

Unit: 1-9

Course Code: 9301

Credit Hours: 3

AIOU

PRINCIPLES OF MICROECONOMICS

B.S. Economics (4 Years)



ALLAMA IQBAL OPEN UNIVERSITY

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Study Guide

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**DEPARTMENT OF ECONOMICS
FACULTY OF SOCIAL SCIENCES AND HUMANITIES
ALLAMA IQBAL OPEN UNIVERSITY
ISLAMABAD**

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1. INTRODUCTION TO THE COURSE

Principles of Microeconomics is a basic course in microeconomic theory. It is concerned with the behavior of individual economic units and their interactions. It consists of a set of theories with one aim: to help us in understanding the process by which scarce resources are allocated among alternative uses and the role of prices and markets in this process. It is essentially a philosophical inquiry into the process of resource allocation. As the Principles of Microeconomics provides some basic tools of analysis, it is one of the most important courses on the subject of Economics.

This course will provide the base for advance courses on Microeconomics. The principle objective pursued in this course has been to provide a concise and integrated treatment of basic concepts of microeconomic theory. The subject matter handled in this guide may be classified into three broad sub-groups of Microeconomics: especially, Basic concepts and the theory of consumer behavior, the theory of production, costs and the market structure. There are nine units in total. First unit is devoted to basic concepts of Economics. Rest of the units interlinked to each other. In each of three broad areas tackled, the format adopted is as follow:

Unit two covers the theory of consumer behavior in a reasonably comprehensive manner. Unit three presents market demand and supply curve and its characteristics. Unit four consists of basic ideas about elasticity of demand and supply. In unit five the concepts of exchange and efficiency will be discussed. Units six and seven are consists of theory of production and theory of cost respectively. Unit eight and nine present a comprehensive account of theories of the firm and market structure analysis which is our third area of study. Unit eight offers a detailed over-view of theory of price and output in perfectly competitive market and unit nine discussed the concepts of monopoly, monopolistic competition, oligopoly and game theory.

The Study Guide in your hand provides you the introduction of each Unit followed by the objectives of the Unit. In each Unit throughout the Study Guide, we have given self-assessment questions. They are meant to assist your comprehension after reading the Unit, the useful reading list is also provided for each Unit.

This is an introductory three credit hours course on Microeconomics, specially designed for BS Economics students learning through distance education system of the Allama Iqbal Open University. We hope that you will find this course useful and interesting one. Suggestions for the improvement of course as well as the Study Guide will be highly appreciated.

2. OBJECTIVES OF THE COURSE

The main objectives of the course are:

1. to explain the basic concepts and familiarize with the methodology of microeconomics.
2. to understand the consumer theory and to derive individual and market demand curve, the subject matter of consumer theory.
3. to comprehend the production and cost theory and to derive market supply curve which is the aim of the production and cost theory.
4. to examine the behavior of firm and market structure and to analyze the price and output decisions making under various market structures.

3. STRUCTURE OF THE COURSE

The course “Principles of Microeconomics” has been structured to make it as easy as possible for you to do the required work. Being three credit hours course, it consists of nine units, one unit comprise of the study work of two weeks, and thus the total study period will be of eighteen weeks.

We have organized this course to enable you to acquire the skill of self-learning. For each unit an introduction is given to help you to develop an objective analysis of the major and sub-themes discussed in the prescribed reading material. Besides this, objectives of each unit are very specifically laid down to facilitate in developing a clear logical analytical approach. Prescribed reading material (Compulsory and Additional Readings) have also been classified. After listing “Required Reading”. We have given you a few Self-Assessment Questions. These questions are not only meant to facilitate you in understanding the required readings but also provide you an opportunity to assess yourself that how much you have learned. Since the course work of one unit will include studying the prescribed reading material and carrying out the various self-assessment questions and assignments, you are required to spend two weeks on each unit.

3.1 How to Use Reading Material?

As this is a distance education course, we have organized the required course work in the following manner to help you in evolving a self-learning process in absence of a formal class room teaching.

- i) A detailed course Introduction
- ii) Introduction to each Unit
- iii) After listing ‘Required Readings’, we have given you a few Self-Assessment Questions on each topic or theme. These questions are not only meant to facilitate you in understanding the required readings but also to provide you an opportunity to assess yourself as to how far you have learned.
- iv) To help you in answering the Self-Assessment Questions (SAQs), key ideas and formulas are given. These points will not only lead you to a better understanding but will also suggest a direction in which we expect you to think and analyze. You can, of course, think of many more points.
- v) Although, you choose your own way of studying the required reading material, you are advised to follow the steps which are shown in the study chart.

4. PRESCRIBED READINGS

1. Mankiw. (2008). *Principles of Economics* (7th). Southwest Publishers
2. Miller, R. L. (2005). *Economics Today* (14th). Addison Wesley
3. Samuelson Nordons. (2004). *Economics* (18th). McGraw-Hill
4. McConnell and Bruce. (2006). *Principles of Economics* (17th). McGraw-Hill.

Unit-1

INTRODUCTION TO ECONOMICS

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1.1 Objectives

After studying this unit, you will be able to:

1. Know the definition of economics and explanation of economics by different economists.
2. Understand that How economic agents, consumer, producer and government make decisions under the scarcity of resources to fulfill unlimited wants?
3. Realize that how scarce resources are distributed to produce goods and services?
4. Describe the types of economics.
5. Modeling the economics theories.
6. Draw graphical representation of the economic variables.
7. Explain the theoretical and policy economics work.

1.2 Major Topics

- Choice in a World of Scarcity
- The No-Free-Lunch Principle
- The Cost-Benefit Principle
- Reservation Prices
- Economic Surplus
- Opportunity Cost
- The Role of Economic Models
- Micro Economic Versus Macro Economics
- Economic Naturalism
- Positive Versus Normative Economics

1.3 Summary of Units

Economics examines how individuals, institutions and society make choices under conditions of scarcity. The economic perspective stresses (a) resource scarcity and the necessity of making choices, (b) the assumption of purposeful (or rational) behavior and (c) comparisons of marginal benefit and marginal cost.

The basic economic questions which each society answers by its own are what to produce? How to produce? And for whom it is produced? In choosing among alternatives, people incur opportunity costs—the value of their next-best option. Economists use the scientific method to establish economic theories—cause-effect generalizations about the economic behavior of individuals and institutions.

Microeconomics focuses on specific decision-making units of the economy, macroeconomics examines the economy as a whole. Positive economics deals with factual statements (“what is”); normative economics involves value judgments (“what ought to be”).

1.4 Introduction

The basic economic problem that we're concerned about is this: Needs and wants are unlimited, but resources are scarce. What are resources? Resources are otherwise known as the factors of production and they include land, labor, capital and entrepreneurship everything it takes to produce the stuff that you and I buy on a regular basis in our economy. Mankiw defines economics as it is the study of how society manages its scarce resources? Hedrick's definition is how society chooses to allocate its scarce resources among competing demands to improve human welfare? Addison Wesley explains it as a science that deals with the allocation, or use, of scarce resources for the purpose of fulfilling society's needs and wants. A good definition of economics is the Study of choice under conditions of scarcity.

1.5 Scarcity and Choice

So, let's get back to this word, **scarcity**. What does it really mean when a resource is scarce? Scarcity, in general terms, means that the demand for something is much greater than the supply, or there is not enough money to buy it. The exact definition in economics is that there are insufficient resources to satisfy everyone's needs and wants. Whether you are talking about oil, from which we get the gasoline that powers most of our cars, or corn, even seats in a movie theater, there is not enough for everyone to get what they want at a zero price. *You know something is scarce if you try to offer it for free, and you don't have enough of it for everyone who stands in line to get it.*

So, how does a society decide who gets what? Producers charge a price for it. That way, whoever values it the most will pay the most for it. This is how scarce resources are allocated or divided up and distributed efficiently in our economy. From our definition of economics, we can easily see why economists view the world through the lens of scarcity. Scarce economic resources mean limited goods and services. Scarcity restricts options and demands choices. Because we “cannot have it all,” we must decide what we will have and what we must forgo.

At the core of economics is the idea that “there is no free lunch.” You may be treated to lunch, making it “free” from your perspective, but someone bears a cost. Because all resources are either privately or collectively owned by members of society, ultimately society bears the cost. Scarce inputs of land, equipment, farm labor, the labor of cooks and waiters and managerial talent are required. Because society could have used these resources to produce something else, it sacrifices those other goods and services in making the lunch available. Economists call such sacrifices **opportunity costs**: To obtain more of one thing, society forgoes the opportunity of getting the next best thing. That sacrifice is the opportunity cost of the choice.

If resources were unlimited, we could all have whatever we want. But as the scarcity-forces-tradeoff principle reminds us, resources are limited. Just as scarcity forces individuals to make choices about what to have and what to give up, it also forces societies to make choices. The larger and more advanced a society is, the more numerous and complex these choices may be. In the end, however, these choices boil down to three basic questions.

1.5.1 The Three Fundamental Economic Questions

In deciding how to allocate limited resources, every society, from a tribe of people living in the desert to a modern industrial nation like the United States must answer three fundamental economic questions. Each society answers these questions differently, depending on its priorities. The questions, however, are the same for everybody.

1.5.1.1 What goods and services are to be produced? Because of scarcity, no society can produce everything its people might want. This raises the question: What goods and services are most wanted and needed? For example, should the Pakistan conserve wilderness areas for recreational purposes or open them up to logging or oil exploration? Should the steel industry produce more car parts or more beams for skyscrapers? What do consumers want or need more: sneakers or diapers? Teachers or dentists? Books or video games? With millions of possible

products and many different interests competing for the same limited resources, the choices seem endless.

Even the simplest societies face difficult choices. Vanuatu is a nation of several small islands in the South Pacific. Vanuatu's economy has long depended on agriculture, but tourism is growing in importance. The question looming over Vanuatu's people is about what will benefit them more putting more resources into growing food, or expanding tourist services? As a society, Vanuatians must decide.

1.5.1.2 How are goods and services to be produced? The answer to this question is not as simple as it may seem. You know that goods and services are produced by combining the factors of production: land, labor, and capital. But how is this done, exactly, and in what combination? Consider wheat production. How should land, labor, and capital be used to raise this essential grain? Should wheat be grown mainly on giant factory farms? That is the way an American agribusiness raises wheat. But in a different society say, in France wheat is more likely to be grown on smaller family farms. Think about another example: hats. Should hats be crafted individually, by hand, or in factories by machines? Each society has to decide for itself the answer to such questions.

At this point, you are probably wondering why a society as a whole has to make decisions about hats. Don't hat manufacturers decide how to produce headwear? In the United States, they do. But that is because our society gives them that choice. Not all societies work this way.

1.5.1.3 For whom are goods and services to be produced? In other words, who gets what? This last question is a difficult one, because it inevitably raises the slippery question of fairness: who *deserves* what? Again, every society finds its own answer. Goods and services are distributed in a variety of ways. The ability to pay is the approach most of us know best. It essentially says that anyone who can afford to buy a hat can have one.

Another approach is equal distribution. This approach was adopted by the Soviet Union before its collapse. Unfortunately, goods were in such short supply that lines formed for everything. Instead of distributing goods equally, the system favored those who got in line early and had time to wait. As a result, some people got more than their share, while others got nothing.

This brings us to yet another form of distribution: first come, first served. As in the Soviet Union, this approach often prevails when quantities are limited. Goods such as concert and theater tickets are usually sold this way. In addition, there is

distribution according to need. A soup kitchen does this when it provides meals to the homeless. So, does a public school that provides classroom aides for special education students.

1.6 The Cost-Benefit Principle

The economic perspective focuses largely on **marginal analysis**—comparisons of marginal benefits and marginal costs, usually for decision making. To economists, “marginal” means “extra,” “additional,” or “a change in.” Most choices or decisions involve changes in the status quo, meaning the existing state of affairs.

Should you attend school for another year? Should you study an extra hour for an exam? Should you supersize your fries? Similarly, should a business expand or reduce its output? Should government increase or decrease its funding for a missile defense system?

Each option involves marginal benefits and, because of scarce resources, marginal costs. In making choices rationally, the decision maker must compare those two amounts. Example: You and your fiancée are shopping for an engagement ring. Should you buy a $\frac{1}{2}$ -carat diamond, a $\frac{5}{8}$ -carat diamond, a $\frac{3}{4}$ -carat diamond, a 1-carat diamond, or something even larger? The marginal cost of a larger-size diamond is the added expense beyond the cost of the smaller-size diamond. The marginal benefit is the perceived lifetime pleasure (utility) from the larger-size stone. If the marginal benefit of the larger diamond exceeds its marginal cost (and you can afford it), buy the larger stone. But if the marginal cost is more than the marginal benefit, buy the smaller diamond instead, even if you can afford the larger stone!

In a world of scarcity, the decision to obtain the marginal benefit associated with some specific option always includes the marginal cost of forgoing something else. The money spent on the larger-size diamond means forgoing some other product. An opportunity cost, the value of the next best thing forgone is always resent whenever a choice is made.

1.7 Theories, Principles, and Models

Like the physical and life sciences, as well as other social sciences, economics relies on the **scientific method**. That procedure consists of several elements:

- Observing real-world behavior and outcomes.
- Based on those observations, formulating a possible explanation of cause and effect (hypothesis).

- Testing this explanation by comparing the outcomes of specific events to the outcome predicted by the hypothesis.
- Accepting, rejecting, and modifying the hypothesis, based on these comparisons.
- Continuing to test the hypothesis against the facts. As favorable results accumulate, the hypothesis evolves into a theory. A very well-tested and widely accepted theory is referred to as an economic law or an **economic principle**—a statement about economic behavior or the economy that enables prediction of the probable effects of certain actions. Combinations of such laws or principles are incorporated into models, which are simplified representations of how something works, such as a market or segment of the economy.

Economists develop theories of the behavior of individuals (consumers, workers) and institutions (businesses, governments) engaged in the production, exchange, and consumption of goods and services. Theories, principles, and models are “purposeful simplifications.” The full scope of economic reality itself is too complex and bewildering to be understood as a whole. In developing theories, principles and models economists remove the clutter.

Economic principles and models are highly useful in analyzing economic behavior and understanding how the economy operates. They are the tools for ascertaining cause and effect (or action and outcome) within the economic system. Good theories do a good job of explaining and predicting. They are supported by facts concerning how individuals and institutions actually behave in producing, exchanging, and consuming goods and services. There are some other things you should know about economic principles.

1.8 Microeconomics and Macroeconomics

Economists develop economic principles and models at two levels.

1.8.1 Microeconomics

Microeconomics is the part of economics concerned with individual units such as a person, a household, a firm or an industry. At this level of analysis, the economist observes the details of an economic unit or very small segment of the economy. In microeconomics we look at decision making by individual customers, workers, households and business firms. We measure the price of a specific product, the number of workers employed by a single firm, the revenue or income of a particular firm or household or the expenditures of a specific firm, government entity or family. In microeconomics, we examine the sand, rock, shells and not the beach.

1.8.2 Macroeconomics

Macroeconomics examines either the economy as a whole or its basic subdivisions or aggregates, such as the government, household, and business sectors. An **aggregate** is a collection of specific economic units treated as if they were one unit. Therefore, we might lump together the millions of consumers in the Pakistan economy and treat them as if they were one huge unit called “consumers.” In using aggregates, macroeconomics seeks to obtain an overview, or general outline, of the structure of the economy and the relationships of its major aggregates. Macroeconomics speaks of such economic measures as total output, total employment, total income, aggregate expenditures and the general level of prices in analyzing various economic problems. No or very little attention is given to specific units making up the various aggregates. Figuratively, macroeconomics looks at the beach, not the pieces of sand, the rocks and the shells.

The micro–macro distinction does not mean that economics is so highly compartmentalized that every topic can be readily labeled as either micro or macro; many topics and subdivisions of economics are rooted in both. Example: While the problem of unemployment is usually treated as a macroeconomic topic (because unemployment relates to aggregate production), economists recognize that the decisions made by individual workers on how long to search for jobs and the way specific labor markets encourage or impede hiring are also critical in determining the unemployment rate.

1.9 Positive and Normative Economics

Both microeconomics and macroeconomics contain elements of positive economics and normative economics.

Positive economics focuses on facts and cause-and-effect relationships. It includes description, theory development and theory testing (theoretical economics). Positive economics avoids value judgments, tries to establish scientific statements about economic behavior, and deals with what the economy is actually like. Such scientific-based analysis is critical to good policy analysis.

Economic policy, on the other hand, involves **normative economics**, which incorporates value judgments about what the economy should be like or what particular policy actions should be recommended to achieve a desirable goal (policy economics). Normative economics looks at the desirability of certain aspects of the economy. It underlies expressions of support for particular economic policies. Positive economics concerns *what is*, whereas normative economics embodies subjective feelings about *what ought to be*.

1.10 Self-Assessment Questions

Q. 1 What is the scarcity and how does it lead to make decision among different alternatives?

Q. 2 Cite three examples of recent decisions that you made in which you, at least implicitly, weighed marginal cost and marginal benefit.

Point to be noted;

1. Make a list of the problems
2. Mark the opportunities and their cost and benefit
3. Analyze the cost and benefit under the principle
4. Choose the opportunity with benefit is greater than cost

Q. 3 Indicate whether each of the following statements applies to microeconomics or macroeconomics?

- a. The unemployment rate in the Pakistan was 5.9 percent in 2017.
- b. Pakistan output, adjusted for inflation, grew by 3.4 percent in 2018.
- c. A Pakistan software firm discharged 15 workers last month and transferred the work to India.
- d. An unexpected freeze in Murree reduced the citrus crop and caused the price of oranges to rise.

Q. 4 Make hypothetical relationship between any two economic variables and present them into a graph.

Point to be noted;

1. Took date of household consumption and their income
2. Put the data on graph and mark X-axis and Y-axis
3. Join the consumption against each of the value of the income
4. Then explain that whether the graph is linear or nonlinear or/and positive or negative sloped

Q. 5 State (a) a positive economic statement of your choice, and then (b) a normative economic statement relating to your first statement.

1.11 Suggested Readings

1. Mankiw. (2008). *Principles of Economics* (7th). Southwest Publishers
2. Miller, R. L. (2005). *Economics Today* (14th). Addison Wesley
3. Samuelson Nordons. (2004). *Economics* (18th). McGraw-Hill
4. McConnell and Bruce. (2006). *Principles of Economics* (17th). McGraw-Hill.

Unit-2

CONSUMER BEHAVIOUR

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2.1 Objectives

After studying this unit, you will be able to:

1. Understand the meaning of utility and its different aspects.
2. Explain the consumer behavior under ordinal and cardinal approaches.
3. Describe law of diminishing marginal utility.
4. Maximize total utility with given level of income.
5. Understand the features of IC and budget line.
6. Recognize the human wants and their types.
7. How consumers fulfill their desires.

