



**NATIONAL OPEN UNIVERSITY OF NIGERIA**

**SCHOOL OF ARTS AND SOCIAL SCIENCES**

**COURSE CODE: ECO 231**

**COURSE TITLE: MICRO-ECONOMIC THEORY I**



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## INTRODUCTION

This course, *ECO 231 Micro-Economics Theory* is a three-credit unit, one- semester core course designed for second year economics students in the School of Art and Social Sciences at the National Open University of Nigeria. The course will help you to gain in-depth insight of the underlining economic theory and how market economies operate.

Therefore, the course is structured to expose you to the skills required to understand the functioning of individual industries and the behaviour of individual economic decision-making units: business firms and households. This course also teaches you how people are hired in a particular industry and factors that determine their labour supply and wages paid to them.

This course guide tells you what microeconomics entails, what course materials you will be using and how you can work your way through these materials. It suggests some general guidelines for time required of you on each unit in order to complete the course. It also guides on your tutor marked assignments (TMAs) as contained herein.

## WHAT YOU WILL LEARN IN THIS COURSE

This course builds on the foundation of *ECO 102*. Topics covered include theory of consumer behaviour, utility approach and indifference curve approach. Topics in consumer demand such as market structures, output and pricing under various market structures-perfect competition, monopoly, monopolistic competition and oligopoly are also treated. The theory of distribution under perfect competition; input pricing and employment under imperfect competition are also examined.

You will be taught introduction to discipline of economics and to provide a basic understanding of how economies function, which requires a blend of economic theory and real life application in solving problems in business.

## COURSE AIMS

The overall aims of this course include:

- to introduce you to the basic concepts in microeconomics theory
- to teach you the concept of consumer behaviour and their peculiar characteristics and assumptions
- to expose you to the operations of the market spectrum starting from perfectly competitive market to the imperfect market system

- to give you the detailed concept of factor pricing and the practical way of understanding the contemporary business world.

## **COURSE OBJECTIVES**

There are 18 study units in this course and each unit has its objectives. You should read the objectives of each unit and bear them in mind as you go through the unit. Each unit of this course has its objectives unit. In addition to these, the course has its overall objectives. At the completion of this course, you should be able to:

- explain the concept of consumer behaviour
- state the reasons for consumer preferences
- define utility and explain the concept of law of diminishing marginal utility (LDMU)
- calculate total utility and marginal utility and state reasons for the differences differentiate between the income effect and substitution effect
- define indifference curve
- explain the meaning of marginal rate of substitution
- define budget constraint
- explain relative price
- describe the concept of revealed preferences

## **WORKING THROUGH THIS COURSE**

Each unit contains self-assessment exercises and tutor- marked assignment. At some points in this course, you will be required to submit assignments for assessment purposes. At the end of this course, there is a final examination. This course should take about 15 weeks to complete. Some components of the course are outlined under the course material subsection.

To successfully complete this course, you are required to read the study units, referenced books and other materials on the course.

## **COURSE MATERIALS**

Major components of this course are:

1. Course guide
2. Study units
3. Text books
4. Assignment file
5. Presentation schedule

## STUDY UNITS

The breakdown of the four modules and 15 units are as follows.

### **Module 1 Theory of Consumer Behaviour**

- Unit 1 Basic Concept of Consumer Behaviour
- Unit 2 Utility Theory
- Unit 3 Utility Theory: Indifference Curve
- Unit 4 Budget Constraint

### **Module 2 Market Structures 1**

- Unit 1 Overview of Market Structure
- Unit 2 Profit Maximisation and Losses Minimisation under Perfect Competitive Market
- Unit 3 Monopoly Markets

### **Module 3 Market Structures 2**

- Unit 1 Price Discrimination in the Monopoly Market
- Unit 2 Monopolistic Competition
- Unit 3 Oligopoly Market and Models

### **Module 4 Theory of Distribution**

- Unit 1 Concepts of Theory of Distribution
- Unit 2 Basic Concept of Factor Pricing: Productivity of the Factor
- Unit 3 Basic Concept of Factor Pricing: Cost of the Factor
- Unit 4 The Concept Marginal Productivity Theory of Distribution (Factor Pricing)
- Unit 5 The Factor Market under Perfect Competition
- Unit 6 The Factor Market under Imperfect Competition

## REFERENCES AND TEXTBOOKS

Every unit contains a list of references and further reading. Try to get as many as possible of those textbooks and materials listed. The textbooks and materials are meant to deepen your knowledge of the course.

## ASSIGNMENT FILE

In this file, you will find all the details of the work you must submit to your tutor for marking. The marks you obtain from these assignments will count towards the final mark you obtain for this course. Further

information on assignments will be found in the assignment file itself and later in this Course Guide in the section on assessment.

## **PRESENTATION SCHEDULE**

The presentation schedule included in your course materials gives you the important dates for the completion of tutor-marked assignments and attending tutorials. Remember, you are required to submit all your assignments by the due date. You should guard against lagging behind in your work.

## **ASSESSMENT**

Your assessment will be based on tutor-marked assignments (TMAs) and a final examination, which you will write at the end of the course.

## **TUTOR-MARKED ASSIGNMENT**

There are many tutor-marked assignments in this course. You will submit all the assignments. You are encouraged to work all the questions thoroughly. The TMAs constitute 30 per cent of the total score.

Assignment questions for the units in this course are contained in the Assignment File. You will be able to complete your assignments from the information and materials contained in your set books, reading and study units. However, it is desirable that you demonstrate that you have read and researched more widely than the required minimum. You should use other references to have a broad viewpoint of the subject and also to give you a deeper understanding of the subject.

When you have completed each assignment, send it, together with a TMA form, to your tutor. Make sure that each assignment reaches your tutor on or before the deadline given in the Presentation File. If for any reason, you cannot complete your work on time, contact your tutor before the assignment is due to discuss the possibility of an extension. Extensions will not be granted after the due date unless there are exceptional circumstances.

## **FINAL EXAMINATION AND GRADING**

The final examination will be of three hours' duration and have a value of 70% of the total course grade. The examination will consist of questions which reflect the types of self-assessment practice exercises and tutor-marked problems you have previously encountered. All areas of the course will be assessed.

You are advised to use the time between finishing the last unit and sitting for the examination to revise the entire course material. You might find it useful to review your self-assessment exercises, tutor-marked assignments and comments on them before the examination. The final examination covers information from all parts of the course.

## **COURSE MARKING SCHEME**

The table presented below indicate the total marks (100%) allocation.

### **ASSESSMENT MARKS**

Tutor-marked assignment (best three assignment out of the four marked)  
30%

Final Examination 70%

**Total 100%**

## **COURSE OVERVIEW**

The table presented below indicate the units, number of weeks and assignments to be taken by you in this course.

## **HOW TO GET THE MOST FROM THIS COURSE**

In distance learning the study units replace the university lecturer. This is one of the great advantages of distance learning; you can read and work through specially designed study materials at your own pace and at a time and place that suit you best.

Think of it as reading the lecture instead of listening to a lecturer. In the same way that a lecturer might set you some reading to do, the study units tell you when to read your books or other material, and when to embark on discussion with your colleagues. Just as a lecturer might give you an in-class exercise, your study units provides exercises for you to do at appropriate points.

Each of the study units follows a common format. The first item is an introduction to the subject matter of the unit and how a particular unit is integrated with the other units and the course as a whole. Next is a set of learning objectives. These objectives let you know what you should be able to do by the time you have completed the unit.

You should use these objectives to guide your study. When you have finished the unit you must go back and check whether you have

achieved the objectives. If you make a habit of doing this you will significantly improve your chances of passing the course and getting the best grade.

The main body of the unit guides you through the required reading from other sources. This will usually be either from your set books or from a readings section. Some units require you to undertake practical overview of historical events. You will be directed when you need to embark on discussion and guided through the tasks you must do.

The purpose of the practical overview of some certain historical economic issues are in twofold. First, it will enhance your understanding of the material in the unit. Second, it will give you practical experience and skills to evaluate economic arguments, and understand the roles of history in guiding current economic policies and debates outside your studies. In any event, most of the critical thinking skills you will develop during studying are applicable in normal working practice, so it is important that you encounter them during your studies.

Self-assessments are interspersed throughout the units, and answers are given at the ends of the units. Working through these tests will help you to achieve the objectives of the unit and prepare you for the assignments and the examination. You should do each self-assessment exercises as you come to it in the study unit. Also, ensure to master some major historical dates and events during the course of studying the material.

The following is a practical strategy for working through the course. If you run into any trouble, consult your tutor. Remember that your tutor's job is to help you. When you need help, don't hesitate to call and ask your tutor to provide it.

1. Read this Course Guide thoroughly.
2. Organise a study schedule. Refer to the 'Course overview' for more details. Note the time you are expected to spend on each unit and how the assignments relate to the units. Important information, e.g. details of your tutorials, and the date of the first day of the semester is available from study centre. You need to gather together all this information in one place, such as your diary or a wall calendar. Whatever method you choose to use, you should decide on and write in your own dates for working breach unit.
3. Once you have created your own study schedule, do everything you can to stick to it. The major reason that students fail is that they get behind with their course work. If you get into difficulties with your schedule, please let your tutor know before it is too late for help.

4. Turn to Unit 1 and read the introduction and the objectives for the unit.
5. Assemble the study materials. Information about what you need for a unit is given in the 'Overview' at the beginning of each unit. You will also need both the study unit you are working on and one of your set books on your desk at the same time.
6. Work through the unit. The content of the unit itself has been arranged to provide a sequence for you to follow. As you work through the unit you will be instructed to read sections from your set books or other articles. Use the unit to guide your reading.
7. Up-to-date course information will be continuously delivered to you at the study centre.
8. Work before the relevant due date (about 4 weeks before due dates), get the Assignment File for the next required assignment. Keep in mind that you will learn a lot by doing the assignments carefully. They have been designed to help you meet the objectives of the course and, therefore, will help you pass the exam. Submit all assignments no later than the due date.
9. Review the objectives for each study unit to confirm that you have achieved them. If you feel unsure about any of the objectives, review the study material or consult your tutor.
10. When you are confident that you have achieved a unit's objectives, you can then start on the next unit. Proceed unit by unit through the course and try to pace your study so that you keep yourself on schedule.
11. When you have submitted an assignment to your tutor for marking, do not wait for its return before starting on the next units. Keep to your schedule. When the assignment is returned, pay particular attention to your tutor's comments, both on the tutor-marked assignment form and also written on the assignment. Consult your tutor as soon as possible if you have any questions or problems.
12. After completing the last unit, review the course and prepare yourself for the final examination. Check that you have achieved the unit objectives (listed at the beginning of each unit) and the course objectives (listed in this Course Guide).

## **FACILITATOR/TUTOR AND TUTORIALS**

There are some hours of tutorials (2-hour session) provided in support of this course. You will be notified of the dates, times and location of these tutorials. Together with the name and phone number of your tutor, as soon as you are allocated a tutorial group.

Your tutor will mark and comment on your assignments, keep a close watch on your progress and on any difficulties you might encounter, and

provide assistance to you during the course. You must mail your tutor-marked assignments to your tutor well before the due date (at least two working days are required). They will be marked by your tutor and returned to you as soon as possible.

Do not hesitate to contact your tutor by telephone, e-mail, or discussion board if you need help. The following might be circumstances in which you would find help necessary. Contact your tutor if:

- You do not understand any part of the study units or the assigned readings
- You have difficulty with the self-assessment exercises
- You have a question or problem with an assignment, with your tutor's comments on an assignment or with the grading of an assignment.

You should try your best to attend the tutorials. This is the only chance to have face to face contact with your tutor and to ask questions which are answered instantly. You can raise any problem encountered in the course of your study. To gain the maximum benefit from course tutorials, prepare a question list before attending them. You will learn a lot from participating in discussions actively.

## **SUMMARY**

On successful completion of the course, you would have developed critical thinking skills with the material necessary for efficient and effective discussion of economic issues and integration of past events with the present. However, to gain a lot from the course please try to apply anything you learn in the course to term papers writing in other economic development courses. We wish you success with the course and hope that you will find it both interesting and useful.



**MAIN  
COURSE**

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## **MODULE 1      THEORY OF CONSUMER BEHAVIOUR**

Unit 1	Basic Concept of Consumer Behaviour
Unit 2	Utility Theory
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### **UNIT 1    BASIC CONCEPT OF CONSUMER BEHAVIOUR**

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4.0	Conclusion
5.0	Summary
6.0	Tutor-Marked Assignment
7.0	References /Further Reading

#### **1.0    INTRODUCTION**

The unit introduces you to the analysis of consumer behaviour. The decisions that consumers make about what and how much to consume are among the most important factors that shape the evolution of the overall economy, and we can analyse these decisions in terms of their underlying preferences. You will learn how to model consumer preferences in a utility function, and use this utility function to make predictions about what consumers' want as well as indifference curve approach to analyse the consumer utility. We shall also look at substitution effect when the price change and income effect on the choice a consumer makes.

#### **2.0    OBJECTIVES**

At the end of this unit, you should be able to:

- explain the concept of consumer behaviour
- state the reasons for consumer preferences.

### **3.0 MAIN CONTENT**

#### **3.1 Theory of Consumer Behaviour**

A basic assumption of microeconomics is that because a consumer does not have an unlimited budget, his or her available cash for spending must be judiciously allocated for maximum benefit. Microeconomics also supposes that consumer consumers make their buying decisions in an effort to obtain the most happiness at the least cost - in other words, maximising happiness or benefit.

The consumer is considered to be a rational person, who tries to spend his or her money to derive the maximum amount of satisfaction, or utility, from it. An individual consumer wants to get all to maximise their total utility. Rational behaviour also expect that a consumer should not spend too much money irrationally by buying tons of items and stock piling them for the future, or starve themselves by buying no food at all. Thus, consumers are believed to engage in rational behaviour.

Consumer behaviour is also the study of consumers, groups, or organisations and the processes they use to select, secure, and dispose of goods, services, experiences, or ideas to satisfy needs and the effects that these processes have on the consumer and society. It is how consumers allocate their money incomes among goods and services. The basis of consumer behaviour is underlined by the thinking referred to as law of diminishing marginal utility (LDMU).

#### **SELF-ASSESSMENT EXERCISE**

Why do you consider a consumer rational being?

#### **3.2 Consumer Preferences**

The essential foundation of demand, therefore, is a pattern of how consumers behave in the market. The individual consumer has a set of preferences and values whose determinations are outside the realm of economics. They are no doubt dependent upon culture, education, and individual tastes, among a plethora of other factors. The measure of these values in this model for a particular good (commodity) is in terms of the real opportunity cost to the consumer who purchases and consumes the good. If an individual consumer purchases a particular good, then the opportunity cost of that purchase is the forgone goods the consumer could have bought instead.

In this unit, we graphically derive consumer preferences. These are measured in terms of the level of satisfaction the consumer derives from

consuming various combinations or bundles of goods. The consumer's desire is to choose the bundle of goods, which provides the highest level of satisfaction as they the consumer, define it. However, individual consumers are very much constrained in their choices. These constraints are defined by the consumer's income, wealth and the prices the consumer pays for the goods.

Concept of market basket (the collection of one or more goods) for example, can contain various food items in a bag of jewelleryes or the combination of food, clothing and electronics that the consumer buys each day, month etc.

### 3.2.1 Decisiveness

Here, given any two commodity bundles in commodity space, the consumer must be able to rank them. In figure 1.1, we randomly chose two commodity bundles A and B. This assumption means that the consumer must be able to say that they prefer commodity bundle A to B, or B to A, or that bundles A and B provide the same level of utility.

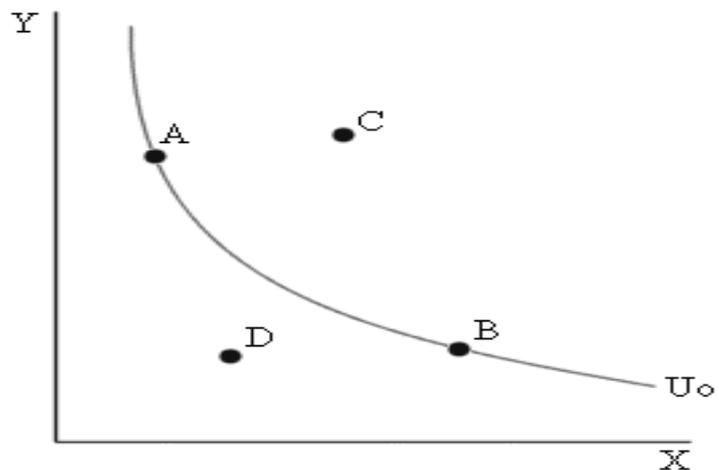


Fig. 1.1: Consumer Preferences

### 3.2.2 Consistency

The consumer must be consistent in preference and rankings. Again, referring to the above diagram, suppose we now include bundle C; let the consumer prefer commodity bundle A to B, and commodity bundle B to C. Then by this assumption, the consumer must prefer A to C.

The following two assumptions are not required to develop the theory of the consumer, but simplify matters significantly.

### 3.2.3 Non-satiation

Non-satiation connotes the expression, “more is always better than less.” More formally, any commodity bundle with at least as much of one good and more of the other must be preferred. Commodity bundle A in figure 1.1 has two straight lines running through it. This creates four quadrants, to the northeast, southeast, southwest and northwest of bundle A. All commodity bundles to the northeast of A contain more of both X and Y than does A. Therefore, by the assumption of non-satiation, any bundle in this quadrant is preferred to A. The opposite is true for bundles to the southwest of A. They contain less X and Y than does A, hence must be less preferred. The quadrants to the southeast and northwest contain more of one good but less of the other; hence, we cannot determine preference rankings with respect to A.

### 3.2.4 Convexity

This is the most difficult to explain. Convexity is based on the notion that as a consumer consumes more and more of a particular good, the additional utility obtained decreases. We define marginal utility as the change in utility due to an increase in the consumption of a given good. Convexity says that marginal utility declines as consumption increases.

### SELF-ASSESSMENT EXERCISE

Describe the concept of consumer preferences.

## 4.0 CONCLUSION

The consumer’s objective is to choose the bundle of goods, which provides the greatest level of satisfaction as they the consumer, define it. However, consumers are very much constrained in their choices. These constraints are defined by the consumer’s income, and the prices the consumer pays for the goods.

Consumer preferences are defined as the subjective (individual) tastes, as measured by utility, of various bundles of goods. They permit the consumer to rank these bundles of goods according to the levels of utility they give the consumer. Note that preferences are independent of income, wealth and prices.

The consumer preferences include decisiveness, consistency, non-satiation and convexity.

## 5.0 SUMMARY

In this unit, you learnt about the concept of consumer behaviour and basic assumptions underlining the theory of consumer behaviour. It also introduced you to law of diminishing marginal utility (LDMU).

## 6.0 TUTOR-MARKED ASSIGNMENT

1. With the aid of diagram, explain any three of the assumptions of consumer preference.
2. Why do you consider a consumer rational being?

## 7.0 REFERENCES/FURTHER READING

Fashola, M.A. (2004). *Microeconomic Theory: Highlights and Policy Extensions for Less-Developed Economies*. Lagos: Concept Publications.

Karl, E.C. & Ray, C. F. (2007). *Principles of Microeconomics*. New Jersey, USA: Pearson Education International.

Umo, J.U. (1986). *Economics: African Perspective*. Lagos: John West Publications Limited.

## **UNIT 2 UTILITY THEORY**

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### **1.0 INTRODUCTION**

In making their choices, most people spread their income over many different kinds of goods. One reason people prefer variety is that consuming more of any one good reduces the marginal or extra satisfaction they get from further consumption of the same good. Formally, marginal utility (MU) is the additional satisfaction gained by the consumption or use of one more unit of something.

### **2.0 OBJECTIVES**

At the end of this unit, you should be able to:

- define utility and explain the concept of law of diminishing marginal utility (LDMU)
- calculate total utility and marginal utility and state reasons for the differences
- differentiate between the income effect and substitution effect.

### **3.0 MAIN CONTENT**

#### **3.1 Definition of Utility**

Utility is defined as the level of happiness or satisfaction connected with alternative choices. Economists assume that when consumers are faced with a choice of feasible alternatives, they will always select the alternative that provides the highest level of utility. There are two economic theories that exhibit how a person maximises utility namely; the ordinal and cardinal utility theory.

In cardinal utility theory, *utile*, as a unit of measure for utility, was used. Thus, a rough numerical measure of consumer satisfaction is derived - what microeconomics call cardinal utility, which refers to the cardinal numbers, starting with 1, 2, 3 and so on. There is a problem, however, with this concept, convenient though it may be, consumers do not as a rule calculate the numerical utility value of their purchases; only micro-economists do. Ordinal utility, another term widely used in microeconomics, may be a more useful way of determining consumer satisfaction because it simply denotes consumer preferences without assigning them numerical values.

A consumer maximises utility if the utility received is greater than or equal to the *naira* spent. While the ordinal utility theory does not use *utile* as a unit of measure, but weighs which goods give the most satisfaction by ordering it, given the indifference curve. A consumer, given this theory, maximises utility when the budget line, that is a person's capacity to pay, is tangent to the highest attainable indifference curve. However, consumers will take into consideration:

- how much satisfaction they get from buying and then consuming an extra unit of a good or service
- the price that they have to pay to make this purchase
- the satisfaction derived from consuming alternative products
- the prices of alternative goods and services.

### 3.2 Difference between Total Utility and Marginal Utility

Consumers buy goods because they get satisfaction from them. This satisfaction, which the consumer experiences when he consumes a good, when measured as number of *utile* is called utility. It is necessary to make a distinction between total utility and marginal utility.

#### Total utility (TU)

"Total utility is the total satisfaction obtained from all units of a particular commodity consumed over a period of time". The total utility associated with a good is the level of happiness derived from consuming the good.

#### Formula:

$$TU_x = \sum MU_x$$

#### Marginal utility (MU)

"Marginal utility means an additional or incremental utility. Marginal utility is the change in the total utility that results from unit one unit

change in consumption of the commodity within a given period of time". Marginal utility is a measure of the additional utility that is derived when an additional unit of the good is consumed.

Marginal utility, thus, can also be described as difference between total utility derived from one level of consumption and total utility derived from another level of consumption.

**Formula:**

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

The table below explains the relationship that exists between total and marginal utility related with a consumer's consumption of bread (in a given time period).

**Table 1.2: Relationship between Total and Marginal Utility**

No of slices	Total utility	Marginal utility
0	0	-
1	80	70
2	120	40
3	140	20
4	150	10
5	155	5
6	150	-5

As the table above shows, the marginal utility associated with an additional slice of bread is just the change in the level of total utility that occurs when one more slice of bread is consumed. For example, the marginal utility of the third slice of bread is 20 since total utility increases by 20 units (from 120 to 140) when the third slice of bread is consumed. More generally, marginal utility can be defined as:

$$\text{Marginal utility} = \frac{\text{change in total utility}}{\text{change in quantity}}$$

The table above also shows what is known as the law of diminishing marginal utility. This law states that marginal utility declines as more of a particular good is consumed in a given time period, all things being

equal. From the example above, the marginal utility of additional slices of bread declines as more bread is consumed (in this period). In this example, the marginal utility of bread consumption becomes negative when the sixth slice of bread is consumed. Note that even though the marginal utility from bread consumption declines, total utility still increases as long as marginal utility is positive. Total utility will decline only if marginal utility is negative. This law of diminishing marginal utility is believed to occur for virtually all commodities. A bit of reflection should confirm the general applicability of this principle.

