticity of Demand

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.

II. Income Elasticity of Demand

- It is a measure of responsiveness of demand to change in income.

$$\varepsilon_d^I = \frac{\% \Delta Q_d}{\% \Delta I} = \frac{\Delta Q}{\Delta I} \times \frac{I}{Q}$$

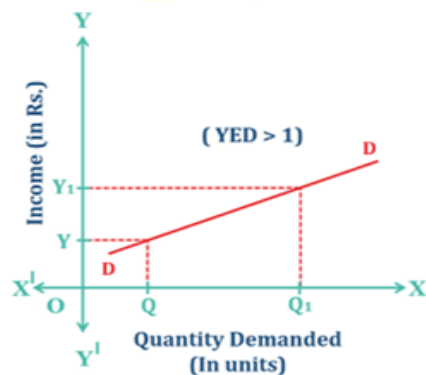
- Point income elasticity of demand:

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

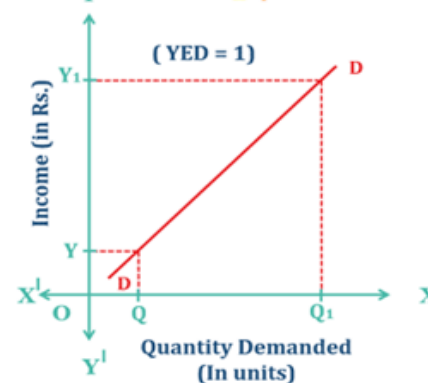
II. Income Elasticity of Demand

Income Elasticity of Demand

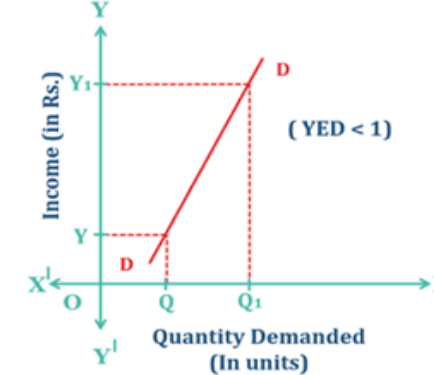
1. High elastic



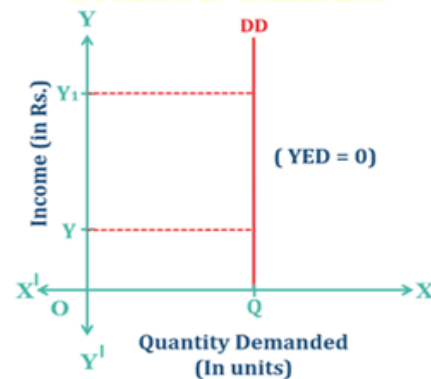
2. Unitary elastic



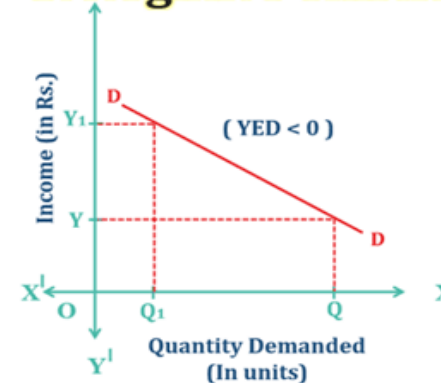
3. Low elastic



4. Zero elastic



5. Negative elastic



III. Cross-elasticity of demand

- Measures how much the demand for a product is affected by a change in price of another good.

$$\epsilon_{xy} = \frac{\% \Delta Q_x}{\% \Delta P_y} = \frac{Q_{x1} - Q_{x0}}{P_{y1} - P_{y0}} \times \frac{P_{y0}}{Q_{y0}}$$

- i) The cross – price elasticity of demand for substitute goods is **positive**.
- ii) The cross – price elasticity of demand for complementary goods is **negative**.
- iii) The cross – price elasticity of demand for unrelated goods is **zero**.

III. Cross-elasticity of demand (Cont..)

Example: Consider the following data which shows the changes in quantity demanded of good X in response to changes in the price of good Y.

Unit price of Y	Quantity demanded of X
10	1500
15	1000

Calculate the cross -price elasticity of demand between the two goods. What can you say about the two goods?

$$\varepsilon_{xy} = \frac{\Delta Q_x}{\Delta P_y} * \frac{P_y}{Q_x} = \left(\frac{1000 - 1500}{15 - 10} \right) * \frac{10}{1500} = \frac{-500}{5} * \frac{10}{1500} = -0.67$$

Therefore, the two goods are complements.

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.
 - It tells us there is a **positive relationship** between price and quantity supplied.

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
Quantity supplied 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.

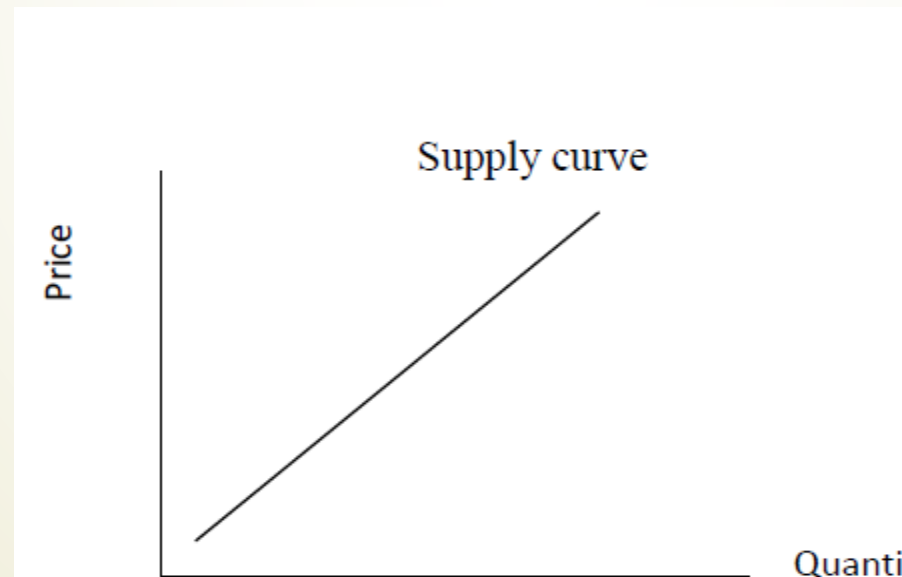


Figure 2.5 supply curve

Mathematical representation of the supply theory

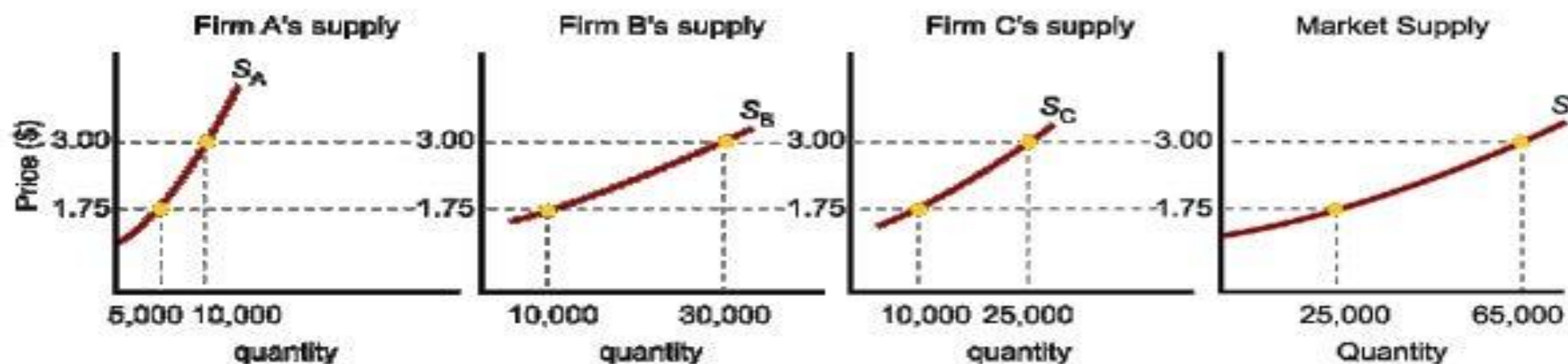
- The supply of a commodity can be briefly expressed in the following functional relationship:
- $S = f(P)$, where S is quantity supplied and P is price of the commodity.
- **Market supply:** It is derived by horizontally adding the quantity supplied of the product by all sellers at each price.

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

Market Supply

- As with market demand, **market supply** is the horizontal summation of individual firms' supply curves.



Determinates of Supply

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

- I. Price of inputs (cost of inputs)
 - II. Technology
 - III. Prices of related goods
 - IV. Sellers' expectation of price of the product
 - V. Taxes & subsidies
 - VI. Number of sellers in the market
 - VII. Weather, etc.
- ➡ They are called **supply shifters**

Determinates of Supply (Cont..)

- ▶ When **only the price of the good changes quantity supplied also changes**, and there will only be **movement along the same supply curve**. It is known as **change in quantity supplied**.
- ▶ If one of the supply determinants, except the price of the good, changes the supply curve shifts its position.
- ▶ If the **supply curve shifts to the right supply increases**, if it **shifts to the left supply decreases**.

I) Effect of change in input price on supply of a product

- ▶ 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.
- ▶ Likewise, a decrease in input price causes an increase in supply.

Determinates of Supply (Cont..)

II) Effect of change in Technology

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

III) Effect of change in weather condition

- A change in weather condition will have an impact on the supply of a number of products, especially agricultural products. For example, other things remain unchanged, good weather condition boosts the supply of agricultural products. This shifts the supply curve of a given agricultural product outward.
- Bad weather condition will have the opposite impact.

Determinates of Supply (Cont..)

IV. The price of substitute: An increase in the price of the substitute of good A causes supply of A to decrease, and a fall in the price of the substitute increases supply of A.

➤ **Price of complements:** a rise in the prices of the complements increases supply for A. A fall in the prices of complements reduces the supply of A.

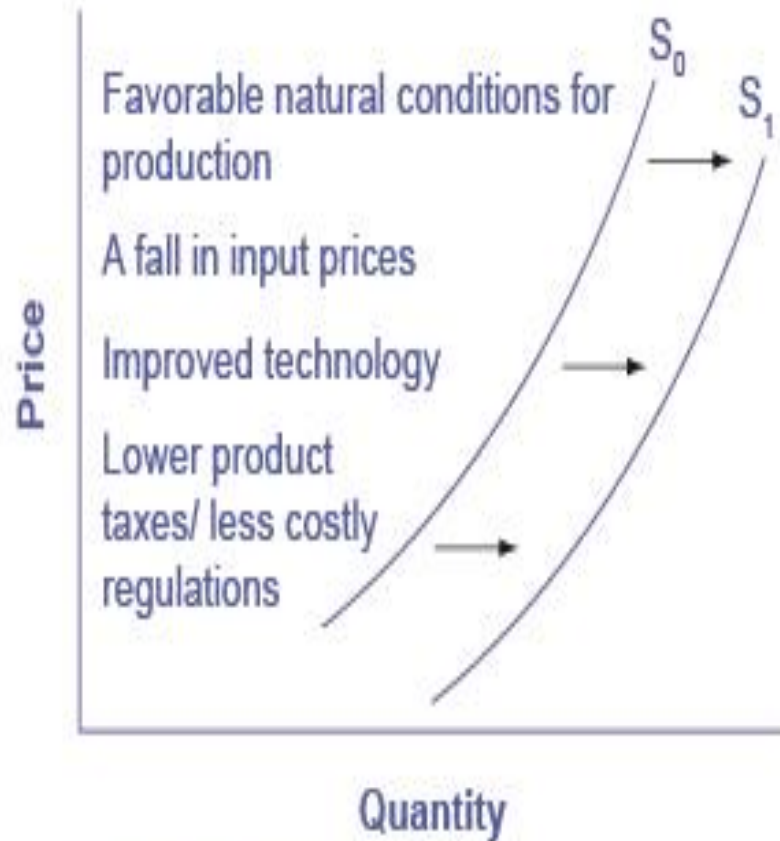
V. Expectation about future price changes: if business men expect price of good A to rise, its future supply will increase. But, if they expect price of the good to fall, its supply will decrease.

Determinates of Supply (Cont..)

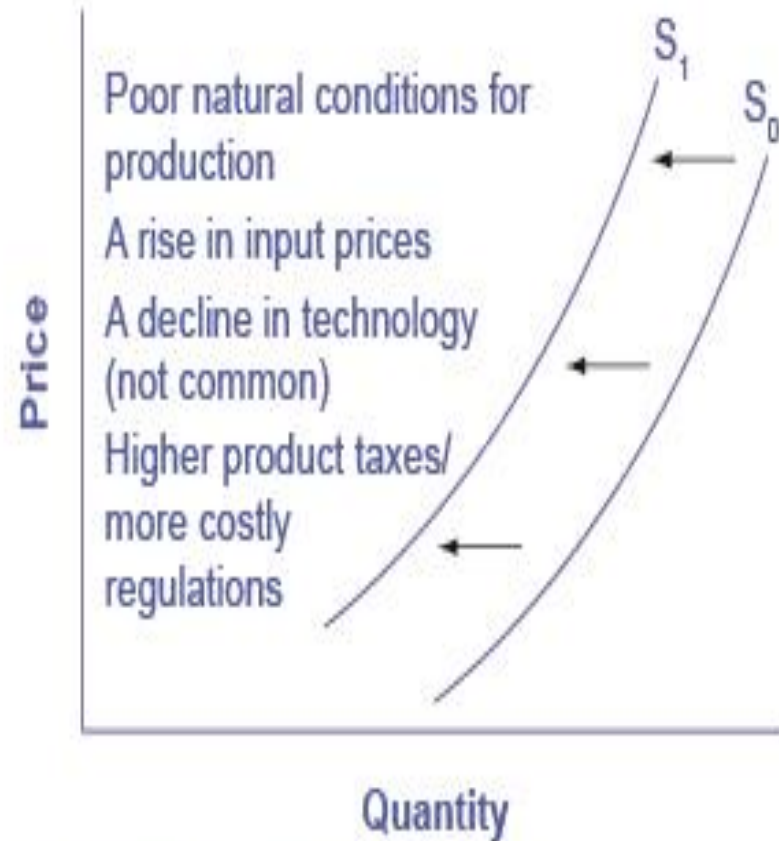
VI. Taxes and subsidies

- From the firm's perspective, **taxes or regulations are an additional cost of production** that shifts supply to the left, leading the firm to produce a lower quantity at every given price.
- Government subsidies, however, reduce the cost of production and increase supply at every given price, shifting supply to the right.

Supply Shifters



(a) Factors that increase supply



(b) Factors that decrease supply

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.
- The **point price elasticity of supply** can be calculated as the ratio of proportionate change in quantity supplied of a commodity to a given proportionate change in its price.

Elasticity of supply (Cont..)

- Thus, the formula for measuring price elasticity of supply is:

$$E_s = \frac{\% \text{ Change in Quantity Supplied}}{\% \text{ change in Price}} = \frac{\Delta Q}{Q} \div \frac{\Delta P}{P} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

- Like elasticity of demand, price elasticity of supply can be elastic, inelastic, unitary elastic, perfectly elastic or perfectly inelastic.
- The supply is **elastic when a small change on price leads to great change in supply**. It is inelastic or less elastic when a great change in price induces only a slight change in supply.

Elasticity of supply (Cont..)

- If the supply is ***perfectly inelastic***, it will be represented by a vertical line.
- If supply is ***perfectly elastic*** it will be represented by a horizontal straight line as in second diagram.