2.2 Major Topics

- Cardinal Approach to Utility Analysis,
- Marginal Utility,
- Law of Diminishing Marginal Utility,
- Law of Equi-Marginal Utility,
- Consumer Equilibrium
- Ordinal Approach of Consumer Behavior,
- Indifference Curves, Definition and Features of Indifference Curves,
- Budget Line,
- Consumer Equilibrium,
- Comparison between Cardinal and Ordinal Approaches.

2.3 Summary of the Unit

Human wants drive of the economic activities which gets wealth as a reward and this wealth is used to satisfy these wants. Human wants are endless and recurring. The satisfaction one gets by using goods and services is known as utility. Law of diminishing marginal utility is natural law which states that the more units of a commodity leads to less importance of that commodity for the consumer. Law of equi marginal utility guides the consumer to distribute his/her income to maximize the total utility. If individuals obey certain basic behavioral postulates in their preferences among goods, they will be able to rank all commodity bundles and that ranking can be represented by a utility function. In making choices, individuals will behave as if they were maximizing this function. The negative of the slope of an indifference curve is defined to be the marginal rate of substitution (MRS). This shows the rate at which an individual would willingly give up an amount of one good (y) if he or she were compensated by receiving one more unit of another good (x). The assumption that the MRS decreases as x is substituted for y in consumption is consistent with the notion that individuals prefer some balance in their consumption choices.

2.4 Utility

The “Utility” in Economics means the satisfaction derived or expected to be derived from the consumption of goods and services. So, utility is the quality/feature of a good or service which satisfies certain human wants. It is a subjective satisfaction derived from consumption, it means it can vary from person to person. e.g. eyeglasses can have greater utility for a person having poor eyesight, while no utility for a person having clear vision.

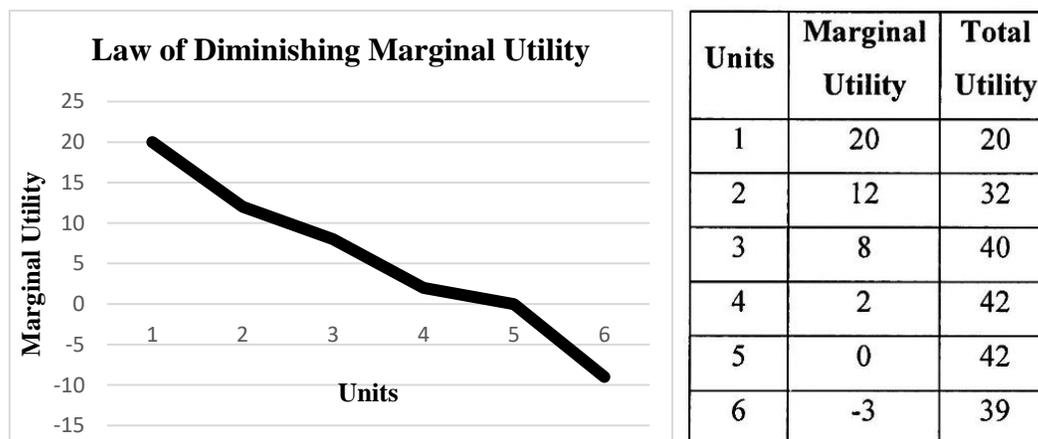
2.5 Cardinal Approach

Cardinal approach is the approach where the satisfaction derived by the consumers from the consumption of good or service can be measured numerically. There are basically two laws in this approach.

2.5.1 Law of Diminishing Marginal Utility

The law of diminishing marginal utility describes a familiar and fundamental tendency of human behavior. The law of diminishing marginal utility states that: “As a consumer consumes more and more units of a specific commodity, the utility from the successive units goes on diminishing”.

In the figure, along horizontal axis we measure units of a commodity consumed and along vertical axis is shown the marginal utility derived from them. The marginal utility of the first glass of water is called initial utility. It is equal to 20 units. The MU of the 5th glass of water is zero. It is called satiety point. The MU of the 6th glass of water is negative (-3). The MU curve here lies below the OX axis. The utility curve MM' falls left from left down to the right showing that the marginal utility of the success units of glasses of water is falling:



2.5.1.1 Assumptions of Law of Diminishing Marginal Utility:

The law of diminishing marginal utility is true under certain assumptions. These assumptions are as under:

- (i) **Rationality:** In the cardinal utility analysis, it is assumed that the consumer is rational. He aims at maximization of utility subject to availability of his income.
- (ii) **Constant marginal utility of money:** It is assumed in the theory that the marginal utility of money based for purchasing goods remains constant.
- (iii) **Diminishing marginal utility:** Another important assumption of utility analysis is that the utility gained from the successive units of a commodity diminishes in a given time period.
- (iv) **Utility is additive:** In the early versions of the theory of consumer behavior, it was assumed that the utilities of different commodities are independent and TU of each commodity is additive.

$$U = U_1(X_1) + U_2(X_2) + U_3(X_3) \dots \dots \dots U_n(X_n)$$

- (v) **Consumption to be continuous:** It is assumed in this law that the consumption of a commodity should be continuous without any interval.
- (vi) **Suitable quantity:** It is also assumed that the commodity consumed is taken in suitable and reasonable units. If the units are too small, then the marginal utility instead of falling may increase up to a few units.
- (vii) **Character of the consumer does not change:** The law holds true if there is no change in the character of the consumer. For example, if a consumer develops a taste for wine, the additional units of wine may increase the marginal utility to a drunkard.
- (viii) **No change to fashion:** Customs and tastes: If there is a sudden change in fashion or customs or taste of a consumer, it can than make the law inoperative.

2.6 Law of Equi-Marginal Utility

The law of equi-marginal utility is simply an extension of law of diminishing marginal utility to two or more than two commodities. “The household maximizing the utility will so allocate the expenditure between commodities that the utility of the last penny spent on each item is equal”. In other words, consumer will maximize total utility from his income when the utility from the last rupee spent on each good is the same. Algebraically, this is:

$$MU_a / P_a = MU_b / P_b = MU_c = P_c = MU_n = P_n$$

The doctrine of equi-marginal utility can be explained by taking an example. Suppose a person has \$5 with him whom he wishes to spend on two commodities,

2.7 Ordinal Approach of Consumer Behavior

Ordinal approach states that the satisfaction which a consumer derives from the consumption of product or service cannot be measured numerically. Cardinal utility gives a value of utility to different options. Ordinal utility just ranks in terms of preference.

2.7.1 Indifference Curves

Indifference curve shows all the combinations or bundle of two goods which yield the same level satisfaction to the consumer and consumer remains indifferent among these combinations. We can say that these bundles of consumption make the consumer equally happy.

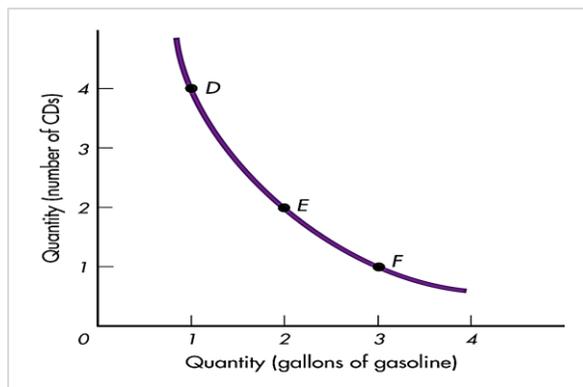
2.7.2 Marginal Rate of Substitution (MRS)

In the words of Hicks: “The marginal rate of substitution of X for Y measures the number of units of Y that must be sacrificed for unit of X gained so as to maintain a constant level of satisfaction”. Marginal rate of substitution (MRS) can also be defined as: “The ratio of exchange between small units of two commodities, which are equally valued or preferred by a consumer”.

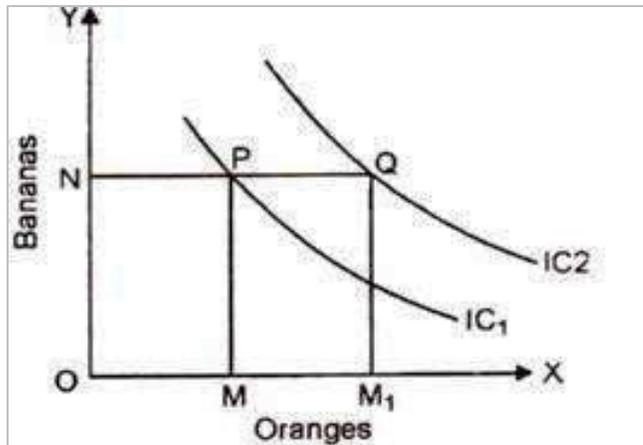
2.7.3 Properties of Indifferent Curve

2.7.3.1 They Slope Negatively or Slope Downwards from the Left to the Right: In this diagram IC is downward sloped. An Indifference Curve cannot slope upward to the right, nor can it be horizontal or vertical. The only possibility is that it must slope downwards to the right. The consumer will get additional supplies of oranges by sacrificing diminishing quantities of bananas.

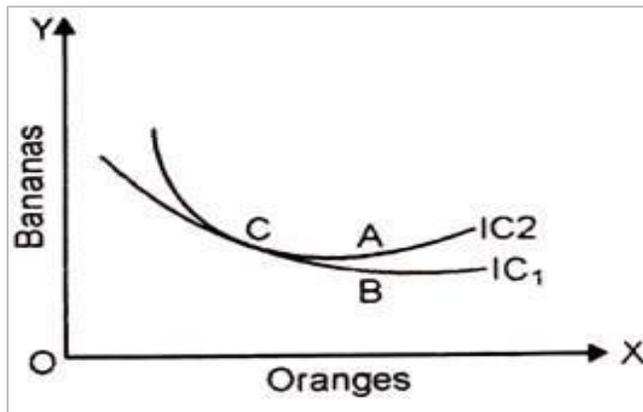
2.7.3.2 They are Convex to the Origin of Axes: The second property of the Indifference Curve is that they are generally convex to the origin of the axes the left-hand portion is normally steep while the right-hand portion is relatively flat. This property of the Indifference Curve is derived from the Law of Diminishing Marginal Rate of Substitution. If the marginal rate of substitution had increased, the Indifference Curve would have been concave to the origin. If the marginal rate of substitution had remained constant, the Indifference Curve would have been a diagonal straight line at 45° angle.



2.7.3.3 Higher Indifference Curve Gives Higher Level of Satisfaction: Let us take two Indifference Curves IC_1 and IC_2 lying to the right of IC_1 . At the point P the consumer gets OM of oranges and ON of bananas. At the point Q though the number of bananas remains the same i.e., ON, yet the number of oranges increases from OM to OM_1 . The total satisfaction of the consumer is therefore bound to be greater at Q than at P.



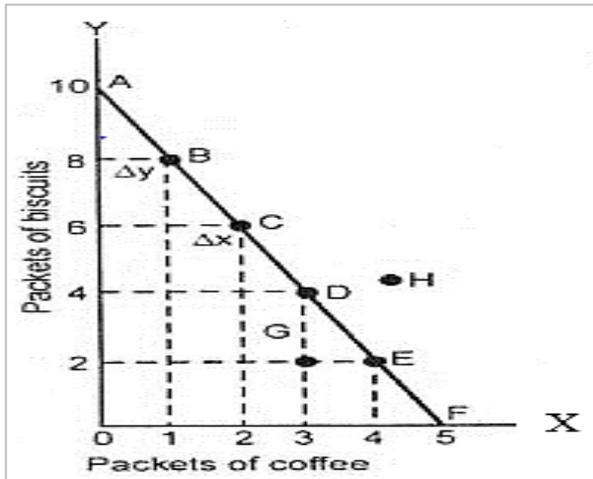
2.7.3.4 Indifference Curves Never Intersect Each Other: The fourth property of Indifference Curve is that no two Indifference Curves can ever cut each other. Since point A is on IC_2 represents a higher level of satisfaction to the consumer than point B which is located on the lower IC_1 . Point C, however lies on both the curves. This means that two levels of satisfaction, A and B which are unequal manage to become equal at the point C. This is clearly impossible that $A=C$, $B=C$ but $A \neq B$.



2.7.3.5 Indifference Curves are not Necessarily Parallel to each other: Yet the rate of the fall will not be the same for all Indifference Curves.

2.7.4 Price Line or Budget Line

The understanding of the concept of budget line is essential for knowing the theory of consumer's equilibrium. "A budget line or price line represents the various combinations of two goods which can be purchased with a given money income and assumed prices of goods". Below the table and diagram are presented the budget line.



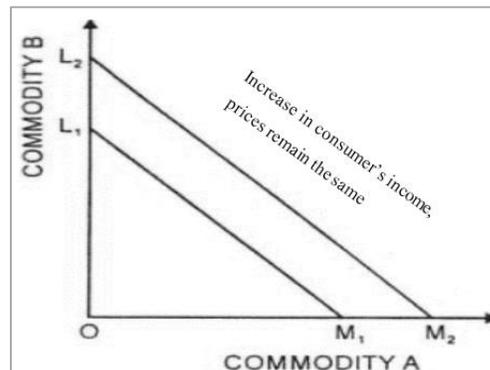
Market Basket	Packets of Biscuits Per Week	Packets of Coffee Per Week
A	10	0
B	8	1
C	6	2
D	4	3
E	2	4
F	0	5

Income \$60 Per Week = Packets of Biscuits Costs \$6 = Packets of Coffee is Priced \$12

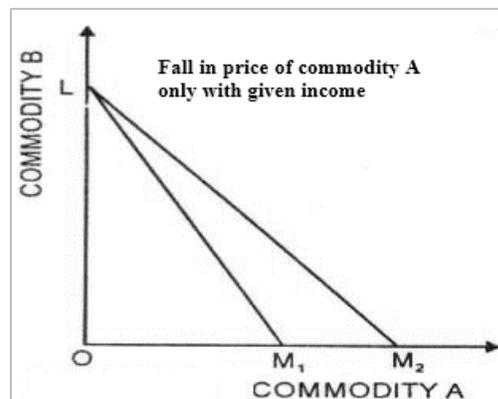
2.7.4.1 Shifts in Budget Line

The price line is determined by the income of the consumer and the prices of goods in the market. If there is a change in the income of the consumer or in the prices of goods, the price line shifts in response to an exchange in these two factors.

(i) **Income changes:** When there is change in the income of the consumer, the prices of goods remaining the same, the price line shifts from the original position. It shifts upward or to the right-hand side in a parallel position with the rise in income. A fall in the level of income, product prices remaining unchanged, the price line shifts left side from the original position.

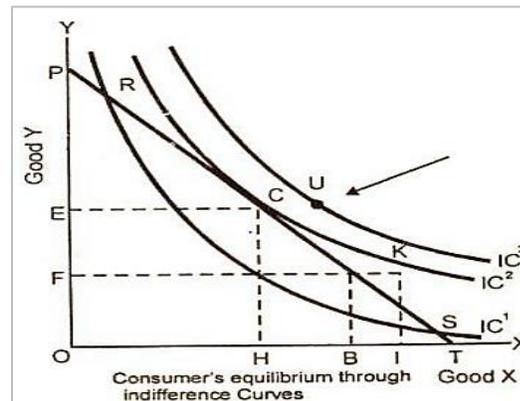


(ii) **Price changes:** Now let us consider that there is a change in the price of one good. The income of the consumer and price of other good is held constant. When there is a fall in the price of one good say commodity A, the consumer purchases more of that good than before. A price change causes the budget line to *rotate* about point L in figure. It becomes flatter and give the new budget line from LM1 to LM2.



2.8 Consumer's Equilibrium Through Indifference Curve Analysis

Given the price line or budget line and the indifference map: "A consumer is said to be in equilibrium at a point where the price line is touching the highest attainable indifference curve from below". Thus, the consumer's equilibrium under the indifference curve theory must meet two conditions. First is **necessary condition** which is that a given price line should be tangent to an indifference curve or marginal rate of satisfaction of good X for good Y (MRS_{xy}) must be equal to the price ratio of the two goods. i.e. $MRS_{xy} = P_x / P_y$. Second is **sufficient condition** is that indifference curve must be convex to the origin at the point of tangency. In the diagram, there are three indifference curves IC^1 , IC^2 and IC^3 . The price line PT is tangent to the indifference curve IC^2 at point C . The consumer gets the maximum satisfaction or is in equilibrium at point C by purchasing OE units of good Y and OH units of good X with the given money income.



2.8.1 Assumptions/Axioms of Ordinal Approach

The following assumptions are made to determine the consumer's equilibrium position.

- I. **Completeness:** If A and B are any two situations, the individual can always specify exactly one of the following three possibilities:
 1. "A is preferred to B,"
 2. "B is preferred to A," or
 3. "A and B are equally attractive."

- II. **Transitivity:** If an individual report that "A is preferred to B" and "B is preferred to C," then he or she must also report that "A is preferred to C." This assumption states that the individual's choices are internally consistent.

- III. **Continuity:** If an individual report "A is preferred to B," then situations suitably "close to" A must also be preferred to B.

2.9 Self-Assessment Questions

Q. 1 Discuss silent features of human wants.

Q. 2 Explain graphically the relationship between total utility and marginal utility.

Q. 3 What is indifferent curve and also explain its properties

Point to be noted;

1. Marginal rate of substitution
2. Higher IC provides higher satisfaction
3. ICs do not intersect each other
4. Convex to Origin or MRS is decreasing
5. IC never touches any axis

Q. 4 What is the consumer equilibrium in cardinal approach?

Q. 5 Define law of diminishing marginal utility and equi marginal utility.

Q. 6 What is the consumer equilibrium in ordinal approach?

Point to be noted;

1. First draw the budget line
2. Draw the ICs map
3. Highest possible IC touches budget line
4. Meet both necessary and sufficient condition

2.10 Suggested Readings

1. Mankiw. (2008). *Principles of Economics* (7th). Southwest Publishers
2. Miller, R. L. (2005). *Economics Today* (14th). Addison Wesley
3. Samuelson Nordons. (2004). *Economics* (18th). McGraw-Hill
4. McConnell and Bruce. (2006). *Principles of Economics* (17th). McGraw-Hill.

Unit-3

DEMAND AND SUPPLY

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3.1 Objectives

After studying this unit, you will be able to:

1. Define demand and its function.
2. Describe Law of demand under certain assumptions.
3. Make clear the things do not obey the law of demand.
4. Define supply and its function.
5. Describe Law of supply under certain assumptions.
6. Examine that how market equilibrium price and quantity are determined.
7. Explain excess demand and excess supply.