### 3.3 Marginal Utility: Consumer Equilibrium

How can the concept of marginal utility be used to explain consumer's choice? As noted above, economists assume that when a consumer is faced with a choice among feasible alternatives, she/he will select the alternative that provides the highest level of utility. Suppose a consumer has a given income that can be spent on alternative combinations of goods and services, a utility maximising consumer will select the bundle of goods at which the following two conditions are satisfied:

1.  $MU_A/P_A = MU_B/P_B = \dots = MU_Z/P_Z$ , for all commodities (A-Z),  
and
2. all income earned is spent.

The first of these conditions requires that the marginal utility per naira of spending be equated for all commodities. To see why this condition must be satisfied, suppose that the condition is violated, let us assume that the marginal utility resulting from the last naira spent on good X equals 10, while the marginal utility received from the last naira spent on good Y equals 5. Since an additional naira spent on good X provides more additional utility than the last naira spent on good Y, a utility-maximising consumer would spend more on good X and less on good Y. Spending N1 less on good Y lowers utility by 5 units, but an additional naira spent on good X raises utility by 10 units in this example. Thus, the transfer of N1 in spending from good Y to good X provides this person with a net gain of 10 units of utility. As more is spent on good Y and less on good X, though, the marginal utility of good Y will fall relative to the marginal utility of good X. This person will keep spending more on good Y and less on good X, until the marginal utility of the last naira spent on good Y is the same as the marginal utility of the last naira spent on good X.

The first condition listed above is sometimes referred to as the "equimarginal principle."

The reason for the assumption that all income is spent is because this relatively simple model is a single-period model in which there is no possibility of saving or borrowing. Of course, a more detailed model can be constructed, which includes such possibilities, but that is a topic left for more advanced microeconomics classes.

When the two conditions above are satisfied, a state of consumer equilibrium is said to occur. This is equilibrium because the consumer has no reason to change the mix of goods and services consumed once this outcome is achieved (unless there is a change in tastes, income, or relative prices).

### 3.5 Consumer Equilibrium and Demand

The concept of consumer equilibrium can be used to explain the negative slope of a consumer's demand curve. Suppose that a consumer is initially buying only two goods, X and Y at a point of consumer equilibrium:

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

and all income is spent, what happens if the price of good X rises? An examination of the equation above shows that the marginal utility per naira spent on good X will fall when the price of good X rises. To have consumer equilibrium back, the consumer will increase his or her consumption of good Y and reduce his or her spending on good X. This change in the mix of goods consumed is called the substitution effect. When good X becomes relatively more expensive, the quantity of good X demanded falls as a result of the substitution effect.

In addition to this substitution effect, there is also an income effect that occurs when the price of a good changes. Since good X has become more expensive in this example, the consumer can no longer buy the original combination of goods X and Y. This income effect results in a reduction in the quantity demanded for all normal goods. If good X is a normal good, the substitution and income effects both work together to reduce the quantity of good X demanded.

With this explanation, there is a possibility that an inferior good may have an upward sloping demand curve if the income effect is larger in magnitude than the substitution effect. A good that exhibits such a demand curve is called a Giffen good. (This type of good is named after an economist who believed that he had found evidence that indicated that the quantity of potatoes demanded increased in Ireland when the

price rose during the Irish Potato Famine - more careful later analysis indicated that Giffen's evidence was flawed.) In practice, though, no one has found reliable evidence of a Giffen good. Thus, it is probably fairly safe to assume that demand curves are downward sloping.

#### 4.0 CONCLUSION

Utility is the satisfying power goods have. If a good causes problem for a consumer we say it has disutility effect. Marginal utility is measured as the ratio of total utility to a change in the number of items consumed while the law of diminishing marginal utility states that consumption of any item yields the consumer declining utility holding taste constant.  $MU = \Delta TU / \Delta X$ . Consumer utility is achieved when the ratio of marginal utility of one commodity is equal to its price is equal to the ratio of another to its price. That is  $MU_x / P_x = MU_y / P_y$  where x and y represent different commodity.

#### 5.0 SUMMARY

The theory of utility outlined in this unit is important in many ways. It gives us at least half explanation for the law of demand and all the processes and conditions for underlying consumer equilibrium and enables us identify and assess the magnitude of consumer surplus. The law of diminishing marginal utility assumes that goods are divisible into small countable units, while it is true for many goods like cup of rice, bar of soap and so on but not true for goods like cars, ships, aircrafts and so on.

#### 6.0 TUTOR-MARKED ASSIGNMENT

The total and marginal utility of two types of drink items are given below:

Unit of drink	Juice TU	Juice MU	Soft Drink TU	Soft Drink MU
0	0		0	
1	170		600	
2	360		1250	
3	540		1680	
4	690		2040	
5	820		2350	
6	930		2550	
7	1030		2720	
8	1110		2820	
9	1170		2820	

10	1170		2760	
11	1120		2660	
12	1020		2460	

1. Complete the table above by computing the marginal utility of each type of entertainment.
2. Compute the consumer equilibrium for bread and rice given the price of bread and rice as N10 and N30 respectively.

Unit	Bread MU	Consumer equilibrium(Bread)	Rice MU	Consumer Equilibrium(Rice)
0	0		0	
1	180		600	
2	180		600	
3	170		480	
4	140		360	
5	140		360	
6	140		360	
7	100		360	
8	100		0	
9	100		0	
10	0		0	

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## **UNIT 3      INDIFFERENCE CURVE**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Utility Theory- Indifference Curve Approach
  - 3.2 Properties of Indifference Curves
  - 3.3 Indifference Curve: Substitution and Income Effect
  - 3.4 Consumer Equilibrium and Indifference Curves
  - 3.5 Diamond-water Paradox
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References /Further Reading

### **1.0 INTRODUCTION**

In this unit, you will learn more about consumer behaviour in another way using indifference curve analysis. Marginal rate of substitution explains the rate at which a consumer gains more of one goods and loses little of the other. The underlining assumptions of indifference curve and consumer equilibrium are to be discussed in this unit.

### **2.0 OBJECTIVES**

At the end of this unit, you should be able to:

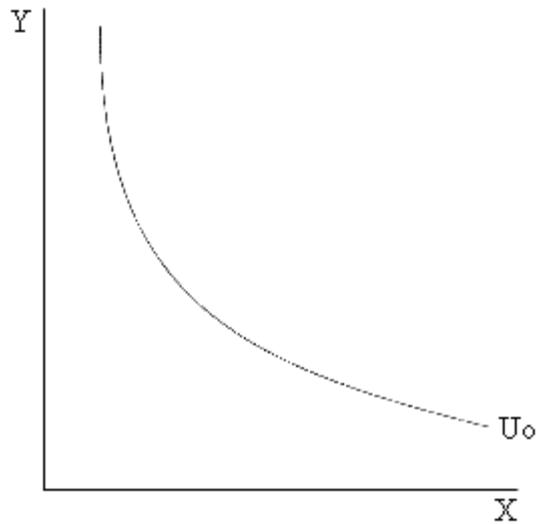
- define indifference curve
- explain the meaning of marginal rate of substitution
- describe four features of indifference curve.

### **3.0 MAIN CONTENT**

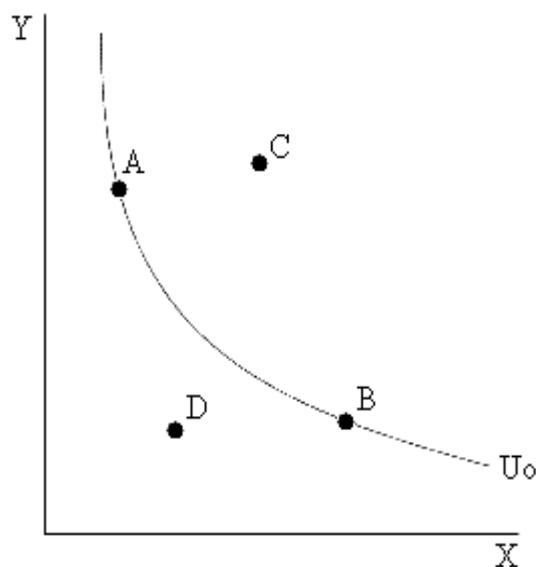
#### **3.1 Indifference Curve**

If a consumer equally prefers two product bundles, then the consumer is indifferent between the two bundles. The consumer gets the same level of satisfaction (utility) from either bundle. Graphically, this is referred to as the indifference curve. It is a curve that shows that all bundles are equally preferred, or have the same utility or same level of satisfaction. Consumer behaviour can also be demonstrated using indifference curves. An indifference curve is a graph of all combinations of goods

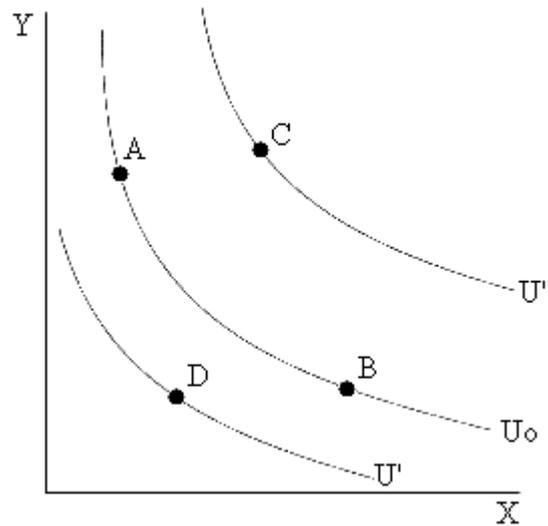
that provide a given level of utility. The graph below shows an indifference curve for two goods, X and Y.



Any two points on an indifference curve generate the same level of utility. Therefore, the figure above indicates that this consumer would be indifferent if faced with a choice between the combinations of goods represented by points A and B. Points that lie above and to the right of an indifference curve provide a higher level of consumption of each good than points on an indifference curve. Because of this, such points provide a higher level of utility than points on the indifference curve. Thus, point C would be preferred to either point A or B (or any other point on the indifference curve  $U_0$ ). Points that lie below and to the left of the indifference curve (such as point D) provide a lower level of utility. Therefore, this consumer would prefer the bundle of goods represented by point A if faced with a choice between the bundles of goods represented by points D and A.



An indifference curve crosses through each point in this graph. Therefore, an infinite number of indifference curves exist for these two goods. Two additional indifference curves, corresponding to the levels of utility derived at points C and D have been added to the graph below.



We assumed that consumers attempt to place themselves on the highest level of utility that they can achieve, given the constraints that they face. Let us examine the budget constraint facing consumers.

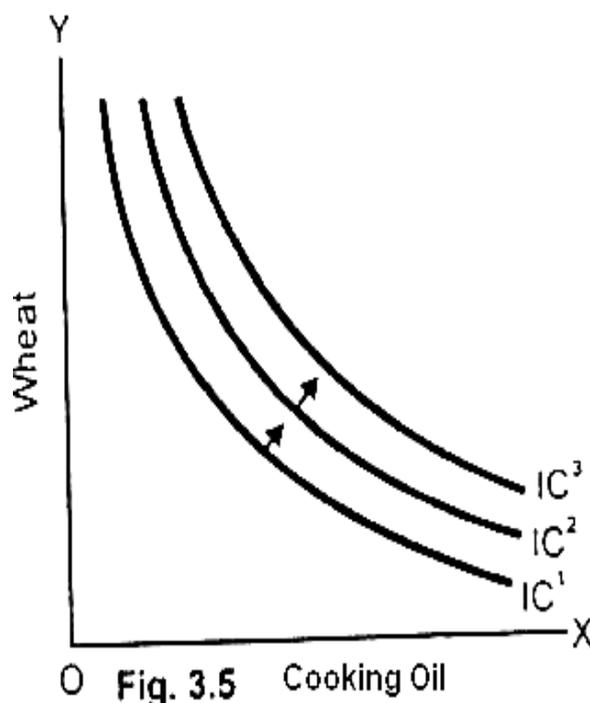
The slope of indifference curve is the rate at which a consumer is willing to trade one good for another, which is also known as the **marginal rate of substitution** (MRS). Marginal rate of substitution (MRS) reflects the maximum amount of good  $Y$  the consumer would be willing to give up obtaining an additional unit of  $X$ . The consumer would be happy to give less  $Y$  since it would place the consumer above  $U_1$  at a higher utility level. However, the consumer would not be willing to give up more  $Y$  since it would place the consumer below  $U_1$  at a lower level of utility.

The MRS can be portrayed as the slope of the indifference curve. This would show the amount of good  $Y$  given up per unit of  $X$ . The slope between points  $A$  and  $B$  is  $\Delta Y_0/\Delta X$ , between  $B$  and  $C$  is  $\Delta Y_1/\Delta X$ , and between  $C$  and  $D$  is  $\Delta Y_2/\Delta X$ . Notice that since  $\Delta Y$  is declining, the slope is getting flatter and flatter. For very small increases in good  $X$ , the slope of the indifference curve becomes the slope of the tangent to it. We can define MRS as the absolute slope of the tangent to an indifference curve. In the diagram above, the tangent gets flatter and flatter as we move from  $A$  to  $B$ ,  $B$  to  $C$  and  $C$  to  $D$ .

### 3.2 Properties of Indifference Curves

1. Higher indifference curves are preferred to lower ones, since more is preferred to less (non-satiation). A higher indifference curve that lies above and to the right of another indifference curve represents a higher level of satisfaction and combination on a lower indifference curve yields a lower satisfaction.

In other words, we can say that the combination of goods, which lies on a higher indifference curve, will be preferred by a consumer to the combination of goods, which lies on a lower indifference curve.



In this diagram above, there are three indifference curves,  $IC^1$ ,  $IC^2$  and  $IC^3$ , which represents different levels of satisfaction. The indifference curve  $IC^3$  shows greater amount of satisfaction and it contains more of both goods than  $IC^2$  and  $IC^1$  ( $IC^3 > IC^2 > IC^1$ ).

2. Indifference curves are downward sloping. If the quantity of one goods is reduced, then you must have more of the other good to make up for the loss. The indifference curves must slope down from left to right. This means that an indifference curve is negatively sloped. It slopes downward because as the consumer increases the consumption of X cooking oil, he has to give up certain units of Y wheat to maintain the same level of satisfaction.

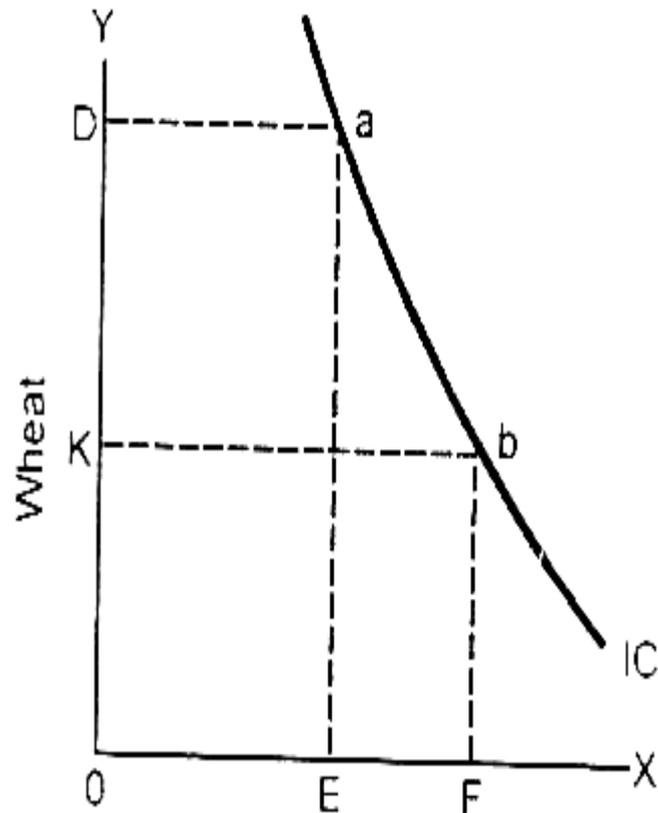
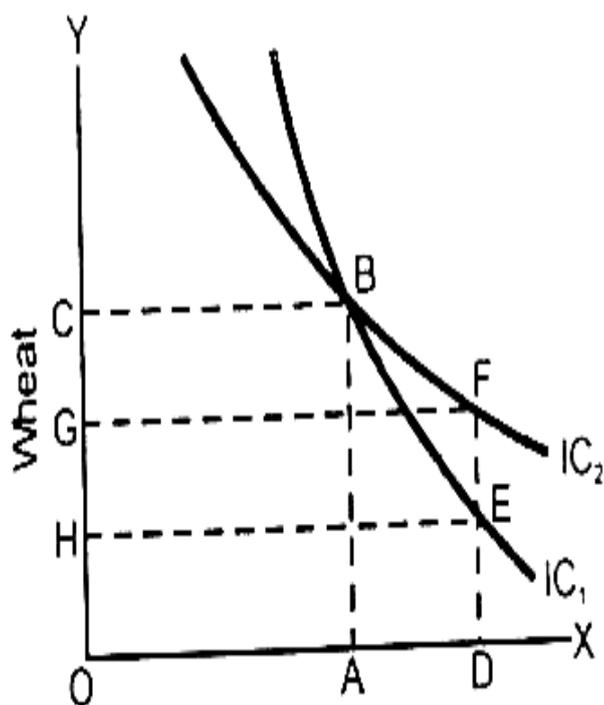


Fig. 3.4 Cooking Oil

In the above graph, two combinations of commodity cooking oil and commodity wheat are shown by the points A and B on the same indifference curve. The consumer is indifferent towards points A and B as they represent equal level of satisfaction.

At point (a) on the indifference curve, the consumer is satisfied with OE units of cooking oil and OD units of wheat. He is equally satisfied with OF units of cooking oil and OK units of wheat shown by point B on the indifference curve. It is only on the negatively sloped curve that different points representing different combinations of goods X and Y give the same level of satisfaction to make the consumer indifferent.

3. Indifference curves do not cross (intersect), since this would imply a contradiction. Given the definition of indifference curve and the assumptions behind it, the indifference curves cannot intersect each other. It is because at the point of tangency, the higher curve will give as much as of the two commodities as is given by the lower indifference curve. This is absurd and impossible.

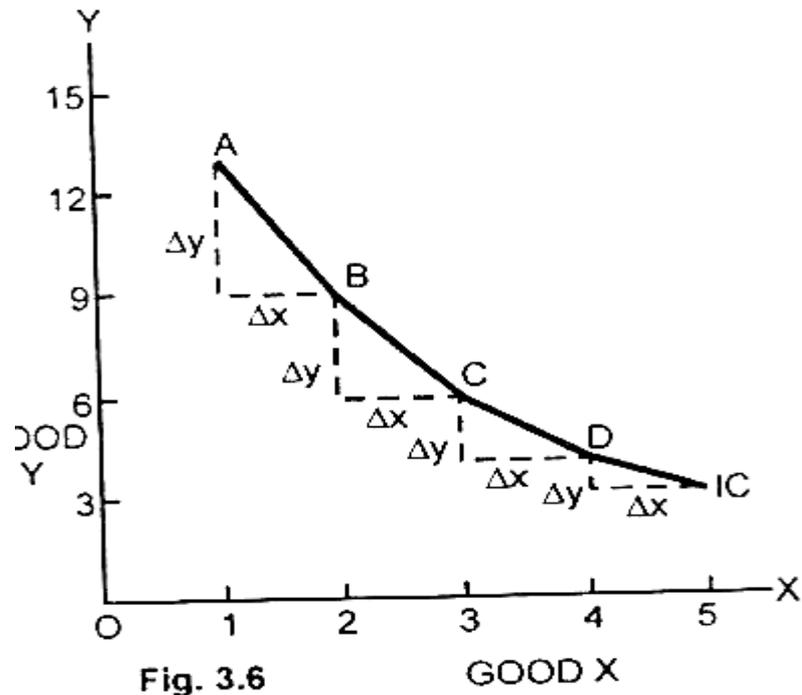


**Fig. 3.7** Cooking Oil

In the above graph, two indifference curves are shown cutting each other at point B. The combinations represented by points B and F given equal satisfaction to the consumer because both lie on the same indifference curve  $IC_2$ . Similarly, the combinations shown by points B and E on indifference curve  $IC_1$  give equal satisfaction to the consumer.

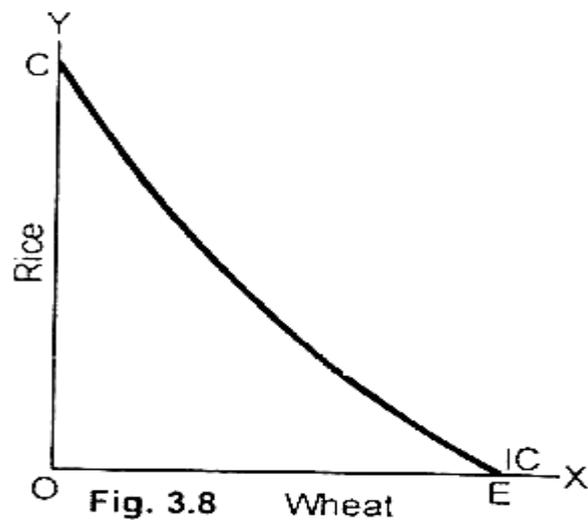
If combination F is equal to combination B in terms of satisfaction and combination E is equal to combination B in satisfaction, it follows that the combination F will be equivalent to E in terms of satisfaction. This conclusion looks quite funny because combination F on  $IC_2$  contains more of good Y (wheat) than combination which gives more satisfaction to the consumer. We, therefore, conclude that indifference curves cannot cut each other.

4. Indifference curves are bowed inward (in most cases). The slopes of indifference curves represent the MRS (rate at which consumers are willing to substitute one good for the other). This is an important property of indifference curves. They are convex to the origin (bowed inward). This is equivalent to saying that as the consumer substitutes commodity X for commodity Y, the marginal rate of substitution diminishes of X for Y along an indifference curve. People are usually willing to trade away more of one good when they have a lot of it, and less willing to trade away goods, which are in scarce supply. This implies that MRS must increase as we get less of a good.



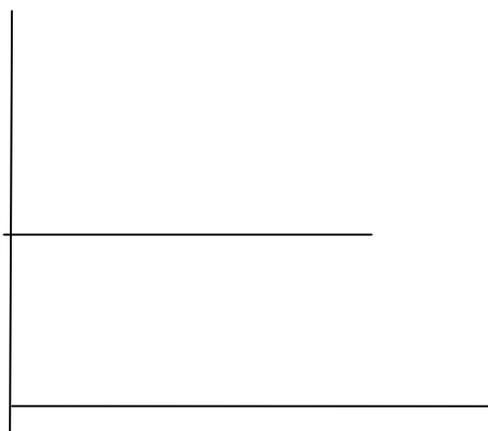
In this diagram, as the consumer moves from A to B to C to D, the willingness to substitute good X for good Y diminishes. This means that as the amount of good X is increased by equal amounts, that of good Y diminishes by smaller amounts. The marginal rate of substitution of X for Y is the quantity of Y good that the consumer is willing to give up to gain a marginal unit of good X. The slope of IC is negative. It is convex to the origin.

5. One of the basic assumptions of indifference curves is that the consumer buys combinations of different commodities. He is not supposed to buy only one commodity. In that case, indifference curve will touch one axis. This violates the basic assumption of Indifference curve.