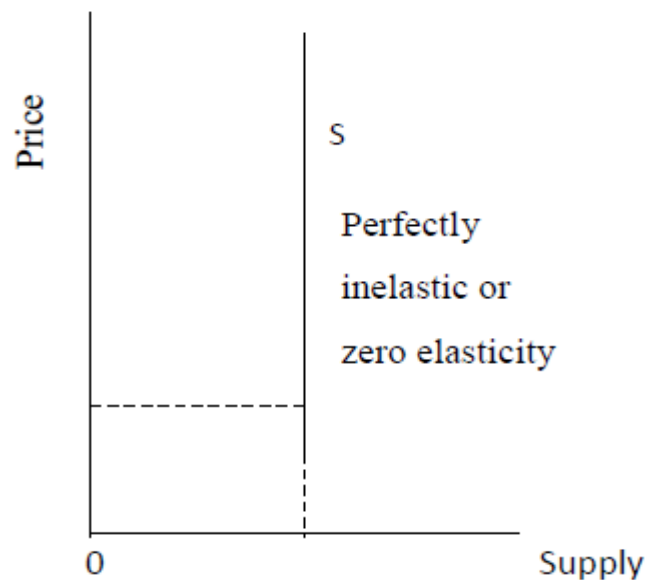
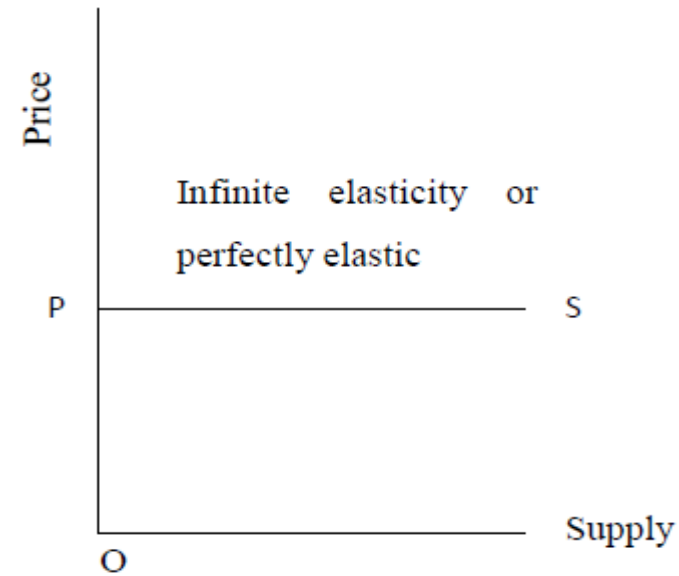
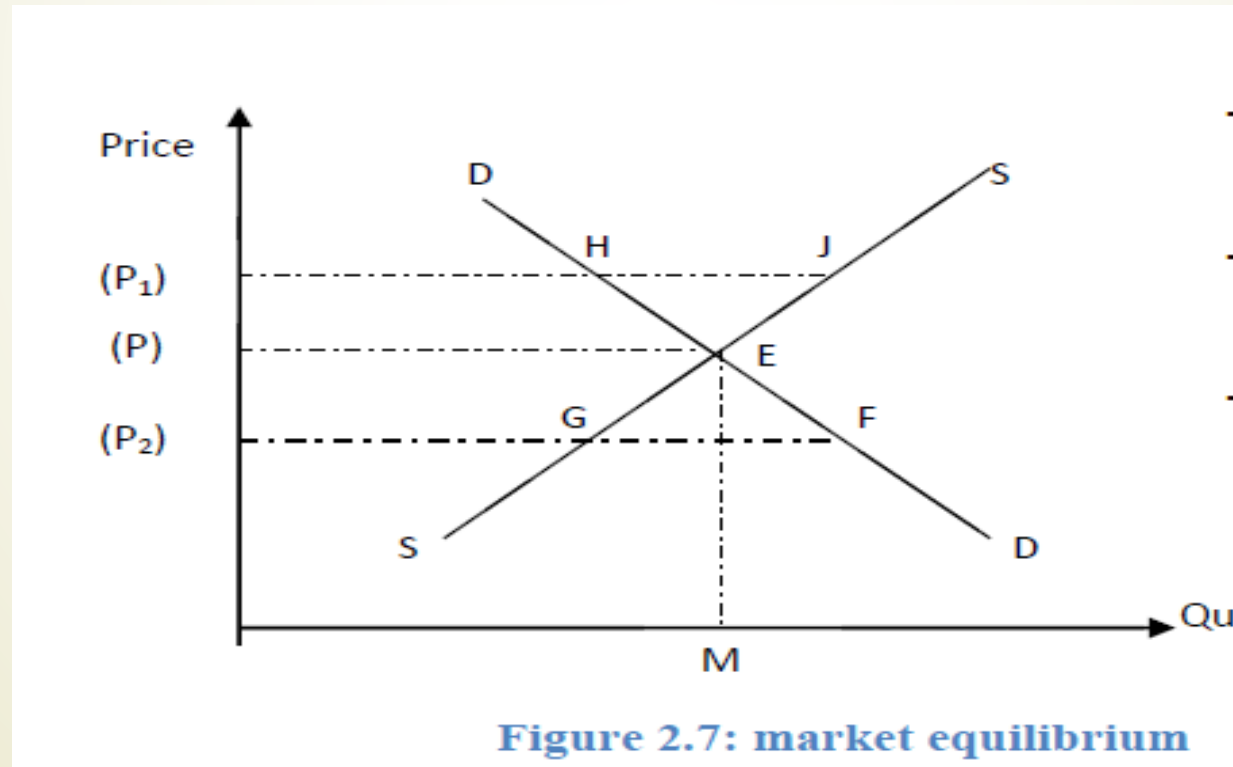


Figure 2.6: Perfectly inelastic and perfectly elastic supply curves

Market equilibrium

- Having seen the demand and supply side of the market, now let's bring demand and supply together so as to see **how the market price of a product is determined**. Market equilibrium occurs when market demand equals market supply.



Numerical example (Cont...)

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: $50 - 30 = \mathbf{20 \text{ units}}$

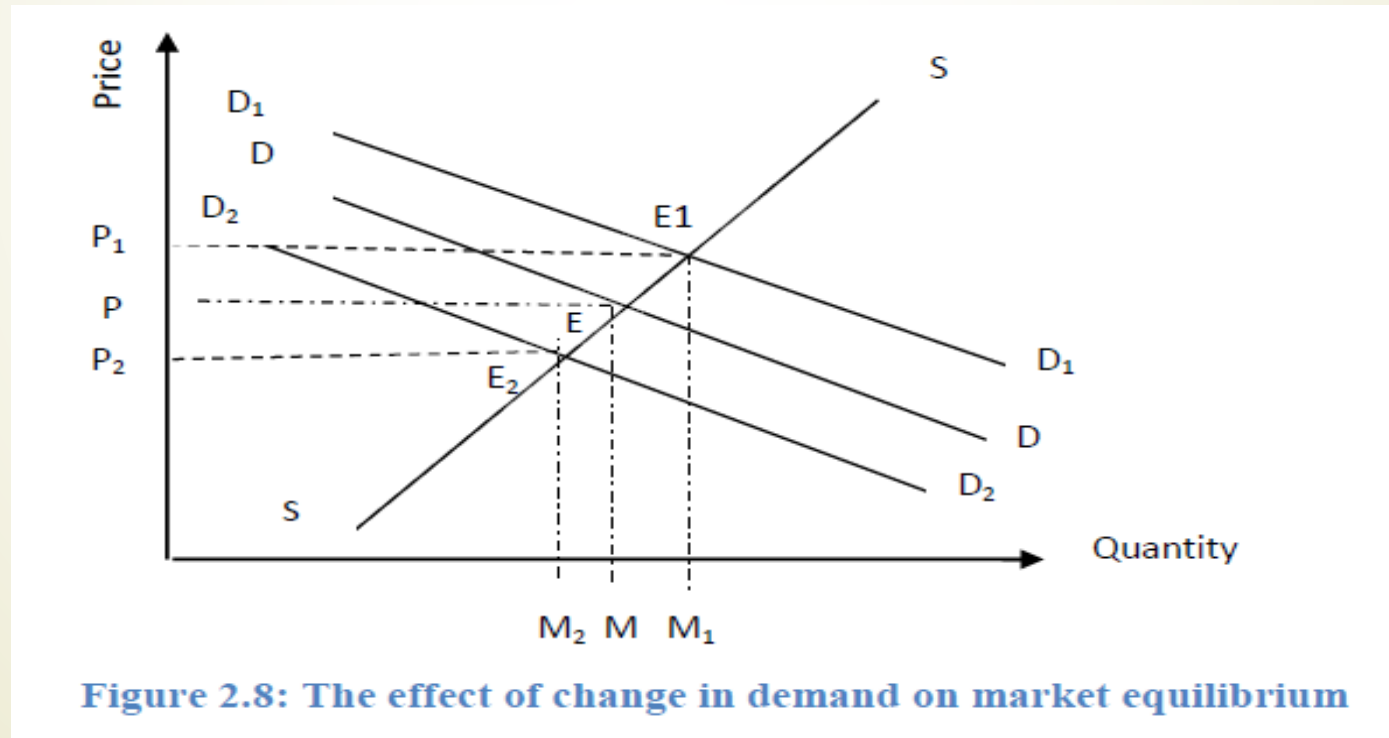
- $Q_d(\text{at } P = 35) = 100 - 2(35) = 30$ and $Q_s(\text{at } p = 35) = 2(35) - 20 = 50$,
therefore, a surplus of **20 units**

Effects of shift in demand and supply on equilibrium

- Given demand and supply the **equilibrium price and quantity are stable.**
- However, **what will happen to the equilibrium price and quantity when these market forces change ?**
 - Changes in demand and supply bring about changes in the equilibrium price level and the equilibrium quantity.

I) when demand changes and supply remains constant

- Factors such as changes in income, tastes, and prices of related goods will lead to a change in demand.
- The figure below shows the effects of a change in demand and the resultant equilibrium price and quantity. DD is the demand curve and SS is the supply curve.



II. When supply changes and demand remains constant

- Changes in supply are brought by changes in technical knowledge and factor prices.
- The following graph explains the effects of changes in supply.

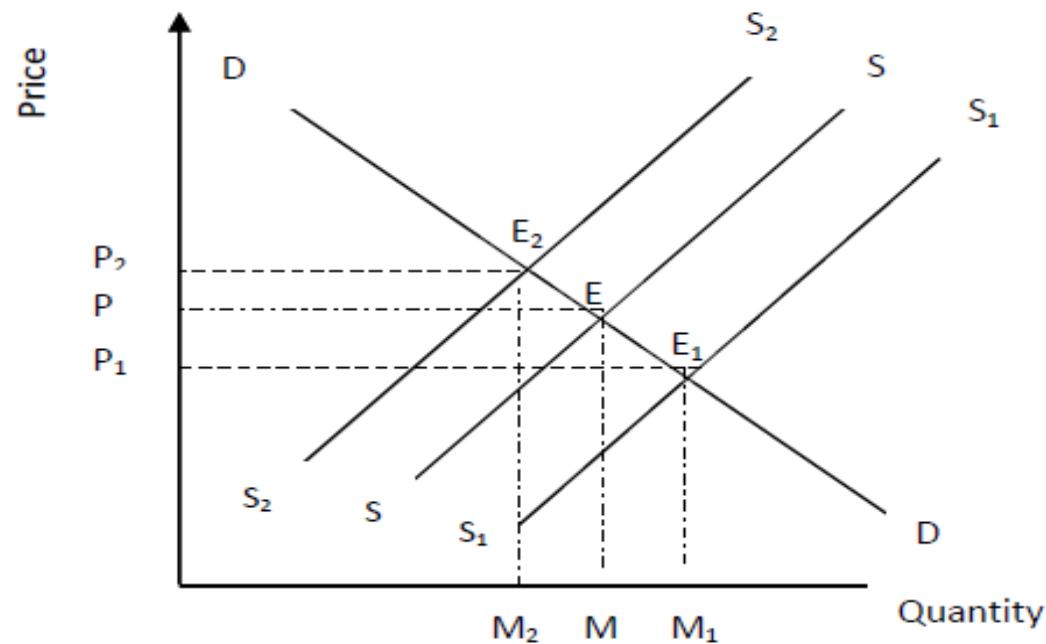


Figure 2.9: The effect of change in supply on market equilibrium

II. When supply changes and demand remains constant

- ▶ **When demand and supply decline, the quantity decreases.**
 - ▶ But the change in price will depend upon the relative fall in demand and supply.
- ▶ When the fall in demand is more than the fall in supply, the price will decrease.
- ▶ On the other hand, when the fall in supply is more than the fall in demand, the price will rise.
- ▶ If both demand and supply decline in the same ratio, there is no change in the equilibrium price, but the quantity decreases.

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.
 - ▶ If an increase in demand is more than an increase in supply, then the price goes up.
 - ▶ On the other hand, if an increase in supply is more than an increase in demand, the price falls but the quantity increases.
 - ▶ If the increase in demand and supply is same, then the price remains the same.

Introduction to Economics

Chapter 3: Theory of Consumer Behaviour

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Introduction

- In our day –to- day life, we buy different goods and services for consumption.
- As consumer, we act to derive satisfaction by using goods and services.
- But, have ever thought of how your mother or any other person whom you know decides to buy those consumption goods and services?
- 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.

Introduction (Cont..)

- ▶ Consumer behaviour can be best understood in three steps.
 - ▶ First, by **examining consumer's preference**, we need a practical way to describe how people prefer one good to another.
 - ▶ Second, we must **take into account the budget constraint consumers face** – they have limited incomes that restrict the quantities of goods they can buy.
 - ▶ Third, we **will put consumer preference and budget constraint together to determine consumer choice.**

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/he 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.

Consumer preferences (Cont..)

- ▶ 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 $X \succeq Y$.

Consumer preferences (Cont...)

- ▶ 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 .

The concept of utility

- ▶ Utility, in economics, refers to **the usefulness or enjoyment a consumer can get from a service or good.**
- ▶ Although the concept of utility is abstract, **it is a useful way to explain how and why consumers make their decisions.**
- ▶ 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.**

Questions

1. *Do you think that utility and usefulness are synonymous?*
2. *Do two individuals always derive equal satisfaction from consuming the same level of a product?*

The concept of utility (Cont..)

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

- ▶ ***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.***
 - ▶ **Utility** is more subjective than **usefulness**
- ▶ ***Utility is subjective.*** The utility of a product will 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.
- ▶ ***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.

Approaches of measuring utility

Question

1. *How do you measure or compare the level of satisfaction (utility) that you obtain from goods and services?*

- ▶ There are two major approaches to measure or compare consumer's 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.

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.
- The cardinal utility theory or approach was proposed by classical economists, Gossen (Germany), William Stanley Jevons (England), Leon Walras (France), and Karl Menger (Austria).
- Later on a neo-classical economist, Alfred Marshall brought about significant refinement in the cardinal utility theory. Therefore, **cardinal utility theory is also known as neo-classical utility theory.**
 - 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.

Assumptions of cardinal utility theory

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.** According to the cardinal approach, **the utility or satisfaction of each commodity is measurable.** Utility is measured in subjective units called utils.
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. A person at the start of the month where he has received monthly salary gives equal value to 1 birr with what he may give it after three weeks or so.

Assumptions of cardinal utility theory (Cont..)

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 $X_1, X_2, \dots, X_n$, the total utility is given by $TU = f(X_1, X_2, \dots, X_n)$.

Total and Marginal utility

- ▶ **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.**

Total and Marginal utility (Cont..)

- **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.

Total and Marginal utility (Cont..)

- To explain the relationship between TU and MU, let us consider the following hypothetical example

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

Total and Marginal utility (Cont..)

- To explain the relationship between TU and MU, let us consider the following hypothetical example

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,

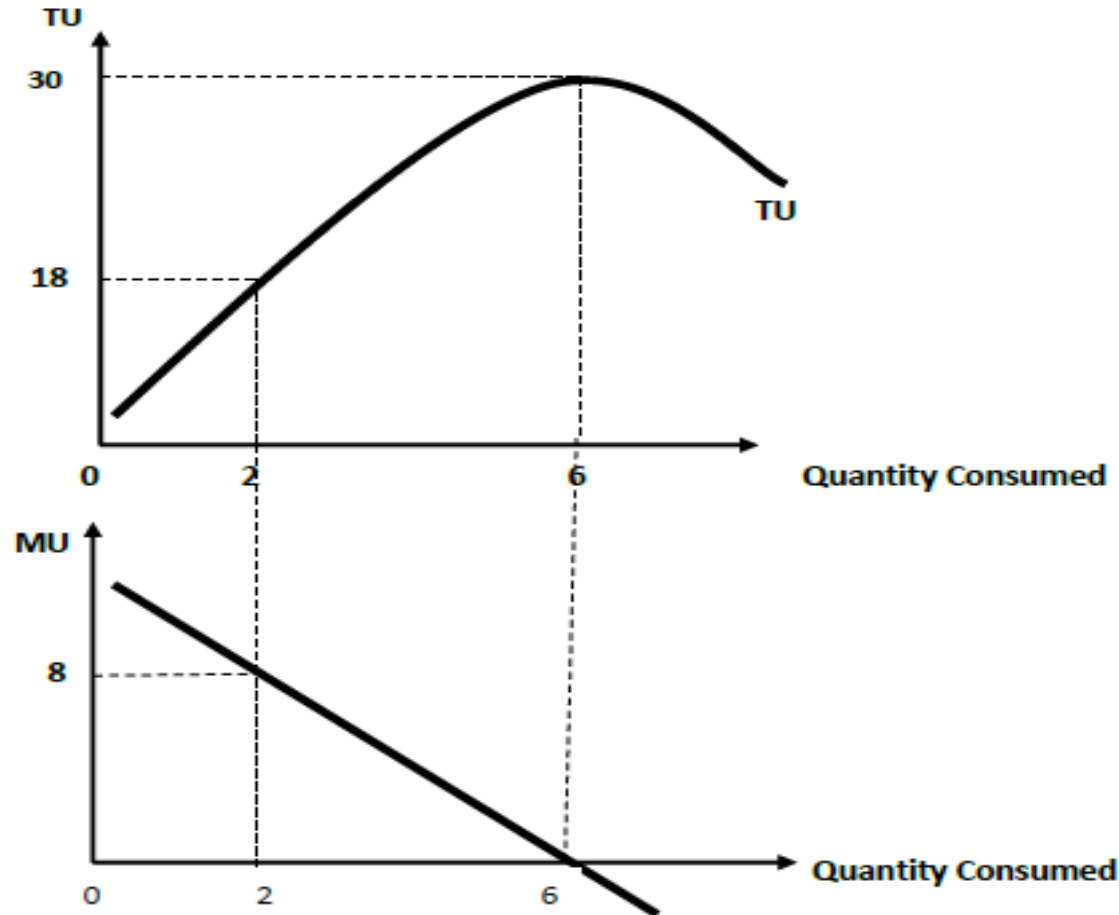


Figure 3.1: Total and marginal utility curves

- When TU is increasing, MU is positive.
- When TU is maximized, MU is zero.
- When TU is decreasing, MU is negative.