3.2 Major Topics

- Demand Function
- Law of Demand
- Factors Affecting Demand
- Shift Factors in Demand
- Change Factors in Demand
- Supply Function
- Law of Supply
- Factors Effecting Supply (Shift and Change Factors)
- Market Equilibrium

3.3 Summary of the Unit

Demand is a schedule or curve representing the willingness of buyers in a specific period to purchase a particular product at each of various prices. The law of demand implies that consumers will buy more of a product at a low price than at a high price. So, other things equal, the relationship between price and quantity demanded is negative or inverse and is graphed as a downward sloping curve. Changes in one or more of the determinants of demand shift the market demand curve. A shift to the right is an increase in demand; a shift to the left is a decrease in demand.

Supply is a schedule or curve showing the amounts of a product that producers are willing to offer in the market at each possible price during a specific period. The law of supply states that, other things equal, producers will offer more of a product at a high price than at a low price. Thus, the relationship between price and quantity supplied is positive or direct, and supply is graphed as an upsloping curve. Changes in one or more of the determinants of supply shift the supply curve of a product. A shift to the right is an increase in supply; a shift to the left is a decrease in supply.

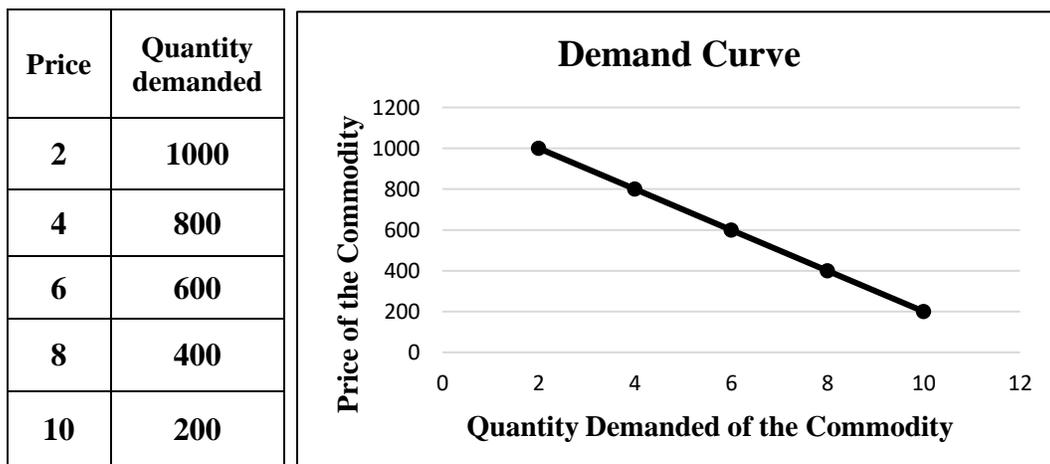
The equilibrium price and quantity are established at the intersection of the supply and demand curves. The interaction of market demand and market supply adjusts the price to the point at which the quantities demanded and supplied are equal. This is the equilibrium price. The corresponding quantity is the equilibrium quantity.

3.4 Demand Function

Economists use the term demand to refer to the amount of some good or service consumers are willing and able to purchase at each price. we can say that by demand is meant the amount of the commodity that buyers are able and willing to purchase at any given price over some given period of time.

3.5 Law of Demand

The law of demand states that other factors being constant (*ceteris paribus*), price and quantity demand of any good and service are inversely related to each other. When the price of a product increases, the demand for the same product will fall. What a buyer pays for a unit of the specific good or service is called price. The total number of units purchased at that price is called the quantity demanded. A rise in price of a good or service almost always decreases the quantity demanded of that good or service. Conversely, a fall in price will increase the quantity demanded. A demand schedule is a table that shows the quantity demanded at each price. A demand curve is a graph that shows the quantity demanded at each price. Here's an example of a demand schedule from the market for gasoline. Other things being equal, if a price of a commodity falls, the quantity demanded of it will rise, and if the price of the commodity rises, its quantity demanded will decline.



3.5.1 Assumptions of the law

- (i) **Income Remains Constant:** The income of the consumer must remain constant for the law of demand to hold. If there is a change in his income, the result will not be regarded in accordance with the law of demand e.g. if the income of the consumer falls and the price of the good remains constant' the consumer will purchase less of the good though its price does not increase. It is so as there is a fall in his power.
- (ii) **Habits and Fashions Should Not Change:** The consumer must not develop a sudden disliking for the product he usually purchases, even though there is a fall in its price. He must not also become suddenly eager to add to the consumption of that product. In short, the consumer must remain rational.
- (iii) **Price of Related Goods Should Remain Constant:** Whether a given change in the price of a related good will increase or decrease, the demand for the product in question will depend on whether the related good is a substitute for or a complement to it. Butter and margarine are substitutes. A rise in the price of butter leads the consumers to more margarine. Hence, demand for margarine increases. Petrol cars are complements. Consumption of petrol increases with a decrease in the price of cars and thus an increase in the demand for oil.
- (iv) **No Change in Future Circumstances:** The consumer must not consider possible future changes in purchasing products, e.g. If he feels that in the future the price of good A will rise substantially, he purchases a lot now to stock up in spite of the fact that the price has not changed.
- (v) **Weather and Population Should Remain Constant:** During the winter season, the utility of woolen clothes goes up, even though they might be very expensive. Whereas changes in demand due to changes in population are concerned, we can say that utility of milk rises due to an increase in the number of consumers even though the price of milk is constant.
- (vi) **Disregarding New Substitutes:** The consumer must not change to different/new products, e.g. the consumer is accustomed to a cloth of quality A. However, when cloth is being selected by her, she prefers to purchase cloth type B, even though there is no change in the price of cloth type A. Hence, this condition is an assumption.

3.5.2 Limitations/Exceptions of Law of Demand

Though as a rule when the prices of normal goods rise, the demand them decreases but there may be a few cases where the law may not operate.

1. **Prestige goods:** There are certain commodities like diamond, sports cars etc., which are purchased as a mark of distinction in society. If the price of these goods rises, the demand for them may increase instead of falling.
2. **Price expectations:** If people expect a further rise in the price particular commodity, they may buy more in spite of rise in price. The violation of the law in this case is only temporary.
3. **Ignorance of the consumer:** If the consumer is ignorant about the rise in price of goods, he may buy more at a higher price.
4. **Giffen goods:** If the prices of basic goods, (potatoes, sugar, etc.) on which the poor spend a large part of their incomes declines, the poor increase the demand for superior goods, hence when the price of Giffen good falls, its demand also falls. There is a positive price effect in case of Giffen goods.

3.6 Movement and Shift in Demand Curve

In economics, demand is defined as the quantity of a product or service, that a consumer is ready to buy at various prices, over a period. Demand Curve is a graph, indicating the quantity demanded by the consumer at different prices. The movement in demand curve (Expansion and Contraction) occurs due to the change in the price of the commodity whereas the shift in demand curve (Rise and Fall) is because of the change in one or more factors other than the price.

The demand curve is downward sloping from left to right, depicting an inverse relationship between the price of the product and quantity demanded. Most of the economics student, find it difficult to understand the difference between movement and shift in the demand curve, so take a look at the article, and resolve all your confusions right away.

3.6.1 Factors of Shifting Demand

1. Change in income of consumers.
2. Change in price of substitute and complementary of the commodity.
3. Change in taste and preference of consumers.
4. The size of population increased
5. The climate and weather conditions are changed
6. Change in expectation
7. Publicity and advertisement

3.7 Law of Supply

The law of supply is the microeconomic law that states that, all other factors being equal, as the price of a good or service increases, the quantity of goods or services that suppliers offer will increase, and vice versa. The law of supply says that as the price of an item goes up, suppliers will attempt to maximize their profits by increasing the quantity offered for sale.

Price	Quantity Supply
10	10
20	20
30	30
40	40
50	50



3.7.1 Assumptions Underlying the Law of Supply

Important assumptions of the law of supply are as follows:

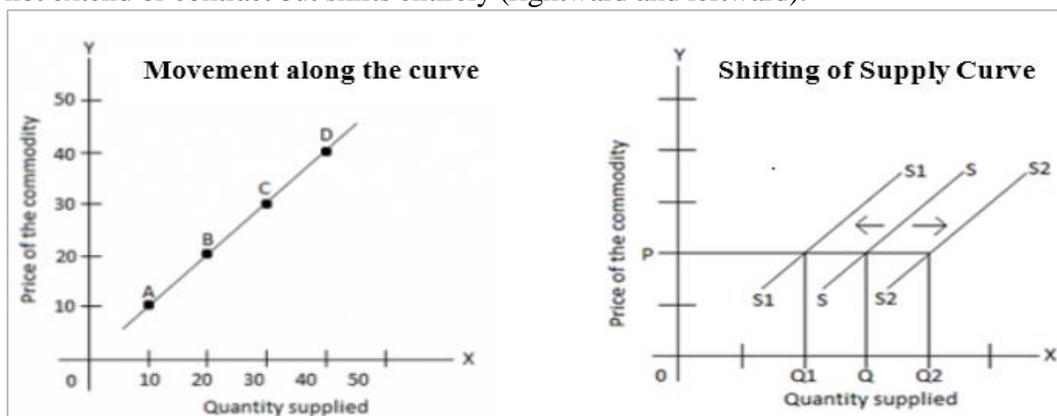
1. **No change in technique of production:** There should not be any change in the technique of production. This is essential for the cost to remain unchanged. With the improvement in technique if the cost of production is reduced, the seller would supply more even at falling prices.
2. **There should be no change in transport cost:** It is assumed that transport facilities and transport costs are unchanged. Otherwise, a reduction in transport cost implies lowering the cost of production, so that more would be supplied even at a lower price.
3. **Cost of production be unchanged:** It is assumed that the price of the product changes, but there is no change in the cost of production. If the cost of production increases along with the rise in the price of product, the sellers will not find it worthwhile to produce more and supply more. Therefore, the law of supply will be valid only if the cost of production remains constant. It implies that the factor prices such as wages, interest, rent etc., are also unchanged.
4. **There should be fixed scale of production:** During a given period of time, it is assumed that the scale of production is held constant. If there is a changing scale of production the level of supply will change, irrespective of changes in the price of the product.

5. **There should not be any speculation:** The law also assumes that the sellers do not speculate about the future changes in the price of the product. If, however, sellers expect prices to rise further in future, they may not expand supply with the present price rise.
6. **The prices of other goods should remain constant:** Further, the law assumes that there are no changes in the prices of other products. If the price of some other product rises faster than that of the product in consideration, producers might transfer their resources to the other product—which is more profit yielding due to rising prices. Under this situation and circumstances, more of the product in consideration may not be supplied, despite the rising prices.
7. **There should not be any change in the government policies:** Government policy is also important and vital for the law of supply. Government policies like—taxation policy, trade policy etc., should remain constant. For instance, an increase in or totally fresh levy of excise duties would imply an increase in the cost or in case there is fixation of quotas for the raw-materials or imported components of a product, then such a situation will not permit the expansion of supply with a rise in prices.

3.8 Movement along a supply curve and its Shifting

Movement along a supply curve; The amount of commodity supplied changes with rise and fall of the price while other determinants of supply remain constant. This change, when shown in the graph, is known as movement along a supply curve. In simple words, movement along a supply curve represents the variation in quantity supplied of the commodity with a change in its price and other factors remaining unchanged.

Shifting of supply curve; The amount of commodity that the producers or suppliers are willing to offer at the marketplace can change even in cases when factors other than the price of the commodity change. Such non-price factors can be the cost of factors of production, tax rate, state of technology, natural factors, etc. When the quantity of the commodity supplied changes due to change in non-price factors, the supply curve does not extend or contract but shifts entirely (rightward and leftward).



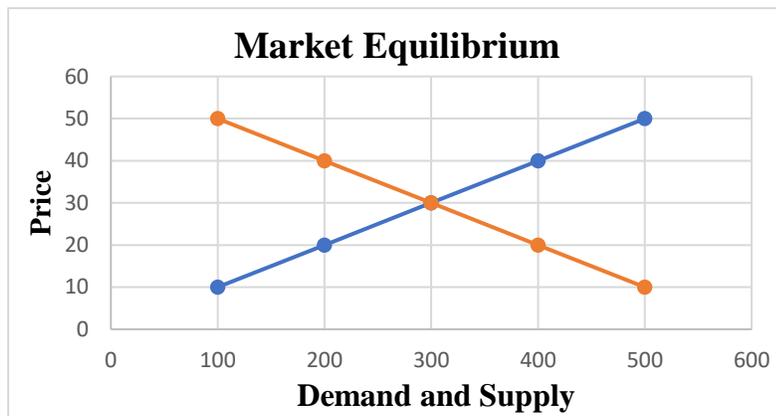
3.8.1 Factors/Reasons of Shift of Supply Curve

1. Improvement in technology
2. Change in tax rates
3. Change in cost of factor of production
4. Favorable/change weather condition
5. Seller's expectation of change in price in future

3.9 Supply and Demand Equilibrium or Market Equilibrium

When supply and demand are equal at a given price level, it is said that market is at equilibrium. This price is called equilibrium price and quantity is known as equilibrium quantity. When the market is in equilibrium, there is no tendency for prices to change. We say the market clearing price has been achieved. Equilibrium is the state in which market supply and demand balance each other, and as a result, prices become stable.

Price	Qd	Qs
10	500	100
20	400	200
30	300	300
40	200	400
50	100	500



3.10 Self-Assessment Questions

Q. 1 Define demand and its function

Q. 2 How equilibrium price and equilibrium quantity are determined in market?

Point to be noted;

1. Draw negative sloped demand curve
2. Draw positive sloped supply curve
3. Determine equilibrium point with the intersection of demand and supply curve
4. Write down the equilibrium price and equilibrium quantity

Q. 3 Explain how the increase in price force the producers to expand their product?

Point to be noted;

1. Write definition of law of supply
2. Make table and graph taking price on Y-axis and quantity supplied on X-axis
3. Explain the graph and supply curve
4. Write assumption of law of supply

Q. 4 What is the difference between shifting and movement of demand and supply?

Q. 5 What will be effects on demand curve if following factors are changed?

1. Change in income of consumers.
2. Change in price of substitute and complementary of the commodity.
3. Change in taste and preference of consumers.
4. The size of population increased
5. The climate and weather conditions are changed

3.11 Suggested Readings

1. Mankiw. (2008). *Principles of Economics* (7th). Southwest Publishers
2. Miller, R. L. (2005). *Economics Today* (14th). Addison Wesley
3. Samuelson Nordons. (2004). *Economics* (18th). McGraw-Hill
4. McConnell and Bruce. (2006). *Principles of Economics* (17th). McGraw-Hill.

Unit-4

ELASTICITY OF DEMAND AND SUPPLY

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4.1 Objectives

After studying this unit, you will be able to;

1. Understand the concept of elasticity of demand and supply.
2. Explain the various types of both elasticities.
3. Describe the various measures of elasticities of demand.
4. Understand the how price of one commodity affect the demand of another commodity.
5. The importance of the elasticities for different economic agents.

4.2 Major Topics

- Price Elasticity of Demand & Supply
- Point Elasticity of Demand & Supply
- Arc Elasticity of Demand & Supply
- Income Elasticity of Demand & Supply
- Cross Elasticity of Demand & Supply

4.3 Summary of the Unit

Price elasticity of demand measures consumer response to price changes. If consumers are relatively sensitive to price changes, demand is elastic. If they are relatively unresponsive to price changes, demand is inelastic. Economists use the averages of prices and quantities under consideration as reference points in determining percentage changes in price and quantity. If Ed is greater than 1, demand is elastic. If Ed is less than 1, demand is inelastic. Unit elasticity is the special case in which Ed equals 1. Perfectly inelastic demand is graphed as a line parallel to the vertical axis; perfectly elastic demand is shown by a line above and parallel to the horizontal axis.

Elasticity varies at different price ranges on a demand curve, tending to be elastic in the upper-left segment and inelastic in the lower-right segment. Elasticity cannot be judged by the steepness or flatness of a demand curve. If total revenue changes in the opposite direction from prices, demand is elastic. If price and total revenue change in the same direction, demand is inelastic. Where demand is of unit elasticity, a change in price leaves total revenue unchanged. The number of available substitutes, the size of an item's price relative to one's budget, whether the product is a luxury or a necessity, and length of time to adjust are all determinants of elasticity of demand.

Cross elasticity of demand indicates how sensitive the purchase of one product is to changes in the price of another product. Positive cross elasticity of demand identifies substitute goods; negative cross elasticity identifies complementary goods. Income elasticity of demand indicates the responsiveness of consumer purchases to a change in income.

The elasticity concept also applies to supply. The averages of the prices and quantities under consideration are used as reference points for computing percentage changes. Elasticity of supply depends on the ease of shifting resources between alternative uses, which varies directly with the time producers have to adjust to a price change.

4.4 Price Elasticity of Demand

The economists here use and measure the quantity demanded to a change in price by the concept of elasticity of demand. Price elasticity of demand measures the degree of responsiveness of the quantity demanded of a good to a change in its price. It is also defined as: "The ratio of proportionate change in quantity demanded caused by a given proportionate change in price".

$$E_d = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}}$$

4.4.1 Types of Elasticity

If modest or small changes in price cause substantial or large changes to quantity demanded then demand is said to be Elastic, then $ED > 1$. If large price changes cause only small changes in quantity of goods purchased the demand for such products is Inelastic, $ED < 1$. When amount of change in price and resulted change in quantity demand are same it is called Unit Elastic, $Ed = 1$.

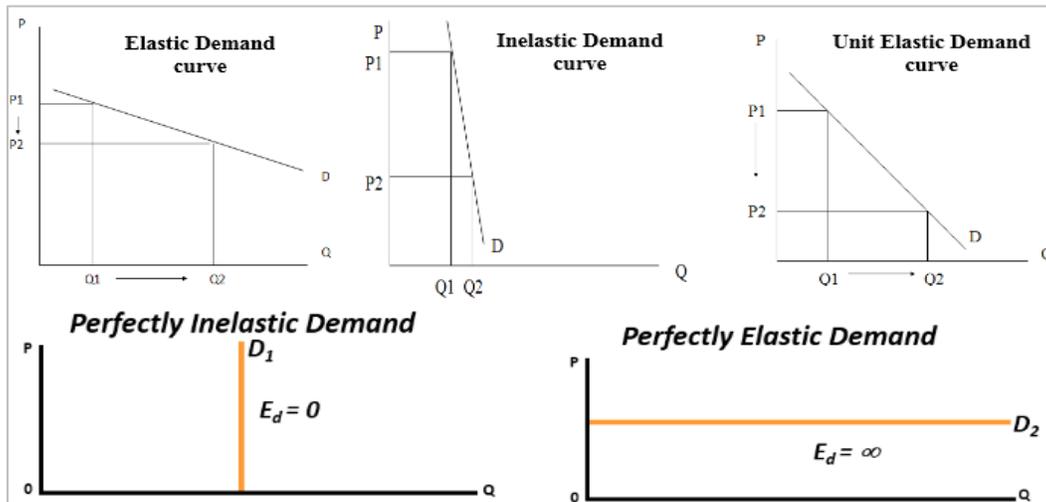
Elastic Demand; when change in price leads to more than proportionate change in quantity demanded. Small decrease in price cause larger increase in quantity demanded and shape of the curve is Flatter. The luxury goods have elastic demand curve because small change in their price will cause a large change in quantity demanded.