In the above diagram, it is shown that the indifference IC touches Y-axis at point C and X-axis at point E. At point C, the consumer purchase only OC commodity of rice and no commodity of wheat. Similarly, at point E, he buys OE quantity of wheat and no amount of rice. Such indifference curves are against our basic assumption. Our basic assumption is that the consumer buys two goods in combination.

6. Note that two extreme examples exist. Perfect substitutes have straight-line indifference curves. As we get more of the good, we trade off with the substitute at a constant rate because we are indifferent between them (i.e. Coke and Pepsi). Perfect complements have right-angled indifference curves. If goods can only be used together, there is no satisfaction in having more of A without additional amounts of B (i.e. left and right shoe). In general, the better substitutes goods are, the straighter the indifference.



### SELF- ASSESSMENT EXERCISE

Mention the salient features that must be considered when drawing indifference curve.

### 3.3 Indifference Curve: Substitution and Income Effect

The substitution and income effect of price change on quantity demanded. The indifference theory is used to explain the distinction between substitution and income effects of a price change. The parallel shifts in budget line indicate a real income change, the difference between the points of tangency of DE and AC (which are parallel budget lines) represent income effect which is indicated on the graph as  $X_3 - X_2$ . Since substitution effect is due purely to the change in relative price, the points of tangency between AB and DE (which have different price ratio but the same real income) represent the substitution effect, which is indicated in the graph as  $X_2 - X_1$ .

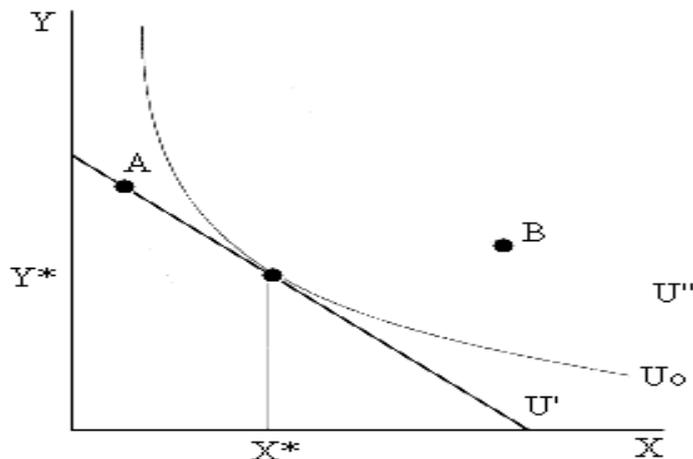
It is observed that the price fall in commodity X has led quantity demand to rise from  $X_1$  to  $X_3$ , for the ordinary demand curve, where we keep only the nominal income constant, rather than the real income. Note that the real income is affected by the change in price as indicated in the graph above.

### SELF- ASSESSMENT EXERCISE

Assuming there is a change in the price of particular goods; explain its effect on consumer level of satisfaction.

### 3.4 Consumer Equilibrium and Indifference Curves

Consumers maximising utility subject to their budget constraint attain the highest possible level of utility at a point of tangency between their budget constraint and an indifference curve. In the graph below, this occurs when the consumer consumes  $X^*$  units of good X and  $Y^*$  units of good Y. While other points on the budget constraint such as point A are feasible, they provide a lower level of utility. Points such as point B provide a higher level of utility, but are not feasible. It is not possible to attain a higher level of utility than  $U_0$  without changing the budget constraint (and there are laws that prevent people from acquiring more goods than they can pay for).



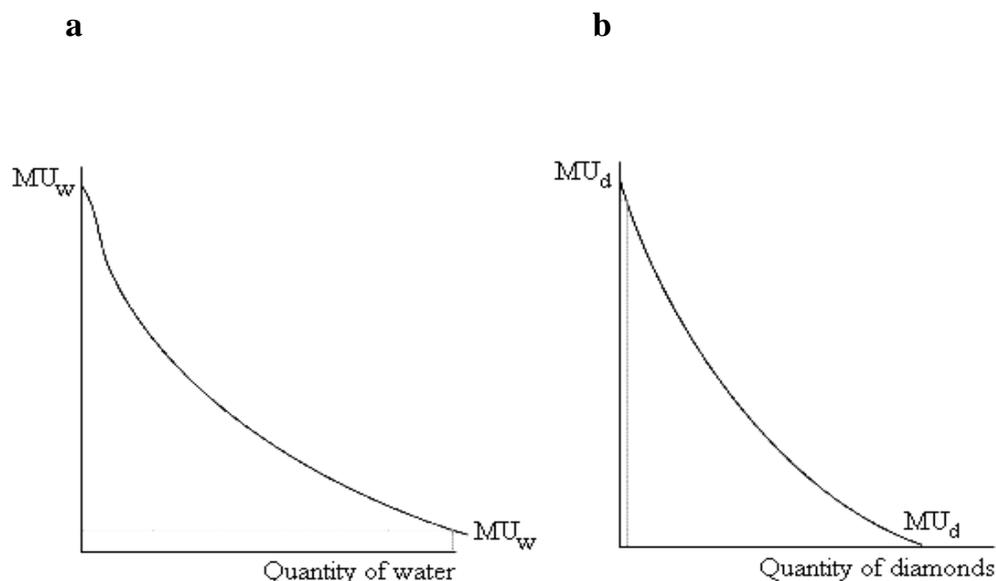
### SELF- ASSESSMENT EXERCISE

With the aid of diagram, describe consumer equilibrium.

### 3.5 Diamond-water Paradox

Adam Smith in his book, *The Wealth of Nation* attempted to make a theory of value that explained why different goods had different market values. In this attempt, however, he faced a problem that has come to be referred as the "diamond-water" paradox. The paradox occurs because water is essential for life and has a low market price (often a price of zero) while diamonds are not as essential yet have a very high market price. To resolve this problem, Adam Smith proposed two concepts of value: **value in use** and **value in exchange**. Diamonds have a low value in use but a high value in exchange while water has a high value in use but a low value in exchange. He argued that economists could explain the exchange value of a commodity by the amount of labour required to produce the commodity. Smith did not propose a theory to explain the use value of a commodity.

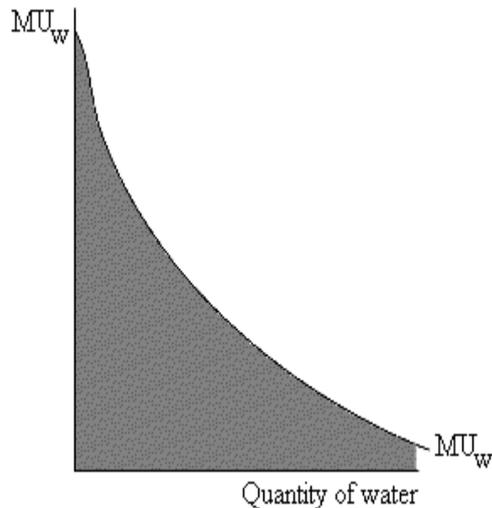
With the help of theory marginal analysis, however, enables us to expound both value in use and value in exchange. The graph below contains marginal utility curves for both diamonds and water. Since consumers consume a large volume of water, the marginal utility of an additional unit of water is relatively low. Since few diamonds are consumed, the marginal utility of an additional diamond is relatively high.



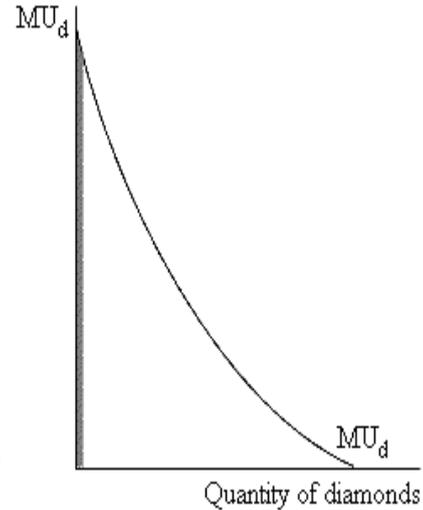
Total utility can be derived by adding up the marginal utilities associated with each unit of the good. A bit of reflection should convince you that total utility can be measured by the area under the marginal utility curve. The shaded areas in the graph below provide a measure of the total utility associated with the consumption of water and diamonds. Note that the total utility from water is very high (since a

large volume of water is consumed) while the total utility received from diamonds is relatively low (because few diamonds are consumed).

a.



b.



These concepts of total and marginal utility can be used to resolve Adam Smith's diamond-water paradox. When Adam Smith was referring to "value in use," he was actually referring to the concept of total utility. Exchange value, on the other hand, is tied to how much someone is willing to pay for an additional unit of the commodity. Because diamonds are expensive, consumers consume few diamonds and the marginal utility of an additional diamond is relatively high. Since water is not very costly to acquire, people consume more water. At this high level of consumption, the marginal utility of an additional unit of water is relatively low. The price that someone is willing to pay for an additional unit of a good is related to its marginal utility. Because the marginal utility of an additional diamond is higher than the marginal utility associated with an additional glass of water, diamonds have a higher value in exchange.

### SELF-ASSESSMENT EXERCISE

Explain the following terms:

- i. value in use
- ii. value in exchange.

### 4.0 CONCLUSION

Indifference curves map or graphically represent consumer preferences. The properties of these indifference curves reflect the four consumer

preference assumptions. The slope of an indifference curve, the MRS, reflects the value placed on the additional unit of a good in terms of the other goods the consumer would be willing to give up. The point at which the lowest point of indifference curve touches the budget line is referred to consumer equilibrium. A paradox stating that (1) the things with the greatest value in use frequently have little or no exchange (2) the things with the greatest value in exchange frequently have little or no value in use.

## 5.0 SUMMARY

Here you have learnt more about utility theory using the concept of indifference curve. You learnt basic properties of indifference curve. By now should be able to use indifference curve to explain substitution effect and income effect on utility. Lastly, you learnt about diamond-water paradox using value in use and value in exchange as explained by father of economics Adams Smith.

## 6.0 TUTOR-MARKED ASSIGNMENT

If Abiodun's marginal rate of substitution of X for Y is 5; that is  $MU_X/MU_Y = 5$  – the price of X is N9.00 and the price of Y is N2.00, she is spending too much of her income on Y. do you agree or disagree? Explain your using graph.

## 7.0 REFERENCES/FURTHER READING

- Bradley, R. S. (2003). *The Economy Today*. New York: The McGraw-Hill Companies.
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## **UNIT 4 BUDGET CONSTRAINT**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Budget Constraint
  - 3.2 Revealed Preference Theory
  - 3.3 Consumer Surplus
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor -Marked Assignment
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### **1.0 INTRODUCTION**

Having learnt about the concept of utility using indifference curve approach as well as consumer equilibrium, it is now necessary to learn about budget constraint, which tells us about how a consumer spends his/her income on the available commodities. Here, you will learn about the properties of budget constraint or budget line in relation to relative price of commodity. Concept revealed preferences is also discussed in this unit.

### **2.0 OBJECTIVES**

At the end this unit, you should be able to:

- define budget constraint
- explain relative price
- describe the concept of revealed preferences.

### **3.0 MAIN CONTENT**

#### **3.1 Budget Constraint**

Using indifference curves, we can model consumer preferences showing how the consumer would rank commodity bundles according to the utility each bundle provides. Having a map of consumer preferences, however, is not enough to explain the choices consumers make. Choices are also a function of other constraints, namely the consumer's income and the price of goods.

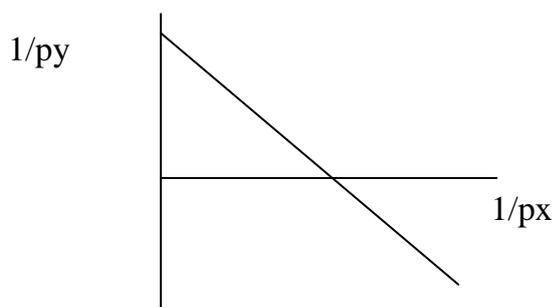
In order to simplify the presentation, we assume that income is exhausted over the consumer purchases. This means we are excluding

savings. The budget constraint would then say that income is equal to the sum of consumer expenditure. Expenditure on a particular good is the product of the amount of the good purchased times its price. We can then write the budget constraint as:

$$I = P_x * X + P_y * Y.$$

In this equation, the consumer has expended all income,  $I$ , across both goods  $X$  and  $Y$ , where  $P_x$  and  $P_y$  are the prices of  $X$  and  $Y$  respectively. To illustrate this budget constraint graphically into commodity space requires rewriting the budget constraint in terms of good  $Y$ , the variable on the vertical axis. Using simple algebra, we can rearrange terms to produce the following budget line:  $Y = I/P_y - P_x/P_y * X$ .

In the equation of a line ( $Y = mX + b$ ), the slope is given by  $m$ , the number multiplied with  $X$ , and the  $Y$  intercept is given as  $b$ . Referring to the budget line, its slope is  $P_x/P_y$  and the  $Y$  intercept is  $I/P_y$ . The diagram below illustrates these characteristics of the budget line.



The budget line divides commodity space into two. The commodity bundles, which are affordable, are shown as being on or below the line. Income is completely spent for those bundles on the line. We exclude the commodity bundles below the budget line since all income is not being spent. The commodity bundles above and to the right of the budget line are beyond the reach of the consumer, given their income and the prices of goods  $X$  and  $Y$ . Note the intercepts—the  $Y$  intercept represents a commodity bundle that contains only good  $Y$ . This is the amount of good  $Y$  that the consumer could purchase if they spent their entire income on good  $Y$ . The same is true for good  $X$ 's intercept.  $I/P_x$  is the maximum amount of good  $X$  that this consumer can purchase, given their income and the two goods' prices.

The budget line plays two important roles. The first is determined by the level of income. The more income the consumer has to spend the greater number of the commodity bundles that are affordable. An increase in income would be portrayed as a parallel shift outwards of the budget

line. It is a parallel shift because we are holding the prices of goods X and Y constant, therefore there would be no change in the line's slope. The second role for the budget line is to act as a price line. A price line demonstrates the relative price of two goods. A **relative price** is the price of one good in terms of another. For example, let  $P_b = N0.50/\text{milk}$  be the price of milks, and  $P_o = N1.00/\text{bread}$  the price of bread. The relative price of a tin of milk in terms of bread is  $\frac{1}{2}$  a loaf of bread. If the consumer buys a tin of milk, then, they necessarily forgo purchasing one half a loaf of bread. If we take the ratio of the milk's price to the price of a loaf of bread, we get:

$$P_b/p_o = \frac{N.50/\text{milk}}{N1.00/\text{bread}} = \frac{1\text{bread}}{2\text{milk}}$$

Thus the slope of the budget line shows the relative price of good X in terms of good Y. If the price of good X increases, then the amount of good Y that is foregone increases. There is an increase in the relative price of good X. Since we are holding income and the price of good Y constant, this increase in good X's price results in a decrease of the budget line's X intercept. The line swivels inward.

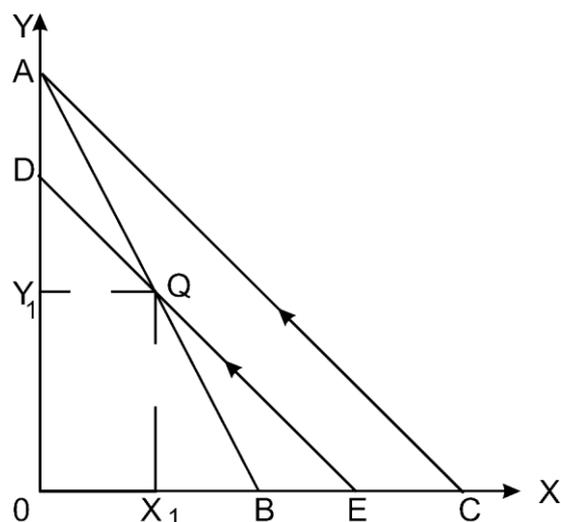
Relative price is an important tool. It shows how much of one good that the consumer must necessarily give up to obtain more of another. The flatter the budget line, the less costly the good on the horizontal axis in terms of the good on the vertical axis. The steeper the budget line, the more costly the good. Note that relative price is shown solely as the budget line's slope. The distance from the origin does not reflect prices.

### SELF-ASSESSMENT EXERCISE

Define budget line and draw a sketchy sample.

### 3.2 Revealed Preference Theory

The revealed preference theory makes two assumptions: (a) that the consumer has a budget constraint (b) that the consumer is consistent in the sense that if he prefers situation A to B, and B is superior to C, then he will prefer A to C. superiority of A to B means that B affords him more quantities of some or all the commodities and less of none in comparison to C. The theory used the budget constraint to draw its logical implications. Given the budget constraint AB in the graph below, and given that the revealed preference of consumer is point Q on AB, which corresponds to  $X_1$  units of commodity X and  $Y_1$  units of commodity Y: if we now consider a fall in the price of X, then the budget line pivots to AC.

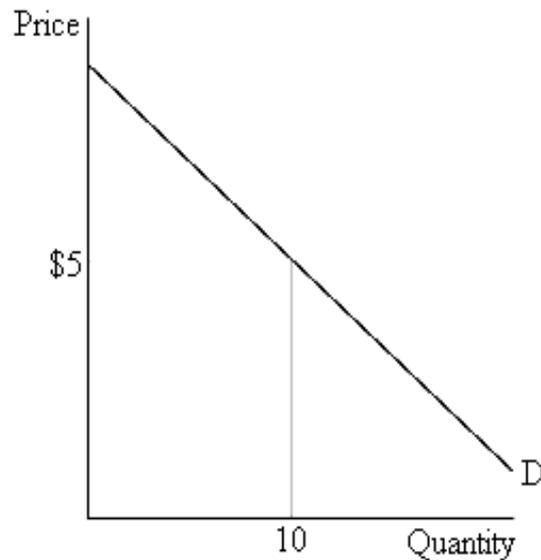


The price change has introduced a change in real income. So, we can eliminate the change in the real income by shifting the new budget line AC backwards in parallel manner until it cuts point Q of the revealed preference on AB. We will maintain a constant real income while preserving the new price ratio. The reconstructed budget line DE presents the consumer with a new situation, consisting of segment DQ and QE. Clearly, DQ is inferior to AQ, so that the consumer can only choose either to remain on point Q or move to another point QE. This implies that the fall in the price of X will make the consumer not demand more of X rather less. The possibilities are the points on QE will correspond to a downward –sloping demand curve with various elasticities.

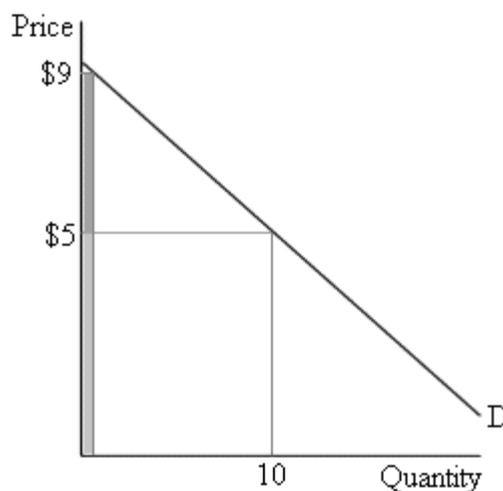
If the consumer decides to remain on point Q, then we have a perfectly –inelastic demand; if he decides to move down the segment QE, then he demands more than  $X_1$  and demand becomes elastic the further down he moves.

### 3.3 Consumer Surplus

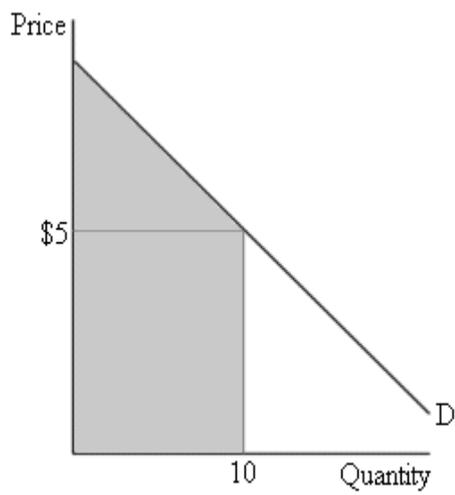
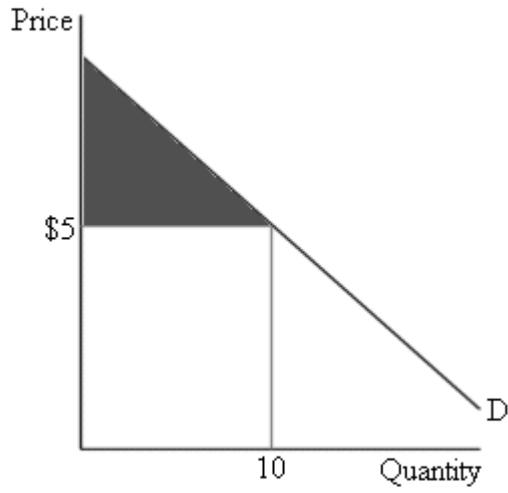
A consumer buys a good only if the purchase is expected to makes the person better off (or at least not worse off). In general, the total benefit received from the purchase of a commodity is expected to exceed the opportunity cost. This provides consumers with a net gain from trade, referred to as **consumer surplus**. Let us examine this concept in more detail. Suppose that a consumer buys 10 units of a good at a price of N5. The graph below illustrates this possibility.



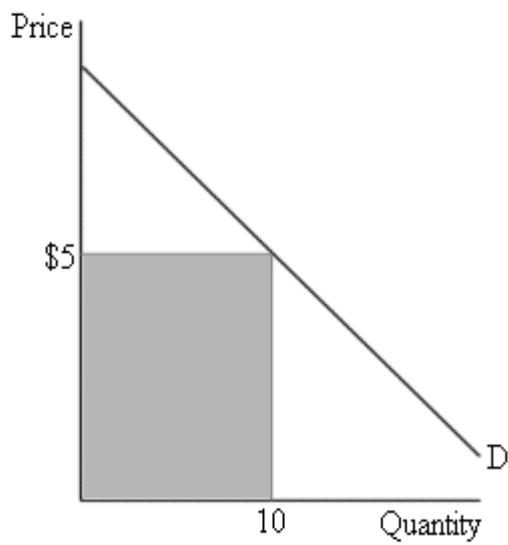
As the graph below shows, the first unit of the good costs N5, but this consumer would have been willing to pay a price of up to N9 for this first unit of this good. In this case, the consumer receives a good that s/he values at N9 by giving up only N5. Therefore, the first unit of the good generates N4 in consumer surplus. In the graph below, the benefit received from the first unit of the good is the sum of the shaded areas (notice the height of this rectangle equals the price the person is willing to pay - N9 - while the base equals 1, thus the area of the rectangle equals N9). The cost of this first unit of the good (N5) is given by the shaded area. The lower shaded area at the top of the graph represents the consumer surplus (N4) received from the first unit of this good.



More generally, the total benefit from consuming 10 units of this good is the entire area under the demand curve (as illustrated by the shaded area in the graph below).



The total cost of consuming 10 units of this good at a price of N5 is N 50. This is represented by the shaded rectangle in the graph below.



The consumer surplus received by this consumer is the difference between the total benefit and total cost. This is represented by the shaded area in the graph below. The consumer surplus represents the consumer's net benefit from engaging in voluntary trade.

### **SELF-ASSESSMENT EXERCISE**

With the aid graph describe consumer surplus.

## **4.0 CONCLUSION**

The budget constraint separates those combinations of goods and services that are not. All the points below and to the left of a graph of an individual budget constraint make up the choice set or opportunity cost. The difference between the maximum amount a person is willing to pay for a good and its current market price is referred to as consumer surplus.