Law of diminishing marginal utility (LDMU)

Question

- *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.
- The **extra satisfaction that a consumer derives declines as he/she consumes more and more of the product in a given period of time.**
 - This gives sense in that the first banana a person consumes gives him more marginal utility than the second and the second banana also gives him higher marginal utility than the third and so on.

Law of diminishing marginal utility (LDMU) (Cont..)

Assumptions of the law of diminishing marginal utility

- ▶ 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 in consumption of the good
- ▶ The consumer taste/preferences remain unchanged

Equilibrium of a consumer

- ▶ The **objective of a rational consumer is to maximize total utility.**
 - ▶ Meaning that, **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, **given his limited income and the price level of goods and services**, what combination of goods and services should he consume so as to get the maximum total utility?
- 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.**

$$U = f(X)$$

Equilibrium of a consumer (Cont..)

Proof

Given the utility function

$$U = f(X)$$

If the consumer buys commodity X, then his expenditure will be $Q_x P_x$.

The consumer maximizes the difference between his utility and expenditure.

$$\text{Max}(U - Q_x P_x)$$

The necessary condition for maximization is equating the derivative of a function to zero.

Thus,

$$\frac{dU}{dQ_x} - \frac{d(Q_x P_x)}{dQ_x} = 0$$

$$\frac{dU}{dQ_x} - P_x = 0$$

$$MU_x = P_x$$

Equilibrium of a consumer (Cont..)

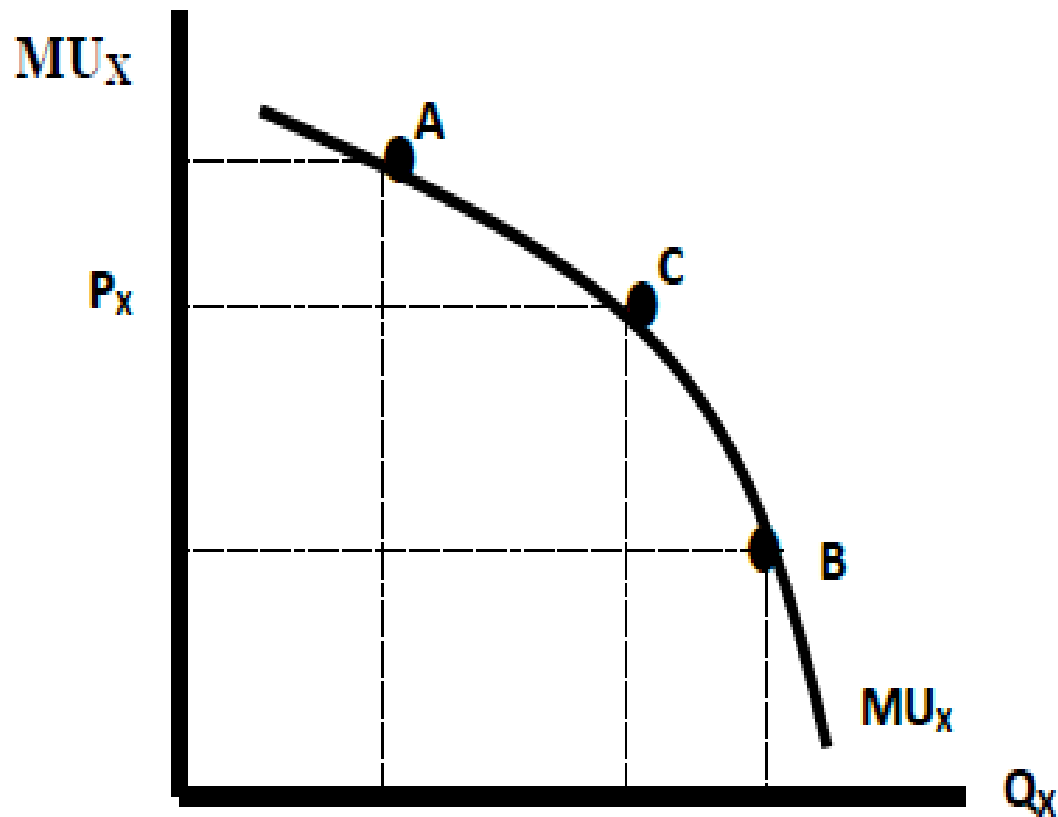


Figure 3.2: Equilibrium condition of consumer with only one commodity

Equilibrium of a consumer (Cont..)

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,

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = \dots = \frac{MU_N}{P_N} \text{ and } P_x Q_x + P_y Q_y + \dots + P_N Q_N = M$$

where, M is the income of the consumer.

Equilibrium of a consumer (Cont..)

Example: Suppose Saron has 7 Birr to be spent on two goods: banana and bread. The unit price of banana is 1 Birr and the unit price of a loaf of bread is 4 Birr. The total utility she obtains from consumption of each good is given below.

Income = 7 Birr, Price of banana = 1 Birr, Price of bread = 4 Birr

Banana				Bread			
Quantity	TU	MU	MU/P	Quantity	TU	MU	MU/P
0	0	-	-	0	0	-	-
1	6			1	12		
2	11			2	20		
3	14			3	26		
4	16			4	29		
5	16			5	31		
6	14			6	32		

Equilibrium of a consumer (Cont..)

Example: Suppose Saron has 7 Birr to be spent on two goods: banana and bread. The unit price of banana is 1 Birr and the unit price of a loaf of bread is 4 Birr. The total utility she obtains from consumption of each good is given below.

Income = 7 Birr, Price of banana = 1 Birr, Price of bread = 4 Birr

Banana				Bread			
Quantity	TU	MU	MU/P	Quantity	TU	MU	MU/P
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

Equilibrium of a consumer (Cont..)

- Recall that utility is maximized when the condition of marginal utility of one commodity divided by its market price is equal to the marginal utility of the other commodity divided by its market price.

$$\frac{MU_1}{P_1} = \frac{MU_2}{P_2}$$

Equilibrium of a consumer (Cont..)

In table 3.2, there are two different combinations of the two goods where the MU of the last birr spent on each commodity is equal. However, only one of the two combinations is consistent with the prices of the goods and her income. Saron will be at equilibrium when she consumes 3 units of banana and 1 loaf of bread. At this equilibrium,

$$\text{i) } MU_1/P_1 = MU_2/P_2$$

$$\frac{MU_{\text{banana}}}{P_{\text{banana}}} = \frac{MU_{\text{bread}}}{P_{\text{bread}}} = \frac{3}{1} = \frac{12}{4} = 3$$

$$\text{ii) } P_1.Q_1 + P_2.Q_2 = M$$

$$(1*3) + (4*1) = 7$$

Equilibrium of a consumer (Cont..)

The total utility that Saron derives from this combination can be given by:

$$TU = TU_1 + TU_2$$

$$TU = 14 + 12$$

$$TU = 26$$

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.

Equilibrium of a consumer (Cont..)

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.

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 but 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 does not need 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.

Assumptions of ordinal utility theory

The ordinal approach is based on the following assumptions.

- **Consumers are rational** - they maximize their satisfaction or utility given their income and market prices.
- **Utility is ordinal** - utility is not absolutely (cardinally) measurable. Consumers are required only to order or rank their preference for various bundles of commodities.
- **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.
 - The rate at which one good can be substituted for another in consumer's basket of goods diminishes as the consumer consumes more and more of the good.

Assumptions of ordinal utility theory (Cont.)

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

Indifference set, curve and map

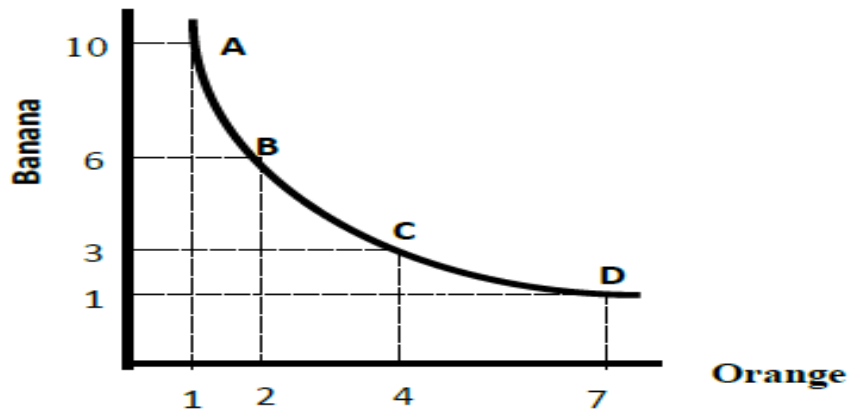
- ▶ **Indifference set/ schedule** is a combination of goods for which the consumer is indifferent.
- ▶ It shows the various combinations of goods from which the consumer derives the same level of satisfaction.
- ▶ Consider a consumer who consumes two goods X and Y.

Table 3.3: Indifference schedule

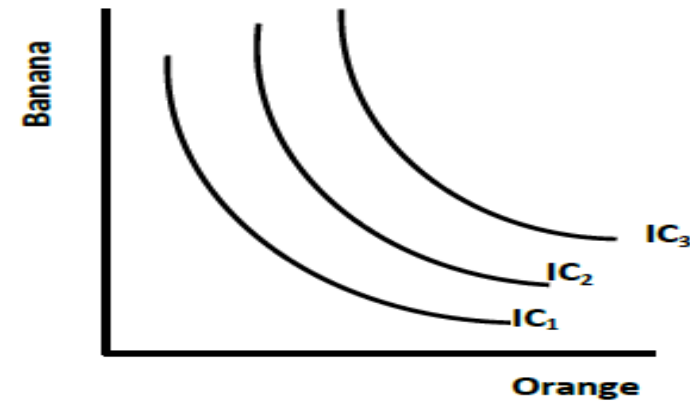
Bundle (Combination)	A	B	C	D
Orange	1	2	4	7
Banana	10	6	3	1

Indifference set, curve and map (Cont..)

- ▶ **Indifference curve:** When the indifference set/schedule is expressed graphically, it is called an *indifference curve*.
- ▶ An indifference curve shows different combinations of two goods which yield the same utility (level of satisfaction) to the consumer.
- ▶ A set of indifference curves is called **indifference map**.



i) Indifference curve



ii) Indifference map

Figure 3.3: Indifference curve and indifference map

Properties of indifference curves

1. Indifference curves have negative slope (downward sloping to the right).

- Indifference curves are negatively sloped because **the consumption level of one commodity can be increased only by reducing the consumption level of the other commodity.**
- In other words, in order to keep the utility of the consumer constant, as the quantity of one commodity is increased the quantity of the other must be decreased.

2. Indifference curves are convex to the origin.

- This implies that **the slope of an indifference curve decreases (in absolute terms) as we move along the curve from the left downwards to the right.**
- The **convexity of indifference curves** is the reflection of the **diminishing marginal rate of substitution.**
- The commodities can substitute one another at any point on an indifference curve but are not perfect substitutes.

Properties of indifference curves (Cont..)

3. A higher indifference curve is always preferred to a lower one.

- The further away from the origin an indifference curve lies, the higher the level of utility it denotes.
- Baskets of goods on a higher indifference curve are preferred by the rational consumer because they contain more of the two commodities than the lower ones.

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.

Properties of indifference curves (Cont..)

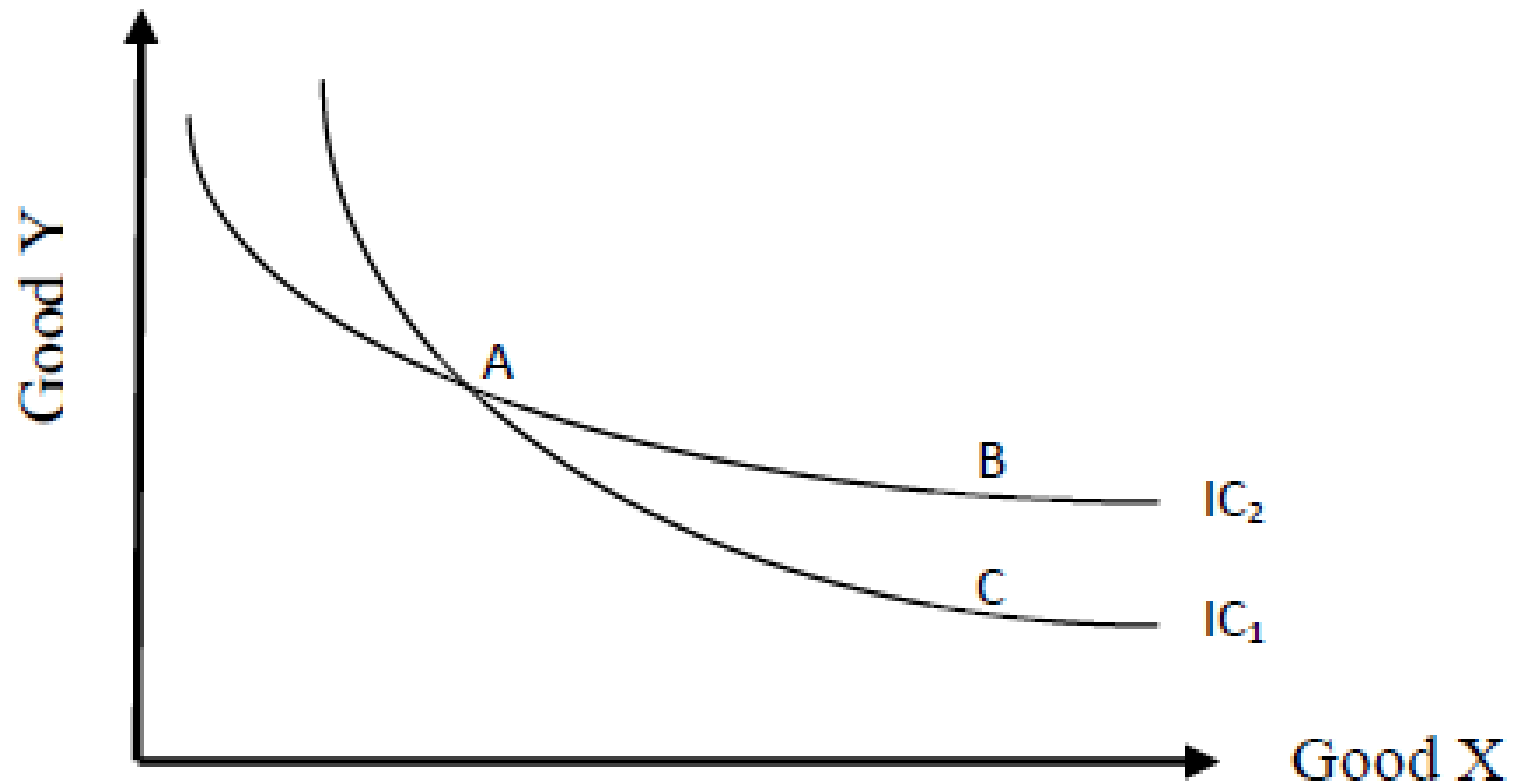


Figure 3.4: Intersection of indifference curves

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.
- Marginal rate of substitution of X for 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.

Marginal rate of substitution (MRS) (Cont..)

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

To understand the concept, consider the following indifference curve.

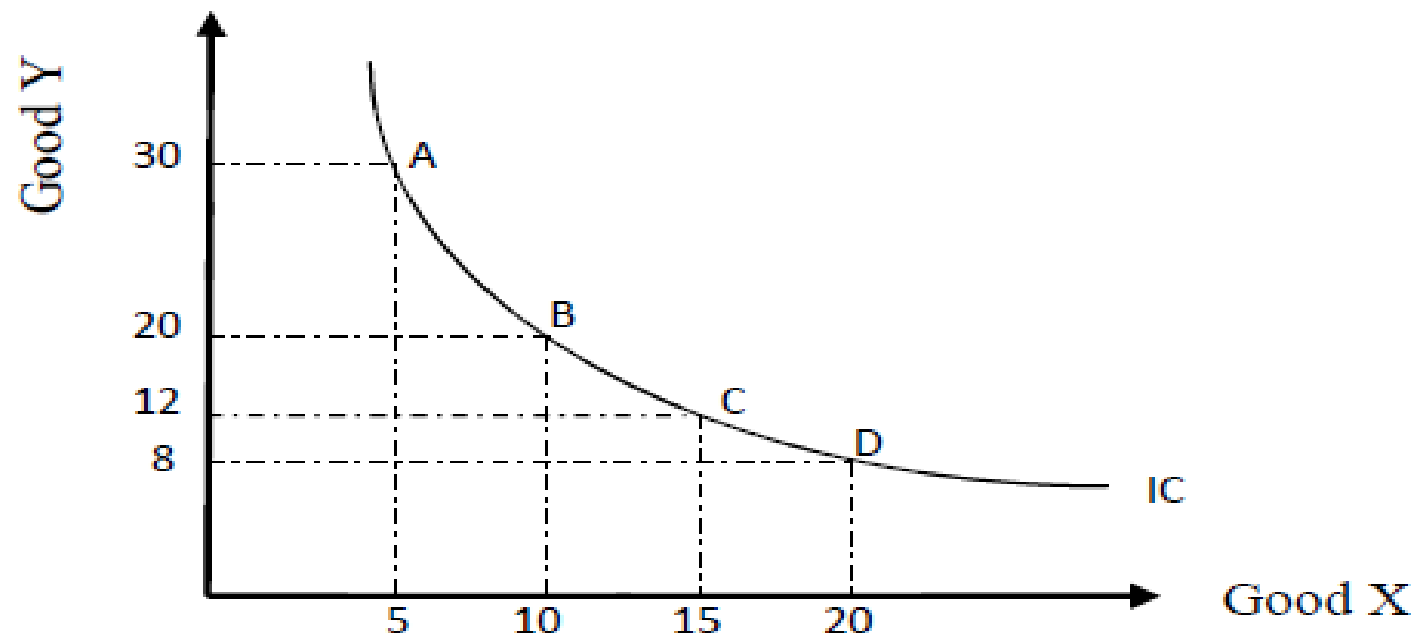


Figure 3.5: Indifference curve for two products X and Y

Marginal rate of substitution (MRS) (Cont..)