Inelastic Demand; When change in price causes a less than proportionate change in quantity demanded. When change in price greater than proportionate change in quantity demanded, demand called Inelastic and shape of the demand curve is Steep. The basic necessities have inelastic demand curve because large change in their price will cause a small reaction by quantity demanded.

Unit Elastic Demand; When change in price leads to an equal change in quantity demanded and $E_d=1$. Moreover, the shape of the demand curve is 45° angle.

Perfectly inelastic demand: When a change in price, how so ever large, no change in quantity demanded, it is known as perfectly inelastic demand.

Perfectly elastic demand: When the demand for a product changes - increases or decreases even when there is no change in price, it is known as perfectly elastic demand.



4.5 Measuring the price elasticity of demand

There are three methods of measuring price elasticity of demand:

1. Percentage Method
2. Total Expenditure/Revenue Method
3. Formula Method

4.5.1 Percentage Method

Percentage change in quantity demanded due to percentage change in price.

$$E_d = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}}$$

4.5.2 Total revenue method

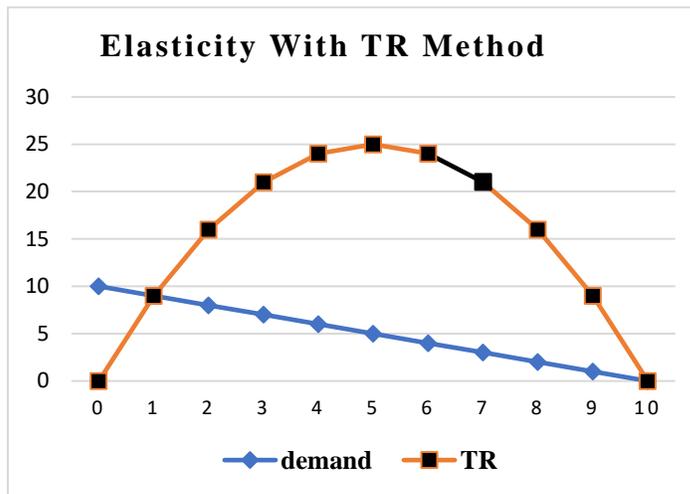
This is a simplest way to measure price elasticity, it tells us whether demand is elastic, inelastic or unitary. In this Total revenue method, we find total revenue by multiplying the quantity sold by price.

$$TR = P * Q$$

Where TR=Total Revenue, P=Price, Q= Quantity. To find out the price elasticity of demand we compare the total revenue at one price with the TR at another price.

1. When P increases, and TR decreases then demand is Elastic, $E_d > 1$.
2. When P decreases, and TR also decreases then demand is Inelastic, $E_d < 1$
3. When P changes and TR is remained constant, demand is Unit Elastic, $E_d = 1$
And Vice versa

Price	Demand	TR
0	10	0
1	9	9
2	8	16
3	7	21
4	6	24
5	5	25
6	4	24
7	3	21
8	2	16
9	1	9
10	0	0



4.5.3 Formula method

Arc Elasticity: Normally the elasticity varies along the length of the demand curve. If we are to measure elasticity between any two points on the demand curve, then the *Arc Elasticity Method*, is used. Arc elasticity is a measure of average elasticity between any two points on the demand curve. It is defined as: "The average elasticity of a range of points on a demand curve". Arc elasticity is calculated by using the following formula:

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

Price	Quantity	Now putting the values into the formula $E_d = \frac{8-10}{25-20} * \frac{25+20}{8+10} = \frac{-2}{5} * \frac{45}{18} = -1$ Hence, the answer states that elasticity is equal to one and demand curve is unit elastic at given price level.
25 → P ₀	8 → Q ₀	
20 → P ₁	10 → Q ₁	

Point Elasticity Method: "The measurement of elasticity at a point of the demand curve is called *point elasticity*". The point elasticity of demand method is used as a measure of the change in the quantity demanded in response to a very small change in price. The point elasticity of demand is defined as: "The proportionate change in the quantity demanded resulting from a very small proportionate change in price".

$$E_d = \frac{\Delta Q}{\Delta P} * \frac{P}{Q} \quad \text{OR} \quad \frac{Q_1 - Q_0}{P_1 - P_0} * \frac{P_0}{Q_0}$$

Price	Quantity	Now putting the values into the formula
2.00 → P ₀	400 → Q ₀	$E_d = \frac{298-400}{2.01-2.00} * \frac{2}{400} = \frac{-2}{0.01} * \frac{2}{400} = -1$
2.01 → P ₁	398 → Q ₁	Hence, the answer states that elasticity is equal to one and demand curve is unit elastic at given price level.

4.6 Income Elasticity of Demand

Income is an important variable affecting the demand for a good. When there is a change in the level of income of a consumer, there is a change in the quantity demanded of a good, other factor remaining the same. The degree of change or responsiveness of quantity demanded of a good to a change in the income of a consumer is called income elasticity of demand. Income elasticity of demand can be defined as: "The ratio of percentage change in the quantity of a good purchased, per unit of time to a percentage change in the income of a consumer". The formula for measuring the income elasticity of demand is the percentage change in demand for a good divided by the percentage change in income. Putting this in symbol gives.

$$E_Y = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in income}}$$

$$E_Y = \frac{\Delta Q}{\Delta Y} * \frac{Y}{Q}$$

4.7 Cross Elasticity of Demand

Cross elasticity of demand is an economic concept that measures the responsiveness in the quantity demanded of one good when the price for another good change. Also called cross price elasticity of demand, this measurement is calculated by taking the percentage change in the quantity demanded of one good and dividing it by the percentage change in price of the other good. In the words of Leibhafsky, "the cross elasticity of demand is a measure of the responsiveness of Y to change in the price of X." According to Ferugson, "the cross-elasticity of demand is the proportional change in the quantity of good-X demanded resulting from a given relative change in the price of the related good-Y."

It should be noted that the cross-elasticity of demand would be **positive**, when two goods are **substitute** of each other. This is because the increase in the price of one good increases the demand for the other. On the other hand, in case of **complementary goods**, the cross-elasticity of demand would be **negative** as increase in the price of one good decreases the demand for the other. For example, increase in the price of tea would result in the increase in the demand for coffee, whereas increase in the price of petrol would cause decrease in the demand for cars.

$$E_{d_{xy}} = \frac{\Delta Q_x}{\Delta P_y} * \frac{P_y}{Q_x}$$

Goods	Prices	Demand	$E_{d_{xy}} = \frac{50-40}{2500-2000} * \frac{2000}{40} = \frac{10}{500} * \frac{2000}{40} = 1$ The answer is positive, so the both goods are substitutes of each other.
X	100	40 → Q _{X0}	
		50 → Q _{X1}	
Y	2000 → P _{Y0}	300	
	2500 → P _{Y1}		

4.8 Price Elasticity of Supply

Price elasticity of supply (PES) measures the responsiveness of quantity supplied to a change in price. It is necessary for a firm to know how quickly, and effectively, it can respond to changing market conditions, especially to price changes.

$$\text{Elasticity of Supply} = \frac{\text{percentage change in quantity supply}}{\text{percentage change in price}}$$

If supply is **elastic (i.e. PES > 1)**, then producers can increase output without a rise in cost or a time delay

If supply is **inelastic (i.e. PES < 1)**, then firms find it hard to change production in a given time period.

The formula for price elasticity of supply is Percentage change in quantity supplied divided by the percentage change in price.

When $Pes > 1$, then supply is price elastic

When $Pes < 1$, then supply is price inelastic

When $Pes = 0$, supply is perfectly inelastic

When $Pes = \text{infinity}$, supply is perfectly elastic following a change in demand

4.9 Self-Assessment Questions

Q. 1 Define the elasticity of demand and its various types

Q. 2 How price elasticity of demand is measured

Q. 3 Find out the elasticity of demand by using two formulas on the given table

Price	Quantity
20	400
40	300

Point to be noted;

1. Arc formula method
2. Point elasticity of demand
3. Compare the answers of both formulas

Q. 4 Define the elasticity of supply and its various types

Q. 5 Suppose the cross elasticity of demand for products A and B is 3.6 and for products C and D is 5.4. What can you conclude about how products A and B are related? Products C and D?

Q. 6 The income elasticities of demand for movies, dental services, and clothing have been estimated to be 3.4, 1, and .5, respectively. Interpret these coefficients. What does it mean if an income elasticity coefficient is negative?

Q. 7 Research has found that an increase in the price of beer would reduce the amount of marijuana consumed. Is cross elasticity of demand between the two products positive or negative? Are these products substitutes or complements? What might be the logic behind this relationship?

4.10 Suggested Readings

1. Mankiw. (2008). *Principles of Economics* (7th). Southwest Publishers
2. Miller, R. L. (2005). *Economics Today* (14th). Addison Wesley
3. Samuelson Nordons. (2004). *Economics* (18th). McGraw-Hill
4. McConnell and Bruce. (2006). *Principles of Economics* (17th). McGraw-Hill.

Unit-5

EFFICIENCY AND EXCHANGE

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5.1 Objectives

After studying this unit, you will be able to:

1. Explain consumer surplus
2. Understand producer surplus
3. Market efficiency under perfect competition
4. Describe how below and above to the equilibrium price leads to market inefficiency or deadweight loss

5.2 Major Topics

- Market Equilibrium and Efficiency
- Economic Surplus
- The Cost of Preventing Price Adjustments
- Taxes and Efficiency

5.3 Summary of the Unit

Consumer surplus is the difference between the maximum price that a consumer is willing to pay for a product and the lower price actually paid. Producer surplus is the difference between the minimum price that a producer is willing to accept for a product and the higher price actually received.

At the equilibrium price and quantity in competitive markets, marginal benefit equals marginal cost, maximum willingness to pay equals minimum acceptable price, and the total of consumer surplus and producer surplus is maximized. These individual conditions define allocative efficiency. Quantities less than or greater than the allocatively efficient level of output create efficiency losses, often called deadweight losses.

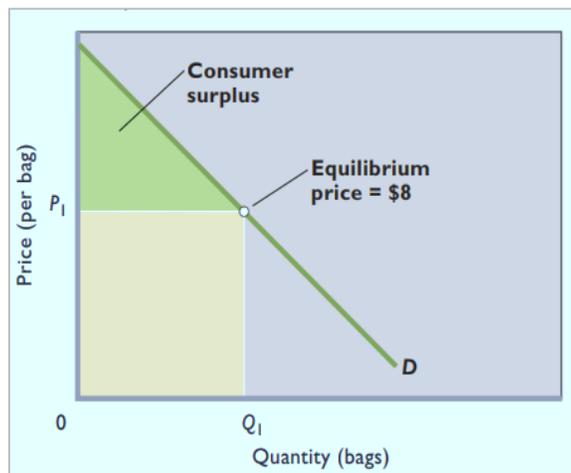
5.4 Consumer and Producer Surplus

Our first goal for this chapter is to examine the following reality: Consumers and producers obtain “benefit surpluses” through market transactions. These surpluses vary in size among the various buyers and sellers.

5.4.1 Consumer Surplus

The benefit surplus received by a consumer or consumers in a market is called consumer surplus. It is defined as the difference between the maximum price a consumer is (or consumers are) willing to pay for a product and the actual price. In nearly all markets, consumers individually and collectively gain greater total utility in dollar terms (total satisfaction) from their purchases than the amount of their expenditures (product price quantity). This utility surplus arises because all consumers pay the equilibrium price even though many would be willing to pay more than that price to obtain the product.

Consider Figure below, where the demand curve shows the buyers' maximum willingness to pay for each unit of the product and we assume that the equilibrium price, P_1 , of oranges is \$8 per bag. The portion of the demand curve D lying above the \$8 equilibrium price shows that many consumers of oranges would be willing to pay more than \$8 per bag rather than go without oranges.



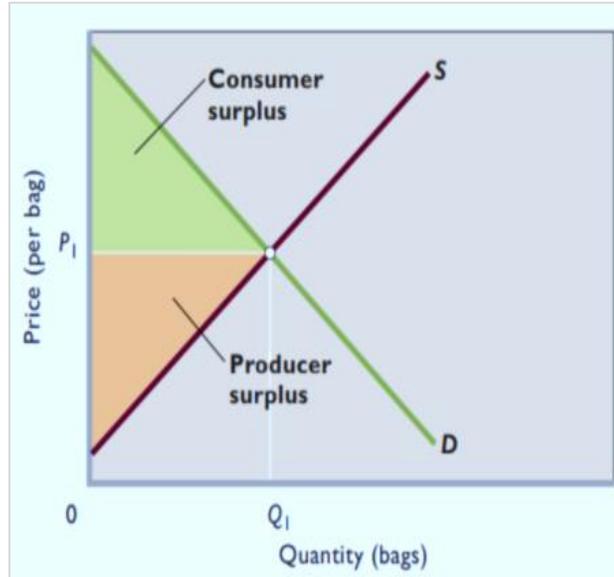
5.4.2 Producer Surplus

Like consumers, producers also receive a benefit surplus in markets. This producer surplus is the difference between the actual price a producer receives (or producers receive) and the minimum acceptable price. The supply curve shows the seller's minimum acceptable price at each unit of the product. Sellers collectively receive a producer surplus in most markets because most sellers would be willing to accept a lower-than-equilibrium price if that were required to sell the product. Those lower acceptable prices for each of the units up to Q_1 are shown by the portion of the supply curve in Figure of producer surplus lying to the left of and below the assumed \$8 equilibrium price.

5.5 Market Efficiency

In Figure, we bring together the demand and supply curves of both Figures to show the equilibrium price and quantity and the previously described regions of consumer and producer surplus. All markets that have downward-sloping demand curves and upward-sloping supply curves yield consumer and producer surplus.

The equilibrium quantity in Figure reflects **economic efficiency**, which consists of productive efficiency and allocative efficiency. *Productive efficiency* is achieved because competition forces producers to use the best techniques and combinations of resources in growing and selling oranges. Production costs of each level of output are minimized. *Allocative efficiency* is achieved because the correct quantity of output Q_1 is produced relative to other goods and services. Points on the demand curve in Figure measure the marginal benefit (MB) of oranges at each level of output. Points on the supply curve measure the marginal cost (MC) of oranges at each output level. The demand and supply curves intersect at the equilibrium output Q_1 , indicating that $MB=MC$.

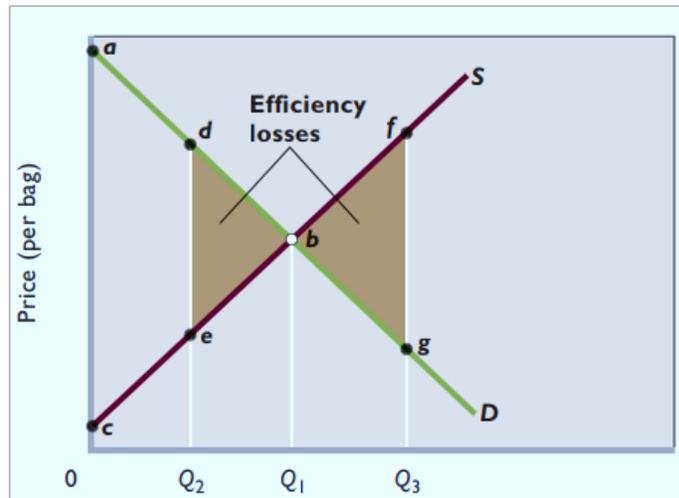


Our analysis of consumer and producer surplus provides a way of thinking about efficiency. Each point on a demand curve identifies not only the marginal benefit of the corresponding unit of output but also the *maximum willingness to pay* for it. Willingness to pay derives from the benefit that a product provides. Similarly, each point on the supply curve identifies not only the marginal cost of a good but also the *minimum acceptable price* for the good. To stay profitable, sellers must receive minimum prices that “cover” their marginal costs.

5.6 Efficiency Losses (or Deadweight Losses)

Below is the figure demonstrating efficiency losses reductions of combined consumer and producer surplus associated with underproduction or overproduction of a product. Suppose that output is Q_2 rather than the efficient level Q . The sum of consumer and producer surplus, previously abc , falls to $adec$. So, the combined consumer and producer surplus declines by the amount of the triangle to the left of Q . That triangle represents an efficiency loss to buyers and sellers. And since buyers and sellers are members of society, it represents an efficiency loss (or a so-called deadweight loss) to society.

For output levels from Q_2 to Q_1 , the maximum willingness to pay by consumers (as reflected by points on the demand curve) exceeds the minimum acceptable price of sellers (as reflected by points on the supply curve). By failing to produce a product for which a consumer is willing to pay, say, \$10, and for which a producer is willing to accept \$6, society suffers a \$4 loss of net benefits. The triangle dbe in Figure shows the total loss of such net benefits due to the underproduction at Q_2 .



In contrast, suppose that the number of oranges produced is Q_3 rather than the efficient level of Q_1 . In Figure the combined consumer and producer surplus therefore declines by bfg —the brown triangle to the right of Q_1 . This triangle subtracts from the total consumer and producer surplus of abc that would occur if the quantity had been Q_1 .

For all units beyond Q_1 , the consumer’s maximum willingness to pay is less than the producer’s minimum acceptable price. Producing an item for which the maximum willingness to pay is, say, \$7 and the minimum acceptable price is \$10 subtracts \$3 from society’s net benefits. Such production is uneconomical and creates an efficiency loss (or deadweight loss) for society. The brown triangle bfg to the right of Q_1 in Figure shows the total efficiency loss from overproduction at Q_3 . We are again reminded that there can be too much as well as too little of a good thing. Under most conditions, however, a competitive market ensures that the “right amount” of a particular good gets produced.

5.7 Self-Assessment Questions

Q. 1 Refer to Table of consumer surplus. If the six people listed in the table are the only consumers in the market and the equilibrium price is \$11 (not the \$8 shown), how much consumer surplus will the market generate?

- Q. 2 Refer to Table producer surplus. If the six people listed in the table are the only producers in the market and the equilibrium price is \$6 (not the \$8 shown), how much producer surplus will the market generate?
- Q. 3 Draw a supply and demand graph and identify the areas of consumer surplus and producer surplus. Given the demand curve, what impact will an increase in supply have on the amount of consumer surplus shown in your diagram? Explain why?
- Q. 4 Use the ideas of consumer surplus and producer surplus to explain why economists say competitive markets are efficient. Why are below- or above-equilibrium levels of output inefficient, according to these two sets of ideas?