## **5.0 SUMMARY**

In this unit, you have learnt about budget constraint, which tells us about how a consumer spends his/her income on the available commodities. You also learnt about the properties of budget constraint or budget line in relation to relative price of commodity. Concept revealed preferences is also discussed in this unit.

## **6.0 TUTOR-MARKED ASSIGNMENT**

1. Suppose that the price X is N5 and the price of Y is N10 and a hypothetical household
2. has N500 to spend per month on goods X and Y, sketch the individual budget constraint
3. Assuming that the individual splits his income equally between X and Y, show where the household ends up the budget constraint.
4. Suppose that the individual income doubles to N1000, sketch the new budget
5. constraint facing the individual.
6. Suppose after the change, the individual spends N200 on Y and N800 on X, does this imply that X is a normal or an inferior good?

## **7.0 REFERENCES/FURTHER READING**

Bradley, R. S. (2003). *The Economy Today*. New York: The McGraw-Hill Companies.

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## MODULE 2 MARKET STRUCTURES 1

Unit 1	Overview of Market Structure
Unit 2	Profit Maximisation and Losses Minimisation under Perfect Competitive Market
Unit 3	Monopoly Markets

### UNIT 1 MARKET STRUCTURE 1

#### CONTENTS

1.0	Introduction
2.0	Objectives
3.0	Main Content
3.1	Market Structure
3.1.1	Types of Market Structures
3.2	Perfect Competitive Market
3.3	Assumptions of Perfectly Competitive Market
3.4	Concept of Total, Average, Marginal Revenues and Demand
3.5	Demand Curve Facing a Single Firm
4.0	Conclusion
5.0	Summary
6.0	Tutor-Marked Assignment
7.0	References /Further Reading

#### 1.0 INTRODUCTION

In this unit, you will understand why microeconomics is concerned with examining the economic behaviour of both buyers and sellers in particular markets. In addition, you will learn what market is and what kind of markets are there and how do the market participants transact in the market. This unit introduces and examines the idea of market structure such as perfect market competition, monopoly, monopolistic competition, and oligopoly.

#### 2.0 OBJECTIVES

At the end of this unit, you should be able to:

- enumerate different forms of market structure
- briefly identify various market structures with their features
- state the characteristics of perfectly competitive market
- calculate total, average, marginal revenues.

### 3.0 MAIN CONTENT

#### 3.1 Market Structure

Market structure is best defined as the structural/organisational and other characteristics of a market. Market structure is the number of firms producing identical goods, which are homogeneous in nature. The major yardstick by which one can distinguish between different market structures are the number and size of producers and consumers in the market, types of goods and services being traded, and the degree to which information can flow freely. We focus on those characteristics, which affect the nature of competition and pricing.

##### 3.1.1 Types of Market Structures

The types of market structures include the following.

1. Perfect competitive market
2. **Imperfect competitive market:** The imperfectly competitive structure is quite identical to the realistic market conditions where some monopolistic competitors, monopolists, oligopolists, oligosopnists, and monopsonists operate.

**Table 5.1 : Brief Reference to Basic Market Structures**

Market Structure	Seller Entry Barriers	Seller Number	Buyer Entry Barriers	Buyer Number
<b>Perfect Competition</b>	No	Many	No	Many
<b>Monopolistic competition</b>	No	Many	No	Many
<b>Oligopoly</b>	Yes	Few	No	Many
<b>Oligopsony</b>	No	Many	Yes	Few
Monopoly	Yes	One	No	Many
Monopsony	No	Many	Yes	One

However, there are four basic types of market structures by traditional economic analysis, namely, perfect competition, monopolistic competition, oligopoly and monopoly.

#### SELF-ASSESSMENT EXERCISE

Mention three characteristics of each the following market structures:

- a. perfect competitive market

- b. monopoly market
- c. monopolistic competition market
- d. oligopoly

### 3.2 Perfectly Competitive Market

Perfect competition exists in an industry where perfect competition is characterised by many buyers and sellers, many products that are similar in nature and, as a result, many substitutes. Perfect competition means there are few, if any, barriers to entry for new companies, and prices are determined by supply and demand. Thus, producers in a perfectly competitive market are subject to the prices determined by the market and do not have any leverage.

### 3.3 Assumptions of Perfectly Competitive Market

1. Many suppliers each with an insignificant share of the market. This means that each firm is too small relative to the overall market to affect price via a change in its own supply – each individual firm is assumed to be a price taker.
2. An identical output produced by each firm. In other words, the market supplies homogeneous or standardised products that are perfect substitutes for each other. Consumers perceive the products to be identical.
3. Consumers have perfect information about the prices all sellers in the market charge – so if some firms decide to charge a price higher than the ruling market price, there will be a large substitution effect away from this firm.
4. All firms (industry participants and new entrants) are assumed to have equal access to resources (technology, other factor inputs) and improvements in production technologies achieved by one firm can spill-over to all the other suppliers in the market.
5. There are assumed to be no barriers to entry and exit of firms in the long run, which means that the market is open to competition from new suppliers. This affects the long-run profits made by each firm in the industry. The long-run equilibrium for a perfectly competitive market occurs when the marginal firm makes normal profit only in the long-term.
6. No externalities in production and consumption so that there is no divergence between private and social costs and benefits.

### SELF-ASSESSMENT EXERCISE

Briefly explain the basic features of a perfect competitive market.

### 3.4 Concept of Total, Average, Marginal Revenues and Demand Revenue in a Perfect Competitive Business

Industries in competitive markets take the market price (P) as given (price takers). The amount the firm receives for a typical unit is known as the "average revenue" (AR). This can be calculated as:

$$TR/Q = (P \times Q)/Q = \text{Price}$$

Thus, average revenue is equal to price, and is constant. How much additional revenue does the firm get if it sells one additional unit? To solve this question, we take a look at "marginal revenue" (MR), which is equal to the change in TR, divided by the change in quantity. Note that this (MR) too is equal to price, so the marginal revenue is constant as well, and is equal to average revenue.

#### 3.4.1 Total Revenue

The total revenue of a firm is the total amount of money that the firm receives by selling a certain quantity of output. This can be illustrated as thus:

$$TR = P \times Q$$

Where,

P = Price

Q = Quantity

TR = Total Revenue

#### Example:

Calculate the total revenue for a firm which is selling 10 television sets at N21,000 each.

$$\begin{aligned} TR &= P \times Q \\ &= 21,000 \times 100 \\ &= \text{N}2, 10,000 \end{aligned}$$

#### 3.4.2 Average Revenue

Revenue earned by a firm per unit of output is called average revenue. Average revenue is equal to price in both competitive and non-competitive markets. This can be illustrated as thus:

$$AR = TR/Q$$

Where

AR = Average revenue

TR = Total revenue

Q = Units sold

### SELF-ASSESSMENT EXERCISE

What is the average revenue for firm JKB which is selling 35 units of commodity X and getting the total revenue of ₦3000?

### 3.4.3 Marginal Revenue

Revenue earned by selling additional unit of output is called as marginal revenue. In other words, change in the revenue resulting from a one unit increase in output is marginal revenue. This can be illustrated as thus:

$$MR = TR_n - TR_{n-1}$$

Where

MR = Marginal revenue

TR = Total revenue

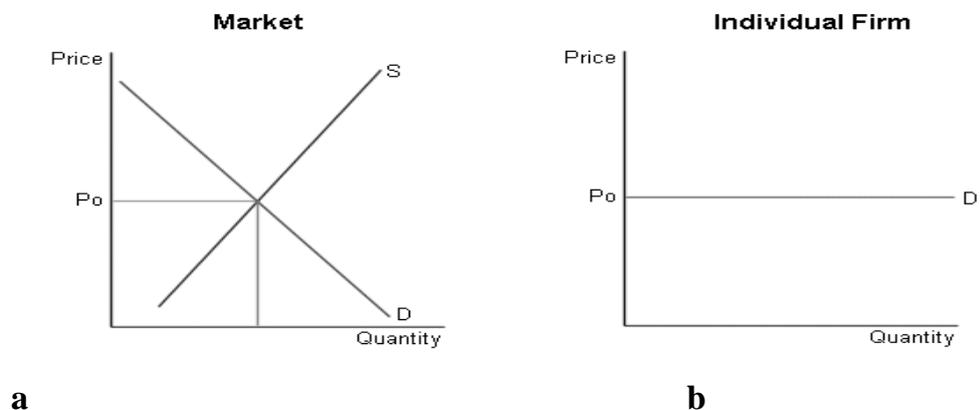
n = Unit sold

### SELF-ASSESSMENT EXERCISE

By selling 30 units, firm JKB make N300. After selling the 31st unit, firm's revenue increased to 318. What is the marginal revenue in this situation?

### 3.5 Demand Curve Facing a Single Firm

The graph below illustrates the relationship between the market and an individual firm. The equilibrium price is determined by the interaction of market demand and market supply. Since the output of each firm is a small share of this total output, no individual firm can affect the market price. Thus, each firm faces a demand curve for its product that is perfectly elastic at the market price.



The demand curve facing perfectly competitive firm is characterised by the following multiple equality:  $P=D=AR=MR$

Where: P =price  
D= demand function  
AR=average revenue  
MR=marginal revenue

#### 4.0 CONCLUSION

Market structure implies a variety of ways consumers and firms interact in the market. How firms actually act requires understanding the competitive environment in which they operate. Perfect competition exists in an industry where:

- many firms sell identical products to many buyers
- there are no restrictions to entry into the industry
- established firms have no advantages over new ones
- sellers and buyers are well informed about prices.

#### 5.0 SUMMARY

In this unit, you learnt about the different market structures. Specifically, you learnt about the types of market structure (perfect market and imperfect market), which include monopoly, monopolistic competition, oligopoly, some others. Furthermore, you learnt about the concept of perfect competitive market and its basic features. Finally, you learnt about demand curve and revenue structure facing perfect competitive market.

#### 6.0 TUTOR-MARKED ASSIGNMENT

Vividly describe the link among the following term:

- a. demand
- b. marginal revenue
- c. price
- d. average revenue

#### 7.0 REFERENCES /FURTHER READING

Fashola, M.A. (2004). *Microeconomic Theory: Highlights and Policy Extensions for Less-Developed Economies*. Lagos: Concept Publications.

Karl, E.C. & Ray, C. F. (2007). *Principles of Microeconomics*. New Jersey, USA: Pearson Education International.

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## **UNIT 2     PERFECT COMPETITIVE MARKET: PROFIT MAXIMISATION**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Profit Maximisation
  - 3.2 Loss Minimisation and Shutdown Rule
  - 3.3 Break-even Price
  - 3.4 Short-run Supply Curve
  - 3.5 Long-run Equilibrium
  - 3.6 Long-run Equilibrium and Economic Efficiency
  - 3.7 Consumer and Producer Surplus
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References /Further Reading

### **1.0 INTRODUCTION**

In this unit, you will learn how to determine profit maximisation and loss minimisation and shutdown rule under perfect competitive market. Furthermore, the breakeven point, short run supply curve, long run equilibrium and long-run and economic efficiency as it operates under perfect competitive market will be discussed. Finally, you will learn about consumer and producer surplus.

### **2.0 OBJECTIVES**

At the end of this unit, you should be able to:

- calculate total revenue and marginal revenue of perfect competitive market
- determine profit maximisation and loss minimisation conditions under perfect competition
- explain the differences between consumer surplus and producer surplus.

### 3.0 MAIN CONTENT

#### 3.1 Profit Maximisation

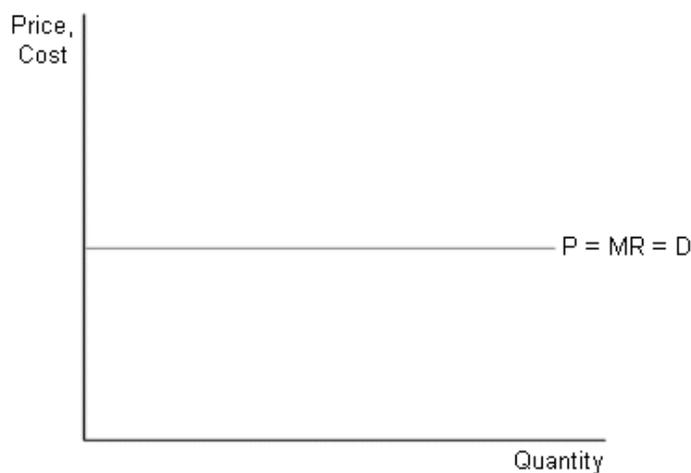
To maximise profit, we need to get the concept of the revenue and the costs of the business. Profit is maximised when marginal revenue equals marginal cost (i.e. marginal revenue = marginal cost) and marginal cost is rising. Marginal revenue is the additional revenue from one additional unit. Marginal cost is the additional cost from one additional unit.

A firm maximises its profits by producing the level of output at which marginal revenue equals marginal cost. Marginal revenue is defined as:

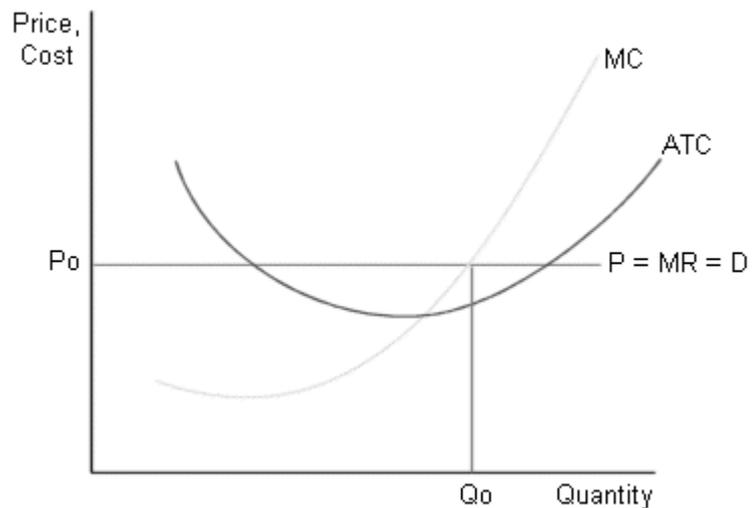
$$\text{Marginal revenue} = \frac{\Delta TR}{\Delta Q}$$

$$\text{Marginal cost} = \frac{\Delta TC}{\Delta Q}$$

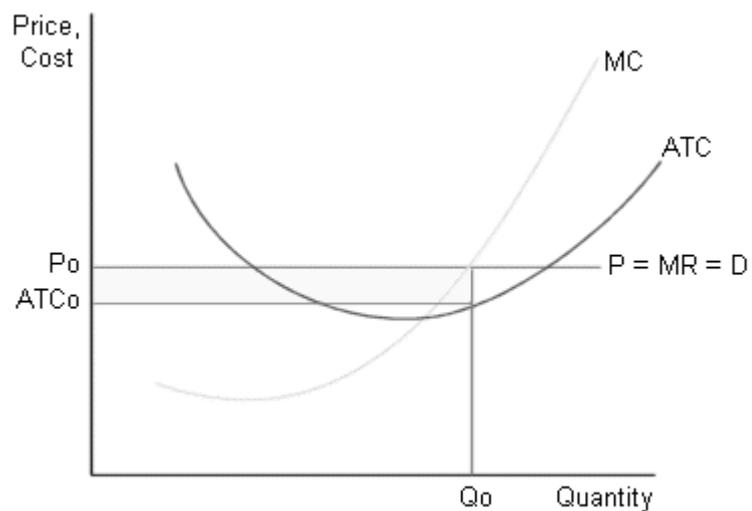
Marginal revenue equals the market price for a firm facing a perfectly elastic demand curve. The graph below illustrates this relationship.



Marginal and average total cost curves have been added to the graph below. As this graph indicates, a profit-maximising firm will produce at the level of output ( $Q_0$ ) at which  $MR = MC$ . The price,  $P_0$  is determined by the firm's demand curve.



At an output level of  $Q_0$ , the firm faces average total costs equal to ATC. Thus, its profit per unit of output equals  $P_0 - ATC$  (= revenue per unit of output - total cost per unit of output). Economic profits are equal to profit per unit  $\times$  number of units of output. A cursory look at the graph below should confirm that economic profits equals the area of the shaded rectangle (notice that the height of this rectangle equals profit per unit of output and the base equals the number of units of output). When  $MR > MC$ , revenue is increasing faster than costs and the firm should increase production.



If a firm is receiving economic profits, the owners are receiving a return on their investment that exceeds that which they could receive if their resources had been used in an alternative occupation. In this case, existing firms will stay in the market and new firms will enter the market.

**SELF-ASSESSMENT EXERCISE**

Complete the following table and identify the profit-maximising output.

Quantity	Price	Total revenue	Marginal revenue	Marginal cost	Total profit
10	N15	N150	N15	N9	
11	N15			N10	
12	N15			N11	
13	N15			N12	
14	N15			N15	

- From the above table, what is correct about marginal revenue and marginal costs when profit is maximised?
- What would be the profit maximising level of output if price fell to N13?

**3.2 Loss Minimisation and Shutdown Rule**

Suppose that  $P < ATC$  at the level of output at which  $MR = MC$ , will the firm continue operations? To determine this, we have to compare the firm's loss if it stays in business with its loss if it shuts down. If the firm decides to shut down, its revenue will equal zero and its costs will equal its fixed costs. (Remember, fixed costs must be paid even if the firm shuts down.) Thus, the firm receives an economic loss equal to its fixed costs if it shuts down. It will stay in business in the short run even if it receives an economic loss as long as its loss is less than its fixed costs. This will occur if the revenue received by the firm is large enough to cover its variable costs and some of its fixed costs. In mathematical terms, this means that the firm will stay in business as long as:

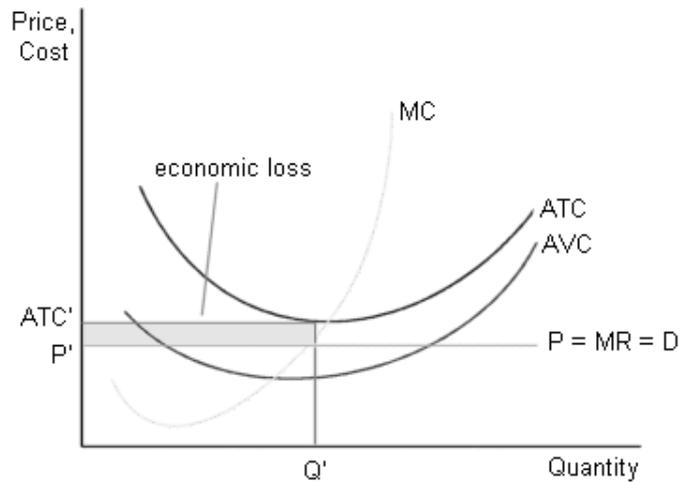
$$TR = P \times Q > VC$$

Dividing both sides of the above expression by  $Q$ , we can write this condition in an alternative form as:

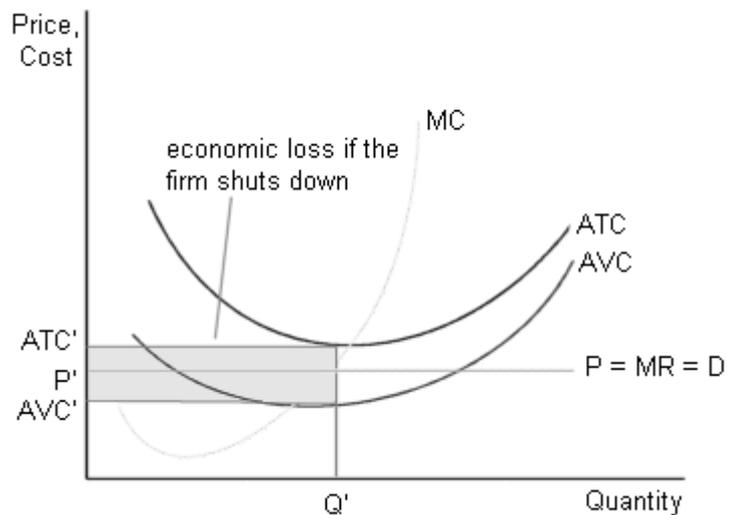
$$P > AVC$$

What this means in practice is that the firm will stay in business if the price is greater than average variable cost. The firm will shut down if the price is less than average variable cost. Consider the situation illustrated by the graph below. In this case, losses are minimised at the level of output at which  $MR = MC$ . This occurs at an output level of  $Q'$ . Since the level of average total cost ( $ATC'$ ) exceeds the market price ( $P'$ ), this

firm receives economic losses. Since the price is greater than AVC, however, this firm will choose to stay in business in the short run.



If the firm shown above were to shut down, it would lose its fixed costs. The shaded area in the graph below equals the firm's fixed costs (to see this, note that the height of this rectangle equals the firm's AFC and the base equals  $Q$  -- therefore, the shaded area equals  $AFC \times Q = TFC$ ). A comparison of the firm's losses if it shuts down (the shaded area in the graph below) with its losses if it continues to operate in the short run (the shaded area in the graph above) shows that this firm will receive lower losses if it decides to continue in business in the short run.



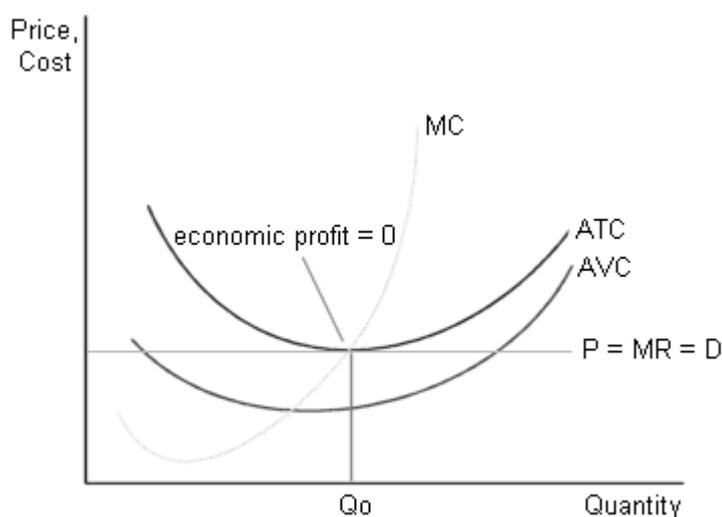
Thus, this discussion should suggest that the shut down rule for a firm is shut down if  $P < AVC$ . In the long run, of course, firms will leave the industry if economic losses are received (remember, there are no fixed costs in the long run.)

## SELF-ASSESSMENT EXERCISE

State the reason an entrepreneur is not affected by zero economic profit.

### 3.3 Break-even Price

If the market price is just equal to the minimum point on the ATC curve, the firm will receive a level of economic profits equal to zero. In this case, the owners of the firm are receiving a rate of return on all of their resources that is just equal to that which they could receive in any alternative employment. When this occurs, there is neither an incentive to enter or leave this market. This possibility is illustrated in the graph below.