- It is also possible to derive MRS using the concept of marginal utility.
- MRS_{xy} , is related to MU_X and MU_Y as follows.

$$MRS_{xy} = \frac{MU_x}{MU_y}$$

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.

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

$$MU_X dX + MU_Y dY = 0$$

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

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

Marginal rate of substitution (MRS) (Cont..)

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

Solution: $MRS_{X,Y} = \frac{MU_X}{MU_Y}$

$$MU_X = \frac{\partial U}{\partial X} = 4X^3 Y^2 \quad \text{and} \quad MU_Y = \frac{\partial U}{\partial Y} = 2X^4 Y \quad \text{Hence, } MRS_{X,Y} = \frac{MU_X}{MU_Y} = \frac{4X^3 Y^2}{2X^4 Y} = \frac{2Y}{X}$$

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.

The budget line or the price line (Cont..)

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:

$$M = P_x X + P_y Y$$

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

$$Y = \frac{M}{P_y} - \frac{P_x}{P_y} X$$

The budget line or the price line (Cont..)

Graphically,

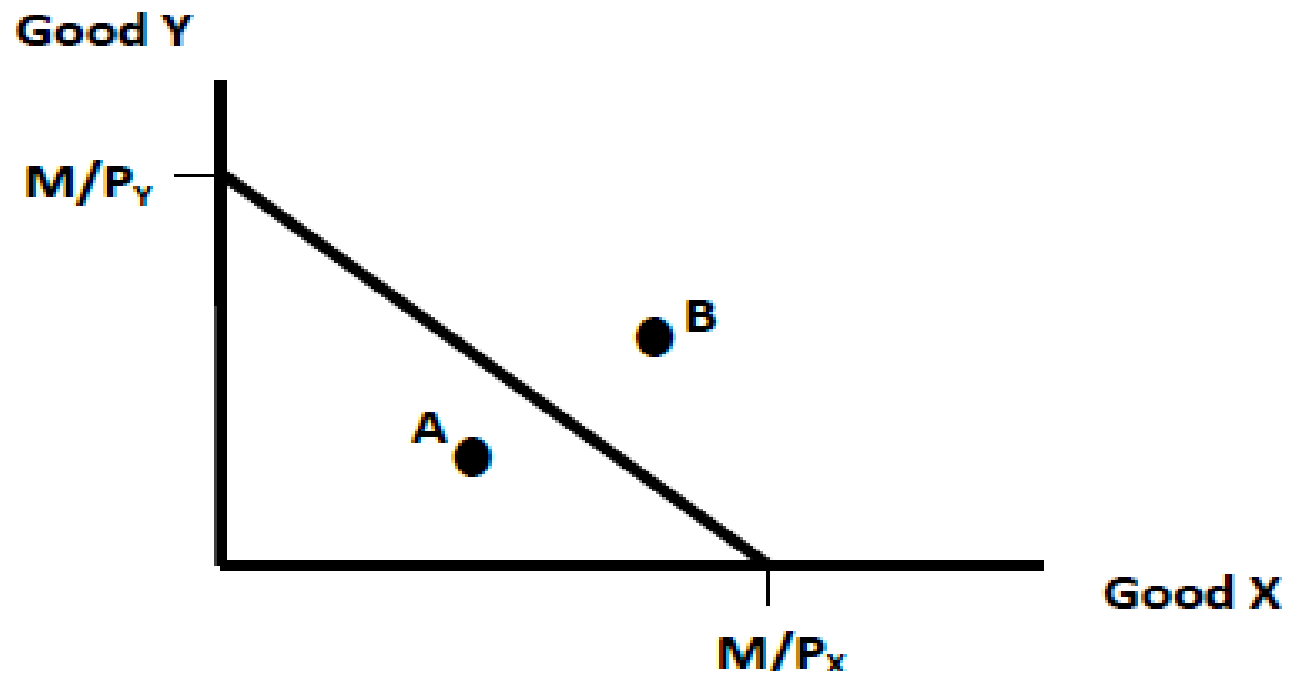


Figure 3.6: The budget line

The budget line or the price line (Cont..)

Note that:

- ▶ The slope of the budget line is given by $\frac{P_x}{P_y}$ (the ratio of the prices of the two goods).
- ▶ 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).

The budget line or the price line (Cont..)

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

Solution: The equation of the budget line can be derived as follows.

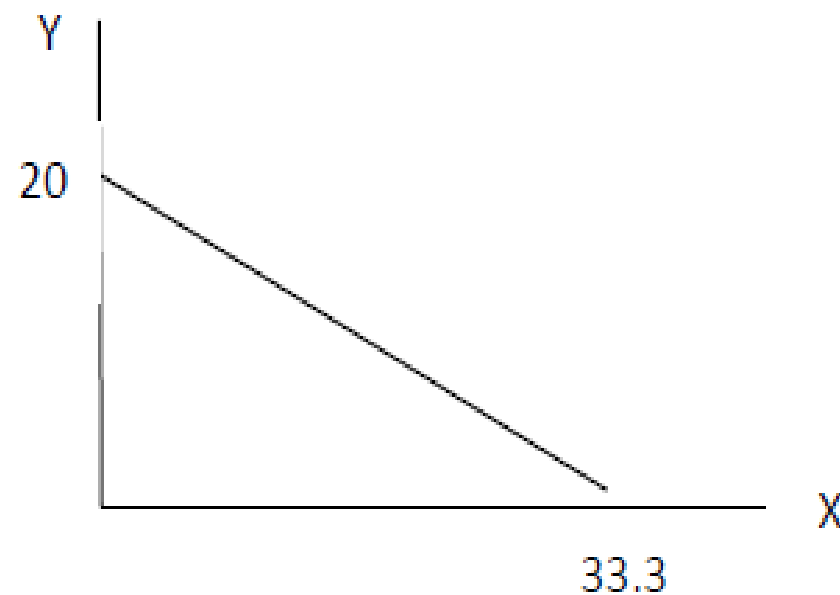
$$P_X X + P_Y Y = M$$

$$3X + 5Y = 100$$

$$5Y = 100 - 3X$$

$$Y = \frac{100}{5} - \frac{3}{5}X$$

$$Y = 20 - \frac{3}{5}X$$



The budget line or the price line (Cont..)

- Recall that 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 a downward/inward shift in the budget line that leads the consumer to buy less quantity of the 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.

The budget line or the price line (Cont..)

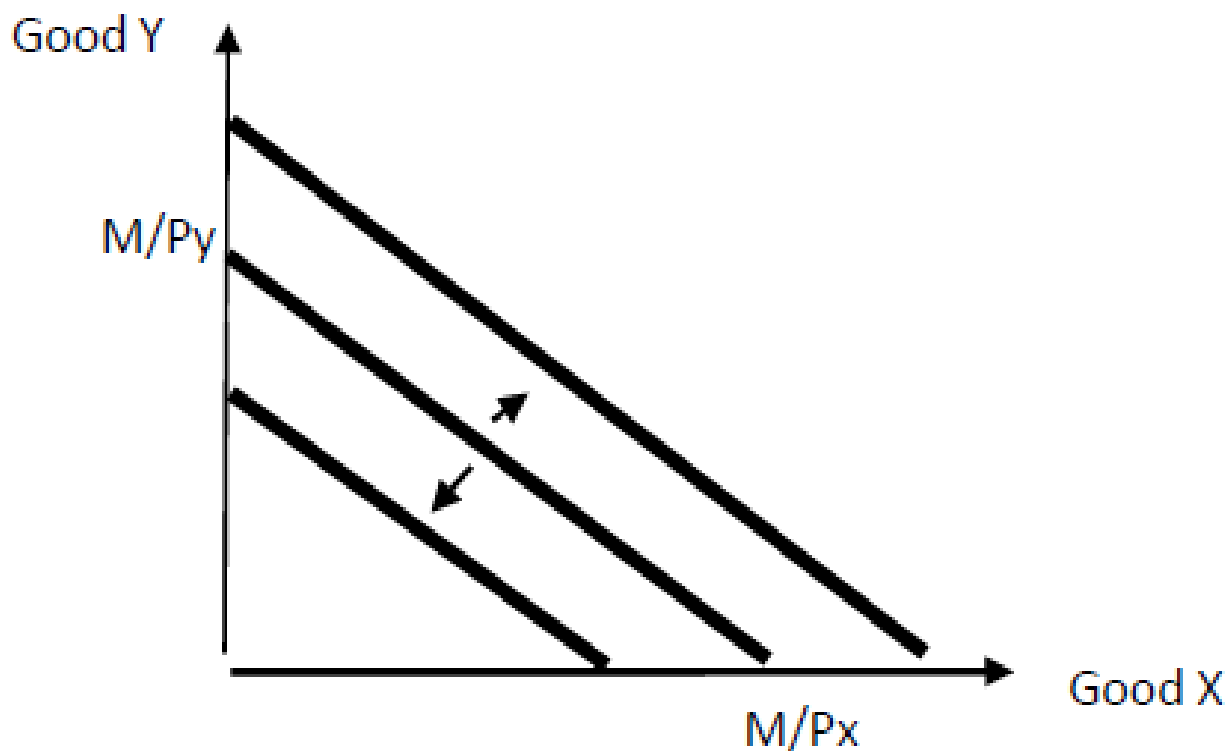


Figure 3.7: *Effects of increase (right) and decrease (left) in income on the budget line*

The budget line or the price line (Cont..)

Change in prices:

- An equal increase 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 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.

The budget line or the price line (Cont..)

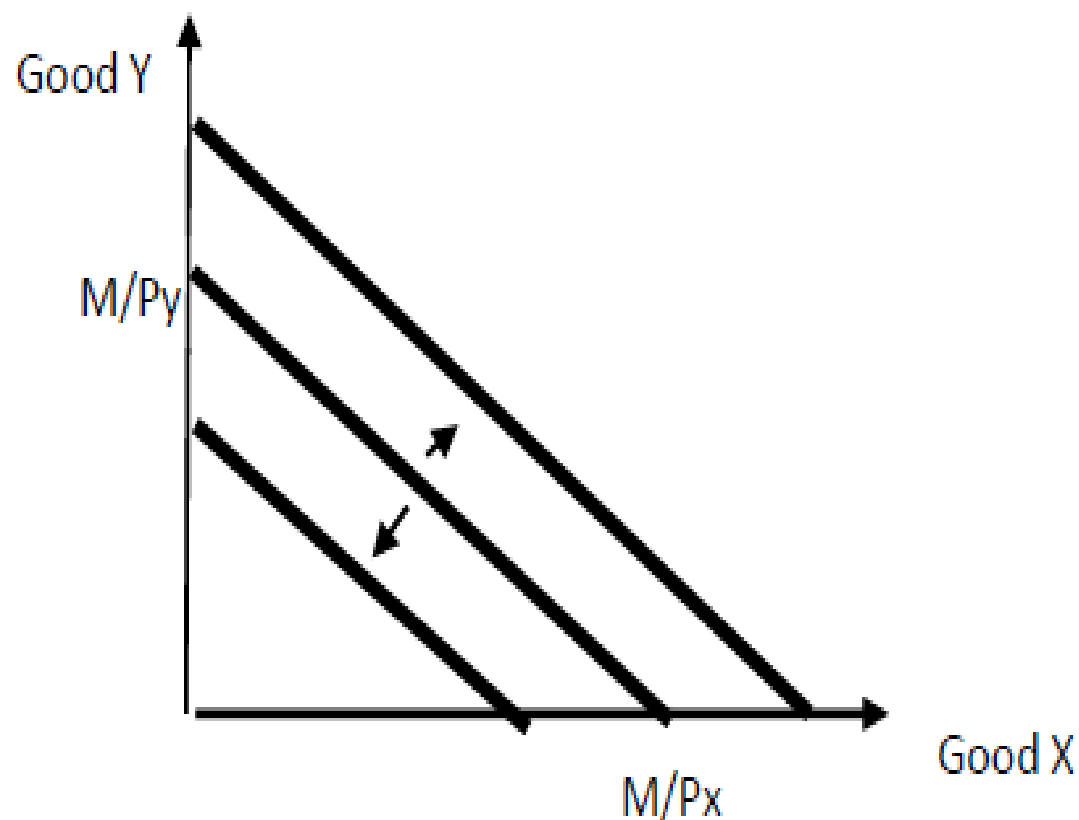


Figure 3.8: *Effect of proportionate increase (inward) and decrease (out ward) in the prices of both goods*

The budget line or the price line (Cont..)

- 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.

The budget line or the price line (Cont..)

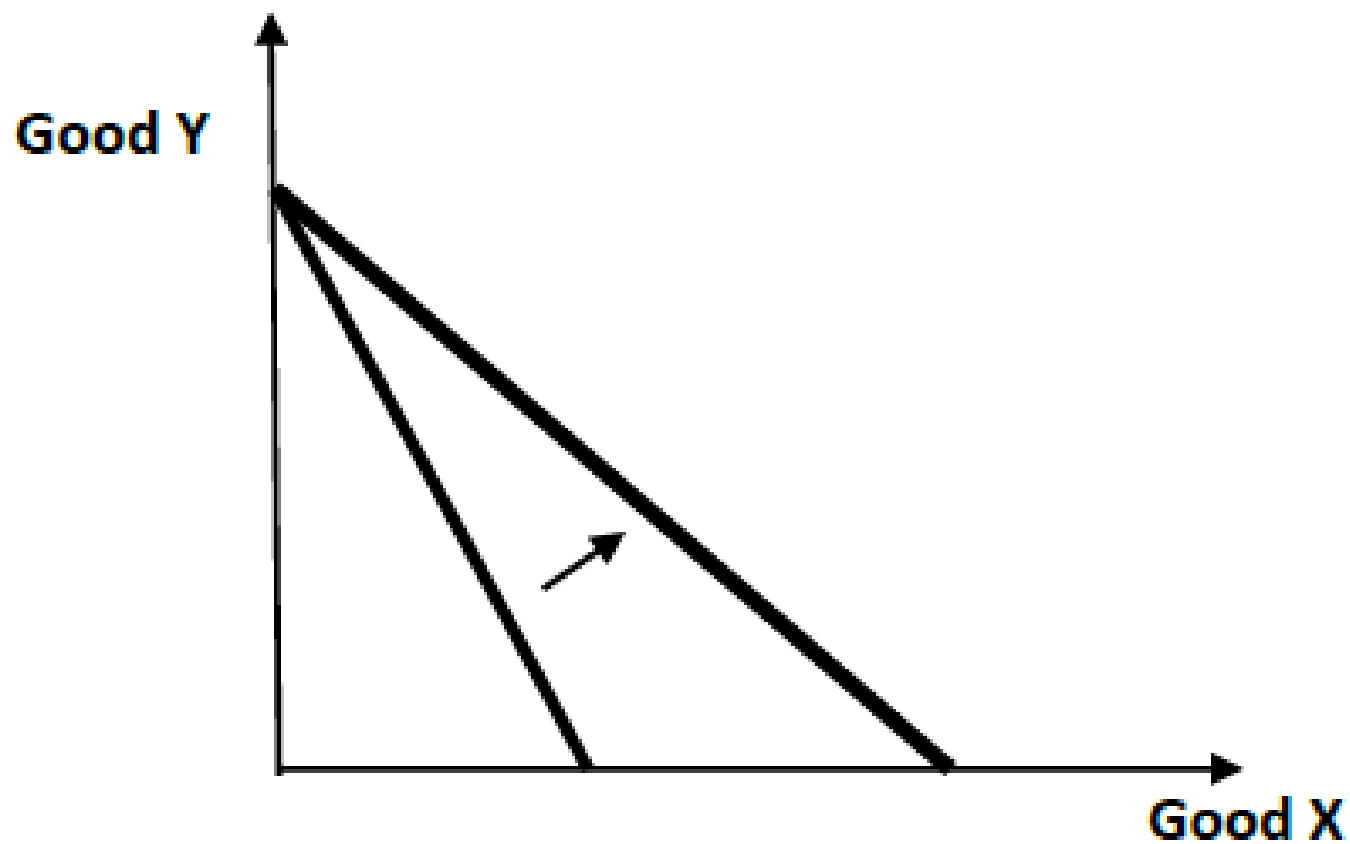


Figure 3.9: Effect of decrease in the price of only good X on the budget line

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 ($XY MRS$) is equal to the slope of the budget line ($\frac{X}{Y}$). 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).