5.8 Suggested Readings

1. Mankiw. (2008). *Principles of Economics* (7th). Southwest Publishers
2. Miller, R. L. (2005). *Economics Today* (14th). Addison Wesley
3. Samuelson Nordons. (2004). *Economics* (18th). McGraw-Hill
4. McConnell and Bruce. (2006). *Principles of Economics* (17th). McGraw-Hill.

Unit-6

THEORY OF PRODUCTION

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6.1 Objectives

After studying this unit, you will be able to;

1. Understand the Production Function
2. Recognize Different concepts related to production like Total, average and marginal product,
3. Explain the relationship among Total, average and marginal product
4. Describe Law of increasing Returns to Scale
5. Define Law of constant Returns to Scale
6. State Law of decreasing Returns to Scale

6.2 Major Topics

- The Production Function
- Total, average and marginal product,
- Laws of Returns to Scale.

6.3 Summary of the Unit

The technical relationship between the inputs and the resulting output is described as production function. When the Marginal Product increases, the Total Product is also increasing at an increasing rate. When the Marginal Product decreasing, the Total Product is increasing at decreasing rate. When the Marginal Product is negative, the Total Product is decreasing.

If a business has been started and more units of factors of production are added into it for the scale of expansion, then it passes through three phases. First, every additional unit give more production to a certain limit. It means, marginal production increases gradually. In second case, every additional units give production which is equal to that of the first unit. It means marginal production remains constant. And lastly, every additional unit gives production which is less than that of the first unit. It means marginal production decrease.

6.4 The Production Function

Production of goods requires resources or inputs. These inputs are called factors of production named as land, labor, capital and organization. The relationship between the inputs and the resulting output is described as production function. A production

function shows the relationship between the amounts of factors used and the amount of output generated per period of time.

6.4.1 Total Product

In simple terms, we can define Total Product as the total volume or amount of final output produced by a firm using given inputs in a given period of time.

6.4.2 Marginal Product

The additional output produced as a result of employing an additional unit of the variable factor input is called the Marginal Product. Thus, we can say that marginal product is the addition to Total Product when an extra factor input is used.

Marginal Product = Change in Output/ Change in Input

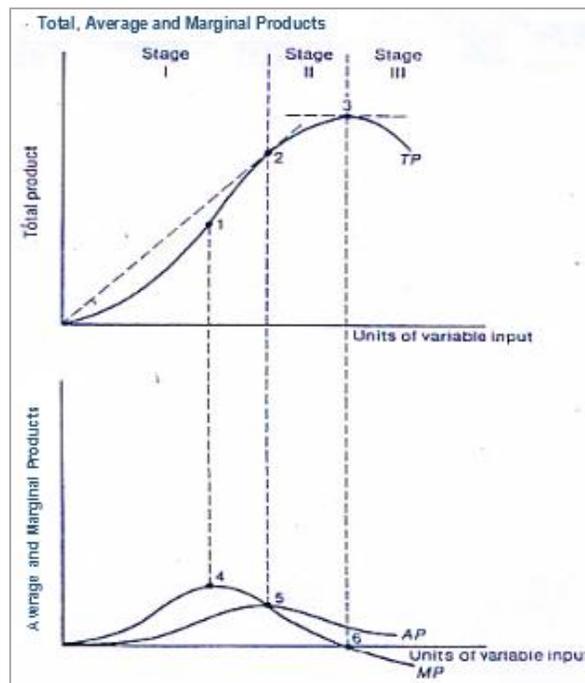
6.4.3 Average Product

It is defined as the output per unit of factor inputs or the average of the total product per unit of input and can be calculated by dividing the Total Product by the inputs (variable factors).

Average Product = Total Product/
Units of Variable Factor Input

6.4.4 Relationship between Marginal Product and Total Product

The law of variable proportions is used to explain the relationship between total Product and Marginal Product. It states that when only one variable factor input is allowed to increase and all other inputs are kept constant, the following can be observed as when the Marginal Product (MP) increases, the Total Product is also increasing at an increasing rate. This gives the Total product curve a convex shape in the beginning as variable factor inputs increase. This continues to the point where the MP curve reaches its maximum.



When the MP declines but remains positive, the Total Product is increasing but at a decreasing rate. This gives the Total product curve a concave shape after the point of inflexion. This continues until the Total product curve reaches its maximum. When the MP is negative, the Total Product declines. When the MP becomes zero, Total Product reaches its maximum.

6.4.5 Relationship between Average Product and Marginal Product

There exists an interesting relationship between Average Product and Marginal Product. We can summarize it as under:

1. When Average Product is rising, Marginal Product lies above Average Product.
2. When Average Product is declining, Marginal Product lies below Average Product.
3. At the maximum of Average Product, Marginal and Average Product equal each other.

6.5 Laws of Returns

If a business has been started and more units of factors of production are added into it for the scale of expansion, then it passes through three phases.

1. Every additional unit gives more production to a certain limit. It means, marginal production increases gradually.
2. Every additional unit gives production which is equal to that of the first unit. It means marginal production remains constant.
3. Every additional unit gives production which is less than that of the first unit. It means marginal production decreases.

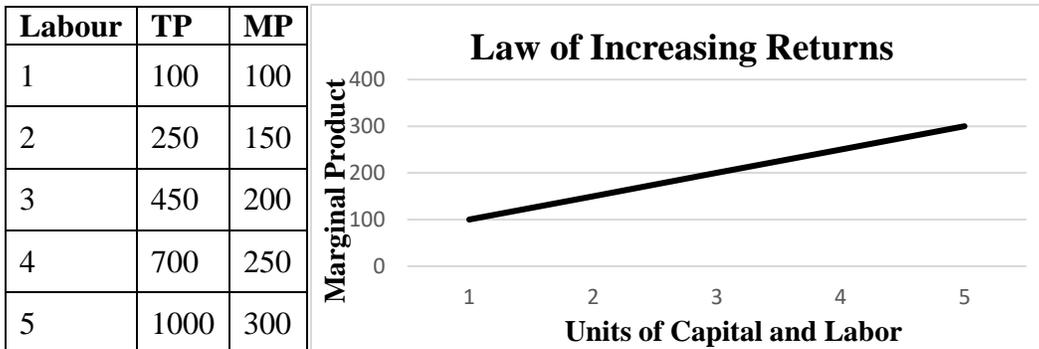
6.5.1 Law of Increasing Returns

If Marginal production increases due to increases in a unit of a variable factor of production in any business. Then this business obeys the law of increasing return. This law can be defined as, 'In any production process if the marginal productivity of variable factor, when it is combined with fixed factor, is increasing then this situation leads to the law of increasing returns.

In the schedule, it is assumed that land is a fixed factor of production. Its quantity is 10 acres (which never changes) but labour and capital are variable factors. So, when we put an additional unit of these variable factors in a business then marginal production increases gradually to a certain extent.

This schedule explains that as we increase the unit of labour and capital, the marginal production increases gradually and the production increases more than before at every unit. We can also explain it with the help of diagram.

We take the unit of labour (L) and capital (C) (K) on x-axis and Marginal revenue on y-axis. On the basis of the data given in schedule, we draw the LM Curve. This curve has been drawn by joining the intersection point of labour, capital and marginal product. This is a positively sloped curve. Thus, it is the curve of increasing returns and indicates that as we put more unit of labour and capital in a business Marginal productivity increase gradually



Assumptions of Law of Increasing Returns

1. Fixed factors of production should neither be changed nor divisible.
2. The unit of variable factors of production should be of same quality and standard.
4. The unit of variable factors should be available as needed.
5. Methods of production should not be changed.

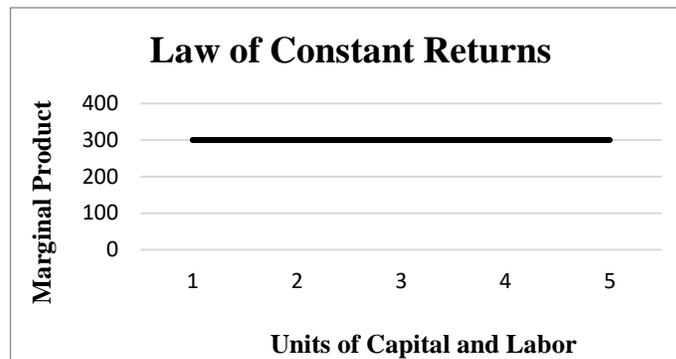
This law mostly applies in industrial sectors, because this sector is handled by human being instead of nature and a man can handle his business under the law of increasing returns due to his experience, intelligence, competence for a long time. But this law is not always applicable on Industrial sector. When the business is extended, and optimal level of production is attained the is marginal production begins to decrease, after such as level this law will not be applicable on business.

6.5.2 Law of Constant Returns

If the marginal production remains constant when we put more units in business. Then constant return to scale is applicable on business. It is defined as, in any production process if the marginal productivity a variable factor when combine with fixed factor, remain constant. Then the situation is called law of constant returns. To explain this law, it is assumed that land is a fixed factor of production but units of labour and capital can be changed and when marginal productivity remain constant by putting more units a variable factor. Then the law of constant

return to scale is applicable on business. This law starts when the law of increasing returns to scale ends and works till the law of decreasing returns starts.

Labor	TP	MP
1	300	300
2	600	300
3	900	300
4	1200	300
5	1500	300

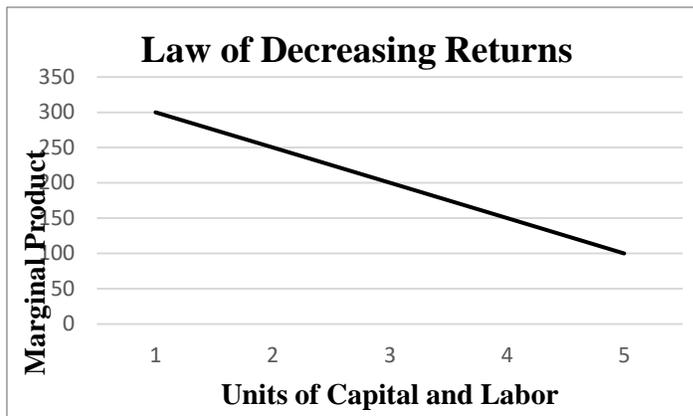


In this diagram, we take the units of labour and capital on horizontal axis and marginal return on vertical axis. If we match the values of labour and capital and marginal productivity according to schedule, we get the curve for marginal productivity of variable factor of production which is parallel to x-axis. Thus, this is the curve of law of constant returns and explains that if we put more units of labour and capital into business there will be no change in Marginal productivity. This law is applicable on those industries which are equally affected by nature and human efforts e.g. wool industry. Wool is obtained from sheep which are affected by nature on the other hand man prepares blankets, shawls and other things with wool by his own skill. Both forces compete each other and there is a balance between them. Hence, marginal production remains the same. It must be kept in mind that such industry does not always remain under the constant returns to scale. Ultimately these become under the law of Decreasing Returns.

6.5.3 Law of Decreasing Returns

When in any business one factor of production land is assumed to be fixed and we put more units of Capital and labour on it, then to a certain limit every additional unit gives less productivity than the first unit. This situation is called Decreasing Returns to scale. Economists define this law as, in any production process if the marginal productivity of variable factors [L and k], when combined with fixed factor[N] is decreasing. Then this situation leads to decreasing return and is called law of decreasing return''. This law is applicable when after optimal level, the law of constant return becomes ineffective. This law can be explained by the following schedule in which land is a fixed factor of production but the units of labour and capital are put one by one. Every additional unit gives less output than the previous unit.

Labor	TP	MP
1	300	300
2	550	250
3	750	200
4	900	150
5	1000	100



This schedule shows that as we put more units of labour and capital, the marginal production is going to be decreased. Hence, the law of decreasing returns is applicable. In this diagram X-axis represents the units of labour and capital and Y-axis shows the marginal production. Diagram shows that the combination of the units of labour and capital and curve of marginal production of the variable factor of production. This curve is negatively sloped and shows that every additional unit gives less output than the previous unit and Marginal production tends to decrease.

Assumptions of Law of Decreasing Return

1. No change should occur in fixed factor of production.
2. There should be no change in means of production.
3. The units of variable factors should be homogenous.
4. The level of optimal combination of factors of production should reach at an end.

This law is applicable on every business. No matter the business is related to industrial sector or agriculture sector. But the sector which are very close to the nature are directly and soon affected by this law, because natural disasters like floods, famines, droughts badly affect the agriculture output. Land is limited, and its fertility can be increased only to some extent. The principle of division of labour can be application to a certain level. When the business expand, expenditure also expands and output decreases. In agriculture sector, outdated instruments are used, and the additional units gives less output.

6.6 Self-Assessment Questions

Q.1 Define the production function and different concepts related to the production.

Q.2 Write down the relationship between total production and marginal production?

Point to be noted;

1. Draw negatively sloped curve for marginal product
2. Adding the marginal product to draw the curve of total product
3. There are three points of relationship

Q.3 Write down the relationship between average production and marginal production?

Point to be noted;

1. Draw negatively sloped curve for marginal product
2. Draw the curve of average product
3. There are three points of relationship

Q.4 Define law of returns with the help of table and diagram.

Point to be noted;

1. Law of increasing returns
2. Law of constant returns
3. Law of decreasing returns

Q.5 Explain the law of variable proportion with the help of table and diagram?

6.7 Suggested Readings

1. Mankiw. (2008). *Principles of Economics* (7th). Southwest Publishers
2. Miller, R. L. (2005). *Economics Today* (14th). Addison Wesley
3. Samuelson Nordons. (2004). *Economics* (18th). McGraw-Hill
4. McConnell and Bruce. (2006). *Principles of Economics* (17th). McGraw-Hill.

Unit-7

THEORY OF COST

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7.1 Objectives

After studying this unit, you will be able to:

1. Understand theory of cost in economics
2. Explain the different concepts of costs like fixed, variable, total costs etc.
3. Estimate the economic and accounting profit
4. Describe the relationship between theory of cost and theory of production
5. Understand Short run and long run theory of cost
6. Economies of scale and diseconomies of scale

7.2 Major Topics

- Short Run Theory of Cost
- Relationship between Production and Cost Curves
- Long-run Theory of Cost
- Graphical Representation of Long Run Cost Economies, Diseconomies and Constant Returns to Scale.

7.3 Summary of the Unit

Economic costs include all payments that must be received by resource owners to ensure a continued supply of needed resources to a particular line of production. Economic costs include explicit costs, which flow to resources owned and supplied by others, and implicit costs, which are payments for the use of self-owned and self-employed resources. One implicit cost is a normal profit to the entrepreneur. Economic profit occurs when total revenue exceeds total cost (explicit costs implicit costs, including a normal profit).

In the short run, a firm's plant capacity is fixed. The firm can use its plant more or less intensively by adding or subtracting units of variable resources, but it does not have sufficient time in the short run to alter plant size. Average fixed, average variable, and average total costs are fixed, variable, and total costs per unit of output. Average fixed cost declines continuously as output increases because a fixed sum is being spread over a larger and larger number of units of production. A graph of average variable cost is U-shaped, reflecting the law of diminishing returns. Average total cost is the sum of average fixed and average variable costs; its graph is also U-shaped.

Marginal cost is the extra, or additional, cost of producing one more unit of output. It is the amount by which total cost and total variable cost change when one more or one less unit of output is produced. Graphically, the marginal-cost curve intersects the ATC and AVC curves at their minimum points.

The long run is a period of time sufficiently long for a firm to vary the amounts of all resources used, including plant size. In the long run, all costs are variable. The long-run ATC or planning, curve is composed of segments of the short-run ATC curves, and it represents the various plant sizes a firm can construct in the long run. The long-run ATC curve is generally U-shaped. Economies of scale are first encountered as a small firm expands. Greater specialization in the use of labor and management, the ability to use the most efficient equipment, and the spreading of start-up costs among more units of output all contribute to economies of scale. As the firm continues to grow, it will encounter diseconomies of scale stemming from the managerial complexities that accompany large-scale production. The output ranges over which economies and diseconomies of scale occur in an industry are often an important determinant of the structure of that industry.

7.4 Short Run Theory of Cost

In short run, some resources cannot be changed such as those are related with the firm's plant, these are fixed. Others are variable. This means that, in the short run, cost can be classified into fixed and variable costs.

7.4.1 Fixed Costs: Fixed cost is those that do not vary with changes in output. Fixed costs, such as those associated with the very existence of a firm, must be paid even if the firm's rate of output is zero.

7.4.2 Variable Cost: Variable costs are those costs that change with the level of output. They include payments for materials, fuel, power, transport services, EST.,

7.4.3 Total Cost: Total cost is the sum of fixed and variable costs at each level of output.

$$TC = FC + VC$$

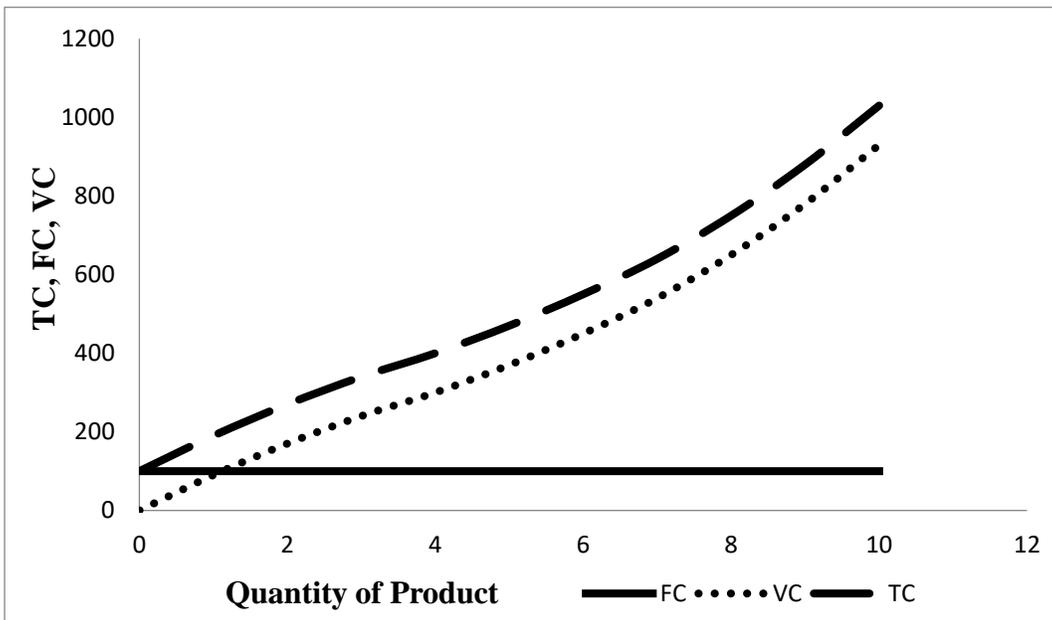
7.4.4 Average Costs: If we divide total cost by quantity we will get average cost.