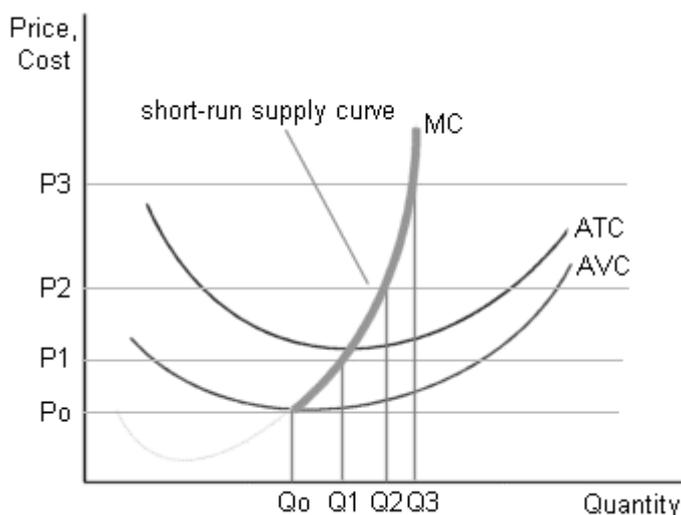


If the price drops below AVC, the firm will shut down. This possibility is illustrated in the graph below. The green shaded area equals the firm's fixed costs (its losses if it shuts down). The loss if it continues operations, however, equals the combined blue and green shaded areas. As this graph suggests, a firm's economic losses are lower when it shuts down if  $P < AVC$ .

### 3.4 Short-run Supply Curve

We have already observed that a perfectly competitive firm will produce at the point at which  $P = MC$ , as long as  $P > AVC$ . The graph below indicates that at prices of  $P_0$ ,  $P_1$ ,  $P_2$ , and  $P_3$ , this firm would produce output levels of  $Q_0$ ,  $Q_1$ ,  $Q_2$ , and  $Q_3$ , respectively. A bit of reflection should convince you that the MC curve can be used to determine the quantity of output that this firm will supply whenever  $P > AVC$ . Since the portion of the MC curve that lies above the AVC curve indicates the quantity of output supplied at each price, it is the firm's short-run supply curve. In general, a perfectly competitive firm's short-run supply curve

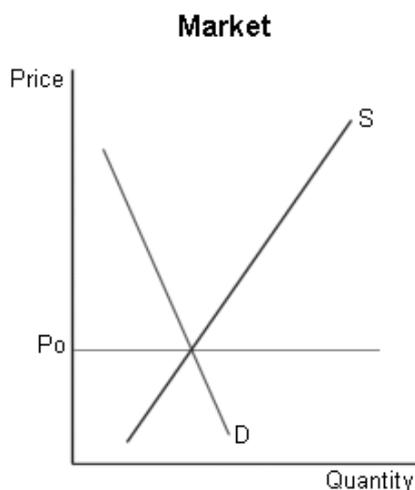
is the portion of its marginal cost curve that lies above the AVC curve. This is illustrated by the darker and thicker portion of the MC curve in the graph below.



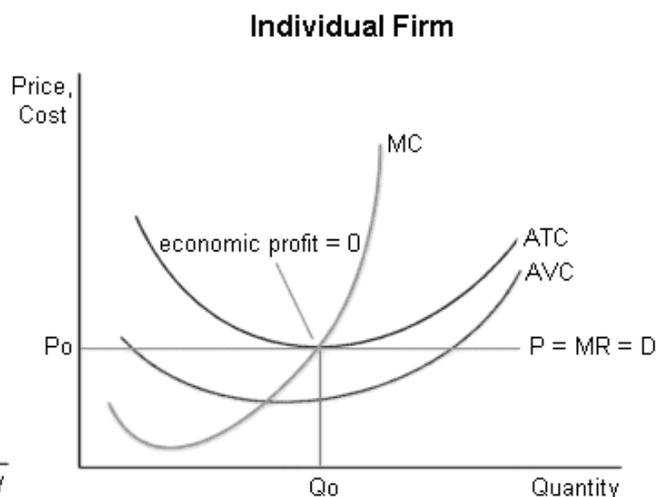
### 3.5 Long-run Equilibrium

In the long-run, firms will enter the market if positive economic profits are received and will leave the market if economic losses are realized. Let us think about the consequences of such entry and exit. Suppose that the current equilibrium price in a market results in economic profits for a typical firm. In this case, firms enter the market and the market supply curve shifts to the right. As market supply increases, the equilibrium price falls. This process will continue until firms no longer have an incentive to enter the market. As the graph below indicates, a typical firm will receive zero economic profits in this long-run equilibrium situation.

**a**



**b**



Assuming a typical firm is receiving an economic loss; such firm will leave the industry in the long run. As they exit, the market supply curve shifts to the left and the equilibrium price rises. Firms will continue to leave until the market supply curve has shifted enough so that a typical firm receives zero economic profits (as illustrated in the graph above).

Thus, as the above graph illustrates, a long-run equilibrium is characterised by the receipt of zero economic profits by a typical firm. This means, of course, that the owners of a typical firm receive accounting profits just equal to normal profit.

### **SELF-ASSESSMENT EXERCISE**

Long-run equilibrium results in each firm producing at its ATC, the point where price equals MC and ATC

### **3.6 Long-run Equilibrium and Economic Efficiency**

This long-run equilibrium condition has two desirable efficiency properties:

- $P = MC$ , and
- $P = \text{minimum ATC}$ .

The equality between  $P$  and  $MC$  important for society because the price reflects society's marginal benefit from the consumption of the good while the marginal cost reflects the social marginal cost of producing the good (in the absence of externalities). At the competitive equilibrium, society's marginal benefit just equals society's marginal costs. Society's net benefit from the production of each good is maximised when social marginal benefit equals social marginal cost.

Production at minimum average cost means that society is producing each good at the lowest possible cost per unit. This, obviously, is also a desirable property.

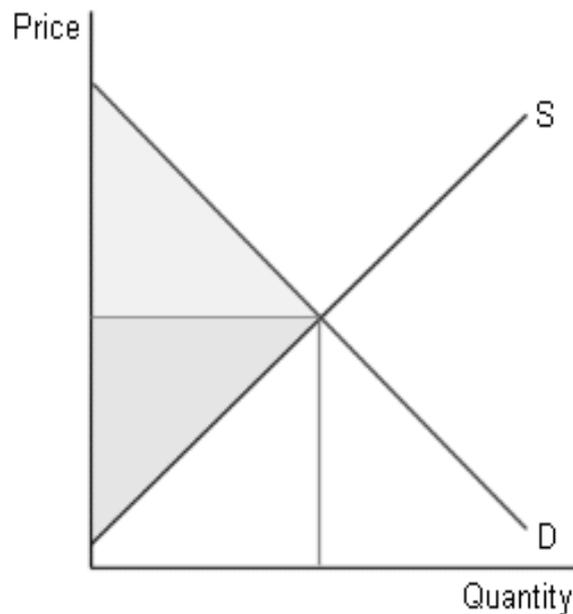
Economic efficiency occurs when both of the above conditions are satisfied.

### **3.7 Consumer and Producer Surplus**

As noted in the section on demand and utility, consumer surplus is equal to the net benefit that consumers receive from the consumption of a good. It occurs because the marginal benefit from each unit of the good exceeds the marginal cost up to the point until the last unit is consumed. Producer surplus is defined in a similar manner as the net benefit received by producers from the sale of a good. It occurs because  $P = MC$

only for the last unit produced. Up to that point, the marginal cost of producing the good is below the price received by the firm.

In the graph below, the shaded region equals the amount of consumer surplus, while the lower shaded region represents producer surplus. The net benefit to society, also known as the "gains from trade," equals the sum of these two areas.



#### 4.0 CONCLUSION

Economic profits encourage new firms to enter a competitive market. The short run production decision leads perfectly competitive firms to produce where price equals marginal cost. In effort to earn economic profits, competitive firms are always searching for better and more efficient production methods. As long as a firm can cover its average variable cost, it minimises losses by continuing to operate in the short run. The point where price equals minimum average variable cost is the short-run point.

The long-run equilibrium output in perfectly competitive market occurs at the lowest point on the average total cost curve, so the equilibrium condition in the long run in perfect competition is for firms to produce at that output that minimises per-unit total cost.

#### 5.0 SUMMARY

In this unit, you learnt how firms under perfect competitive market maximise their profit, minimise their losses and even the way firms can withdraw from the market to avoid unlimited waste of resources. The

analysis of breakeven position, short run supply curve and long run equilibrium were also explained to your good understanding of perfect competitive market operations.

## 6.0 TUTOR-MARKED ASSIGNMENT

At a price of N5 the profit – maximising output for a perfectly competitive firm is 1000 units per year. If the average total cost is N3 per unit, what will be the firm's profit? If the average total cost is N6 per unit, what will be the firm's profit? What are the relationships that exist among profit, price, and average total cost?

## 7.0 REFERENCES/FURTHER READING

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## UNIT 3 MONOPOLY MARKETS

### CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Monopoly Markets
    - 3.1.1 Salient Features of Monopoly
  - 3.2 Sources of Monopoly Power
  - 3.3 Monopoly: Demand, Average Revenue, Marginal Revenue, Total Revenue and Elasticity
  - 3.4 Profit Maximisation under Monopoly
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References /Further Reading

### 1.0 INTRODUCTION

In this unit, you will learn about ‘one in town seller’ as you have been introduced to in the previous unit. More is to be learnt about monopoly especially on its salient features, sources of its market power and also monopolist profit maximisation strategy and its loss limits.

### 2.0 OBJECTIVES

At the end of this unit, you should be able to:

- describe the monopoly market
- state the features of monopoly
- enumerate sources of monopoly power
- explain total revenue, marginal revenue and demand curve monopoly market
- explain profit maximisation and loss minimisation under monopoly market.

### 3.0 MAIN CONTENT

#### 3.1 Monopoly Markets

A monopoly is a single producer of a product, which does not have close substitute. A monopoly has market power, which is the ability to increase the product's price above marginal cost without losing all customers, it provides firms the ability to increase the price by

restricting supply, such that  $MR > MC$ . In other words, the ability to influence the market, and in particular the market price, by influencing the total quantity offered for sale.

### 3.1.1 Salient Features of Monopoly

1. Monopolist maximises profits.
2. Monopolist decides the price of the good or product to be sold, but does so by determining the quantity in order to demand the price desired by the firm.
3. Monopolist creates high barriers to entry, i.e. other sellers are unable to enter the market of the monopoly.
4. In a monopoly, there is one seller of the good that produces all the output. Thus, the whole market is being served by a single company; in other words, the company is similar to the industry.
5. A monopolist can change the price and quality of the product. He sells more quantities charging fewer prices for the product in a very elastic market and sells less quantities charging high price in a less elastic market.

### 3.2 Sources of Monopoly Power

Monopolies derive their market power from barriers to entry – circumstances that prevent or greatly impede a potential competitor's ability to compete in a market. There are three major types of barriers to entry; economic, legal and deliberate.

1. **Economic barrier:** Economic barriers include economies of scale, capital requirements, cost advantages and technological superiority.
2. **Economies of scale:** Monopolies are characterised by decreasing costs for a relatively large range of production i.e. falling average total cost - making one company more efficient than others (this is also known as a natural monopoly), arising from economies of scale over the relevant range of output. Decreasing costs coupled with large capital to start give monopolies some benefits over would-be competitors. Monopolies are often in a position to reduce prices below a new producer's operating costs and thereby prevent them from venturing into competition. Furthermore, the size of the industry relative to the minimum efficient scale (MES) may limit the number of companies that can effectively compete within the industry.
3. **Scale of capital:** Production processes that require large investments of capital, or large research development and

innovation costs or substantial sunk costs, limit the number of companies in an industry. A large fixed cost also makes it tough for a small company to enter an industry and expand.

4. **Technological superiority:** A monopoly may be better able to acquire, integrate and use the best possible technology in producing its goods while entrants do not have the size or finances to use the best available technology. One large company can sometimes produce goods cheaper than several small companies.
5. **No substitute goods:** A monopoly sells a good for which there is no close substitute. The absence of substitutes makes the demand for the good relatively inelastic enabling monopolies to extract positive profits.
6. **Ownership/control of a key resource:** A prime source of monopoly power is the control of resources that are critical to the production of final goods. A monopoly can hardly be established within a country without overt and covert government assistance in the form of a tariff or some other device. It is close to impossible to do so.
7. **Network effects:** The use of a product by a person can affect the value of that product to other people. This is the network effect. There is a direct relationship between the proportion of people using a product and the demand for that product. Thus, the more the people using a particular good, the greater the chances of any individual starting to use that good. This effect can be seen in fads and fashion trends. It also can play a crucial role in the development or acquisition of market power. The most famous current example is the market dominance of the Microsoft operating system in personal computers.
8. **Special right given by government:** Legal rights can provide opportunity to monopolise the market of a good. Intellectual property rights, including patents and copyrights, give a monopolist special control of the production and selling of certain goods. Property rights may give a firm special control of the materials necessary to produce a good.
9. **Elimination strategies/ actions:** A company wanting to monopolise a market may engage in various types of deliberate action to exclude competitors or eliminate competition. Such actions include collusion, lobbying governmental authorities, and force.

- 10. Difficulty to exit may be a source of market power:** Barriers to exit include market conditions that make it difficult or expensive for a company to end its involvement with a market. Great liquidation costs are a primary barrier to exit. Market exit and shutdown are separate events. The decision whether to shut down or operate is not affected by exit barriers. A company will shutdown if price falls below minimum average variable costs.

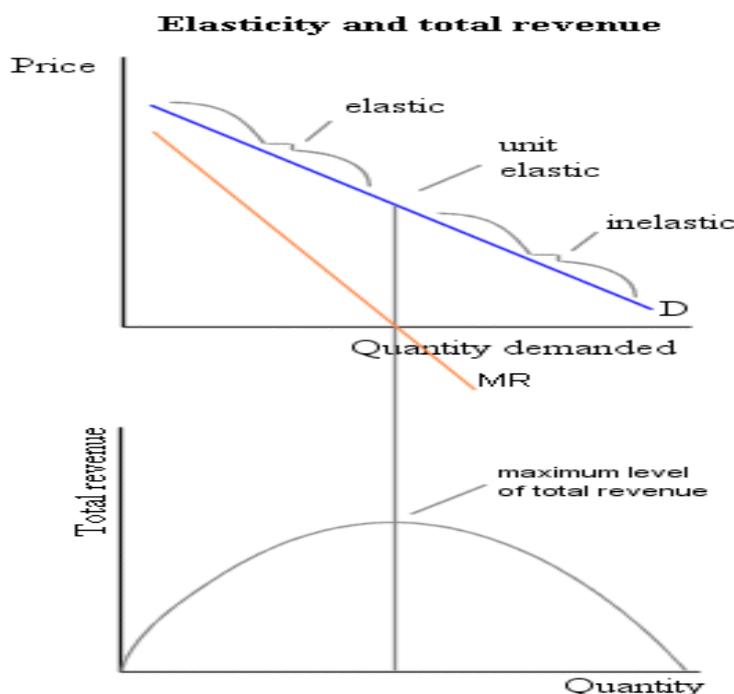
### 3.4 Monopoly: Profit Maximisation

#### Demand, average revenue, marginal revenue, total revenue and elasticity

The demand curve facing a monopoly firm is the market demand curve (since the firm is the only firm in the market). Since the market demand curve is a downward sloping curve, marginal revenue will be less than the price of the good. As noted earlier, marginal revenue is:

- positive when demand is elastic,
- equal to zero when demand is unit elastic, and
- negative when demand is inelastic.

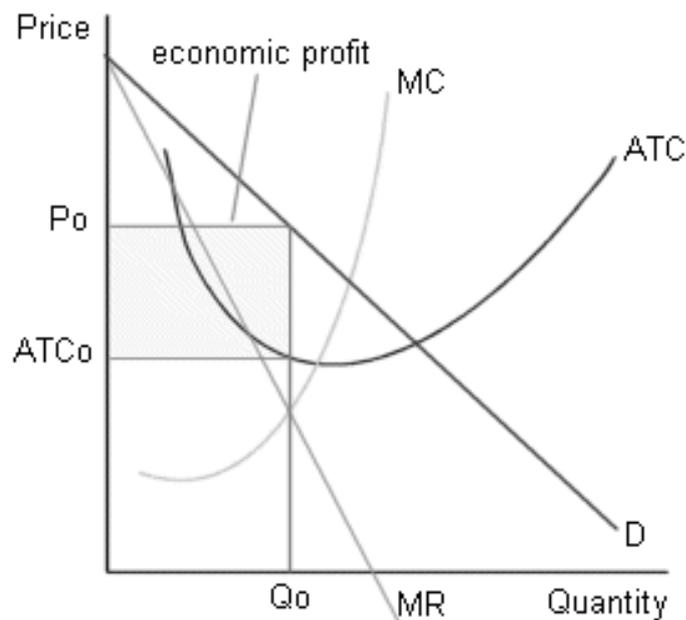
These relationships are shown in the graph below. As this graph illustrates, total revenue is maximised at the level of output at which demand is unit elastic (and  $MR = 0$ ). It might be tempting to assume that this is the best output level for the firm to produce. This would be the case, though, only if the firm's goal is to maximise its revenue. A profit-maximising monopolist must take its costs as well as its revenue into



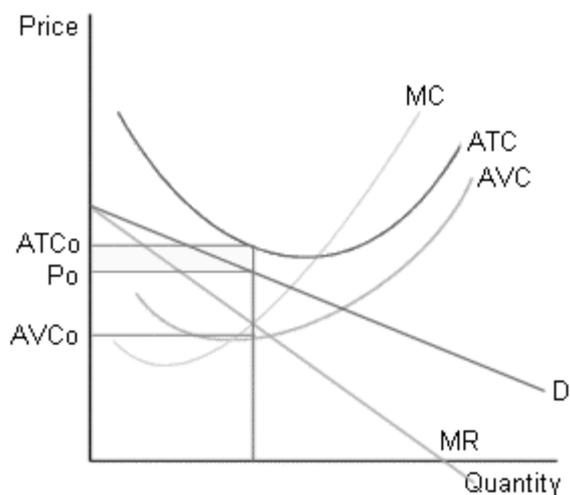
account in determining how much output to produce.

As in all other market structures, average revenue (AR) is equal to the price of the good. (To see this note that  $AR = TR/Q = (P \times Q)/Q = P$ .) Thus, the price given by the demand curve is the average revenue that the firm receives at each level of output.

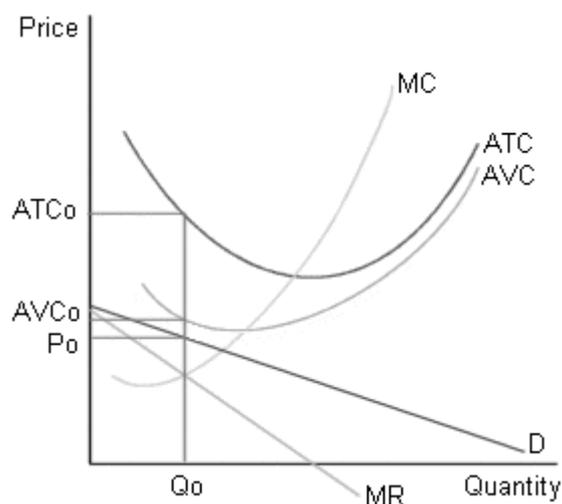
Any firm maximises its profits by producing at the level of output at which marginal revenue equals marginal cost (as long as  $P > AVC$ ). For the monopoly firm described by the graph below,  $MR = MC$  at an output level of  $Q_0$ . The price that this firm will charge is  $P_0$  (the price that the firm can charge for this level of output given by the demand curve). Since the price ( $P_0$ ) exceeds average total cost (ATC) at this level of output, the firm receives economic profit. These monopoly profits, though, differ from those received by a perfectly competitive firm in that these profits will persist in the long run (due to the barriers to entry that characterise a monopoly industry).



Of course, it is possible that a monopoly firm will experience losses. The graph below illustrates this possibility. In this graph, the firm receives economic losses equal to the shaded area. Since price is above AVC, though, it will continue operations in the short run, but will leave the industry in the long run. Note that the ownership of a monopoly does not guarantee the existence of economic profits.



A monopoly firm will shutdown in the short run if the price falls below AVC. This possibility is illustrated in the graph below.



Those who have not studied economics often believe that a monopolist is able to choose any price that it wishes and that it can always receive higher profits by raising its price. As in all other market structures, the monopolist is constrained by the demand for its product. If a monopoly firm wishes to maximise its profit, it must select the level of output at which  $MR = MC$ . This determines a unique price that will be charged in this industry. An increase in the price above this level would reduce the profits received by the firm.

#### 4.0 CONCLUSION

The true monopoly exists where there is only one seller of a product for which no close substitute is available. Monopoly firm faces the industry demand curve; it can pick the most profitable point on the demand curve. Monopolist is a price maker rather than price taker. Legal barrier

to entry include patent right, licensing and the control of natural resources, and large entry cost, give monopolist power control the market.

## 5.0 SUMMARY

In this unit, you learnt about the concept and features of monopoly market, and its characteristics. The sources of monopoly power and the nature of its demand curve, marginal cost, marginal revenue, average total cost and average revenue. You also learnt how monopolist maximises profit and minimises losses in case it fails to manage its fortune and market power it has.

## 6.0 TUTOR-MARKED ASSIGNMENT

Complete the table below. The table shows the demand for electricity and cost condition for the PHCN.

Quantity/Unit	Price	Total revenue	Marginal revenue	Marginal cost	Average cost	Total profit
1000	N4.00			N2.00	N4.5	
1001	N3.95			N2.20	N4.40	
1002	N3.90			N2.40	N4.30	
1003	N3.85			N2.50	N4.20	
1004	N3.80			N2.70	N4.15	

2. What is the relationship between MC and marginal revenue when the profit is the greatest?

## 7.0 REFERENCES/FURTHER READING

Fashola, M.A. (2004). *Microeconomic Theory: Highlights and Policy Extensions for Less-Developed Economies*. Lagos: Concept Publications.

Karl, E.C. & Ray, C. F. (2007). *Principles of Microeconomics*. New Jersey, USA: Pearson Education International.

Umo, J.U. (1986). *Economics: African Perspective*. Lagos: John West Publications Limited.

## **MODULE 3      MARKET STRUCTURES 2**

Unit 1	Price Discrimination in the Monopoly Market
Unit 2	Monopolistic Competition
Unit 3	Oligopoly Market and Models

### **UNIT 1      PRICE DISCRIMINATION IN THE MONOPOLY MARKET**

#### **CONTENTS**

1.0	Introduction
2.0	Objectives
3.0	Main Content
3.1	Price Discrimination
3.1.1	Types of Price Discrimination
3.2	Price Discrimination and Dumping
3.3	Comparison of Perfect Competition and Monopoly
3.4	Control of Monopoly
4.0	Conclusion
5.0	Summary
6.0	Tutor-Marked Assignment
7.0	References /Further Reading

#### **1.0      INTRODUCTION**

In the previous unit, you learnt about monopoly market- the price maker and its sources of market power. In this unit, you will learn about price discrimination as a strategy adopted by the monopolist to increase its profit. Here, we shall discuss all the three degrees of price discriminations and their implications. In addition, you will learn about the differences that exist between perfectly competitive market and monopoly market as well as government ways of curtailing the monopolist power.

#### **2.0      OBJECTIVES**

At the end of this unit, you should be able to:

- explain price discrimination
- state the different degrees of price discriminations
- compare and contrast perfectly competitive market and monopoly market
- indicate how government can control excesses of monopolist.