Equilibrium of the consumer (Cont..)

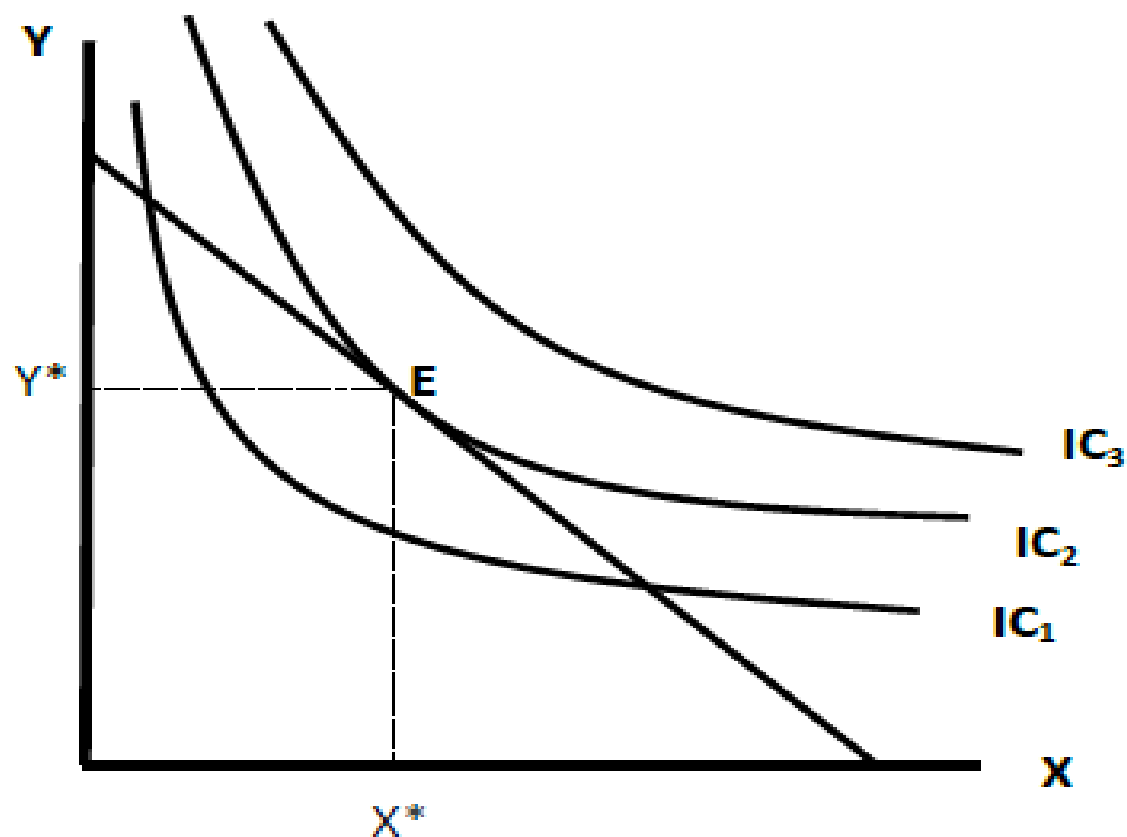


Figure 3.10: Consumer equilibrium under indifference curve approach

Equilibrium of the consumer (Cont..)

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

Slope of indifference curve = Slope of the budget line

$$MRS_{XY} = \frac{P_X}{P_Y}$$
$$\Rightarrow \frac{MU_X}{MU_Y} = \frac{P_X}{P_Y}$$

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.

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

Equilibrium of the consumer (Cont..)

Solution

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

$$P_X \cdot X + P_Y \cdot Y = M$$

$$4X + 2Y = 60 \quad \dots\dots\dots (i)$$

Moreover, at equilibrium

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

$$\frac{Y + 2}{X} = \frac{4}{2}$$

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

$$Y = 2X - 2 \quad \dots\dots\dots (ii)$$

Substituting equation (ii) into (i), we obtain $Y = 14$ and $X = 8$.

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

(At the equilibrium, MRS can also be calculated as the ratio of the prices of the two goods)



Introduction to Economics

Chapter 3: The Theory of Production and Cost

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Theory of Production in the Short-run

Definition of production

- Raw materials has to be transformed into output to get better utility.
- Inputs such as land, labour, capital and entrepreneurial ability are required to transform raw materials into outputs.
- Production (sometime also known as the act of creating value or utility) is **the process of transforming inputs into outputs**.
- The **end products of the production** process are **outputs** which could be goods (tangible) or service(intangible).

Theory of Production in the Short-run (Cont..)

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:

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

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

Inputs

- Inputs are commonly classified as **fixed inputs or variable inputs**.
- **Fixed inputs** are **those inputs whose quantity cannot be readily changed** when an immediate adjustment in output is required.
 - In fact, **no input is ever absolutely fixed** but may be fixed during an immediate requirement.
 - For example, if the demand for Beer rises suddenly in a week, the brewery factories cannot plant additional machinery overnight and respond to the increased demand.
 - **Buildings, land and machineries are examples of fixed inputs** because their quantity cannot be manipulated easily in a short period of time.

Inputs (Cont..)

- **Variable inputs** are those inputs whose quantity can be altered almost immediately in response to desired changes in output.
 - Their quantities can easily be reduced when the market demand for the product decreases and vice versa.
 - The best example of variable input is unskilled labour.

Short run

- 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.
 - Short run periods of different firms have different durations.
- This sub-section is confined to production with one variable input and one fixed input.
- Consider a firm that uses two inputs: capital (fixed input) and labour (variable input).

Short run (Cont..)

- 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.

Total, average, and marginal product

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

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.

- But 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.

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.*

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

- 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.

Average Product (AP):

- Average product of an input 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.
- The average product of labour (APL), for instance, is given by:

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

- Average product of labour first increases, reaches its maximum value and eventually declines.
- 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 APL at L2 is the ratio of TP2 to L2.
- This is identical to the slope of ray a .

Average Product (AP) (Cont..)

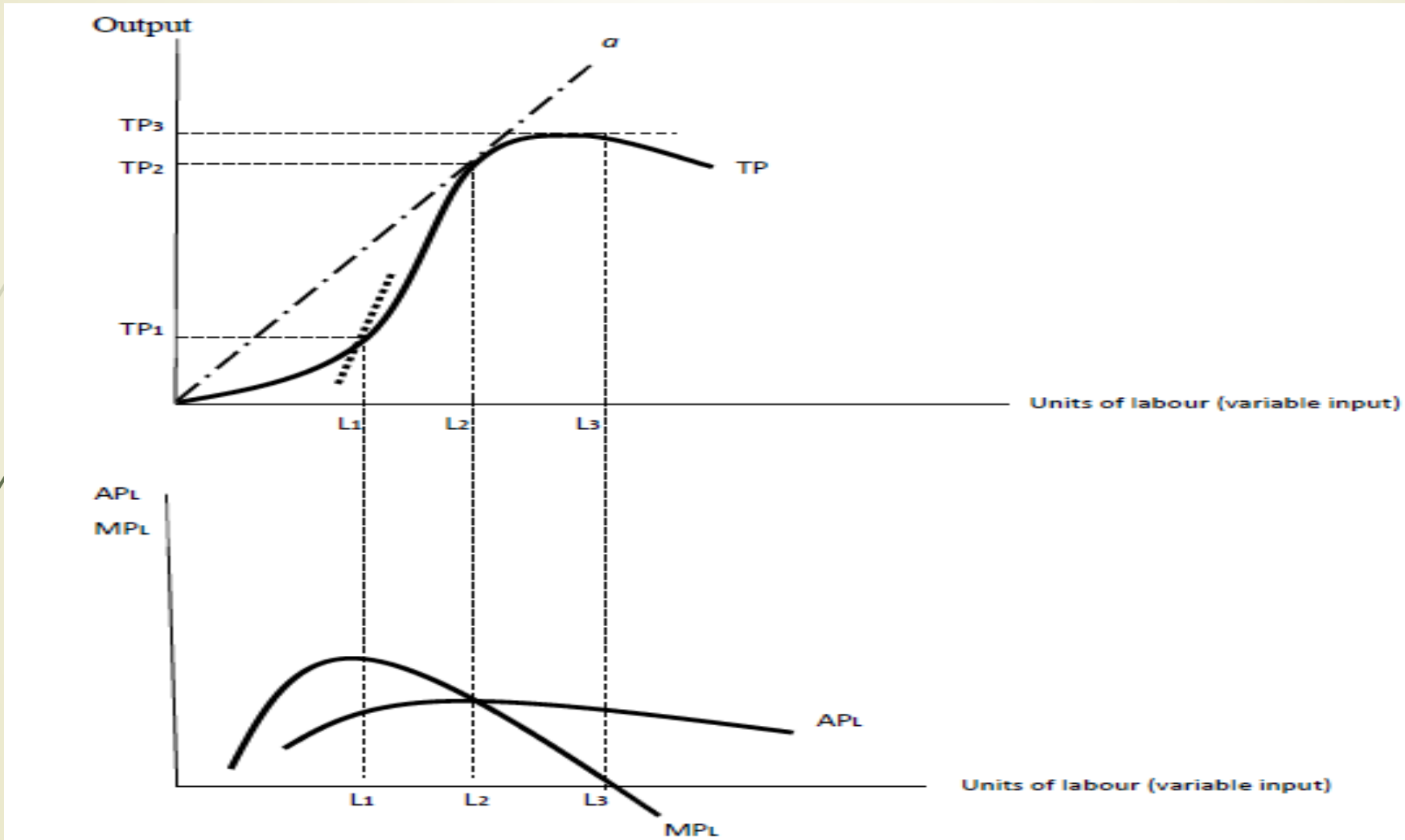


Figure 4.1: Total product, average product and marginal product curves

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 ($K=5$).

- Determine the average product of labour (APL) function.
- At what level of labour does the total output of cut-flower reach the maximum?
- What will be the maximum achievable amount of cut-flower production?

Example

Solution:

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

b) When total product (Q) is maximum, MP will be zero.

$$MP_L = \frac{\partial Q}{\partial L} = \frac{\partial(4KL - 0.6K^2 - 0.1L^2)}{\partial L} = 4K - 0.2L = 0$$

$$\Rightarrow 20 - 0.2L = 0 \Rightarrow L = \frac{20}{0.2} = \underline{\underline{100}}$$

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):

$$Q_{max} = 4KL - 0.6K^2 - 0.1L^2 = 4 * 5 * 100 - 0.6 * 5^2 - 0.1 * 100^2 = \underline{\underline{985}}$$

The law of variable proportions

- ▶ 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.

The law of variable proportions (Cont..)

- Assumption of the law of variable proportions
 - 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.
- The law starts to operate after the marginal product curve reaches its maximum
- This law is also called the *law of diminishing returns*.

Stages of production

- ▶ The determination the specific number of variable input (labour) that a firm should employ is not an easy task because it 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.

Stages of Production (Cont..)

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 L2 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).

Stages of production (Cont..)

Stage II: It ranges from the point where APL 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.
- ▶ This 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**.

Stages of production (Cont..)

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 L3

Theory of costs in the short run

Definition and types of costs

- ▶ Factors of production or inputs are required to produce goods and services.
- ▶ These inputs have to be bought from resource suppliers.
- ▶ Each business, regardless of size or complexity, tries to earn a profit:
$$\text{Profit} = \text{Total Revenue} - \text{Total Cost}$$
- ▶ Total revenue is the income the firm generates from selling its products.
- ▶ We calculate it **by multiplying the price of the product times the quantity of output sold:**

$$\text{Total Revenue} = \text{Price} \times \text{Quantity}$$

Theory of costs in the short run

- **Cost** is, the **monetary value of inputs** used in the production of an item.
- **Total cost** is what the firm pays for producing and selling its products.
- Recall that **production involves the firm converting inputs to outputs**.
- Each of those **inputs has a cost to the firm**.
- The **sum of all those costs is total cost**.
- 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, economic profit is total revenue less economic costs (explicit and implicit costs).

Types of Costs

- Two types of cost: **explicit and implicit**.
- **Explicit costs** are out-of-pocket costs, that is, actual payments.
 - Wages that a firm pays its employees or rent that a firm pays for its office are explicit costs.
- **Implicit costs** are more subtle, but just as important.
- They represent the **opportunity cost of using resources** that the firm already owns.
- Often for small businesses, they are **resources that the owners contribute**.
 - For example, working in the business while not earning a formal salary, or using the ground floor of a home as a retail store are both implicit costs.
- Implicit costs also include the **depreciation of goods, materials, and equipment** that are necessary for a company to operate.

Conceptions of profit

- ▶ These two definitions of cost are important for distinguishing between two conceptions of profit,
- ▶ **Accounting profit and Economic profit.**
- ▶ Accounting profit is a **cash concept**.
 - ▶ It means **total revenue minus explicit costs**—the difference between dollars brought in and dollars paid out.
- ▶ If a producer calculates her cost by considering only the costs incurred for purchased inputs, then her profit will be an accounting profit.

Accounting profit = Total revenue – Accounting cost = Total revenue – Explicit cost

Conceptions of profit

- ▶ **Economic profit** is total revenue minus total cost, including both explicit and implicit costs.
 - ▶ The difference is important because even though a business pays income taxes based on its accounting profit, whether or not it is economically successful depends on its economic profit.

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

- ▶ 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.

Example

Consider the following example.

Fred currently works for a corporate law firm where he earns \$125,000 per year. He is considering opening his own legal practice, where he expects to earn \$200,000 per year once he establishes himself. To run his own firm, he would need an office and a law clerk. He has found the perfect office, which rents for \$50,000 per year. He could hire a law clerk for \$35,000 per year. If these figures are accurate, would Fred's legal practice be profitable?

Example (Cont..)

First, let us calculate revenue. This is simple as it is given to us. Fred will earn \$200,000 worth of revenue (as stated in the problem.)

Next, let us calculate the explicit costs.

These are the actual outlays of money.

- Frank is spending \$50,000 per year on rent and \$35,000 on a law clerk.
- This means that the total explicit cost is \$85,000.
- Therefore, his accounting profit, which is revenue minus explicit cost, is

$$\text{Accounting Profit} = \$200,000 - \$85,000 = \$115,000.$$

Example (Cont..)

However, we are ignoring the fact that Fred has to leave his job to start his own firm. This is where implicit costs come in to play. Fred does not have to pay to leave. Instead, he is giving up the ability to earn his salary. In this example, the implicit cost is \$125,000, which is the salary he is giving up to start the firm.

- Therefore, his economic profit, which is revenue minus explicit cost minus implicit cost, is

$$\text{Economic Profit} = \$200,000 - \$85,000 - \$125,000 = -\$10,000.$$

- Fred would be losing \$10,000 per year. That does not mean he would not want to open his own business, but it does mean he would be earning \$10,000 less than if he worked for the corporate firm.

Total, average and marginal costs in the short run

- ▶ For every factor of production (or input), there is an associated **factor payment**.
- ▶ Factor payments are **what the firm pays for the use of the factors of production**.
- ▶ From the **firm's perspective**, factor payments are costs. From **the owner of each factor's perspective**, factor payments are income.

Factor payments include:

- ▶ Raw materials prices for raw materials
- ▶ Rent for land or buildings
- ▶ Wages and salaries for labor
- ▶ Interest and dividends for the use of financial capital (loans and equity investments)
- ▶ Profit for entrepreneurship. **Profit is the residual**, what's left over from revenues after the firm pays all the other costs.

Total, average and marginal costs in the short run

- ▶ A **cost function shows** the total cost of producing a given level of output.
- ▶ It 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.
- ▶ A cost function is a mathematical expression or equation that shows the cost of producing different levels of output.

Q	1	2	3	4
Total Cost	\$32.50	\$44.00	\$52.00	\$90.00

Table 6.2 A Cost Function

- ▶ What we observe is that the **cost increases as the firm produces higher quantities of output**. This is pretty intuitive, since producing more output requires greater quantities of inputs

Total, average and marginal costs in the short run

- ▶ Total cost (TC) can be broken down in to two – total fixed cost (TFC) and total variable cost (TVC).
- ▶ **Fixed costs:** costs which **do not vary with the level of output**.
 - ▶ They are regarded as fixed because **they are unavoidable** regardless of the level of output.
 - ▶ Eg. Salaries of administrative staff, expenses for building depreciation and repairs, expenses for land maintenance and the rent of building used for production
- ▶ **Variable costs:** include all costs which **directly vary with the level of output**.
 - ▶ For example, if the **firm produces zero output, the variable cost is zero**.
 - ▶ These costs may include the cost of raw materials, the cost of direct labour and the running expenses of fuel, water, electricity, etc.