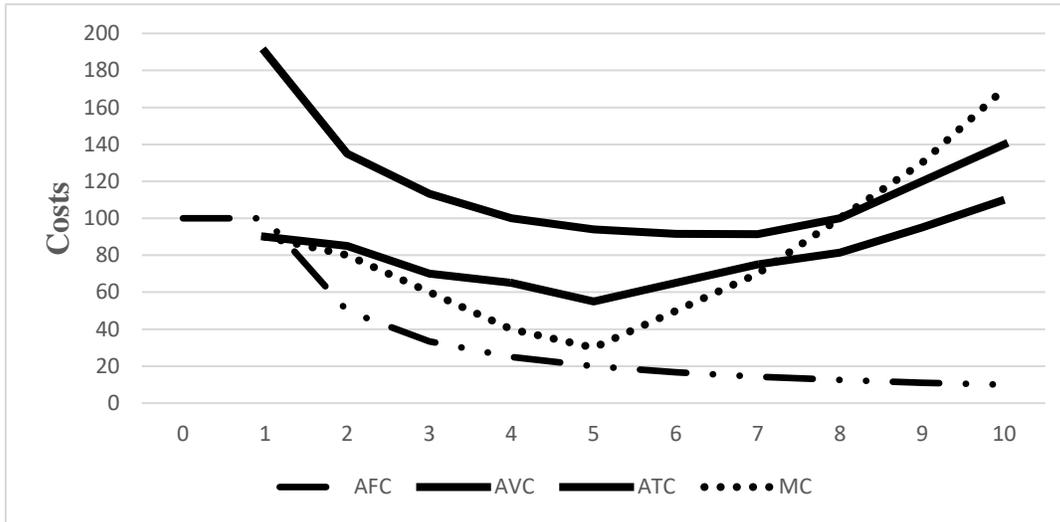
$$AC = TC/Q$$

7.4.5 Average Fixed Cost: Average fixed cost (AFC) is found by dividing total fixed cost (TFC) by the corresponding output (Q).

$$AFC = TFC/Q$$

Total product	Fixed cost	Variable Cost	Total cost	Average fixed cost	Average variable cost	Average total cost	Marginal Cost
0	100	0	100	100	0	190	0
1	100	90	190	100	90	190	90
2	100	170	270	50	85	135	80
3	100	240	340	33.33	80	113.33	70
4	100	300	400	25	75	100	60
5	100	370	470	20	74	94	70
6	100	450	550	16.67	75	91.67	80
7	100	540	640	14.29	77.14	91.43	90
8	100	650	750	12.5	81.45	93.73	110
9	100	780	880	11.11	86.67	97.78	130
10	100	930	1030	10	93	103	150





7.4.6 Average Variable Cost: Average variable cost is found by dividing total variable cost (TVC) by the corresponding output (Q). Remember, AVC declines initially, reaches a minimum and then increases again. Graphically this provides us U – shaped curve.

$$AVC = TVC / Q$$

7.4.7 Average Total Cost: ATC can be found by dividing total cost (TC) by total output (Q) or more simply by adding AFC and AVC and the answer is divided by corresponding level of output.

$$ATC = TC / Q = AFC + AVC$$

7.4.8 Marginal Cost: The extra or additional cost of producing one more unit of output. MC can be determined simply by noting the change in total cost that unit's production involves.

$$MC = \Delta TC / \Delta Q$$

7.4.9 Economic Costs

Costs exist because resources are scarce, productive and have alternative uses. When society uses a combination of resources to produce a particular product, it forgoes all alternative opportunities to use those resources for other purposes. The measure of the economic cost, or opportunity cost, of any resource used to produce a good is the value or worth the resource would have in its best alternative use.

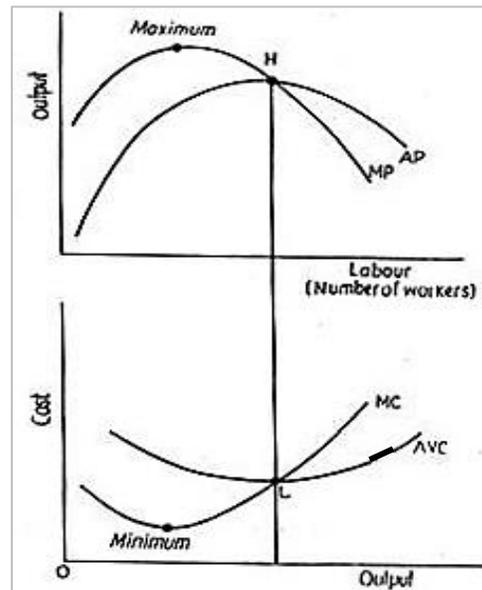
7.4.10 Explicit and Implicit Costs

Who supply labor services, materials, fuel, transportation services and the like. Such money payments for the use of resources owned by others is the explicit cost.

A firm's **implicit costs** are the opportunity costs of using its self-owned and self-employed resources. To the firm, implicit costs are the money payments that self-employed resources could have earned in their best alternative use.

7.5 Relationship Between Production and Cost Curves

There is a close relation between production and cost in the short-run since one is a mirror image of the other. ATC is U-shaped because AVC is U-shaped and AVC is U-shaped because of the Law of Variable Proportions. So, we discover a close relation between the Law of Diminishing Return and the shape of the short run average cost curve. The same type of relation can be discussed between the Law of Diminishing Return and the shape of the MC curve. It is to this relation that we turn now. We can observe from diagram that as marginal product rises, marginal cost falls; when marginal product falls, marginal cost rises. Marginal cost reaches its minimum point when marginal product attains its maximum.



7.6 Relationship Between Long Run and Short Run

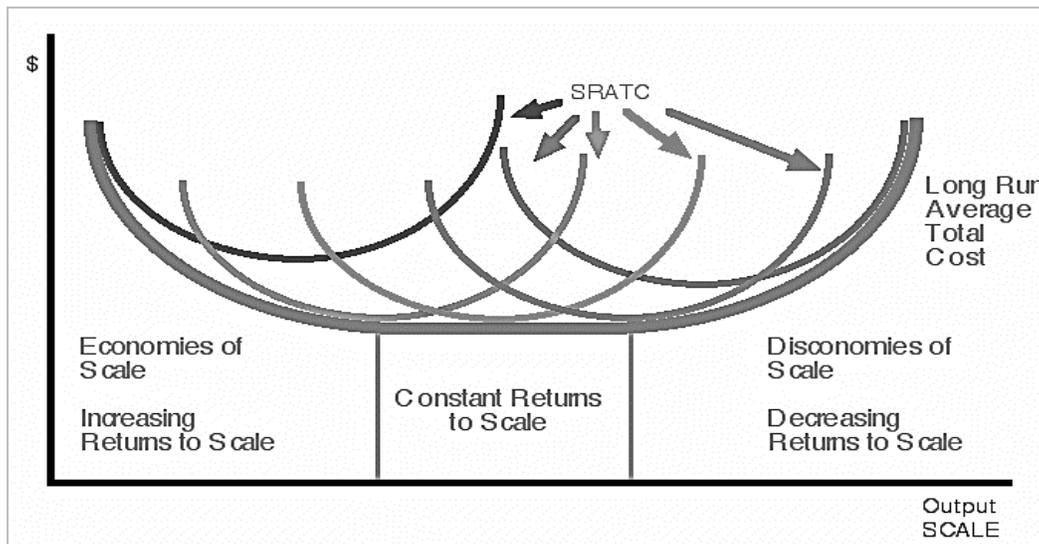
In many firms, time period is determined the division of total cost between fixed and variable cost. For example, a car manufacture company has only few months. The organizer cannot change or adjust the sizes or number of all factors of Production. He can only increase the workers for raising the number of cars. Therefore, the cost of these existing factories is fixed cost in short run. On the other hand, if he has the time period of several years, he can expand the sizes of his factories, build new factories. So, the cost of these factories is variable cost in long run.

Fixed cost and variable cost are both represent different period of time, so the causes of long run and short run are different. In figure below, there are many short run average total cost curves. With the help of these curves, we derive a long run average total cost curve. As firm moves along long run curve, it is adjusting the sizes of the factory and quantity of production.

This graph shows how the short run and long run are related to each other? Both in short run and long run, the ATC curve is “U” shaped, but in long run, ATC curve

is much flatter than short run. The long run ATC curves cover all short run ATC curves. This is because a firm can vary every factor of production but in short run it cannot change all factors of production.

The shape of the long run average total cost curve conveys important information about the production processes that a firm has available for manufacturing a good. When long run average total cost declines as output increases, there are said to be economies of scale. When long run average total cost rises as output increases,



there are said diseconomies of scale. When long run average total cost does not vary with the level of output, there are said to be constant returns to scale. When long run average total cost falls as output increases, there are said economies of scale.

7.7 Economies and Diseconomies of Scale

We have assumed that, for a time, larger and larger plant sizes will lead to lower unit costs but that, beyond some point, successively larger plants will mean higher average total costs. That is, we have assumed the long-run ATC curve is U-shaped. But why should this be? It turns out that the U shape is caused by economies and diseconomies of large scale production, as we explain in a moment. But before we do, please understand that the U shape of the long-run average-total-cost curve cannot be the result of rising resource prices or the law of diminishing returns. First, our discussion assumes that resource prices are constant. Second, the law of diminishing returns does not apply to production in the long run. This is true because the law of diminishing returns only deals with situations in which a productive resource or input is held constant. Under our definition of “long run,” all resources and inputs are variable.

7.7.1 Economies of Scale

Economies of scale or economies of mass production, explain the down sloping part of the long-run ATC curve, as indicated in graph. As plant size increases, a number of factors will for a time lead to lower average costs of production. There are many factors like labor specialization/division of labor, managerial specialization and efficient capital.

7.7.2 Diseconomies of Scale

In time the expansion of a firm may lead to diseconomies and therefore higher average total costs.

The main factor causing diseconomies of scale is the difficulty of efficiently controlling and coordinating a firm's operations as it becomes a large-scale producer. In a small plant a single key executive may make all the basic decisions for the plant's operation. Because of the firm's small size, the executive is close to the production line, understands the firm's operations, and can make efficient decisions because the small plant size requires only a relatively small amount of information to be examined and understood in optimizing production.

7.8 Self-Assessment Questions

- Q. 1 Distinguish between explicit and implicit costs, giving examples of each. What are some explicit and implicit costs of attending college? Why does the economist classify normal profit as a cost? Is economic profit a cost of production?
- Q. 2 Which of the following are short-run and which are long run adjustments?
- Wendy's builds a new restaurant.
 - Harley-Davidson Corporation hires 200 more production workers.
 - A farmer increases the amount of fertilizer used on his corn crop.
 - An Alcoa aluminum plant adds a third shift of workers
- Q. 3 Why can the distinction between fixed costs and variable costs be made in the short run? Classify the following as fixed or variable costs: advertising expenditures, fuel, interest on company-issued bonds, shipping charges, payments for raw materials, real estate taxes, executive salaries, insurance premiums, wage payments, depreciation and obsolescence charges, sales taxes, and rental payments on leased office machinery. "There are no fixed costs in the long run; all costs are variable." Explain
- Q. 4 A firm has fixed costs of RS.60 and variable costs as indicated in the table in the chapter.

Complete the table and check your calculations and do following activities:

- a. Graph total fixed cost, total variable cost, and total cost. Explain how the law of diminishing returns influences the shapes of the variable-cost and total-cost curves.
 - b. Graph AFC, AVC, ATC, and MC. Explain the derivation and shape of each of these four curves and their relationships to one another. Specifically, explain in nontechnical terms why the MC curve intersects both the AVC and the ATC curves at their minimum points.
- Q. 5 Use the concepts of economies and diseconomies of scale to explain the shape of a firm's long-run ATC curve. What is the concept of minimum efficient scale? What bearing can the shape of the long-run ATC curve have on the structure of an industry?
- Q. 6 What is a sunk cost? Provide an example of a sunk cost. Why are such costs irrelevant in making decisions about future actions?

7.9 Suggested Readings

1. Mankiw. (2008). *Principles of Economics* (7th). Southwest Publishers
2. Miller, R. L. (2005). *Economics Today* (14th). Addison Wesley
3. Samuelson Nordons. (2004). *Economics* (18th). McGraw-Hill
4. McConnell and Bruce. (2006). *Principles of Economics* (17th). McGraw-Hill.

Unit–8

PERFECT COMPETITION

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8.1 Objectives

After studying this unit, you will be able to:

1. Define the concept of Perfect Competition
2. Explain the difference between perfect competition and pure competition
3. Understand the firm and industry demand curves in perfect competition
4. Describe total revenue and marginal revenue approaches of short run equilibrium under perfect competition
5. You can draw graphically different possibilities of profit and loss in short run in competitive market
6. Explain profit maximization and long run firm equilibrium under perfect competition

8.2 Major Topics

- Perfect Competition vs. Pure Competition
- Different Possibilities of Short Run and Long Run Firm Equilibrium
- Profit Maximization in the Short Run and Long Run

8.3 Summary of the Unit

A purely competitive industry consists of a large number of independent firms producing a standardized product. Pure competition assumes that firms and resources are mobile among different industries. In a competitive industry, no single firm can influence market price. This means that the firm's demand curve is perfectly elastic, and price equals marginal revenue. We can analyze short-run profit maximization by a competitive firm by comparing total revenue and total cost or by applying marginal analysis.

A firm maximizes its short run profit by producing the output at which total revenue exceeds total cost by the greatest amount. Provided price exceeds minimum average variable cost, a competitive firm maximizes profit or minimizes loss in the short run by producing the output at which price or marginal revenue equals marginal cost. If price is less than average variable cost, the firm minimizes its loss by shutting down. If price is greater than average variable cost but is less than average total cost, the firm minimizes its loss by producing the $P = MC$ output. If price also exceeds average total cost, the firm maximizes its economic profit at the $P = MC$ output. In the long run, the market price of a product will equal the minimum average total cost of production. At a higher price, economic profits would cause

firms to enter the industry until those profits had been competed away. At a lower price, losses would force the exit of firms from the industry until the product price rose to equal average total cost.

8.4 Perfect Competition

Left witch has defined market competition in the following words: "Perfect competition is a market in which there are many firms selling identical products with no firm large enough, relative to the entire market, to be able to influence market price".

The main conditions or features of perfect competition are as under:

- (1) **Large number of buyers and sellers.** The basic condition of perfect competition is that there are large number of firms in an industry and there are very large number of buyers of the product.
- (2) **The product is homogeneous.** Another provision of perfect competition is that the good produced by all the firms in the industry is identical.
- (3) **No barriers to entry and exit.** The firms have complete freedom of entering and exit in market. There are no legal, social or technological barriers for the new firms.
- (4) **Complete information.** The consumers and producers possess perfect information about the prevailing price of the product in the market. The consumers know the ruling price, the producers know costs, the workers know about wage rates and so on.

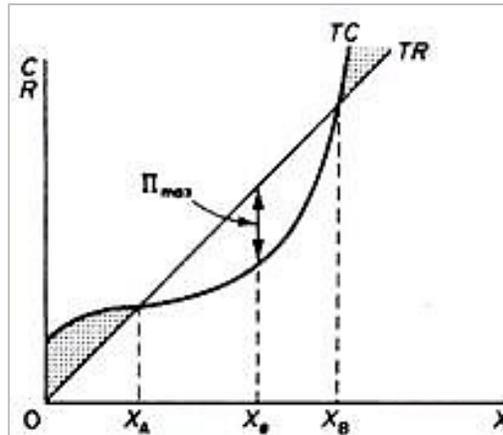
8.5 Short Run Equilibrium Under Perfect Competition

In the short run, the demand curve facing the competitive firm is horizontal. Under perfect competition, the firm takes the price of the product as determined in the market. The firm, in other words, is a price taker. In short run there are two approaches to explain the equilibrium of a firm.

Total revenue and total cost approach and Marginal revenue and marginal cost approach.

8.5.1 Total revenue and total cost approach

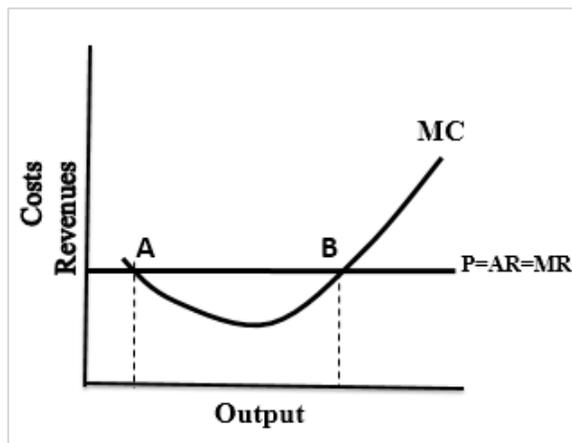
The firm is in equilibrium when it produces the output that maximizes the difference between total receipts and total costs. The figure shows the total revenue and total cost curves of a firm in a perfectly competitive market. The total-revenue curve is a straight line through the origin, showing that the price is constant at all levels of output. The shape of the total-cost curve reflects the U shape of the average-cost curve, that is, the law of variable proportions. The firm maximizes its profit at the output X_e , where the distance between the TR and TC curves is the greatest. At lower and higher levels of output total profit is not maximized, at levels smaller than X_A and larger than X_B the firm has losses.



8.5.2 Marginal revenue and marginal cost approach

The short-run equilibrium of a firm can be easily explained with the help of marginal revenue = marginal cost approach or (MR = MC) rule. Since price is given for the competitive firm, average revenue (AR) thus is equal to marginal revenue (MR) is equal to price (MR = AR = Price).

This diagram shows that the firm will not produce at the portion A because MC is decreasing. Similarly, firm will not produce at the after point B because now MC is higher than the MR. So, If $MC < MR$ profit has not been maximized. If $MC > MR$ the profit has to be reduced as costs are higher than the revenue. Finally, If $MC = MR$ profits are maximized. The $MC = MR$ is the necessary condition but not the sufficient as its being fulfilled. At the point A & B in this diagram. The second condition requires that MC be rising at the point of intersection with MR. This means that the *MC must cut the MR from below*. Thus, the sufficient condition for the equilibrium of firm *Slope of MC > slope of MR*. Hence the equilibrium of the firm is at point B where both conditions for equilibrium of the Firm are fulfilled.