### 3.0 MAIN CONTENT

#### 3.1 Price Discrimination

Price discrimination is a pricing strategy that enables monopolist to charge customers different prices for the same or service. In pure price discrimination, the seller will charge each customer the maximum price that he or she is willing to pay. In another kind of price discrimination, the seller places customers in groups based on certain characteristics and charges each group a different price. Examples of price discrimination include:

- a. quantity/bulk purchase discounts
- b. coupons for sporting activities, games, cinema
- c. airline/bus tickets
- d. school/college tuition

To practice price discrimination, three conditions must be present:

1. resale between groups must be prevented
2. the firm must have monopoly power
3. demand curve for different groups must be different.

##### 3.1.1 Types of Price Discrimination

There are three types of price discrimination in the monopoly market. They are:

- first-degree price discrimination
- second-degree price discrimination
- third-degree price discrimination

**First-degree price discrimination:** This monopolist charges the maximum price each client is willing to pay. The maximum price a client is willing to pay for a unit of the good is the reservation price. Therefore, for each unit, the seller tries to set the price equal to the consumer's reservation price. Direct information about a consumer's willingness to pay is rarely available. Monopolists tend to rely on secondary information such as where a person lives (postal codes). For example, catalog retailers can use mail high-priced catalogs/internet website and online marts e.g. Konga to high-income postal codes. First-degree price discrimination mostly occurs in regard to professional services or in transactions involving direct buyer/seller negotiations.

**Second-degree price discrimination:** This monopolist uses quantity to discriminate clients as s/he charged different prices based on how much

they purchased. A single price schedule for all clients but the prices vary depending on the quantity of the good purchased. The theory of second-degree price discrimination is a client is willing to buy only a specific quantity of a good at a given price. Monopolists know that client's willingness to buy decreases as more units are purchased. The job of the seller is to identify these price points and to reduce the price once one is reached in the aim that a reduced price will spur additional purchases from the consumer. For example, sell in bulk rather than units.

**Third-degree price discrimination:** This is multi-market price discrimination. The monopolist divides the clients into different groups according to their willingness to pay as measured by their price elasticity of demand. Each group of consumers effectively becomes a separate market with its own demand curve and marginal revenue curve. The firm then attempts to maximise profits in each segment by equating marginal revenue (MR) and marginal cost (MC). Largely, the company charges a higher price to the group with a more price inelastic demand and a relatively lesser price to the group with a more elastic demand. Examples of third-degree price discrimination abound. Airlines charge higher prices to business managers who travel than to holidaymakers who travel for vacation. The reasoning is that the demand curve for holidaymakers is relatively elastic while the demand curve for business managers is relatively inelastic. Any determinant of price elasticity of demand can be used to segment markets. For example, adults have a more elastic demand for free calls than do young adults because they love to have more free time for calling.

### SELF-ASSESSMENT EXERCISE

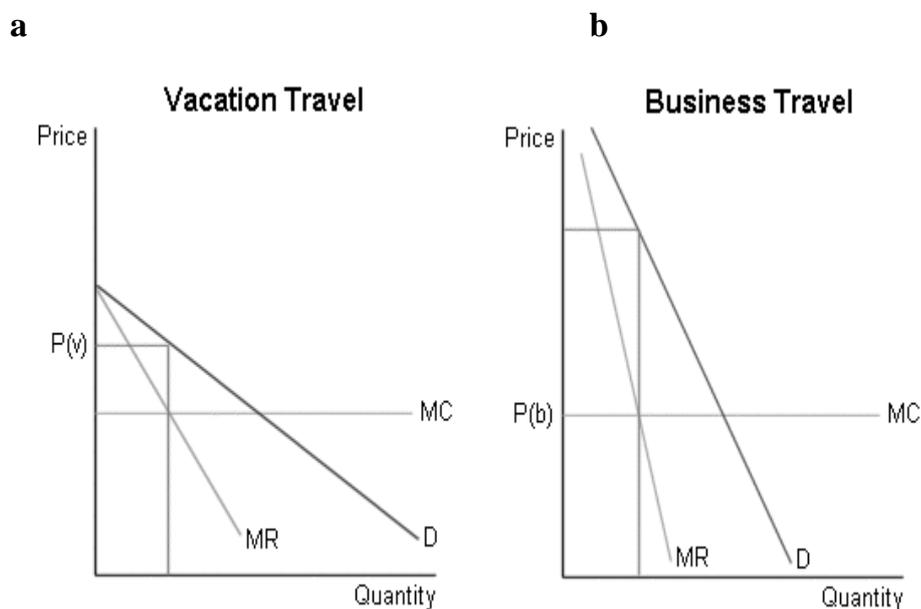
- i. What do you understand by the term 'price discrimination'?
- ii. Describe the three forms of price discrimination as used by the monopolist.

### 3.2 Price Discrimination and Dumping

Firms operating in markets other than those of perfect competition are able to increase their profits by engaging in price discrimination, a practice in which higher prices are charged to those customers who have the most inelastic demand for the product. Necessary conditions for price discrimination include:

- the firm cannot be a price taker,
- the firm must be able to sort customers according to their elasticity of demand, and
- re-sale of the product must not be feasible.

The graph below illustrates how price discrimination may be used in the market for airline travel. Those flying for holiday purposes are likely to have a more elastic demand than those who fly for business purposes. As the graph below indicates, the optimal price is higher in for business managers than for holidaymakers. Airlines engage in price discrimination by offering low price "super subsidy" fares that require a weekend stay and that tickets/permits be bought two-to-four weeks in advance. These conditions are much more likely to be satisfied by individuals travelling for holiday purposes. This helps to ensure that the customers with the most elastic demand pay the lowest price for this commodity.

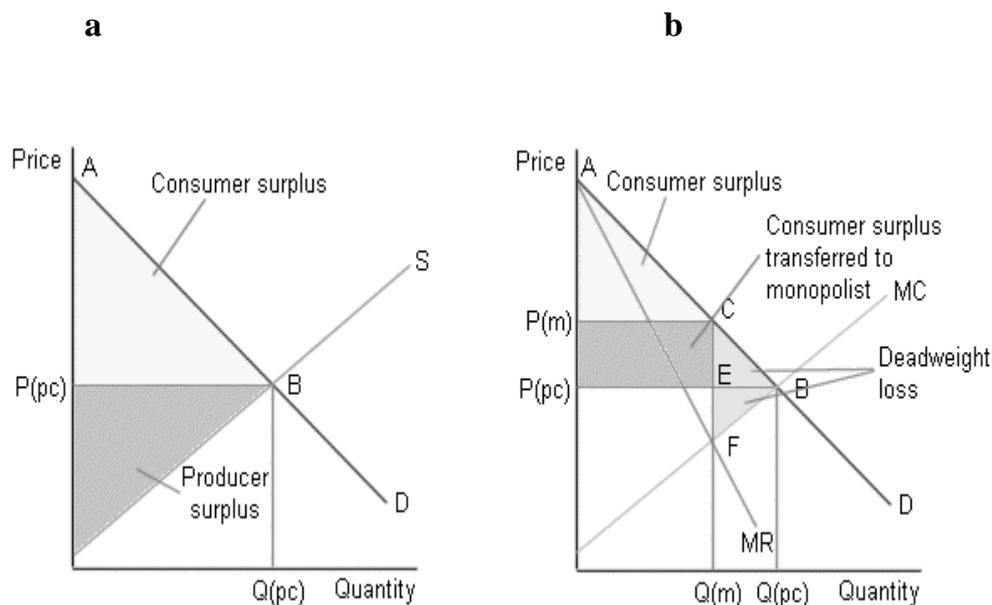


Other examples of price discrimination include daytime and evening telephone rates, child and senior citizen discounts at restaurants and movie theaters. (Be sure to understand why each of these is an example of price discrimination.)

### 3.3 Comparison of Perfect Competition and Monopoly

The left-hand side portion of the graph below illustrates the consumer and producer surplus that is received in a perfectly competitive market. The right-hand side portion of the graph illustrates the loss in consumer and producer surplus that results when a perfectly competitive industry is replaced by a monopoly. As this graph indicates, the introduction of a monopoly firm causes the price to rise from  $P(pc)$  to  $P(m)$  while the quantity of output falls from  $Q(pc)$  to  $Q(m)$ . The higher price and reduced quantity in the monopoly industry causes consumer surplus to fall by the trapezoidal area  $ACBP(pc)$ . This does not all represent a cost to society, since the rectangle  $P(m)CEP(pc)$  is transferred to the

monopolist as additional producer surplus. The net cost to society is equal to the outer shaded triangle CBF. This net cost of a monopoly is called deadweight loss. It is a measure of the loss of consumer and producer surplus that results from the lower level of production that occurs in a monopoly industry.



Some economists argue that the threat of potential competition may encourage monopoly firms to produce more output at a lower price than the model presented above suggests. This argument suggests that the deadweight loss from a monopoly is smaller when barriers to entry are less effective. Fear of government intervention (in the form of price regulation or antitrust action) may also keep prices lower in a monopoly firm than would otherwise be expected.

It is unreasonable to compare outcomes in a perfectly competitive market with outcomes in monopoly firm that results from economies of scale. While competitive firms may produce more output than a monopoly firm with the same cost curves, a large monopoly firm produces output at a lower cost than could smaller firms when economies of scale are present. This reduces the amount of deadweight loss that might be expected to occur as a result of the existence of a monopoly.

On the other hand, deadweight loss may understate the cost of monopoly as a result of either **X-inefficiency** or **rent-seeking behaviour** on the part of monopolies. X-inefficiency occurs if monopolies have less incentive to produce output in a least-cost manner since they are not threatened with competitive pressures. Rent-seeking behaviour occurs when firms expend resources to acquire monopoly power by hiring

lawyers, lobbyists, etc. in an attempt to receive governmentally granted monopoly power. These rent-seeking activities do not benefit society as a whole and divert resources away from productive activity.

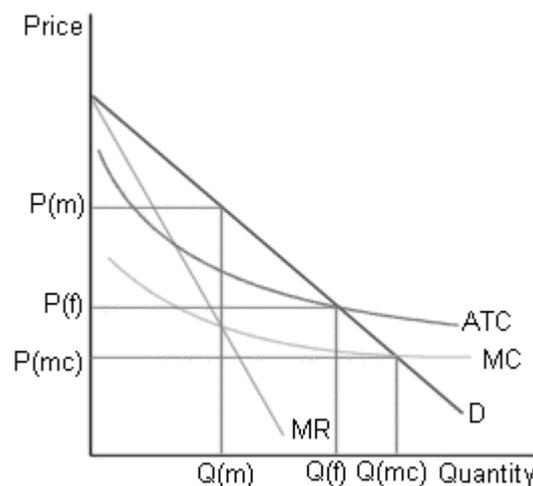
### SELF-ASSESSMENT EXERCISE

Differentiate between X-inefficiency and rent-seeking behaviour of monopoly.

### 3.4 Control of Monopoly

As noted above, a monopoly firm can produce at a lower cost per unit of output than could any smaller firms in a natural monopoly industry. In this case, the government generally regulates the price that a monopoly firm can charge. The graph below illustrates alternative regulatory strategies in such an industry. If the government leaves the monopolist alone, it will maximise its profits by producing  $Q(m)$  units of output and charging a price of  $P(m)$ . Assuming that the government attempts to emulate a perfectly competitive market by setting the price equal to marginal cost, this would occur at a price of  $P(\text{monopolistic competitive firm})$  and a quantity of output of  $Q(\text{monopolistic competitive firm})$ . Since this is a natural monopoly, the average cost curve declines over the relevant range of output. If average costs are declining, marginal costs must be less than average costs. Thus, if the price equals marginal costs, the price will be less than average total costs and the monopoly firm will experience economic losses. This pricing strategy could only exist in the long run if the government subsidised the production of this good.

**a**



An alternative pricing strategy is to ensure that the owners of the monopoly receive only a "fair rate of return" on their investment rather than monopoly profits. This would occur if the price were set at  $P(f)$ . At this price, it would be optimal for the firm to produce  $Q(f)$  units of output. As long as the owners receive a fair rate of return, there would be no incentive for this firm to leave the industry. This is the pricing strategy that regulators use in establishing prices for utilities, cable services, and the prices of other services produced in regulated monopoly markets.

#### **4.0 CONCLUSION**

Price discrimination is a situation in which sellers charge different customers different prices for the same product and services. Conditions for effective price discrimination are:

- resale between groups must be prevented
- the firm must have monopoly power
- demand curve for different groups must be different.

Price discrimination can be based on quantity purchased, price elasticity of demand and the willingness of consumer to pay for a good or service.

#### **5.0 SUMMARY**

In this unit, you have learnt how a monopolist manipulates its prices to maximise his profit. The strategy adopted by government to control the activities of monopoly and the comparison of perfect market structure with monopoly were also discussed in the unit.

#### **6.0 TUTOR-MARKED ASSIGNMENT**

1. Why does a firm charge different customer different prices?
2. Mention five examples of forms of price discrimination.

#### **7.0 REFERENCES /FURTHER READING**

- Fashola, M.A. (2004). *Microeconomic Theory: Highlights and Policy Extensions for Less-Developed Economies*. Lagos: Concept Publications.
- Karl, E.C. & Ray, C. F. (2007). *Principles of Microeconomics*. New Jersey, USA: Pearson Education International.
- Umo, J.U. (1986). *Economics: African Perspective*. Lagos: John West Publications Limited.

## UNIT 2 MONOPOLISTIC COMPETITION

### CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Concept of Monopolistic Competition
  - 3.2 Features of Monopolistic Competition Market
  - 3.3 Profit Maximisation and Loss Minimisation in Monopolistically Competitive Market
  - 3.4 Comparison of Monopolistic Competition with Monopoly
  - 3.5 Comparison of Monopolistic Competition and Perfectly Competitive Market
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References /Further Reading

### 1.0 INTRODUCTION

This is one of the markets in-between perfectly competitive market and monopoly market. This market can be found in many African countries because of its distinguishing features. We shall look into the model of monopolistic competition with interest in the price and output decisions for both the firm and industry in the short and long run.

### 2.0 OBJECTIVES

At the end of this unit, you should be able to:

- describe monopolistic market structure
- enumerate the features of monopolistic competition
- determine profit maximisation in monopolistically competitive market
- compare monopolistic competition with monopoly, perfectly competitive market.

### 3.0 MAIN CONTENT

#### 3.1 Monopolistic Competition

A monopolistic competitive market has characteristics of both perfect competitive and monopoly. Similar to perfect competition, monopolistic competitive has many buyers and sellers, and free exit and entry. Related to monopoly, the products are differentiated and each company

faces a downward sloping demand curve. Since the company has a differentiated product, it is like a monopolist and faces a negatively sloped demand curve. In the short run:

- marginal revenue is always less than demand
- profit is maximised where  $MR = MC$
- profit = (price - average total cost) x quantity.

### **3.2 Features of Monopolistic Competitive Market**

These are few but very important features of monopolistic competition; they include the following:

1. Product differentiation using branding and advertisement
2. Many firms in the industry
3. Free entry and exit to buyers and sellers in the long run
4. Independent decision making
5. Market power
6. Imperfect Information available to buyer and seller

#### **1. Product differentiation**

It is a fact that monopolistic competitive firms sell products that have real or perceived non-price differences. Those differences are not so extraordinary as to disregard other goods as substitutes. Technically, the cross price elasticity of demand between goods in such a market is positive. Monopolistic competitive firm goods are best described as close but imperfect substitutes. The goods perform the same basic functions but have differences in qualities such as type, style, quality, reputation, appearance, and location that tend to differentiate them from each other. For example, the basic function of mobile phone is basically the same - to make call to people and text messages in reasonable clarity. In spite of that, there are many different types of phones such as blackberry, android, iphone, and many variations even within these categories.

#### **2. Many buyers and sellers in the industry**

Many firms in each monopolistic competitive product group and many firms are also waiting to make entry into the industry. A product group is a "collection of goods with the features". With this reason i.e. existence of many firms, it gives each monopolistic competitive firm the freedom to set prices without participating in the act of strategic decision making regarding the prices of other firms and each firm's actions have an insignificant impact on the market. For example, a firm

could cut prices and increase sales without anxiety that its actions will prompt retaliatory responses from competitors.

How many firms will a monopolistic competitive market structure support at market equilibrium? This depends on factors such as fixed costs, economies of scale and the degree of product differentiation. For example, the higher the fixed costs, the fewer firms the market will support. Also, the greater the degree of product differentiation - the more the firm can separate itself from the pack - the fewer firms there will be at market equilibrium.

### **3. Free entry and exit**

There are numerous firms waiting to enter the market each with its own "unique" product or in pursuit of positive profits and any firm unable to cover its costs can leave the market without incurring liquidation costs in the long run. This implies that there are low capital to start up, no sunk costs and no exit costs. The cost of entering and exit is very low.

### **4. Independent decision making**

The monopolistic competitive firm gives no concern to what impact its decision may have on competitors/ rivals in the market. The theory is that any action will have such an insignificant effect on the market demand as whole that a monopolistic competitive firm can act without fear of prompting intensify competition. In other words, each firm feels free to set prices as if it were a monopoly rather than an oligopoly.

### **5. Some degree of market power**

Monopolistic competitive firms have some degree of market power. Market power means that the firm has control over the terms and conditions of exchange. A monopolistic competition firm can increase its prices without dropping all its customers. The firm can also reduce prices without causing a potentially ruinous price war with competitors. The source of a monopolistic competitive firm's market power is not barriers to entry since they are low. Reasonably, a monopolistic competitive firm has market power because it has relatively few competitors, those competitors do not engage in strategic decision-making and the firm sells differentiated product. Market power also means a monopolistic competitive firm faces a downward sloping demand curve. The demand curve is extremely elastic although not "perfect".

## 6. Imperfect information available to buyers and sellers

No sellers or buyers have all the market information, especially market demand or market supply.

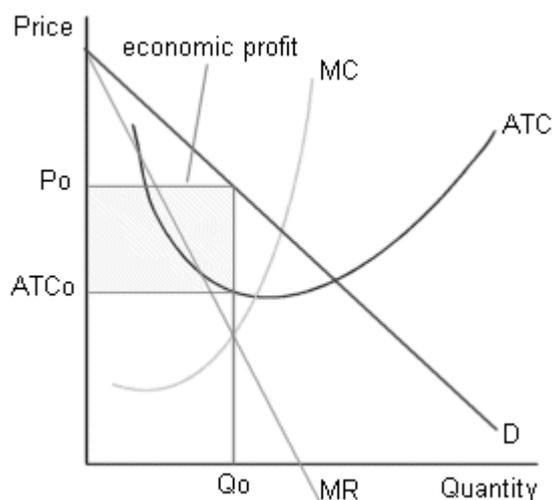
### SELF-ASSESSMENT EXERCISE

State five peculiar features of monopolistic competition you considered very important.

### 3.3 Profit Maximisation and Loss Minimisation in Monopolistically Competitive Market

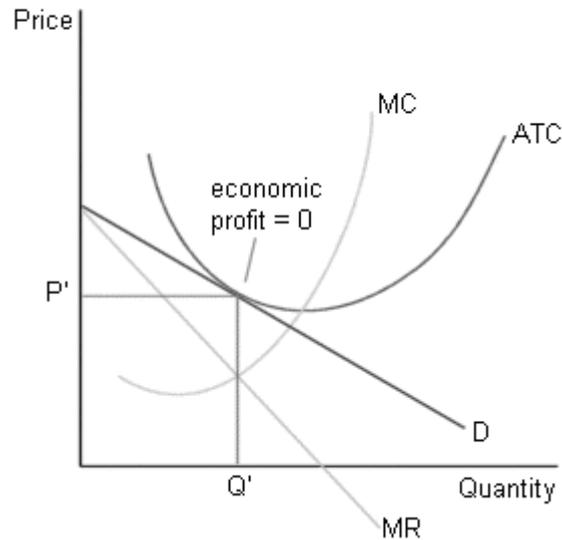
Let us examine the determination of short run equilibrium in a monopolistically competitive output market.

The graph below illustrates a possible short-run equilibrium for a typical firm in a monopolistically competitive market. As with any profit-maximising firm, a monopolistically competitive firm maximises its profits by producing at a level of output at which  $MR = MC$ . In the graph below, this occurs at an output level of  $Q_0$ . The price is determined by the amount that customers are willing to pay to buy  $Q_0$  units of output. In the example below, the demand curve indicates that a price of  $P_0$  will be charged when  $Q_0$  units of output are sold.

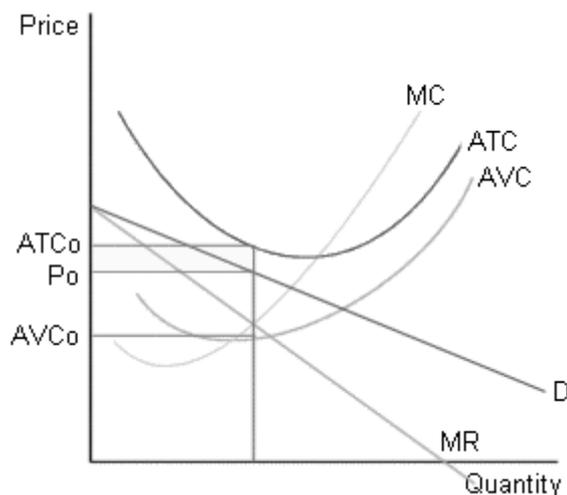


In a monopoly industry, economic profits could persist indefinitely due to the existence of barriers to entry. In a monopolistically competitive industry, however, the existence of economic profits results in the entry of additional firms into the industry. As additional firms enter, the demand for each firm's product will fall and become more elastic. This reduction in demand, though, results in a reduction in the level of economic profit received by a typical firm. Entry into the market

continues until a typical firm receives zero economic profits. This possibility is illustrated in the graph below.

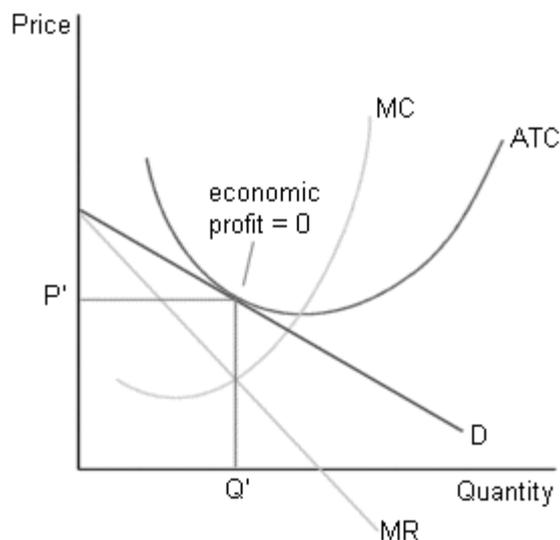


The graph above shows a monopolistically competitive market in a state of long run equilibrium. This firm maximises its profit by producing an output level of  $Q'$ . The equilibrium price is  $P'$ . Since the price equals average total cost at this level of output, a typical firm receives a level of economic profit equal to zero. This long-run equilibrium situation is often referred to as a "tangency equilibrium" since the demand curve is tangent to the ATC curve at the profit-maximising level of output.



In the short run, a monopolistically competitive firm may receive economic losses in the short run. This possibility is shown in the graph below. While each firm will continue operations in the short run, firms will leave the industry in the long run. As firms leave, the demand curves facing the remaining firms will shift to the right and become less

elastic. (To see this, note that when firms leave the industry, the remaining firms will receive some of the customers that used to purchase the commodity at the firms that have left the industry.) Exit from the industry will continue until economic profits again equal zero (as illustrated in the graph below).