Total, average and marginal costs in the short run (Cont..)

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

$$TC = TFC + TVC$$

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

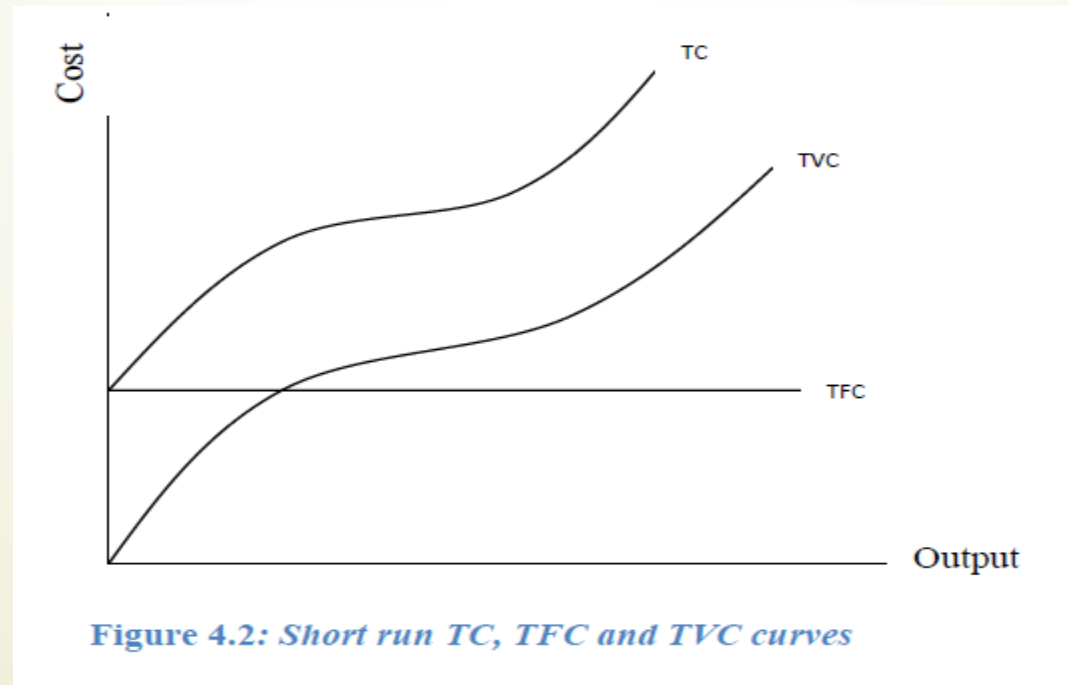
- ▶ This is because such **costs do not vary with the level of output**.

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.

Total, average and marginal costs in the short run (Cont..)

- ▶ **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 $TC = TFC$.



Total, average and marginal costs in the short run (Cont..)

- **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)** - Average fixed cost 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.

Total, average and marginal costs in the short run (Cont..)

c) Average Total Cost (ATC) or simply Average Cost (AC) - Average total cost 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, $AC = \frac{TVC+TFC}{Q} = \frac{TVC}{Q} + \frac{TFC}{Q} = AVC + AFC$
- Thus, AC can also be given by the vertical sum of AVC and AFC.

Marginal Cost (MC)

- Marginal cost is defined as the additional cost that a firm incurs to produce one extra unit of output.
- Graphically, MC is the slope of TC function.

$$MC = \frac{dTC}{dQ}$$

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

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

- 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.

Total, average and marginal costs in the short run (Cont..)

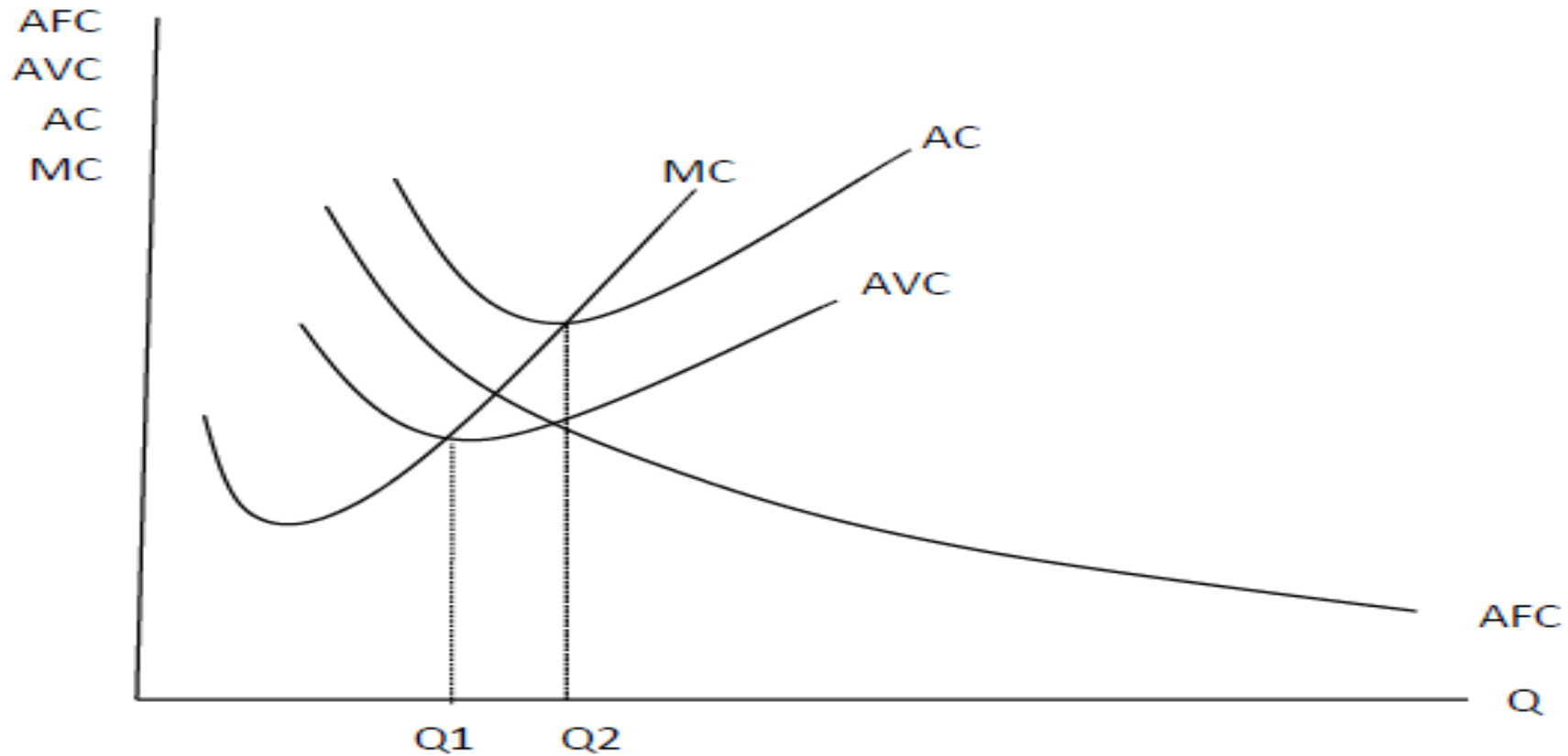


Figure 4.3: *Short run AFC, AVC, AC and MC Curves*

Example:

- Suppose the short run cost function of a firm is given by: $TC = 2Q^3 - 2Q^2 + Q + 10$.
 - a) Find the expression of TFC & TVC
 - b) Derive the expressions of AFC, AVC, AC and MC
 - c) Find the levels of output that minimize MC and AVC and then find the minimum values of MC and AVC

Solution:

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

a) $TFC = 10$, $TVC = 2Q^3 - 2Q^2 + Q$

b) $AFC = TFC/Q = 10/Q$

$$AVC = TVC/Q = (2Q^3 - 2Q^2 + Q)/Q = 2Q^2 - 2Q + 1$$

$$AC = TC/Q = (2Q^3 - 2Q^2 + Q + 10)/Q = 2Q^2 - 2Q + 1 + 10/Q$$

$$MC = dC/dQ = 6Q^2 - 4Q + 1$$

c) To find the minimum value of MC,

$$dMC/dQ = 12Q - 4 = 0$$

$$Q = 1/3$$

MC is minimized when $Q = 0.33$

Solution:

The minimum value of MC will be:

$$\begin{aligned} MC &= 6Q^2 - 4Q + 1 \\ &= 6(1/3)^2 - 4(1/3) + 1 = 0.33 \end{aligned}$$

To find the minimum value of AVC

$$dAVC/dQ = 4Q - 2 = 0$$

$$Q = 0.5$$

AVC is minimized at $Q = 0.5$

The minimum value of AVC will be:

$$\begin{aligned} AVC &= 2Q^2 - 2Q + 1 \\ AVC &= 2(0.5)^2 - 2(0.5) + 1 \\ &= 0.5 - 1 + 1 \\ &= 0.5 \end{aligned}$$

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. Marginal Cost and Marginal Product of Labour

$$MC = \frac{\Delta TVC}{\Delta Q}, \text{ where } TVC = w.L$$

$$MC = \frac{\Delta(w.L)}{\Delta Q} = w \cdot \frac{\Delta L}{\Delta Q}, \text{ but } \frac{\Delta L}{\Delta Q} = \frac{1}{MP_L}$$

$$\text{Therefore, } MC = \frac{w}{MP_L}$$

The relationship between short run production and cost curves (Cont..)

II. Average Variable Cost and Average Product of Labour

$$AVC = \frac{TVC}{Q}, \text{ where, } TVC = w.L$$

$$AVC = \frac{w.L}{Q} = w.\frac{L}{Q}, \text{ but } \frac{L}{Q} = \frac{1}{AP_L}$$

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

The relationship between short run production and cost curves (Cont.)

- ▶ We can also sketch the relationship between these production and cost curves using graphs.

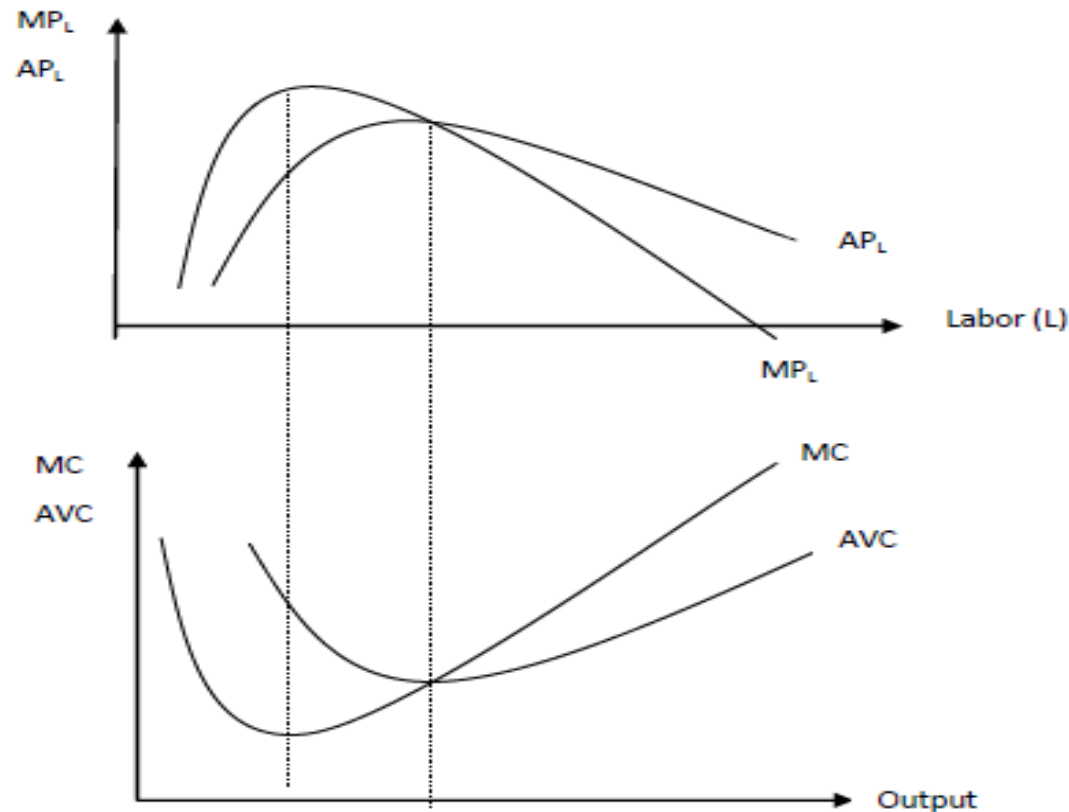


Figure 4.4: relationship between short run production and cost curves

Discussion question

- ▶ What is production?
- ▶ What is the short run production function?
- ▶ Graph the short run production function (or total product curve). Why is it shaped the way it is shaped?
- ▶ What is the relationship between MP and MC?



Introduction to Economics

Chapter 5: Market Structure

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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 that satisfy individual and organizational objectives.**
- 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.**
- **Physical market** is a **set up where buyers can physically meet their sellers and purchase the desired merchandise from them in exchange of money.**
- The choice of the marketing mainly depends on **the nature of the products and services.**

AN INTRODUCTION TO MARKET STRUCTURES

- ▶ The cost calculations are the same regardless of the market structure.
- ▶ It is very tough to find a market or firm that exists in a single market structure.

We will have a total of four market structures:

- ▶ Perfect competition
- ▶ Monopolistic competition
- ▶ Oligopoly
- ▶ Monopoly.

AN INTRODUCTION TO MARKET STRUCTURES

The main characteristics we will study are:

- ▶ Are individual firms price takers or price searchers?
- ▶ Are there barriers to entry that firms face to enter the market or barriers to exit that firms have to pay to leave the market?
- ▶ How many firms are there in the market?

AN INTRODUCTION TO MARKET STRUCTURES

The following flowchart summarizes the markets:



Figure 7.1: A Flowchart of the Market Structures

AN INTRODUCTION TO MARKET STRUCTURES

The four market structures can be thought of as a spectrum like the one shown below.

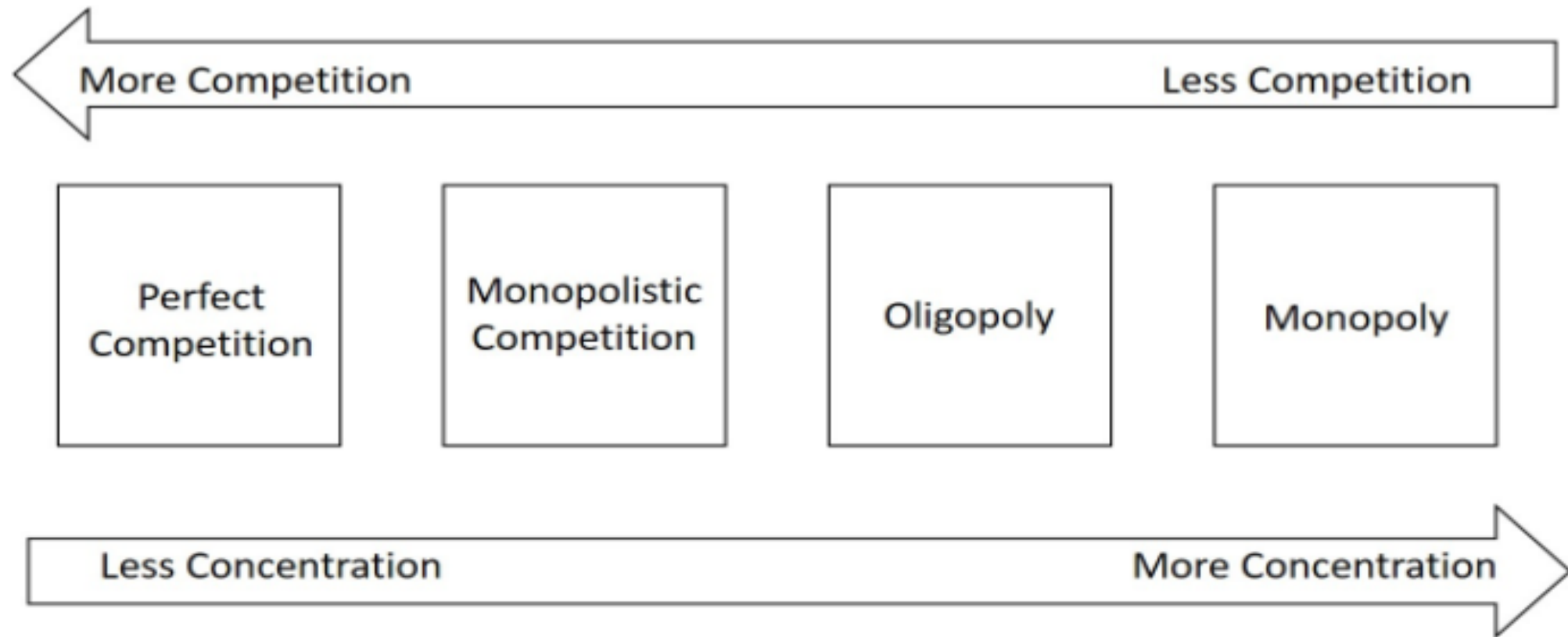


Figure 7.2: The Market Structures on a Spectrum

Perfectly competitive market

- Perfect competition is a market structure characterized by a complete absence of rivalry among the individual firms.