8.6 Possibilities of Short Run Equilibrium in Perfectly Competitive Market

The point where $MR = MC = \text{Price}$, the firm produces the best level of output. From this it may not be concluded that the perfectly competitive firm at the equilibrium level of output ($MR = MC = \text{Price}$) necessarily ensures maximum profit. The fact is that in the short period, a firm at the equilibrium level of output is faced with four types of product prices in the market which give rise to following results:

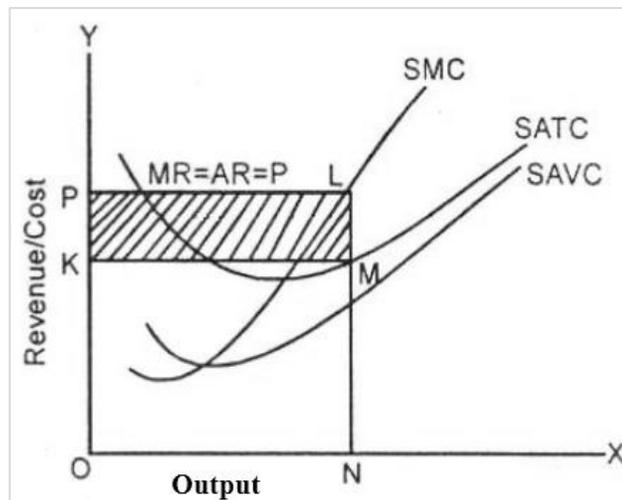
1. A firm earns supernormal profits or abnormal profit.
2. A firm earns normal profits.
3. A firm incurs losses but does not closed down.
4. A firm minimizes losses by shutting down.

All these short run cases of profits or losses are explained with the help of diagrams.

8.6.1 Abnormal Profit Position ($AR > ATC$)

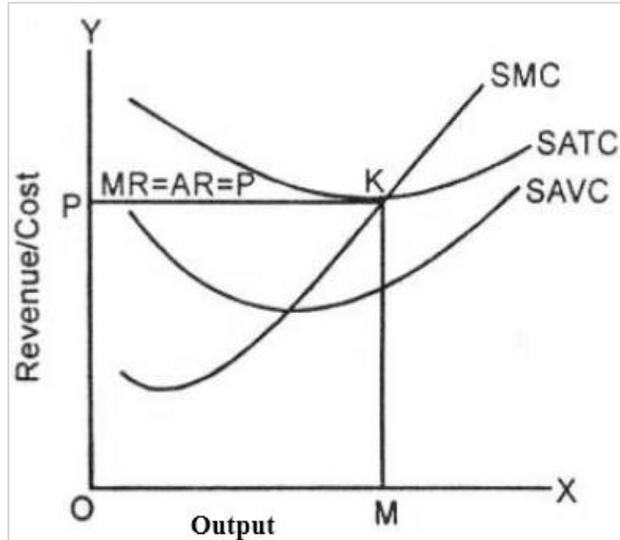
A firm in the short run earns abnormal profits when at the best level of output, the market price exceeds the short run average total cost (SATC). In the figure, output is measured along OX axis and revenue / cost on OY axis. We assume here that the market price is equal to OP. A price taker firm has to sell its entire output at this prevailing market price i.e. OP. The firm is in equilibrium at point L. Where $MC = MR$. The inter section of MC and MR determine the quantity of the good the firm will produce.

After having determined the quantity, drop a vertical line down to the horizontal axis and see what the average total cost (ATC) is at that output level (point N)? The competitive firm will produce ON quantity of output and sell at market price OP. The total revenue of the firm at the best level of output ON is equal to OPLN. Whereas the total cost of producing ON quantity of output is equal to OKMN. The firm is earning supernormal profits equal to the shaded rectangle KPLM. The per unit profit is indicated by the distance LM or PK.



8.6.2 Normal Profit of a Firm (AR=ATC)

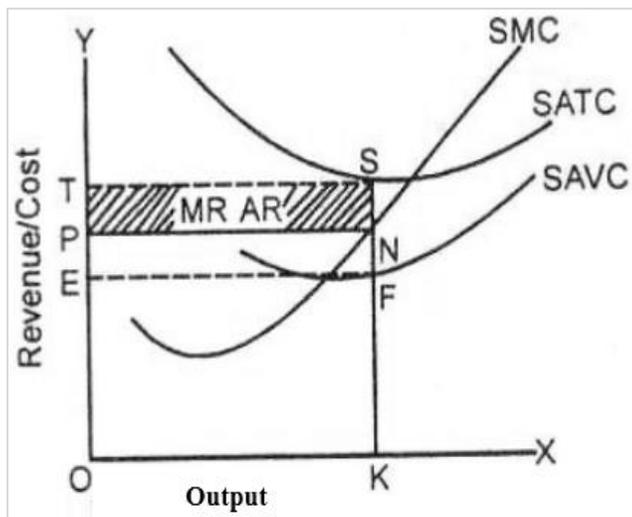
A firm, in the short run, may be making zero economic profit. We assume in the that OP is the prevailing market price and PK is the average revenue, marginal revenue curve. At point K, which is the break-even price for a Competitive firm, the MR, MC and ATC are all equal. The firm produces OM output-and sells at market price OP. The total revenue of the firm to equal is the area OPKM. The total cost of producing OM output also equals the area OPKM. The firm is earning only normal profits. It is a situation in which the resources employed by the firm are earning just what they could-earn in some other alternative occupations.



8.6.3 A Firm Incurs Losses but Does Not Close Down (AR<ATC)

The firm in the short run is minimizing losses if the market price is smaller than average total cost but larger than average variable cost. The loss minimizing position of a price taker firm is explained with the help of a diagram.

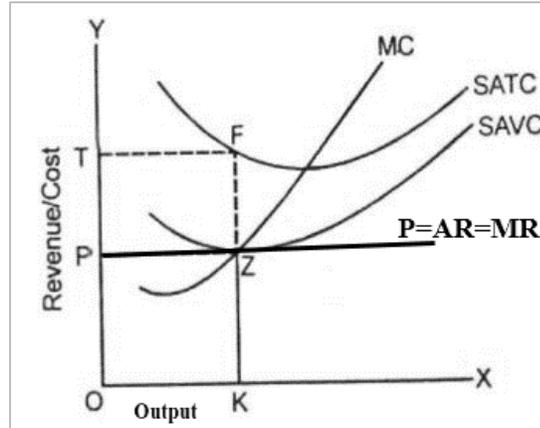
We assume in the figure that the market price is OP. The firm is in equilibrium at point N where MR = MC. The firm's best level of output is OK which is sold at unit cost OP. The total revenue of the firm is equal to the area OPNK. The total cost of producing OK quantity of output is equal to OTSK. The firm is suffering a net loss equal to the shaded area PTSN.



8.6.4 Short Run Shut Down Point ($AR=AVC$) and ($AR<ATC$)

The price taker firm in the short-run minimizes losses by closing it down, if the market price is less than average variable cost. The shutdown position of a competitive firm is explained with the help of a diagram.

The diagram shows that the market price is OP . The firm is in equilibrium at point Z where $MR = MC$. The firm produces OK output and sells at OP unit cost. The total revenue of the firm is equal to the area $OPZK$, whereas the total cost producing OK output is $OTFR$. The firm is facing a net loss of total fixed cost equal to the area $PTFZ$. The firm at point Z is just covering average variable costs.



If the price falls below Z , the competitive firm will minimize its losses by closing down. There is no level of output which the firm can produce and realize a loss smaller than its fixed costs. It is, therefore, a **shutdown point** for the firm. Operate when Price is $>$ average variable cost.

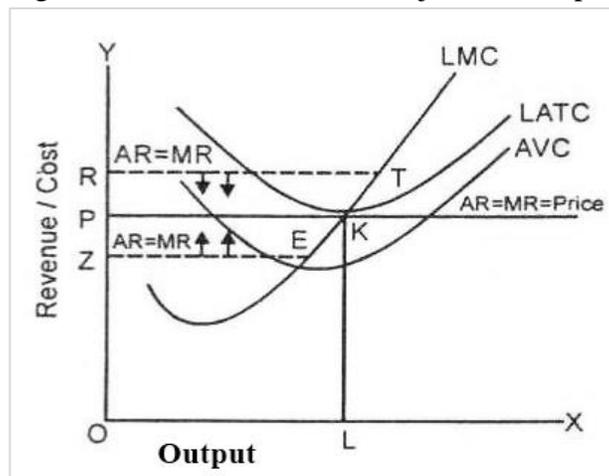
8.7 Long Run Equilibrium of the Price Taker Firm

"All the firms in a competitive industry achieve long run equilibrium, when market price or marginal revenue equals marginal cost equals minimum of average total cost."

$$P = MC = LATC = MR = AR$$

The long run is a period of time during which the firms are able to adjust their outputs according to the changing conditions. If the demand for a product increases, all the firms have sufficient time to expand their plant capacities, train and engage more labor, use more raw material, replace old machines, purchase new equipment, etc.

In the figure, the firm is in the long run equilibrium at point K , where price or marginal revenue equals long run marginal cost



equals minimum of long run average cost. The average revenue per unit cost of the firm and its marginal revenue at price OP are the same. The firm at equilibrium point K, produces the best level of output OL and sells at price OP per unit. The total revenue of the firm is equal to the area OPKL.

The total cost of producing OL quantity of output is also equal to the area OPKL. The firm is earning only normal profits. At price OP, there is no tendency for the new firms to enter or leave the industry. This can be proved by taking prices higher or lower price than OP. If the market price in the long run happens to be OR, the firm would be making more than normal profits. The new firms attracted by profit will enter the industry. The supply of the commodity will increase which derives the market price down to the OP level. The firm here makes only normal profits.

8.8 Self-Assessment Questions

Q. 1 Define the perfect competition and explain its feature in detail.

Q. 2 How price and output determine under perfect competition in short run?

Point to be noted;

1. The demand curve of the firm
2. Marginal cost equates marginal revenue
3. Slope of marginal cost must be increasing
4. Price, average revenue and marginal revenue curve is same

Q. 3 Can competitive firm earn abnormal profit, or/and face loss in short run?

Point to be noted;

1. Concept of marginal revenue and price
2. The concept of average total cost and average variable cost
3. What happen if the price is above the average total cost?
4. What happen if the price is below the average total cost?

Q. 4 What is the difference between short run and long run equilibrium under perfect competition?

Q. 5 What does the shutdown point in a perfectly competitive market?

8.9 Suggested Readings

1. Mankiw. (2008). *Principles of Economics* (7th). Southwest Publishers
2. Miller, R. L. (2005). *Economics Today* (14th). Addison Wesley
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4. McConnell and Bruce. (2006). *Principles of Economics* (17th). McGraw-Hill.

Unit-9

**MONOPOLY, MONOPOLISTIC
COMPETITION AND OLIGOPOLY**

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9.1 Objectives

After studying this unit, you will be able to:

1. Understand the concept of monopoly
2. Explain how price and output determination under monopoly
3. Describe the short run and long run equilibrium under monopoly
4. Make the comparison of monopoly and perfect competition
5. Understand the concept of monopolistic competition
6. Explain how price and output determination in monopolistic competition,
7. Make Comparison perfect competition with monopolistic competition
8. Define Oligopoly:
9. Understand the concept of game theory
10. Explain the price rigidity and the kinked demand curve,
11. Define the notion of demand for and supply of labor,
12. Understand how the equilibrium in labor demand is determined
13. Explain the shifts in the market demand for and supply of labor
14. What is inefficiency wage model?
15. Understand the concept of monopsony

9.2 Major Topics

- Monopoly
- Price and Output Determination Under Monopoly
- Short Run and Long Run Equilibrium under Monopoly
- Comparison of Monopoly and Perfect Competition
- Monopolistic Competition
- Price and Output Determination in Monopolistic Competition,
- Comparison of Perfect Competition with Monopolistic Competition
- Oligopoly: Definition, Strategic Behavior and Game Theory
- Price Rigidity and the Kinked Demand Curve
- Labor Markets. The Market Demand for and Supply of Labor
- Shifts in the Market Demand for and Supply of Labor
- Inefficiency Wages
- Monopsony

9.3 Summary of the Unit

A pure monopolist is the sole producer of a commodity for which there are no close substitutes. The existence of pure monopoly and other imperfectly competitive market structures is explained by barriers to entry in the form of (a) economies of scale, (b) patent ownership and research, (c) ownership or control of essential resources and (d) pricing and other strategic behavior. The pure monopolist's market situation differs from that of a competitive firm in that the monopolist's demand curve is down sloping, causing the marginal-revenue curve to lie below the demand curve. Like the competitive seller, the pure monopolist will maximize profit by equating marginal revenue and marginal cost.

A monopolistically competitive market is characterized by three attributes: many firms, differentiated products and free entry. The equilibrium in a monopolistically competitive market differs from that in a perfectly competitive market in two related ways. First, each firm in a monopolistically competitive market has excess capacity. That is, it operates on the downward-sloping portion of the average-total cost curve. Second, each firm charges a price above MC.

Oligopolists maximize their total profits by forming a cartel and acting like a monopolist. Yet, if oligopolists make decisions about production levels individually, the result is a greater quantity and a lower price than under the monopoly outcome. The larger the number of firms in the oligopoly, the closer the quantity and price will be to the levels that would prevail under perfect competition. The prisoners' dilemma shows that self-interest can prevent people from maintaining cooperation, even when cooperation is in their mutual interest. The logic of the prisoners' dilemma applies in many situations, including arms races, common resource problems, and oligopolies.

The demand for factors, such as labor, is a derived demand that comes from firms that use the factors to produce goods and services. Competitive, profit-maximizing firms hire each factor up to the point at which the value of the marginal product of the factor equals its price. The supply of labor arises from individuals' trade-off between work and leisure. An upward sloping labor-supply curve means that people respond to an increase in the wage by working more hours and enjoying less leisure.

9.4 Monopoly

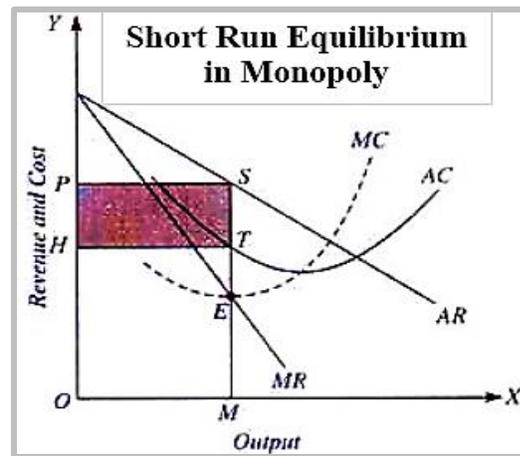
It is defined as: "Monopoly refers to a market, where there is a single seller for a product and there is no close substitute of the commodity that is offered by the sole supplier to the buyers. The firm constitutes the entire industry". Monopoly, therefore, indicates a case where:

1. There is only a single seller of a product or service in the market.
2. The goods produced by a sole seller has not close substitutes.
3. The entry of new firms into the industry is effectively barred by legal or natural barriers.

4. The firm being the sole supplier of a product constitutes industry. Firm and industry thus have single identity. Or we can say monopoly is a single firm identity.
5. The single seller affects no other seller by its own action in the market. The other sellers too cannot affect the price and output of the monopolist.
6. The demand curve facing the monopolist is negatively sloped.

9.5 Short Run Equilibrium Under Monopoly

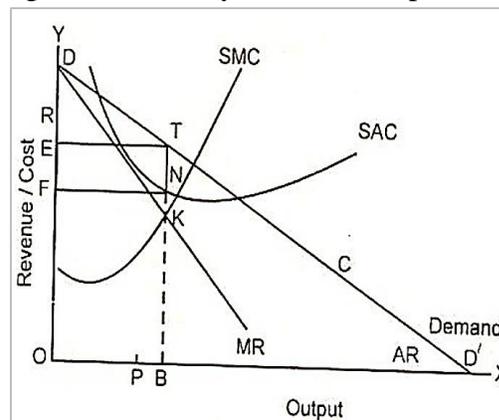
In the short period, the monopolist behaves like any other firm. A monopolist will maximize profit or minimize losses by producing that output for which marginal cost equals marginal revenue. Monopolist faces a downward-sloping demand curve and his marginal revenue curve lies below the average revenue curve. Monopoly equilibrium is depicted in Figure. In Figure, MR is equal to MC at OM level of output. The firm will be earning maximum profits and will therefore be in equilibrium when it is producing and selling OM quantity of the product. If he increases his output beyond OM, marginal revenue will be less than marginal cost, that is, additional units beyond OM will add more to cost than to revenue.



9.6 Different Possibilities in Short Run for Monopoly Equilibrium

9.6.1 Short Run Monopoly Equilibrium with Positive Profit

The monopolist is a price maker. There is a greater tendency for the monopolist to have a price which earns positive profits. This can only be possible, if the price (AR) is higher than average total cost (ATC). The short run profit earned by the monopolist is now explained with the help of the diagram below. In this diagram, the monopoly firm is in equilibrium at point K where $SMC = MR$.

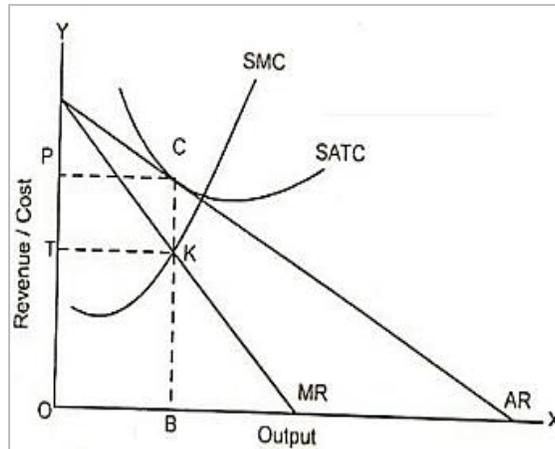


The short run marginal cost (SMC) curve cuts MR from below. At point K both the equilibrium conditions are fulfilled. As a

result, therefore, OE is monopoly price and OB, the monopoly output. At the monopoly output OB, the average total cost OF = BN. The profit per unit is FE. The short run monopoly profit is ETNF, it is represented by the area of shaded rectangle in figure.

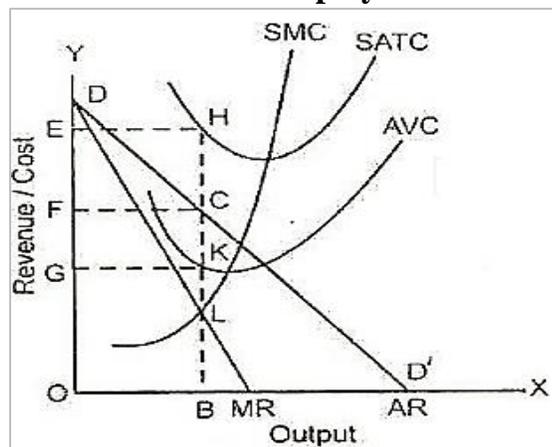
9.6.2 Short Run Equilibrium with Normal Profit Under Monopoly

The normal profit short run equilibrium of the monopoly firm is explained, in brief, with the help of the given diagrams. In figure, a firm is in the short run equilibrium at point K, where $SMC = MR$. The price line is tangent to SAC at point C. The firm charges CB price per unit for units of output OB. The total revenue of the firm is equal to the area OPCB. The total cost of the firm is also equal to the area OPCB. The firm earns only normal profits and continues operating.