### SELF-ASSESSMENT EXERCISE

Explain the reason why monopolistic competition would not be able to earn long run economic profits.

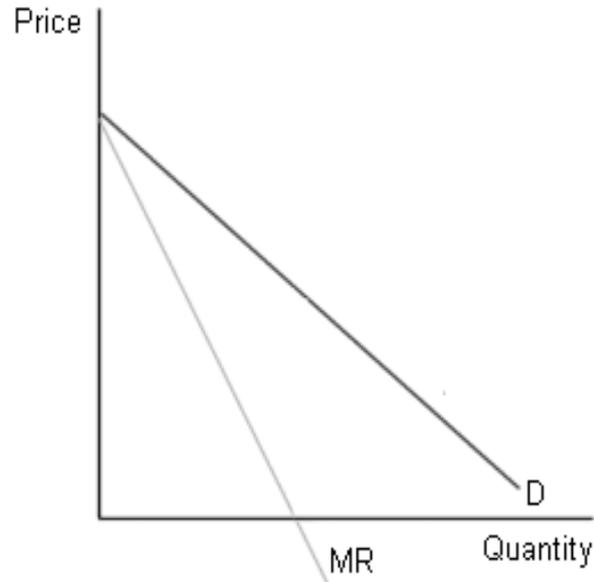
### 3.4 Comparison of Monopolistic Competition and Monopoly

The short run equilibrium in monopolistic competition is the same as for a monopolist, and businesses may make positive, zero, or negative profits in the short run.

The monopolistically competitive market is similar to perfect competition in that there are many buyers and sellers who can enter or leave the market easily in response to economic profits or losses. A monopolistically competitive firm is similar to a monopoly in that it produces a product that is different from that produced by all other firms in the market. The restaurant market (Mr. Biggs, Sweet Sensation, Tantalizer) in Nigerian cities provides a good example of a monopolistically competitive market. Each restaurant has its own recipes, decor, ambiance, etc but also must compete with many other similar restaurants.

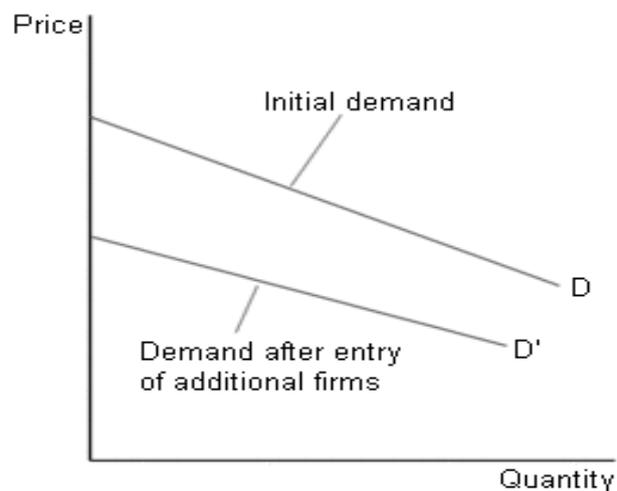
Each firm produces a differentiated product; hence, it will not lose all of its customers if it raises its prices. Therefore, a monopolistically competitive firm faces a downward sloping demand curve for its

product. Whenever a firm faces a downward sloping demand curve, its marginal revenue curve lies under its demand curve. The graph below illustrates the relationship that exists between a monopolistically competitive firm's demand and marginal revenue curves.



Although the graph above seems similar to the demand and marginal revenue curves facing a monopolist, there is a critical difference. In a monopolistically competitive market, the number of firms changes as firms enter or leave the industry. As new firms enter the market, the customers are spread over a larger number of firms and the demand for each firm's product reduces. An increase in the number of firms also tends to result in an increase in the elasticity of demand for each firm's products (because demand is more elastic when more substitutes are available). The graph below illustrates the shift in a typical firm's demand curve that occurs when additional firms enter a monopolistically competitive market.

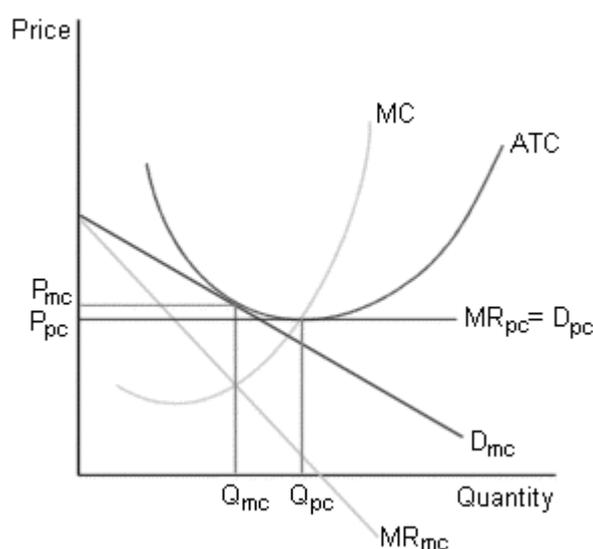
#### Typical firm in an oligopoly market



### 3.5 Monopolistic Competitive Market and Perfectly Competitive Market

From the graph below, perfectly competitive markets result in economic efficiency; therefore,  $P = MC$  and firms produce at the minimum level of ATC. The graph below compares price and output levels for perfectly competitive and monopolistically competitive firms. As this graph depicts, a perfectly competitive firm produces output at a price ( $P_{pc}$ ) that is less than the price that would be charged by a monopolistically competitive firm ( $P_{monopolistic\ competitive\ firm}$ ).

A perfectly competitive firm will also produce a larger quantity of output ( $Q_{pc}$ ) than would be produced by a monopolistically competitive firm ( $Q_{monopolistic\ competitive\ firm}$ ).



Since monopolistically competitive firms produce at a level of cost that exceeds the minimum level of ATC, they are less efficient than perfectly competitive firms. This efficiency loss, however, is a cost that society must bear if it wishes to have differentiated products. One of the costs of having variety in restaurants, clothing, most types of prepared foods, etc., is that average production costs will be higher than they would be if a homogenous product were produced.

It should be noted that the larger the number of firms in the market, the more elastic will be the demand for each firm's product. As the number of firms increase, the demand curve facing a monopolistically competitive firm will approach the perfectly elastic demand curve that is faced by a perfectly competitive firm. In such a situation, the efficiency cost of product differentiation will be relatively small.

In the short run, monopolistically competitive firms may receive economic profits by successfully differentiating their product. Successful product differentiation, however, will soon be copied by other firms. It is expected that such profits will disappear in the long run. Advertising campaigns may raise the profits of a firm in this industry in the short run. Monopolistically competitive firms in the same industry often locate near each other in communities as a result of their attempts to appeal to the median customer in a geographic region. This is why we often see car dealers and fast-food restaurants locating near each other on a particular street.

### **SELF-ASSESSMENT EXERCISE**

Monopolistic competition is considered to be a mixture of both perfectly competitive market and monopoly market. Do you agree?

### **4.0 CONCLUSION**

A monopolistic market is a market where we have: (i) differentiated products (ii) large number of firms and (iii) free entry and free exit.

The market does not have unique supply curve and its demand curve is downward sloping because it is partially price maker and relatively elastic as its goods has substitutes.

The short run profit maximisation in monopolistically competitive firm is the same as that of monopoly i.e.  $MC=MR$  this condition should hold. The entry of more firms into the industry in order to claim from excess profit in the short run, will later adjust to normal profit in the long run because of losses incurred.

- a.  $P = AVC$  (break-even point)
- b. price is greater than marginal cost (excess profit).

### **5.0 SUMMARY**

In this unit, you have learnt more about another market structure participant- monopolistic competition. The salient features of the market, the profit maximisation strategy both in the short and long run, relationship between demand curve, marginal cost and marginal revenue in the determination of its profit. You also learnt about the comparison of monopolistic competition with perfect competitive market and monopoly market.

## 6.0 TUTOR-MARKED ASSIGNMENT

A monopolistically competitive firm can only make normal profit in the long run. Explain the statement critically.

## 7.0 REFERENCES/FURTHER READING

Fashola, M.A. (2004). *Microeconomic Theory: Highlights and Policy Extensions for Less-Developed Economies*. Lagos: Concept Publications.

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## UNIT 3 OLIGOPOLY MARKET

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### 1.0 INTRODUCTION

In this unit, you will learn about one of the intermediate markets in our market structure that is, oligopoly or competition. This kind of market is found in many African countries including Nigeria- where the domestic market size can only permit few firms to operate effectively in a particular industry. This unit highlights the salient characteristics of oligopoly and different models of oligopoly. It also explains price and output decisions in the short and long run.

### 2.0 OBJECTIVES

At the end of this unit, you should be able to:

- describe the concept of oligopoly market
- explain the different behaviours of oligopoly
- differentiate between games/model under oligopoly market
- justify the need for oligopolists.

### **3.0 MAIN CONTENT**

#### **3.1 Oligopoly Market Structure**

An oligopoly is where there are a few sellers with similar or identical products. Monopolistic competition has many companies with similar but not identical products as earlier explained. Each firm has monopoly power over what it produces, however products are close substitutes. Examples include cigarettes, CDs, and computer games. Examples of oligopolies include crude oil businesses, phone makers and auto manufacturers.

In an oligopoly industry, there are few firms; thus, each firm's output represents a large share of the market. Because of this, each firm's pricing and output decisions have a substantial effect on the profitability of other firms. Furthermore, when making decisions concerning price or output, each firm has to take into account the expected reaction of rival firms. If Nokia lowers the price of their smart phones, for example, the effect on their profits would be very different if Blackberry company responded by lowering the price on their phone say Curve 3 by a larger amount. Because of this mutual interdependence, oligopoly firms engage in strategic behaviour. Strategic behaviour occurs when the best outcome for one party is determined by the actions of other parties.

#### **3.2 Oligopoly Behaviour**

Oligopolistic industries share several behavioural tendencies, including:

(1) interdependence, (2) rigid prices, (3) non-price competition, (4) mergers, and (5) collusion. In other words, each oligopolistic firm keeps a close eye on the decisions made by other firms in the industry (interdependence). They are reluctant to change prices (rigid prices); instead, they try to attract customers from the competition using incentives other than prices (non-price competition), and when they get tired of competing with their competitors, they are inclined to cooperate formally and legally (mergers) or informally and illegally (collusion).

Oligopolistic industries are nothing if not diverse. Some sell identical products, others differentiated products. Some have three or four firms of nearly equal size, others have one large dominate firm (a clear industry leader) and a handful of smaller firms (that follow the leader). Some sell intermediate goods to other producers others sell consumer goods directly to the public.

However, through this diversity, all oligopolistic industries engage in similar types of behaviour. The most noted behavior tendencies are: (1)

interdependent decision making, (2) relatively constant prices, (3) competition in ways that do not involve prices, (4) the legal merger of two or more firms, and (5) the illegal collusion among firms to control price and production.

### 3.2.1 Interdependence

Each firm in an oligopolistic industry keeps a close eye on the activities of other firms in the industry. Because oligopolistic firms engage in competition among the few, decisions made by one firm invariably affect others. Competition among interdependent oligopoly firms is comparable to a game or an athletic contest. One team's success depends not only on its own actions but the actions of its competitors.

Oligopolistic industries tend to keep prices relatively constant, preferring to compete in ways that do not involve changing the price. The prime reason for rigid prices rests with the interdependence among oligopolistic firms.

- Because competing firms ARE NOT likely to match the price increases of an oligopolistic firm, the firm is likely to lose customers and market share to the competition should it charge a higher price. As such, it has little motive to increase its price.
- Because competing firms ARE likely to match the price decreases of an oligopolistic firm, the firm is unlikely to gain customers and market share from the competition should it charge a lower price. As such, it has little motive to decrease its price.

### 3.2.2 Non-price Competition

Oligopolistic firms generally rely on non-price methods of competition because they realise that price competition is ineffective. Three of the more common methods of non-price competition are: (1) advertising, (2) product differentiation, and (3) barriers to entry. The key for a firm is to attract buyers and increase market share, while holding the line on price:

- **Advertising:** A large share of commercial advertising, especially at the national level, is designed as non-price competition among oligopolistic firms. Each firm engages in advertising is an attempt either: (a) to attract customers from its competition or (b) to prevent the competition from attracting its customers.
- **Production differentiation:** Another common method of non-price competition among oligopolistic firms is product differentiation. Such firms often compete by offering a bigger, better, faster, cleaner, and newer product--and especially one that

is different from the competition. Each firm seeks to differentiate its product and to give customers a reason (other than price differences) to select its product over the competition.

- **Barriers to entry:** Oligopolistic firms also frequently "compete" by preventing the competition from entering the industry. While assorted entry barriers exist, a popular form is government restrictions, especially if the competition happens to reside in another country.

### 3.2.3 Mergers

Interdependence means that oligopolistic firms perpetually balance the need for competition against the benefits of cooperation. Such competition is inherent in an industry with a small number of large firms.

However, oligopolistic firms also realise that cooperation is often more beneficial than competition. One common method of cooperation is through a merger, that is, the legal combination of two firms into a single firm. In general, as the number of competitors in an industry declines, the market control of the remaining firms is enhanced.

Because oligopoly has a small number of firms, the incentive to cooperate through mergers is quite high. The large number of firms in monopolistic competition, by contrast, provides very few merger benefits. The merger of two monopolistically competitive firms, each with one-third of the overall market, does not enhance market control much at all. However, the merger of two oligopolistic firms, each with one-third of the market, greatly enhances the market control of the new firm.

### 3.2.4 Collusion

The incentive among oligopolistic firms to cooperate also takes the form of collusion. With collusion, oligopolistic firms remain legally independent and autonomous; however, they enjoy the benefits of cooperation. Collusion occurs when two or more firms secretly agree to control prices, production, or other aspects of the market.

By acting like a monopoly, the colluding firms can set a monopoly price, produce a monopoly quantity, generate monopoly profit; and allocate resources as inefficiently as a monopoly.

Collusion can take one of two forms. Explicit collusion results when two or more firms reach a formal agreement. Implicit collusion results when

two or more firms informally control the market with necessarily reaching a formal agreement.

Given that collusion is usually illegal, especially in some developing countries and within the United States, it is invariably kept secret. Some collusive agreements however are nothing but secret. The most well-known example is the organisation of Petroleum Exporting Countries (OPEC). OPEC is an open, formal collusive agreement among petroleum producing countries to control prices and production.

### 3.3 Modelling/Game Theory

The variety and complexity of the models is because you can have two to 10 firms competing on the basis of price, quantity, technological innovations, marketing, advertising and reputation. Fortunately, there are a series of simplified models that attempt to describe market behaviour under certain circumstances. Some of the better-known models are the dominant firm model, the Cournot-Nash model, the Bertrand model and the kinked demand model.

1. **Stackelberg's duopoly:** In this model, the firms move sequentially
2. **Cournot's duopoly:** In this model, the firms simultaneously choose quantities.
3. **Bertrand's oligopoly:** In this model, the firms simultaneously choose prices.

#### 3.3.1 Dominant Firm/ Price Leadership Model

In some markets, there is a single model that controls a dominant share of the market and a group of smaller firms. The dominant firm sets prices, which are simply taken by the smaller firms in determining their profit maximising levels of production. This type of market is practically a monopoly and an attached perfectly competitive market in which price is set by the dominant firm rather than the market. The demand curve for the dominant firm is determined by subtracting the supply curves of all the small firms from the industry demand curve. After estimating its net demand curve (market demand less the supply curve of the small firms) the dominant firm maximises profits by following the normal price-max rule of producing where marginal revenue equals marginal costs. The small firms maximise profits by acting as perfect competitive firms—equating price to marginal costs.

#### **Tacit collusion**

Perhaps you can see that price leadership is almost as good as a cartel. If the dominant firm knows that the other firms will definitely follow its

price lead, then they can feel free to set a high profitable price. The other firms will be happy to follow the lead and also set a high profitable price. This is why price leadership is sometimes called tacit collusion.

### Problems with price leadership

**It does not work with too many firms:** If there are too many firms, then at least one is surely not going to be satisfied with its market share, and will hence compete with the dominant firm on price.

**It may be illegal:** Depending on who is enforcing antitrust laws (law to prevent them from using monopolistic business practices to make unfair profits) a price leadership strategy may be judged to be illegal price setting.

### The cartel game

Suppose we allow the firms to collude, jointly setting prices and production. (It will not, however, allow price discrimination; each unit of output sells for the same price per unit.) Then the firms act as though they are a monopoly with two plants, and they will maximise profits by following the same profit-maximising rule that a multi-plant monopoly follows:

$$MR = MC_1 = MC_2$$

In our particular case, both MCs are constant at 100, and  $MR = 300 - 2Q$ . So:

$$\begin{aligned} 300 - 2Q &= 100 \\ Q &= 100 \end{aligned}$$

Combined production of the two firms totals 100. Price per unit is found using the demand curve:

$$P = 300 - Q = 300 - 100 = N200$$

### 3.3.2 Cournot-Nash Model

The Cournot-Nash model is the simplest oligopoly model. The model assumes that there are two “equally positioned firms”; the firms compete on the basis of quantity rather than price and each firm makes an “output decision assuming that the other firm’s behaviour is fixed.” The market demand curve is assumed to be linear and marginal costs are constant. To find the Cournot-Nash equilibrium, one determines how each firm reacts to a change in the output of the other firm. The path to equilibrium is a series of actions and reactions. The pattern continues until a point is reached where neither firm desires “to change what it is

doing, given how it believes the other firm will react to any change.” The equilibrium is the intersection of the two firm’s reaction functions. The reaction function shows how one firm reacts to the quantity choice of the other firm. For example, assume that the firm 1’s demand function is  $P = (M - Q_2) - Q_1$  where  $Q_2$  is the quantity produced by the other firm and  $Q_1$  is the amount produced by firm 1, and  $M=60$  is the market.

### 3.3.3 The Cournot Game

Suppose now we have alternate assumptions. First, we outlaw collusion. Then, we stipulate that both firms must decide their levels of production simultaneously. Finally, we require each firm to compete based on quantity; that is, each choose the quantity that maximises its profits. (In this simple model, price is only of secondary concern).

(Note: Let us use “ $Q_1$ ” to represent the units of output supplied by Firm 1, and “ $Q_2$ ” to represent the units of output supplied by Firm 2. Note that  $Q_1 + Q_2 = Q$ ; in other words, the sum of the output produced by the two firms equals the quantity supplied to the market. Let us further assume that the firms produce an identical product, so that each must charge the same price per unit,  $P$ ).

Clearly, the profit maximising quantity of one firm depends on the quantity produced by the other firm. Let us demonstrate this mathematically for Firm 1:

Firm 1 maximises profits by setting its marginal revenue equal to its marginal cost:

$$MR_1 = MC_1$$

We know that  $MC_1$  is constant at 100 because we have assumed this from the beginning. But what is  $MR_1$ ? Let us get an equation to represent  $MR_1$ . We will do this by:

- (1) Getting a total revenue equation for Firm 1, then
  - (2) Differentiating the total revenue equation
- (1) The total revenue equation: (Let “ $R_1$ ” represent total revenue of Firm 1).

$$R_1 = PQ_1$$

From the demand equation we know that  $P = 300 - Q$   
 $R_1 = (300 - Q)Q_1 = R_1 = 300Q_1 - QQ_1 \quad q_1$

We know that  $Q = Q_1 + Q_2$

$$R1 = 300Q_1 - (Q_1 + Q_2)Q_1 \rightarrow R1 = 300Q_1 - Q_1^2 - Q_2Q_1$$

(2) MR1 is the derivative of R1 with respect to  $Q_1$

$$MR1 = 300 - 2Q_1 - Q_2$$

Now Let us get back to our profit-maximising equation and try to figure out the profit-maximising level of  $Q_1$ :

$$MR1 = MC1$$

$$300 - 2Q_1 - Q_2 = 100$$

$$2Q_1 = 200 - Q_2$$

$$Q_1 = 100 - .5Q_2 \rightarrow \text{firm 1's reaction curve}$$

See how the profit maximising level of  $Q_1$  depends on the level of production by firm 2?

So how does Firm 1 figure out how much to produce, since it does not know  $Q_2$ ? Well, it does know that Firm 2 is identical to it, and that Firm 2 will be doing the same types of calculations. We could do all of the calculations for Firm 2, but by symmetry you can hopefully see that we had got Firm 2's reaction curve similar to Firm 1's:

$$Q_2 = 100 - .5Q_1 \rightarrow \text{Firm 2's reaction curve}$$

So Firm 1 can substitute information from Firm 2's reaction curve, to calculate its own profit maximising level of production:

$$Q_1 = 100 - .5Q_2 \text{ now substitute info from firm 2's reaction curve}$$

$$Q_1 = 100 - .5(100 - .5Q_1) \rightarrow Q_1 = 100 - 50 + .25Q_1$$

$$Q_1 = 50 + .25Q_1 \rightarrow Q_1 = 66.667 \text{ (rounded)}$$

Firm 2 is identical to Firm 1. We could do all of the calculations for Firm 2, but hopefully you can see that by symmetry we would get:

$$Q_2 = 66.667 \text{ (rounded)}$$

The market quantity,  $Q$ , is the sum of  $Q_1$  and  $Q_2$ :

$$Q = 66.667 + 66.667 = 133.333$$

We can now get the price from the market demand curve:

$$P = 300 - Q = 300 - 133.333 = 166.667$$

Compare our results to the cartel results. Same two firms, same demand curve, but different results, because we imposed different rules on the game and the players.

### 3.3.4 Bertrand Equilibrium Model

The Bertrand model is essentially the Cournot-Nash model except the strategic variable is price rather than quantity. The model assumptions are:

- there are two firms in the market
- they produce a homogeneous product
- they produce at a constant marginal cost
- firms choose prices  $P_A$  and  $P_B$  simultaneously
- firms outputs are perfect substitutes
- sales are split evenly if  $P_A = P_B$

The only Nash equilibrium is  $P_A = P_B = MC$ .

The Bertrand equilibrium is the same as the competitive result. Each firm will produce where  $P = \text{marginal costs}$  and there will be zero profits. A generalisation of the Bertrand model is the Bertrand-Edgeworth model that allows for capacity constraints and more general cost functions.

Suppose we keep the same two firms, but assume that they compete viciously based on price—to heck with profits and quantity!

In this case, there is only 1 equilibrium—where  $P = MC$ , that is  $P=90$ .

Why? Suppose you are Firm 1 and think that  $P = 130$  is a good price. Firm 2 can charge N129 and take away all of your business, since Firm 2 produces an identical product. Indeed, this is true if either firm sets a price above MC; the other firm can undercut it and take away all of its business.

Since  $P = 100$ , then using the demand curve,  $Q = 130$ .

In this case, the outcome is socially efficient, since  $P = MC$ .

Do you see the importance of modelling a real world market correctly? Get the model wrong, and the results will be way off. Real game theoretic models of oligopoly are much more complicated than the ones shown here.

### 3.3.5 Kinked Demand Curve Model/ Rigid Prices Model

In this theory, each firm faces a demand curve kinked at the existing price. The assumptions of the model are; if the firm raises its price above the current existing price, competitors will not follow and the acting firm will lose market share; and second, if a firm lowers prices below the existing price, then their competitors will follow to retain their market share and the firm's output will increase only marginally.