Assumptions of perfectly competitive market

- 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.
 - 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.
 - 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.

Perfectly competitive market (Assumptions)

2. Homogeneous product: buyers do not distinguish between products supplied by the various firms of an industry.

- Products are regarded as a **perfect substitute**
- No firm can gain any competitive advantage over the other firm.

3. Perfect mobility of factors of production: factors of production are free to move from one firm to another throughout the economy.

- **Capital, raw materials, and other factors are not monopolized.**

4. 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.

Perfectly competitive market (Assumptions)

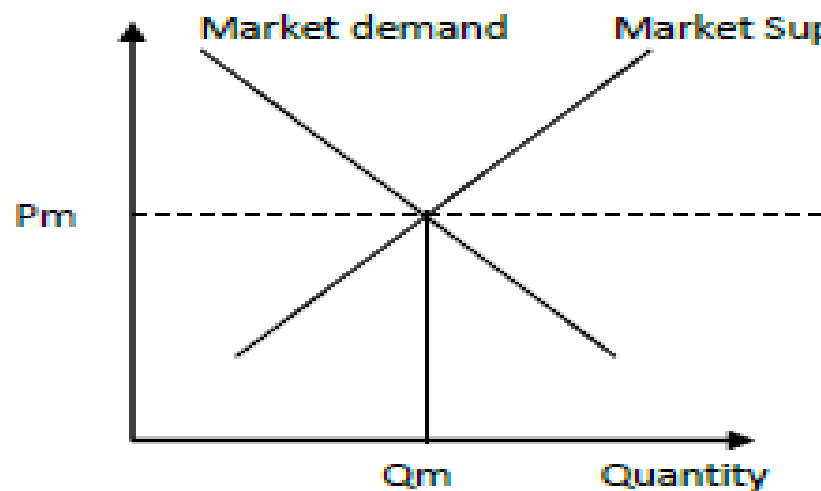
5. Perfect knowledge about market conditions: all the buyers and sellers have full information regarding the prevailing and future prices and availability of the commodity.

6. No government interference:- government does not interfere in any way with the functioning of the market.

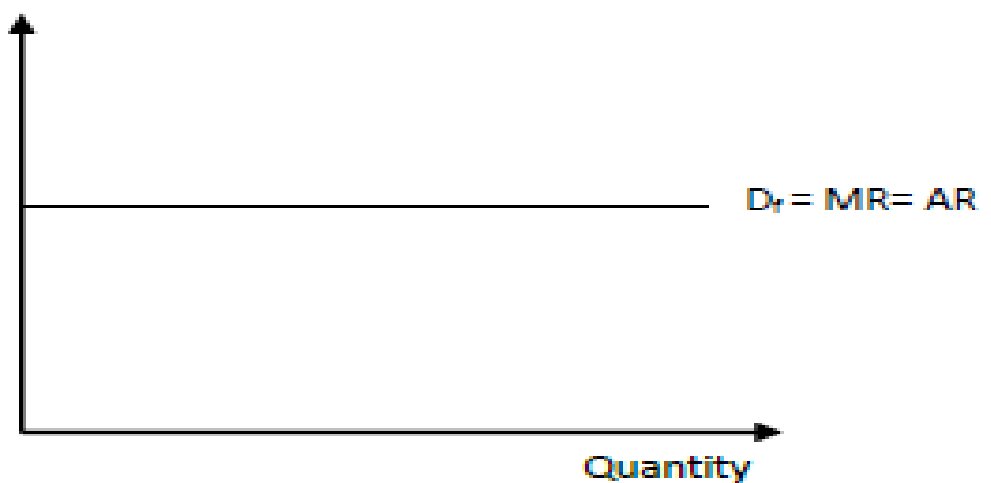
- There are no discriminator taxes or subsidies, no allocation of inputs by the procurement, or any kind of direct or indirect control.
- If government intervene, it is intended to correct the market imperfection.

Perfectly competitive market (Assumptions)

- From these assumptions, a single producer 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.



(a): Market demand and supply



(b): Demand curve of a firm

Figure 5.1: Individual and market demand curve

Short run equilibrium of the firm

- 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): 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 X Q, where P = price of the product and 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.

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

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

Short run equilibrium of the firm (Cont...)

- **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.

$$MR = \left\{ \frac{\Delta TR}{\Delta Q} \right\} = \frac{\Delta(P \times Q)}{\Delta Q}$$

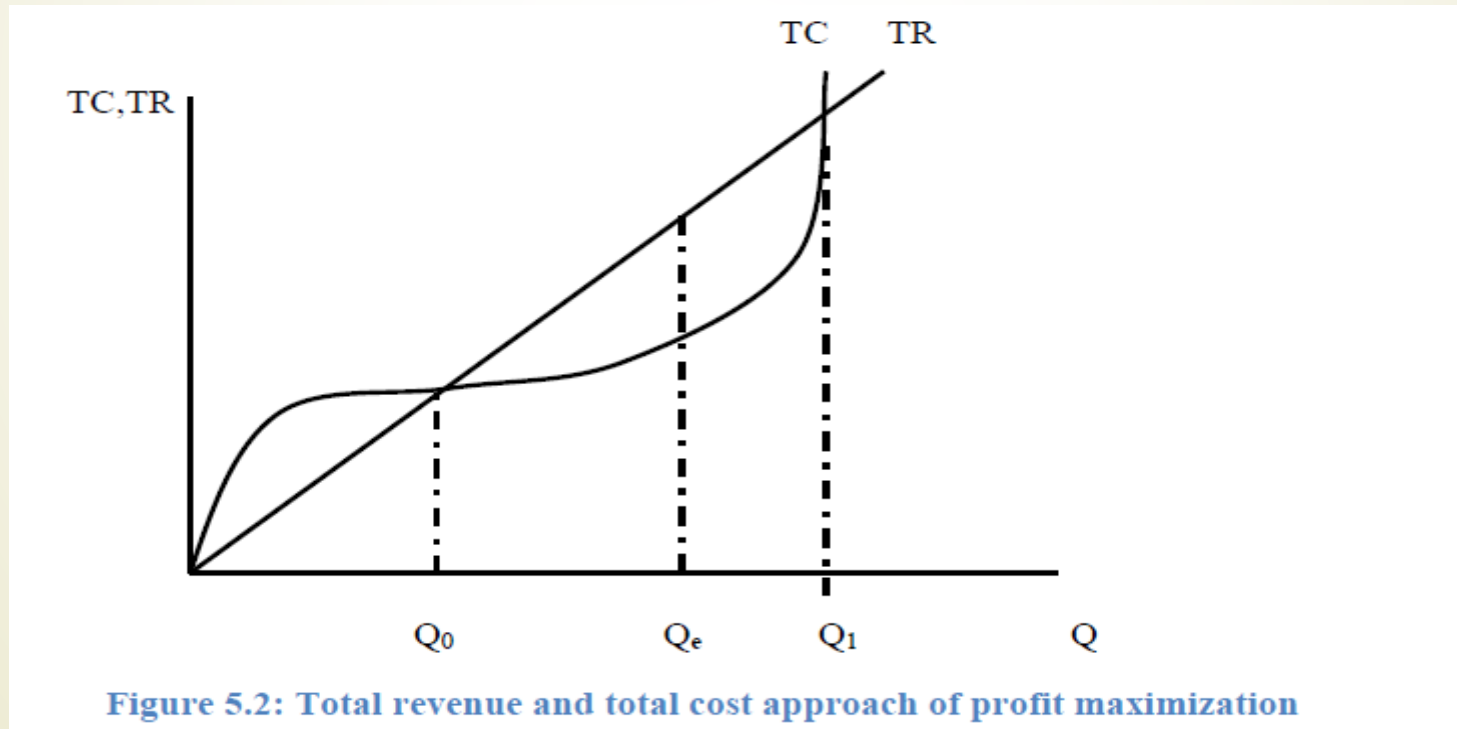
$$= \frac{P \Delta Q}{\Delta Q} \text{ (because } P \text{ is constant)} \Rightarrow \boxed{MR = P}$$

Short run equilibrium of the firm (Cont...)

- 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, 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.

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.



Total Approach (TR-TC approach)

Quantity (Q)	Total Revenue (TR)	Total Cost (TC)	Total Profit (Tr)
0	\$0	\$62	-\$62
10	\$40	\$90	-\$50
20	\$80	\$110	-\$30
30	\$120	\$126	-\$6
40	\$160	\$138	\$22
50	\$200	\$150	\$50
60	\$240	\$165	\$75
70	\$280	\$190	\$90
80	\$320	\$230	\$90
90	\$360	\$296	\$64
100	\$400	\$400	\$0
110	\$440	\$550	-\$110
120	\$480	\$715	-\$235

Table 7.1: Total Revenue, Total Cost, and Total Profit

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 short-run total profits at the output when the following two conditions are met:
 - $MR = MC$
 - The slope of MC is greater than slope of MR; or MC is rising). (that is, slope of MC is greater than zero).

Marginal Approach (MR-MC) (Cont...)

Mathematically, $\Pi = TR - TC$

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

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

- $MR - MC = 0$
- $MR = MC$ First order condition (FOC)

$$\frac{d^2\Pi}{dQ^2} < 0$$

Marginal Approach (MR-MC) (Cont...)

The $\frac{d^2\pi}{dQ^2} = \frac{d^2TR}{dQ^2} - \frac{d^2TC}{dQ^2} < 0$ second order condition of profit maximization is

That is,

$$\Rightarrow \frac{dMR}{dQ} - \frac{dMC}{dQ} < 0$$

$$\Rightarrow \frac{dMR}{dQ} < \frac{dMC}{dQ}$$

$$\Rightarrow \frac{dMC}{dQ} > \frac{dMR}{dQ} \quad \text{where } \frac{dMR}{dQ} = \text{slope of MR} \text{ and } \frac{dMC}{dQ} = \text{slope of MC}$$

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

$\Rightarrow$ **Slope of MC > 0** (because the slope of MR is zero)

Marginal Approach (MR-MC) (Cont...)

Graphically, the marginal approach can be shown as follows.

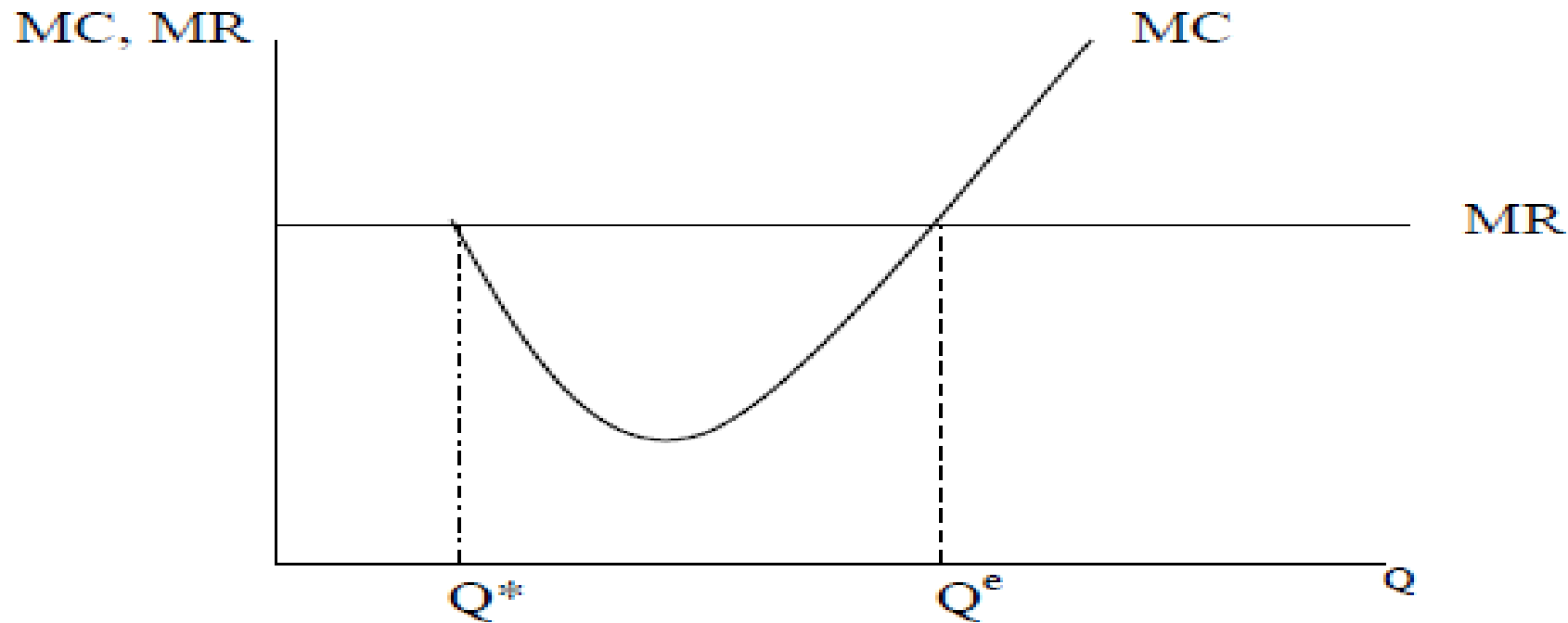


Figure 5.3: *Marginal approach of profit maximization*

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.

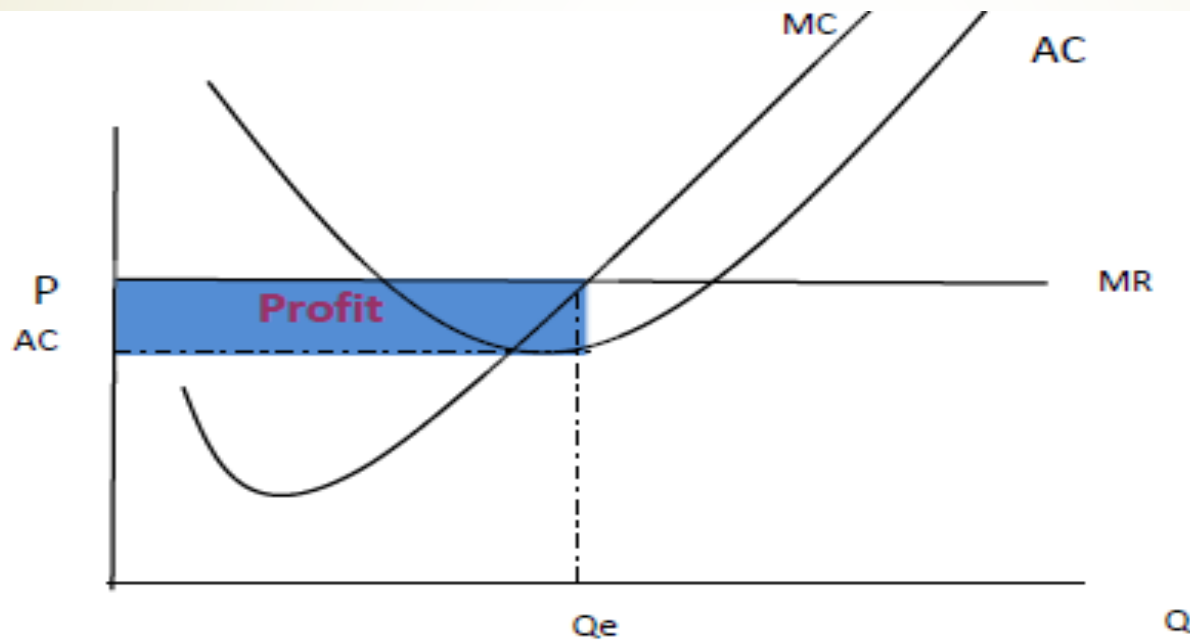


Figure 5.4: Economic profit a firm

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.

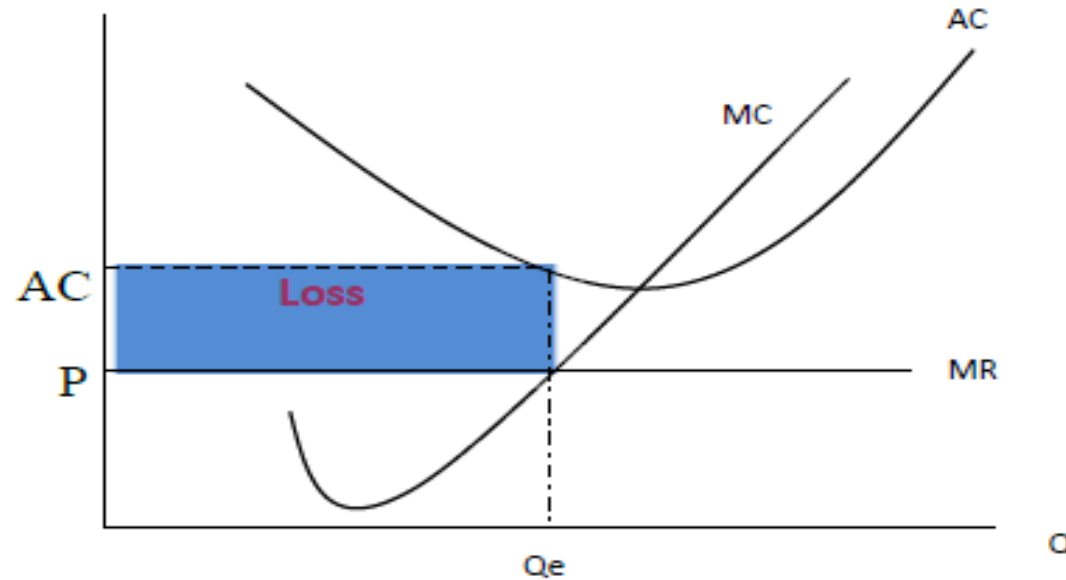


Figure 5.6: A firm incurring a loss

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.