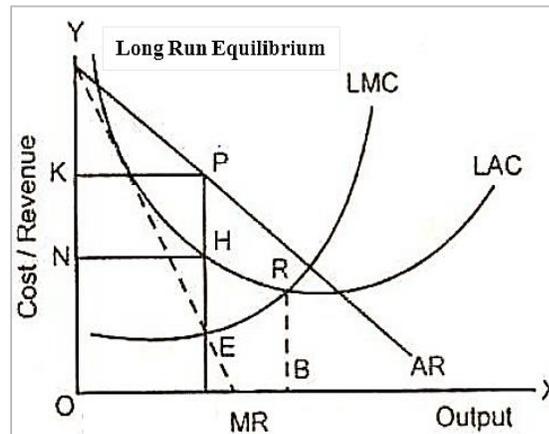
9.6.3 Short Run Equilibrium with Losses Under Monopoly

A monopolist also accepts short run losses provided the variable costs of the firm are fully covered. The loss minimizing short run equilibrium analysis is presented graphically. In this figure, the best short run level of output is OB units which is given by the point L where $MC = MR$. A monopolist sells OB units of output at price CB. The total revenue of the firm is equal to OBCF. The total cost of producing OB units is OBHE. The monopoly firm suffers a net loss equal to the area FCHE. If the firm ceases production, it then has to bear total fixed cost equal to GKHE. The firm in the short run prefers to operate and reduces its losses to FCHE only. In the long, if the loss continues, the firm shall have to close down.



9.7 Long Run Equilibrium Under Monopoly

In the long run, all the factors of production including the size of the plant are variable. A monopoly firm will maximize profit at that level of output for which long run marginal cost (MC) is equal to marginal revenue (MR) and the LMC curve intersects the MR curve from below. In the figure, the monopoly firm is in equilibrium at point E where $LMC = MR$ and LMC cuts MR curve from below. QP is the equilibrium price and OQ is the equilibrium output.



9.8 Monopolistic Competition /Imperfect Competition

Monopolistic competition is a market situation in which there are relatively large number of small firms which produce or sell similar but not identical commodities to the customers. In the words of J.S. Bain: "Monopolistic competition is found in the industry where there is a large number of small sellers selling differentiated but close substitute products".

9.8.1 Characteristics of Monopolistic/Imperfect Competition

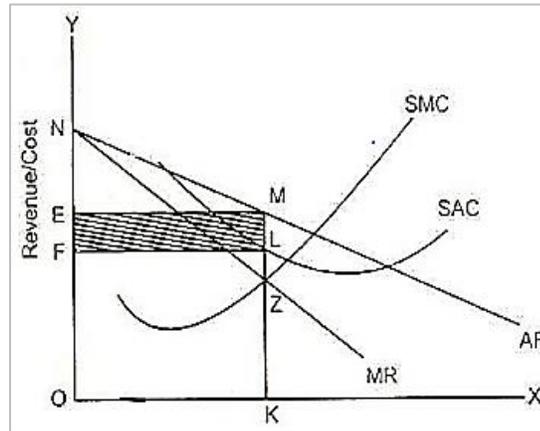
The main characteristic or features of monopolistic competition are as under:

- (i) **A fairly large number of sellers:** The number of firms in monopolistic competition is fairly large. Each firm produces or sells a close substitute for the product of other firms in the product group or industry. Product differentiation is thus the hallmark of monopolistic competition.
- (ii) **Differentiation in products:** Under monopolistic competition, the firms sell differentiated products. Product differentiation may be real or imaginary. Real differentiation is done through differences in the materials used, design, color etc. Imaginary differences may be created through advertisement, brand name, trademarks etc.
- (iii) **Advertisement and propaganda:** Another very important characteristic of the monopolistic competition is that each firm tries to create difference in its product from the other by advertising, propaganda, attractive packing, nice smile, etc.
- (iv) **Nature of demand curve:** Since the existence of close substitutes limits the monopoly power, the demand curve faced by a monopolistically competitive firm is fairly elastic.

- (v) **Freedom of entry and exit of firms:** The entry of new firms in the monopolistically competition industry is relatively easy. There are no barriers of the new firm to enter the product group or leave the industry in the long run.

9.9 Short Run Equilibrium Under Monopolistic/Imperfect Competition

To maximize the profit, it goes on producing a commodity so long as the marginal revenue is equal marginal cost. When $MR = MC$, it is then in equilibrium and produces the best level of output. If a firm produces less than or more than the $MR = MC$ output, it will then not be making maximum of profits. In the figure, the downward sloping demand curve (AR curve) is quite elastic. The MR curve lies below the average curve except at point N. The SMC curve



which includes advertising and sales promotional costs is drawn in the usual fashion. The SMC curve cuts the MR curve from below at point Z. The firm produces and sells an output OK, as at this level of output $MR = MC$. The firm sells output OK at OE/KM per unit price.

9.10 Monopsony

A monopsony, sometimes referred to as a buyer's monopoly, is a market condition similar to a monopoly. However, in a monopsony, a large buyer, not a seller, controls a large proportion of the market and drives prices down. A monopsony occurs when a single firm has market power through its factors of production.

9.11 Oligopoly Behavior: A Game-Theory Overview

Oligopoly is a market dominated by a few large producers of a homogeneous or differentiated product. Because of their “fewness,” oligopolists have considerable control over their prices, but each must consider the possible reaction of rivals to its own pricing, output, and advertising decisions. Oligopoly pricing behavior has the characteristics of certain games of strategy such as poker, chess and bridge. The best way to play such a game depends on the way one’s opponent plays. Players (and oligopolists) must pattern their actions according to the actions and expected reactions of rivals. The study of how people behave in strategic situations is called

game theory? And we will use a simple game-theory model to analyze the pricing behavior of oligopolists.

9.12 The Prisoner's Dilemma

The classic example of game theory is the Prisoner's Dilemma, a situation where two prisoners are being questioned over their guilt or innocence of a crime. They have a simple choice, either to confess to the crime (thereby implicating their accomplice) and accept the consequences, or to deny all involvement and hope that their partner does likewise. Confess or keep quiet? The "pay-off" in this game is measured in terms of years in prison arising from their choices and this is summarized in the table below. No communication is permitted between the two suspects – in other words, each must make an independent decision but clearly, they will take into account the likely behavior of the other when under-interrogation. This highlights the importance of uncertainty in an oligopoly.

Nash Equilibrium is an important idea in game theory, it describes any situation where all of the participants in a game are pursuing their best possible strategy given the strategies of all of the other participants.

		Prisoner A	
		Confess	Deny
Prisoner B	Confess	(3 years, 3 years)	(1 year, 10 years)
	Deny	(10 years, 1 year)	(2 years, 2 years)

In our example of the Prisoners' Dilemma, the *dominant strategy* for each player is to confess since this is a course of action likely to minimize the average number of years they might expect to remain in prison. If both prisoners choose to confess, their "pay-off" i.e. 3 years each in prison is higher than if they both choose to deny any involvement in the crime. In following narrowly defined self-interest, both prisoners make themselves worse off than said, even if both prisoners chose to deny the crime, then each prisoner has an **incentive to cheat** on any agreement and confess, thereby reducing their own spell in custody.

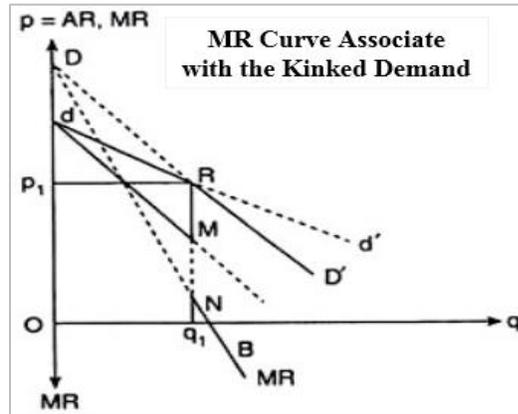
9.13 Kinked Demand Curve

The kinked demand curve model assumes that a business might face a dual demand curve for its product based on the likely reactions of other firms to a change in its price or another variable. The assumptions of this model are:

- (i) There are only a few firms in an oligopolistic market.
- (ii) The firms are producing close-substitute products.
- (iii) The quality of the products remains constant and the firms do not spend on advertising.

- (iv) A set of prices of the product has already been determined and these prices prevail in the market at present.
- (v) Each firm believes that if it reduces the price of its product, the rival firms would follow suit, but if it increases the price, then the rivals would not follow it, they would simply keep their prices unchanged. We shall see presently that, because of this asymmetric reaction pattern of the rivals, the demand curve of each firm would have a kink at the prevailing price of its product.

The kinked demand curve of the firm in this Figure is dRD' . There is a kink at the point $R (p_1, q_1)$ on this curve, because the curve consists of a segment dR of the relatively flatter curve dd' and another segment RD' of the relatively steeper curve DD' . Therefore, in the case of the kinked demand curve dRD' , the firm's MR curve, up to $q = q_1$, would consist of the MR curve dM associated with the dR segment of the kinked demand curve and for $q > q_1$, the MR curve would be the segment NB associated with the segment RD' of the demand curve.



We have obtained above that the firm's MR curve for its kinked demand curve would consist of two parts, viz., the segments dM and NB , and there would be a vertical gap between the points M and N at $q = Q$. 1

This implies that as the firm's output goes on increasing up to q_1 , its MR would go on decreasing along the segment dM up to the amount Mq_1 and if the firm's output increases even by an infinitesimally small quantity at $q = q_1$, its MR would fall to Nq_1 , and, thereafter, as q increases, MR would decrease along the segment NB .

In other words, there would be no MR value between Mq_1 and Nq_1 , i.e., the dotted segment MN is the discontinuity in the firm's MR curve. We may now easily see that the numerical coefficient of elasticity of demand (e_1) at the point R on the demand curve segment dR is different from the coefficient (e_2) at the point R on the demand curve segment RD' , and the larger the difference between e_1 and e_2 , the larger would be length of the discontinuity of MR curve at the output Q . 1

9.14 Labor Demand and Supply

Markets for labor have demand and supply curves, just like markets for goods. The law of demand applies in labor markets this way: A higher salary or wage that is, a higher price in the labor market leads to a decrease in the quantity of labor

demanded by employers, while a lower salary or wage leads to an increase in the quantity of labor demanded. The law of supply functions in labor markets, too: A higher price for labor leads to a higher quantity of labor supplied; a lower price leads to a lower quantity supplied.

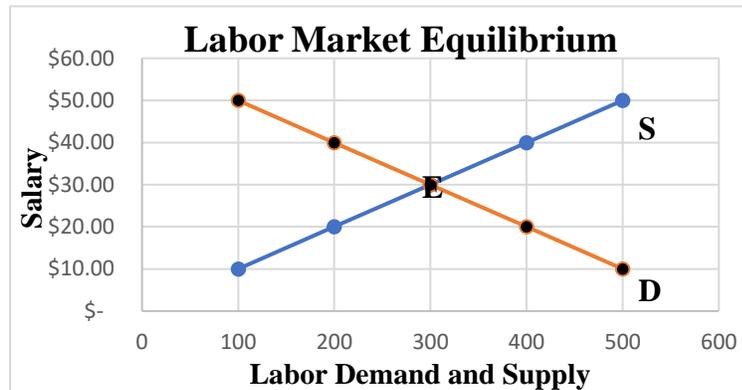
9.14.1 Equilibrium in the Labor Market

The horizontal axis shows the quantity of nurses hired. The vertical axis shows the price for nurses' labor that is, how much they are paid (Salary)? As the salary for nurses rises, the quantity demanded will fall. At equilibrium, the quantity supplied, and the quantity demanded are equal. Thus, every employer who wants to hire a nurse at this equilibrium wage can find a willing worker, and every nurse who wants to work at this equilibrium salary can find a job. In Figure, the supply curve (S) and demand curve (D) intersect at equilibrium point (E).

9.14.2 Shifts in Labor Demand Curve

Demand for labor can increase or decrease (shift) in response to several factors which given below.

Change Demand for Output: When the demand for the good produced increases, both the output price and profitability increase. As a result, producers demand more labor to ramp up production.



Education and Training: Increased levels of productivity within the workforce will cause the demand for labor to shift to the right. Similarly, change in technology, change in number of companies and change in government regulations will shift the demand for certain types of labor resulting in a rightward or leftward shift of the demand curve.

9.14.3 Shifts in Labor Supply

The supply of labor is upward-sloping and adheres to the law of supply. In below sections, some of the factors that will cause the supply to increase or decrease are given.

Number of Workers: A rise in number of workers will cause the supply curve to shift to the right and fall in the number of workers will cause to shift the supply curve left.

Required Education: The more required education, the lower the supply vice verse.

Government Policies: Government policies can also affect the supply of labor for jobs. The government may subsidize training or even reduce the required level of qualifications which would shift the supply curve to the right.

9.15 Efficiency Wage Theory

The idea of the efficiency wage theory is that increasing wages can lead to increased labour productivity. By paying a wage above equilibrium, a firm can influence the quantity as well as the quality of labor. Higher wages boost employee morale and increase worker productivity. Firms that pay an efficiency wage attract skilled workers and reduce employee turnover. In theory, higher wages could cause increased labour productivity (MRP). In this case, the wage increases can pay for themselves.

9.16 Self-Assessment Questions

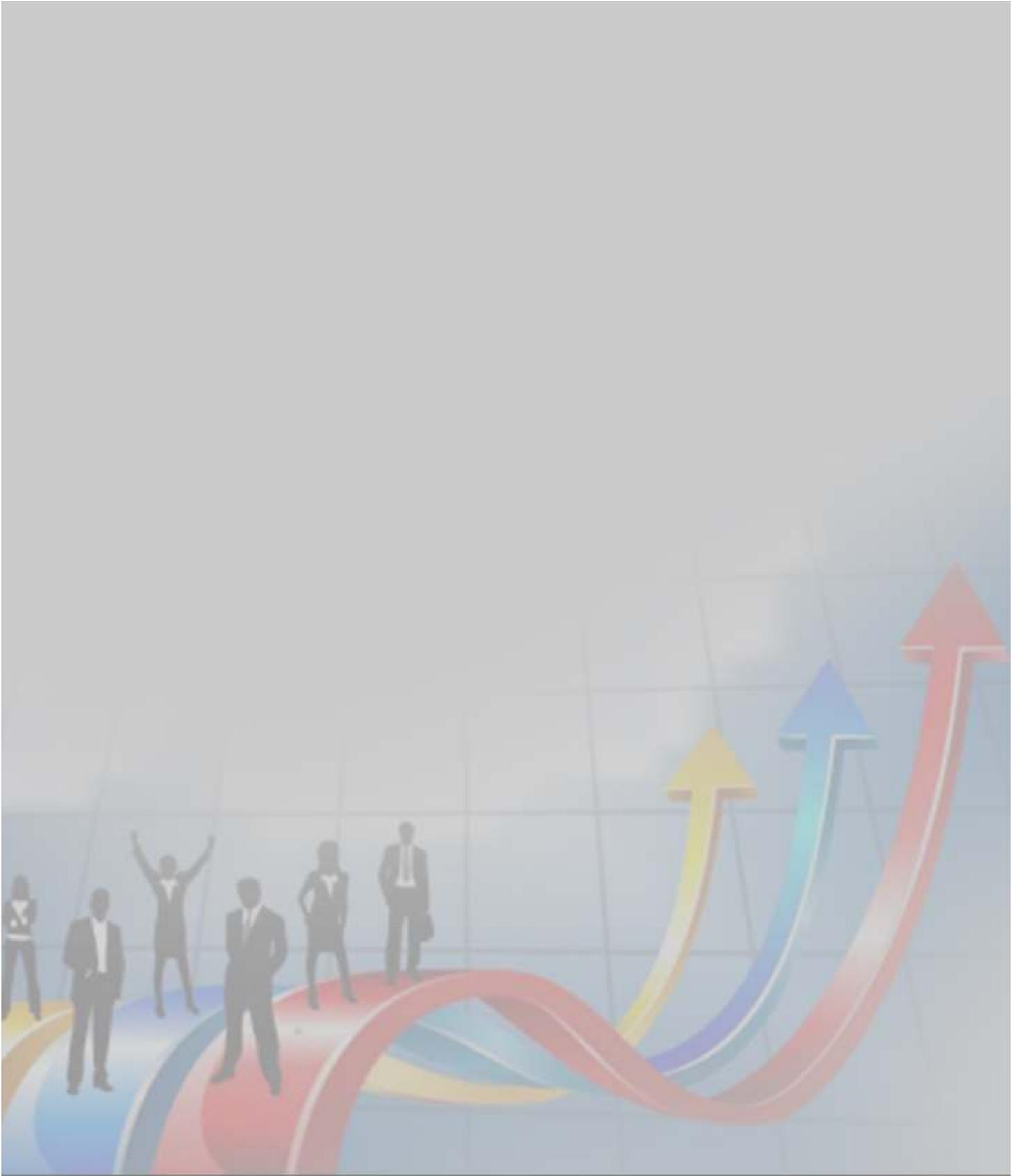
- Q. 1 No firm is completely sheltered from rivals; all firms compete for consumer dollars. If that is so, then pure monopoly does not exist. Do you agree?
- Q. 2 Discuss the major barriers to entry into an industry. Explain how each barrier can foster either monopoly or oligopoly. Which barriers, if any, do you feel give rise to monopoly that is socially justifiable?
- Q. 3 Describe the three attributes of monopolistic competition. How is monopolistic competition like monopoly? How is it like perfect competition?
- Q. 4 Draw a diagram depicting a firm that is making a profit in a monopolistically competitive market. Now show what happens to this firm as new firms enter the industry.
- Q. 5 Give two examples of events that could shift the demand for labor and explain why they do so.
- Q. 6 Give two examples of events that could shift the supply of labor and explain why they do so.
- Q. 7 Compare the quantity and price of an oligopoly to those of a monopoly.

- Q. 8 Compare the quantity and price of an oligopoly to those of a competitive market.
- Q. 9 How does the number of firms in an oligopoly affect the outcome in its market?
- Q. 10 What is the prisoners' dilemma, and what does it have to do with oligopoly?
- Q. 11 Give two examples other than oligopoly that show how the prisoners' dilemma helps to explain behavior.
- Q. 12 What assumptions about a rival's response to price changes underlie the kinked-demand curve for oligopolists? Why is there a gap in the oligopolists marginal revenue curve? How does the kinked-demand curve explain price rigidity in oligopoly? What are the shortcomings of the kinked-demand model?

9.17 Suggested Readings

1. Mankiw. (2008). *Principles of Economics* (7th). Southwest Publishers
2. Miller, R. L. (2005). *Economics Today* (14th). Addison Wesley
3. Samuelson Nordons. (2004). *Economics* (18th). McGraw-Hill
4. McConnell and Bruce. (2006). *Principles of Economics* (17th). McGraw-Hill.

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