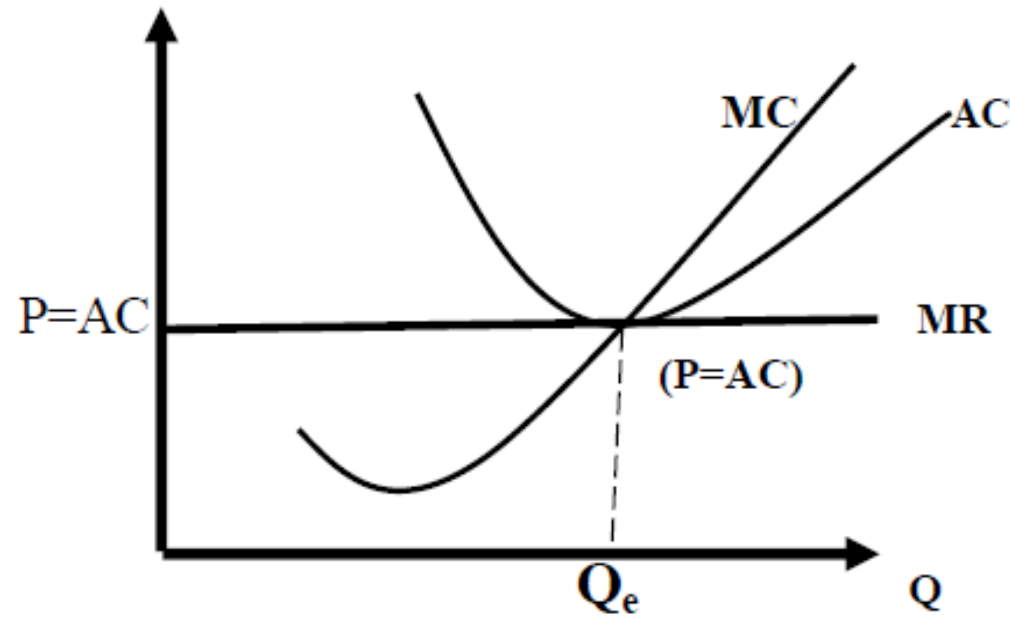


Figure 5.7: A firm earning a normal profit

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.
- 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.

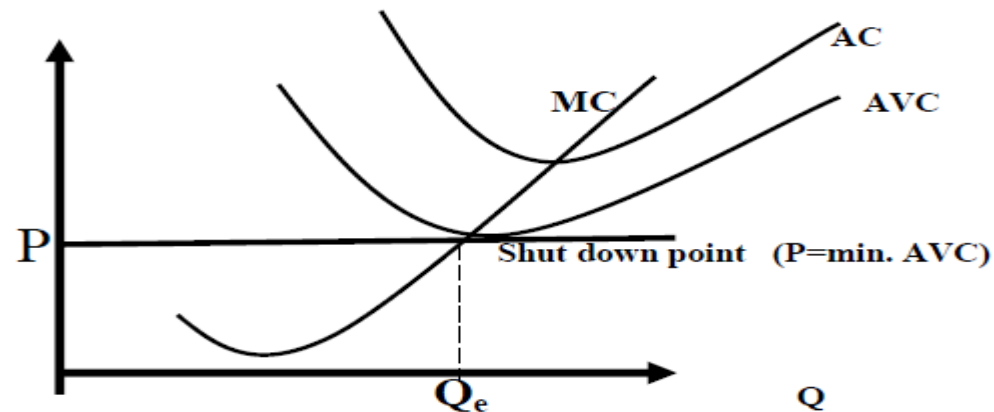


Figure 5.8: A shut down point

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

$MC = MR$ &

MC is rising

Thus, we have to find MC & MR first

• MR in a perfectly competitive market is equal to the market price. Hence, $MR = 10$

Alternatively, $MR = \frac{dTR}{dq}$ where $TR = P \cdot q = 10q$ Thus, $MR = \frac{d(10q)}{dq} = 10$

$$MC = \frac{dTC}{dq} = 10 - 8q + 3q^2$$

Solution:

- ◆ To determine equilibrium output just equate MC& MR

And then solve for q.

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

$$- 8q + 3q^2 = 0$$

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

$$q = 0 \text{ or } q = 8/3$$

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.

Solution:

- ▶ 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 implies 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 $q = 8/3$

Solution:

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.

$$TR = \text{Price} * \text{Equilibrium Output}$$

$$= \$ 10 * 8/3 = \$ 80/3$$

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

$$TC = 2 + 10 (8/3) - 4 (8/3)^2 + (8/3)^3 \approx 19.18$$

Thus the equilibrium (maximum) profit is

$$\Pi = TR - TC$$

$$= 26.67 - 19.18 = \$ 7.48$$

Solution:

- 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. That is: $\frac{dAVC}{dq} = 0$

Given the TC function: $TC = 2 + 10q - 4q^2 + q^3$, $TVC = 10q - 4q^2 + q^3$

$$AVC = \frac{TVC}{q} = \frac{10q - 4q^2 + q^3}{q} = 10 - 4q + q^2$$

$$\frac{dAVC}{dq} = 0 \rightarrow \frac{d(10 - 4q + q^2)}{dq} = 0$$

$$= -4 + 2q = 0$$

→ $q = 2$ i.e. AVC is minimum when output is equal to 2 units.

The minimum AVC is obtained by substituting 2 for q in the AVC function i.e.,
 $\text{Min AVC} = 10 - 4(2) + 2^2 = 6$. Thus, to stay in the market the firm should get a minimum price of \$ 6.

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 of the industry equals the 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.

Monopoly Market

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**; 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.

Monopoly Market (Cont..)

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**.

Sources of Monopoly

For a monopoly to emerge and survive there are 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, telegraph, telephone services, radio and TV services, generation and distribution of electricity, rail ways, airlines etc... are public monopolies.

Sources of Monopoly (Cont..)

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. (Eg. Coltan from DRC)

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**.

Sources of Monopoly (Cont..)

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.**

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**.
- The monopoly element results from **differentiated products**, i.e. similar but not identical products.
- A seller of a differentiated product **has limited monopoly power over customers who prefer his product to others**.
- His monopoly is **limited** because the difference between his product and others are small enough that they are close substitutes for one another.

Monopolistically competitive market

- ▶ **Examples include** stores that sell **different styles of clothing**; **restaurants or grocery stores that sell a variety of food**; and **even products like golf balls or beer** that may be at least somewhat similar but differ in public perception **because of advertising and brand names**.
- ▶ There are very large number of restaurants in Ethiopia.
- ▶ When products are **distinctive**, each firm has a mini-monopoly on its particular style or flavor or brand name.
- ▶ However, firms producing such products must also compete with other styles and flavors and brand names.

Characteristics of Monopolistically competitive market

(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**.

- There is a variety of the same product.
- The differentiation of the product could be real (eg. quality) or fancied (e.g. difference in packing).
- A firm can try to make its products different from those of its competitors in several ways:
 - **physical aspects of the product**, **location from which it sells the product**, **intangible aspects of the product**, and **perceptions of the product**. The difference could be in style, brand name, in quality, or others.

We call products that are distinctive in one of these ways **differentiated products**.

Characteristics of Monopolistically competitive market(Cont..)

Physical aspects of a product include all the phrases you hear in advertisements:

- ▶ unbreakable bottle, nonstick surface, freezer-to-microwave, non-shrink, extra spicy, newly redesigned for your comfort.

A firm's location can also create a difference between producers.

- ▶ For example, a gas station located at a heavily traveled intersection can probably sell more gas, because more cars drive by that corner.
- ▶ A supplier to an automobile manufacturer may find that it is an advantage to locate close to the car factory.

Characteristics of Monopolistically competitive market (Cont)

Intangible aspects can differentiate a product, too.

- Some intangible aspects may be promises like a guarantee of satisfaction or money back, a reputation for high quality, services like free delivery, or offering a loan to purchase the product.

Finally, product differentiation may occur in the minds of buyers.

- For example, many people could not tell the difference in taste between common varieties of ketchup or mayonnaise if they were blindfolded but, because of past habits and advertising, they have strong preferences for certain brands.
- **Advertising** can play a role in shaping these intangible preferences.

Characteristics of Monopolistically competitive market (Cont.)

- The **concept of differentiated products** is closely related to the degree of variety that is available.
- If everyone in the economy wore **only blue jeans**, ate **only white bread**, and **drank only tap water**, then the markets for clothing, food, and drink would be much closer to **perfectly competitive**.
- The variety of styles, flavors, locations, and characteristics creates product differentiation and monopolistic competition.

Characteristics of Monopolistically competitive market

- (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.

Entry and Exit

- ▶ If one monopolistic competitor earns positive economic profits, other firms will be tempted to enter the market.
- ▶ **The entry of other firms into the same general market** (like gas, restaurants, or detergent) **shifts the demand curve that a monopolistically competitive firm faces.**
- ▶ **As more firms enter the market, the quantity demanded at a given price for any particular firm will decline, and the firm's perceived demand curve will shift to the left.**
- ▶ As a firm's perceived demand curve shifts to the left, its marginal revenue curve will shift to the left, too. The shift in marginal revenue will change the profit-maximizing quantity that the firm chooses to produce.

Entry and Exit (Cont..)

- ▶ As long as the firm is earning positive economic profits, new competitors will continue to enter the market, reducing the original firm's demand and marginal revenue curves.
- ▶ When price is equal to average cost, economic profits are zero.
- ▶ Thus, although a monopolistically competitive firm may earn positive economic profits in the short term, the process of new entry will drive down economic profits to zero in the long run.

Entry and Exit (Cont..)

- ▶ Remember that **zero economic profit is not equivalent to zero accounting profit.**
- ▶ A zero economic profit means the firm's accounting profit is equal to what its resources could earn in their next best use.
- ▶ We can also have the reverse situation, where a monopolistically competitive firm is originally losing money.
- ▶ The economic losses lead to firms exiting, which will result in increased demand for this particular firm, and consequently lower losses.
- ▶ **Firms exit up to the point where there are no more losses in this market,** for example when the demand curve touches the average cost curve.

Characteristics of Monopolistically competitive market (Cont..)

(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.

The Demand in the Market Structures

- A monopolistically competitive firm perceives a demand for its goods that is an **intermediate case between monopoly and competition**.
- The demand curve that a perfectly competitive firm faces is **perfectly elastic or flat**, because the perfectly competitive firm can sell any quantity it wishes at the prevailing market price.
- In contrast, the demand curve, as faced by a monopolist, is the **market demand curve, since a monopolist is the only firm in the market**, and hence is downward sloping.

The Demand in the Market Structures

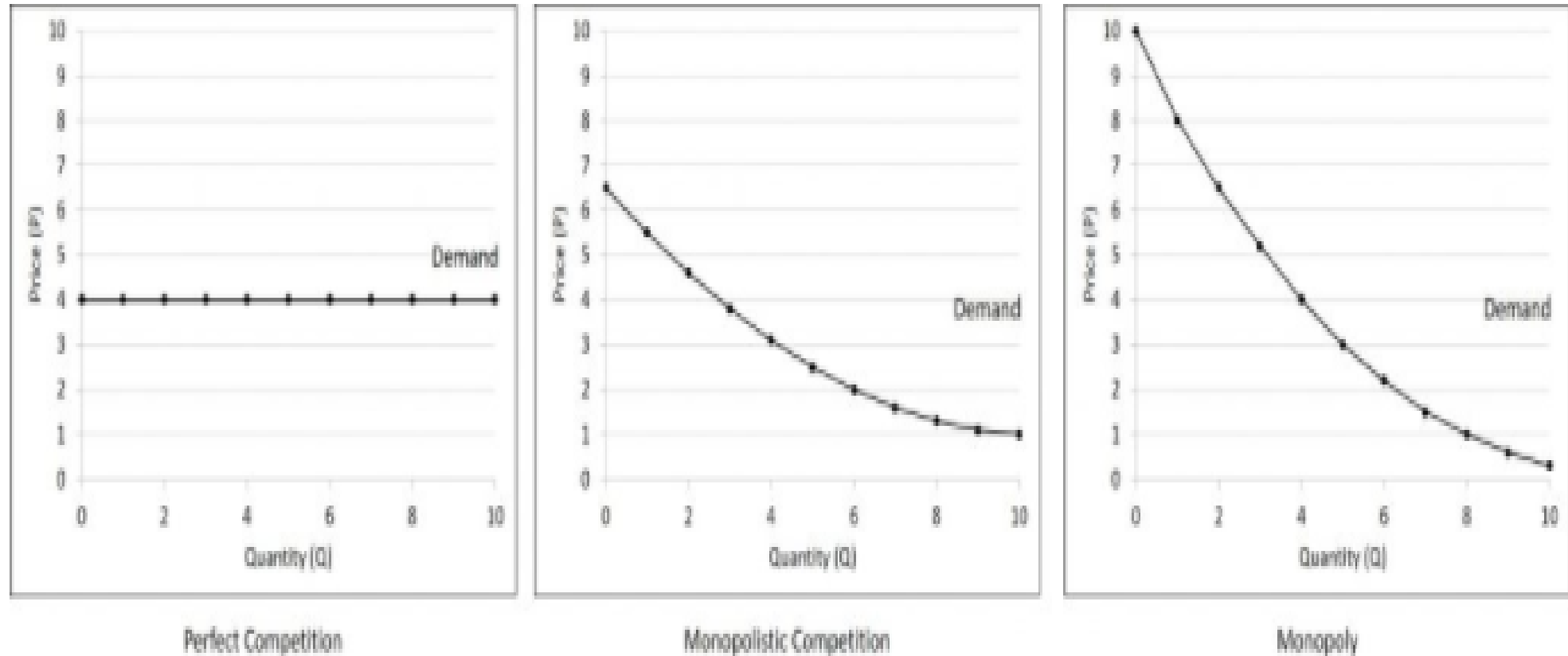


Figure 9.1: Three Demand Curves

The Demand in the Market Structures

- ▶ The **demand curve as a monopolistic competitor** faces **is not flat**, but rather downward-sloping, which means that the **monopolistic competitor can raise its price without losing all of its customers or lower the price and gain more customers.**
- ▶ Since there are substitutes, **the demand curve facing a monopolistically competitive firm is more elastic than that of a monopoly** where there are no close substitutes.

The Demand in the Market Structures

- If a **monopolist raises its price**, some consumers will choose not to purchase its product—but they will then need to **buy a completely different product**.
- However, when a **monopolistic competitor raises its price**, some consumers will choose not to purchase the product at all, **but others will choose to buy a similar product from another firm**.
- If a monopolistic competitor raises its price, **it will not lose as many customers as would a perfectly competitive firm**, but it will lose more customers than would a monopoly that raised its prices.

Why do Oligopolies Exist?

- ▶ Many purchases that individuals make at the retail level are produced in markets that are neither perfectly competitive, monopolies, nor monopolistically competitive. Rather, they are oligopolies.
- ▶ Oligopoly arises when a small number of large firms have all or most of the sales in an industry.
 - ▶ Examples of oligopoly abound and include the auto industry, cable television, and commercial air travel.
- ▶ Oligopolistic firms are like cats in a bag.

Why do Oligopolies Exist?

- ▶ They can either **scratch each other to pieces** or **cuddle up and get comfortable with one another**.
- ▶ **If oligopolists compete hard**, they may end up acting very much like perfect competitors, driving down costs and leading to zero profits for all.
- ▶ **If oligopolists collude with each other**, they may effectively act like a monopoly and succeed in pushing up prices and earning consistently high levels of profit.
- ▶ We typically characterize oligopolies by **mutual interdependence** where various decisions such as **output, price, and advertising** depend on other firm(s)' decisions.
- ▶ Analyzing the choices of oligopolistic firms about pricing and quantity produced involves considering the pros and cons of competition versus collusion at a given point in time.

Oligopoly Market

A combination of **the barriers to entry that create monopolies** and **the product differentiation that characterizes monopolistic competition** can create the setting for an oligopoly. This is a market structure characterized by:

- **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.
- **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.
- **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.

Oligopoly Market (Cont..)

- **Products may be homogenous or differentiated.** If the product is homogeneous, we have a *pure oligopoly*. If the product is differentiated, it will be a *differentiated oligopoly*.
- **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*.

Summary

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

Review questions

- ▶ Why is there no market supply curve under conditions of monopoly?
- ▶ How is the perceived demand curve for a monopolistically competitive firm different from the perceived demand curve for a monopoly or a perfectly competitive firm?
- ▶ Will the firms in an oligopoly act more like a monopoly or more like competitors?