If the assumptions hold, then:

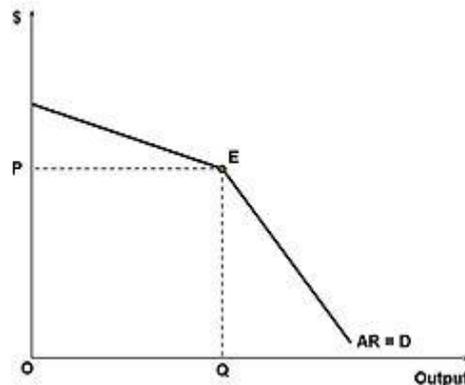
- the firm's marginal revenue curve is discontinuous (or rather, not differentiable), and has a gap at the kink
- for prices above the prevailing price, the curve is relatively elastic
- for prices below the point the curve is relatively inelastic.

--If one firm in an oligopoly increases its prices, then none of the other firms in the oligopoly will raise theirs.

--If one firm in an oligopoly reduces its prices, then all of the other firms in the oligopoly will reduce theirs.

In this model, there is fairly intense competition among firms. A single firm, which dares to raise price will be “left out to dry” by the other firms and will lose market share, suffering a huge loss in demand because its competitors’ prices remain low. Conversely, a single firm that cuts prices will only see a small increase in demand and no increase in market share, as its entire competitors match the price reduction.

### Demand curve



Above the kink, demand is relatively elastic because all other firms' prices remain unchanged. Below the kink, demand is relatively inelastic because all other firms will introduce a similar price cut, eventually leading to a price war. Therefore, the best option for the oligopolist is to produce at point **E**, which is the equilibrium point and the kink point. This is a theoretical model proposed in 1947, which has failed to receive conclusive evidence for support.

**Demand curve:** A firm in a market such as this will have a kinked demand curve. The curve will be pretty flat above the current price, since a price hike results in a loss of market share. The curve will be pretty steep below the current price, since a price reduction results in no increase in market share.

**Marginal revenue curve:** You might think that since the demand curve is kinked, the marginal revenue curve will also be kinked; contrarily, the laws of maths dictate that there is a gap in the kink in the demand curve. The gap in the marginal revenue curve means that marginal costs can fluctuate without changing equilibrium price and quantity. Thus prices tend to be rigid.

### 3.3.6 Stackelberg Model

In Stackelberg's model of duopoly, the players of this game are a leader and a follower and they compete on quantity. The Stackelberg leader is sometimes referred to as the market leader. The leader should be aware that the follower observes his action. The follower must have no means of committing to a future i.e. non-Stackelberg follower action and the leader must know this. Indeed, if the 'follower' could commit to a Stackelberg leader action and the 'leader' knows this, the leader's best response would be to play a Stackelberg follower action.

Firms may engage in Stackelberg competition if one has some sort of advantage enabling it to move first. More generally, the leader must have commitment power. Moving observably first is the most obvious means of commitment: once the leader has made its move, it cannot undo it - it is committed to that action. Moving first may be possible if the leader was the incumbent monopoly of the industry and the follower is a new entrant. Holding excess capacity is another means of commitment.

#### Assumptions

1. Two competing firms, selling a homogeneous good
2. The marginal cost of producing each unit of the good:  $C_1$  and  $C_2$   
 Firm 1 moves first and decides on the quantity to sell:  $q_1$   
 Firm 2 moves next and after seeing  $q_1$ , decides on the quantity to sell:  $q_2$   
 $Q = q_1 + q_2$  total market demand  
 The market price,  $P$  is determined by (inverse) market demand:  
 $P = a - bQ$  if  $a > bQ$ ,  $P = 0$  otherwise.
3. Both firms seek to maximise profits

Stackelberg model: Strategy of Firm 2

Suppose firm 1 produces  $q_1$

Firm 2's profits, if it produces  $q_2$  are:

$$\pi_2 = (P - c)q_2 = [a - b(q_1 + q_2)]q_2 - c_2q_2$$

= (Residual) revenue – Cost

First order conditions:

$$d\pi_2/dq_2 = a - 2bq_2 - bq_1 - c_2 =$$

$$= \text{RMR} - \text{MC} = 0 \rightarrow$$

$$q_2 = (a - c_2)/2b - q_1/2 = R^2(q_1)$$

$$s^2 = R^2(q_1) \text{ Strategy of firm 2}$$

Stackelberg model: Firm 1's decision

Firm 1's profits, if it produces  $q_1$  are:

$$\pi_1 = (P - c)q_1 = [a - b(q_1 + q_2)]q_1 - c_1q_1$$

(Now, what is different from the Cournot game?)

We know that from the best response of Firm 2:

$$q_2 = (a - c_2)/2b - q_1/2$$

Substitute  $q_2$  into  $\pi_1$ :

$$\pi_1 = [a - b(q_1 + (a - c_2)/2b - q_1/2)]q_1 - c_1q_1$$

$$= [(a + c_2)/2 - (b/2)q_1 - c_1]q_1$$

From FOC:

$$d\pi_1/dq_1 = (a + c_2)/2 - b q_1 - c_1 = 0 \rightarrow$$

$$q_1 = (a - 2c_1 + c_2)/2b$$

### Stackelberg equilibrium

We have Firm 1's profits, if it produces  $q_1$ :

**Example:** Stackelberg competition

$$P = 130 - (q_1 + q_2), \text{ so } a = 130, b = 1$$

$$c_1 = c_2 = c = 10$$

$$\text{Firm 2: } q_2 = (a - c_2)/2b - q_1/2 = 60 - q_1/2$$

Firm 1: Profit Function

$$\Pi_1 = [a - b(q_1 + q_2)]q_1 - c_1q_1$$

$$\Pi_1 = [(a + c_2)/2 - (b/2)q_1]q_1 - c_1q_1$$

$$\Pi_1 = [70 - q_1/2]q_1 - c_1q_1$$

$$\rightarrow q_1 = 60$$

Market price and demand

$$Q = 90, P = 40$$

### 3.7 Evaluating Oligopoly

How do oligopolies compare with more competitive industries? Firms in oligopolistic industries exercise considerable market power, yielding economic inefficiency similar to that described earlier for monopoly. In equilibrium, the marginal social benefit (price) of their products exceeds the marginal social cost. Compared with purely or even monopolistically competitive industries, output will tend to be lower, and at higher prices to consumers.

If oligopoly arises from economies of scale, however, it is possible that consumers pay lower prices than they would were the market more competitive. Furthermore, if research and development (R&D) leading to technological advances requires massive outlays, small competitive firms may be unable to finance adequate innovation. Some economists suggest that society gains over the long run when short run profits reaped by oligopolistic firms are ploughed back into the development and innovation of newer and better products.

Evidence on the effects of oligopolies is mixed. Economies of scale are clearly responsible for the oligopolistic nature of some industries. In other instances, however, satisfactory economies of scale can be realised by smaller firms, and oligopoly is sustained by legal or strategic entry barriers. Finally, the evidence does not support the idea that large firms are especially responsible for new inventions and technological advances in our economy. If anything, it appears that the desire for increased market power has been the driving force behind the creation of most oligopolies.

Successful collusion requires a stable environment, but unless cartels have the legal support of government, stability is unlikely. When products are significantly differentiated, or resource costs are volatile, or demands are fickle, or entry is easy, or competitors are numerous, or technology advances rapidly, or policing a cartel agreement is excessively costly, then the quiet cooperation that oligopolists would like may be replaced by strategic behaviour as intense as championship chess and as hostile as war.

### 4.0 CONCLUSION

Oligopolies exist where relatively few firms control all or most of the production and sale of a product. The products may be homogeneous or barrier to entry are often very high, which makes it difficult for firms to enter into the industry.

Oligopoly is characterised by mutual interdependence among firm; each firm make its policy with an eye to the policies of competing firms.

Some of the game theories under this market include dominant theory, Cournot model, Cournot – Nash model, Bertrand equilibrium model, Stackelberg model, kinked demand curve model.

## **5.0 SUMMARY**

In this unit, you have learnt about the oligopoly market and its characteristics. By now, you should able to explain the various game theories under oligopoly structure. Some these include dominant theory, Cournot model, Cournot – Nash model, Bertrand equilibrium model, Stackelberg model, kinked demand curve model. Lastly, you learnt about appraisal of oligopoly market structure.

## **6.0 TUTOR-MARKED ASSIGNMENT**

Critically appraise the leadership model and Bertrand equilibrium model of oligopoly.

## **7.0 REFERENCES/FURTHER READING**

Fashola, M.A. (2004). *Microeconomic Theory: Highlights and Policy Extensions for Less-Developed Economies*. Lagos: Concept Publications.

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## **MODULE 4      THEORY OF DISTRIBUTION**

Unit 1	Concepts of Theory of Distribution
Unit 2	Basic Concept of Factor Pricing: Productivity of the Factor
Unit 3	Basic Concept of Factor Pricing: Cost of the Factor
Unit 4	The Concept Marginal Productivity Theory of Distribution (Factor Pricing)
Unit 5	The Factor Market under Perfect Competition
Unit 6	The Factor Market under Imperfect Competition

### **UNIT 1      CONCEPT OF THEORY DISTRIBUTION**

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2.0	Objectives
3.0	Main Content
3.1	Concept of Theory Distribution
3.2	Reason for the Study of Factor Pricing
3.3	The Differences between Factor Market and Product Market
3.3.1	Nature of Demand
3.3.2	Nature of Supply in Relation to Price
3.3.3	Nature of Supply in Relation to Cost
4.0	Conclusion
5.0	Summary
6.0	Tutor-Marked Assignment
7.0	References/Further Reading

#### **1.0      INTRODUCTION**

Having understood the operations of the participants of the market structure under the theory of value (product market), the understanding of theory of distribution (factor market) will not be difficult for you. You will learn differences that exist between product market and factor market. Here, you will learn basic concepts of factor pricing, which would be useful as foundation for the understanding of theory of distribution.

#### **2.0      OBJECTIVES**

At the end of this unit, you should be able to:

- differentiate revenue factor from the cost of a factor

- distinguish between factor market and product market
- determine the various uses of marginal productivity.

### **3.0 MAIN CONTENT**

#### **3.1 Concept of Theory Distribution**

The theory of distribution is an attempt to explain how income is distributed among the factors of production. To produce goods and services, firms need the services of factors of production, such as land, labour, capital, and entrepreneur. The prices paid for these factors of production are called rent, wage, interest, and profit. The factor pricing is therefore concerned with the determination of prices of services of these factors of production. According to Anatol Murad, the theory of factor pricing deals with the prices paid for factor services and earned by the sellers of factor of production that is the households. The theory of factor pricing is the same as theory of distribution. The factors needed in the production process are also known as production services, resources or inputs.

The explanation of factor pricing helps us in two ways:

- a. It completes the analysis of function of prices and the mechanism of resource allocation.
- b. It allows the understanding of the forces underlining the distribution of total income among various groups of factors owners.

#### **SELF-ASSESSMENT EXERCISE**

List factors of production and their corresponding rewards.

#### **3.2 Reason for the Study of Factor Pricing**

We study factor pricing for the following reasons.

1. To understand how the forces of demand and supply determine prices of factor of production in factor market.
2. To understand the different roles participants play in the market as firms are sellers in products market but buyers in factor market. In addition, the nature of factor market is different from product market in the sense of objects of interaction.

### **3.3 The Differences between Factor Market and Product Market**

#### **3.3.1 Nature of Demand**

Factors of production are never demanded for their own sake thus the demand here is a derived demand. When workers are engaged or capital is borrowed, it does not offer any direct satisfaction to the producer. The employer of factors of production only uses these factors in the production of goods and services to be finally sold in the product market. The demand for goods and services is direct demand, as goods demanded directly satisfy the need of consumer, for example the demand for apple by a consumer.

The demand of factor of product can also be joint demand because for producer to produce orange s/he has to demand for all the factors of production; however, the demand for orange by a consumer is not a joint demand once he can pay for it.

#### **3.3.2 Nature of Supply in Relation to Price**

There is definite relationship between the price of goods and supply of goods in the product market. There is linear relationship between supply of goods increase in response to the rise in the price and decreases in response to the fall in the price. However, there is no definite relationship between the supply of factors and the price of factors. For instance, the supply of labour may increase due to increase in wage, but only when the wages are low and the workers are striving for good living condition substitution effect. Once a particular level of wage is reached (good living condition is attained by workers) more labour may not be supplied due to increase in higher wage rate. Workers may start to prefer leisure to enjoy their high wage rate, to work which is explained by supply curve of labour called backward sloping income effect. It is worth to note that land supply is related to its price.

#### **3.3.3 Nature of Supply in Relation to Cost**

Supply of goods is dependent on the cost of producing such goods and services. However, it is not that the same in the factor market. It is almost impossible to estimate the cost of supplying factors of production. For instance, there is a difference in the cost –estimate of labour in a software computer factory and the amount of labour supplied in the chemical factory (individual differences, level of academic and training, physical qualities). However, savings involves abstinence from consumption and this can be calculated as opportunity cost to the consumption.

The similarities that exist in both market is that in both markets are fundamentally based on the interaction of the forces of demand and supply. That is, buyers and sellers play important role in the determination of price in both markets.

#### **4.0 CONCLUSION**

The production of goods and services in the output/ product market cannot take place without the presence of factor of production (land, labour, capital and entrepreneur). Their rewards are the prices paid to have their services in the production. The basic differences between these markets are explained under the following heading: nature of demand, nature of supply, and cost and supply of factor of production. The theory of distribution is studied differently from the theory of value because of these differences.

#### **5.0 SUMMARY**

In this unit you have learnt, the basic concept of factor market and why is it different from product market. You also learnt that the interplay of demand and supply in the determination of price play important role in both market. Thereafter, the major differences were clearly stated for your understanding.

#### **6.0 TUTOR-MARKED ASSIGNMENT**

Elucidate major differences that exist between the factor market and the product market.

#### **7.0 REFERENCES/FURTHER READING**

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## UNIT 2 BASIC CONCEPT OF FACTOR PRICING

### CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Basic Concept of Factor Pricing: Productivity of the Factor
  - 3.2 Productivity of the Factor
    - 3.2.1 Marginal Productivity
  - 3.3 Marginal Revenue Productivity (MRP)
  - 3.4 Average Physical Productivity
    - 3.4.1 Average Physical Productivity
    - 3.4.2 Average Revenue Productivity
    - 3.4.3 Relationship between ARP and MRP Curves
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References /Further Reading

### 1.0 INTRODUCTION

In this unit, you will learn about productivity of factors and its divisions. You will also be introduced to the concept and the calculation of marginal productivity and average productivity and different divisions each of them has. All the relationships that exist among these concepts will be explained in detail.

### 2.0 OBJECTIVES

At end of this unit, you should be able to:

- define productivity of factor and its uses
- differentiate between marginal revenue (MR) and marginal revenue productivity (MRP)
- differentiate between MRP and value of marginal physical
- calculate total revenue, marginal revenue product, and marginal physical product.

### 3.0 MAIN CONTENT

#### 3.1 Basic Concept of Factor Pricing: Productivity of the Factor

The clear understanding of basic concepts in factor pricing will help you appreciate the operations of the market participants both in perfectly competitive market and imperfect market. These concepts relate to the following:

1. Productivity of the factor
2. Cost of the factor

#### 3.2 Productivity of the Factor

Productivity of factor is the amount of a commodity produced per unit of resources used. While production refers to the total amount of a commodity produced. Therefore, the contribution of a factor of production to the total output has two types:

- a. Marginal productivity
- b. Average productivity

##### 3.2.1 Marginal Productivity

This refers to extra unit of output or product as a result of the employment of an extra unit of labour while keeping the application of other factors fixed. Extra product may be measured either in term of extra units of the goods produced or in terms of revenue gotten by the producer on the account of sale of extra units produced. Marginal productivity can be used in these three ways:

- (1.) Marginal physical productivity (**MPP**)
- (2.) Marginal revenue productivity (**MRP**)
- (3.) Value of marginal physical productivity (**VMPP**)

**Marginal physical productivity (MPP):** If marginal productivity is measured by the extra unit of product produced then, it is called marginal physical productivity (MPP).

Where,  $MPP = TPP_n - TPP_{n-1}$  or  $\Delta TRP / \Delta L$

**MPP** = Marginal physical productivity

**TPP<sub>N</sub>** = Total physical productivity of a factor and n is the units of the factor employed

$TPP_{n-1}$  = Total physical productivity of a factor and n-1 are the units of the factor employed

$\Delta TP$  = change in total product

$\Delta L$  = change in factor (labour)

### SELF -ASSESSMENT EXERCISE

Assuming 1000 shirts were produced in a month when 100 labourers are engaged with 15 units of capital. When 101 labourers are employed with the same amount capital, 1100 shirts were produced. Calculate the marginal physical productivity (MPP).

**Marginal revenue productivity:** If marginal productivity is measured by the extra amount of revenue earned then, it is called marginal physical productivity (MRP). It is the addition made to total revenue productivity by employing one more unit of a variable factor i.e.

$$MRP = TRP_n - TRP_{n-1} \text{ or } \Delta TRP / \Delta L$$

Where,

**MRP** = marginal revenue productivity of the factor

**TRP<sub>n</sub>** = Total revenue productivity of a factor and n are the units of the factor employed

**TRP<sub>n-1</sub>** = Total revenue productivity of a factor and n-1 are the units of the factor employed

$\Delta TRP$  = change in total revenue productivity

$\Delta L$  = change in factor (labour)

**Or:**

$$MRP = MPP \times MR$$

Where

**MRP** = Marginal revenue productivity of the factor

**MPP** = Marginal physical productivity of the factor

**MR** = Marginal revenue which is the additional revenue gotten by the producer as a result of the sale of one extra unit of the goods

### Difference between MR and MRP

**MRP** is the additional revenue gotten to the producer on the account of the sale of all additional units of the goods, as a result of the employment of one additional unit of the factor, while MP is referred to

as additional revenue gotten to the producer on the account of the sale of one extra unit of the goods produced.

### **SELF-ASSESSMENT EXERCISE**

From the above self-assessment exercise, if 1000 shirts produced by 100 labourers (with 10 units of capital) earned a revenue of N100000 (each was sold at the rate of N100), and if 1100 shirts were produced by 101 labourer earned the producer a revenue of N11000, calculate the MRP.

**Value of marginal physical productivity:** According to Ferguson and Maurice, 'The value of the marginal productivity (VMPP) of a variable factor is equal to its marginal physical productivity multiplied by the price of the commodity in question'.

VMPP is obtained by multiplying MPP with the price/ AR of the product.

$$\text{VMPP or VMP} = \text{MPP} \times \text{Price (AR)}$$

### **SELF-ASSESSMENT EXERCISE**

From the above solution of MPP, assuming the price of the shirt is N100 each and MPP of 101st labourer is 100 shirts, calculate VMPP.

### **Difference between marginal revenue productivity and value of marginal physical productivity**

Value of marginal physical productivity (VMPP) is calculated by multiplying marginal physical productivity (MPP) of a factor by the price of the product. Price of the product is the same as average revenue (AR). Thus:

$$\text{Value of MPP} = \text{MPP} \times (\text{AR})$$

Marginal revenue productivity (MRP) is, on the other hand, the multiple of MPP and MR

$$\text{MRP} = \text{MPP} \times \text{MR}$$

When **AR** is fixed under perfectly competitive market,  $\text{AR} = \text{MR}$  for a firm as there are no differences between value of Marginal Physical Productivity and Marginal Revenue Productivity.

$$\text{Value of MPP} = \text{MRP or MPP} \times \text{AR} = \text{MPP} \times \text{MR}$$

Under imperfect market structure when AR is constant. In such circumstances AR is not equal to MR ( $AR \neq MR$ ). Therefore,  $VMPP \neq MRP$

$$(MPP \times AR) \neq (MPP \times MR)$$

**Table 9.1**

**Equality between MRP and value of MPP under perfectly competitive market**

Unit of labour	Total product	MPP	P =MR= AR	MRP = MPP × MR	VMPP = MPP × AR
1	8	8	6	48	48
2	15	7	6	42	42
3	21	6	6	36	36
4	26	5	6	30	30
5	27	4	6	24	24

### 3.4 Average Productivity

Average productivity refers to per unit productivity of a variable factor. The concept of average productivity may be used in the following two aspects:

**Average physical productivity (APP):** This is the physical units produced per unit of the variable factor. It is obtained by dividing total physical product TPP by number of units of the variable factor employed N, i.e.

$$APP = \text{Total physical product} \div \text{Number of unit of the variable factor}$$

#### SELF-ASSESSMENT EXERCISE

If 100 units of labour (along with some fixed factors of production) produce 1000 unit of shirts, calculate APP.

**Average revenue productivity:** This refers to revenue generated per unit of the variable factor. Average Revenue Productivity (ARP) – ARP is the revenue obtained per unit of the factor employed. It is obtained by dividing total revenue product TRP by the total number of units of the factor employed N, i.e.

$$ARP = \text{TRP}/N$$

It is also obtained by multiplying APP with the price of the product.

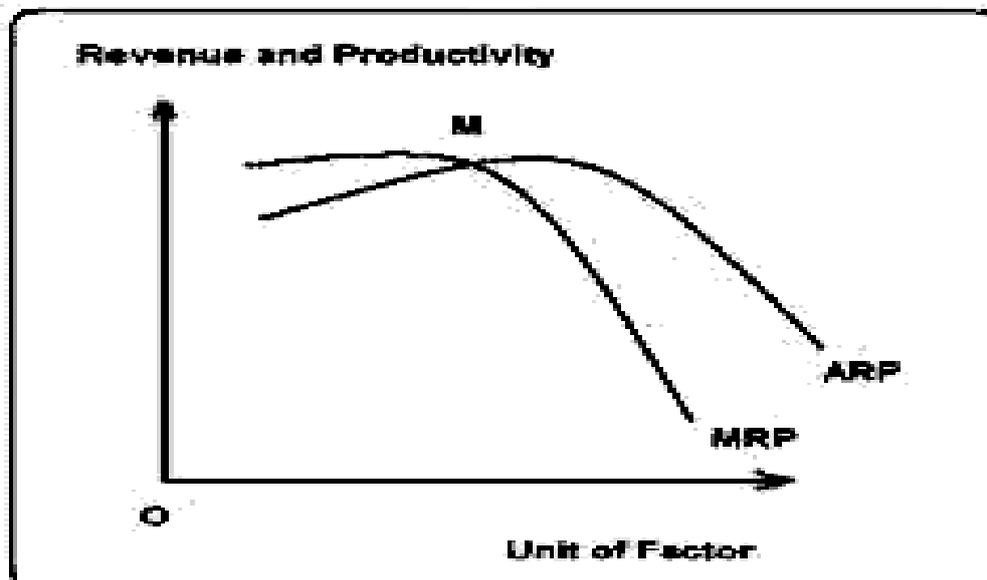
$$\text{ARP} = \text{APP} \times \text{Price (AR)}$$

### SELF-ASSESSMENT EXERCISE

Supposing 10 units of labour (along with some fixed factors of production) produce shirts worth N100, 000, calculate ARP.

### Relationship between ARP and MRP Curves

There is a definite relation between ARP and MRP curves, which is based on the law of variable proportions. Both ARP and MRP curves are inverted U-shaped or bell-shaped. First they rise upward, reach maximum and then decline, as it is represented in the below diagram.



1. When the ARP curve rises, the MRP curve is above it.
2. When the ARP curve is at its maximum, a point M, the MRP curve cuts it from above.
3. When the ARP curve falls, the MRP curve is below it and falls steep.

### 4.0 CONCLUSION

Productivity of factor is the amount of a commodity produced per unit of resources used. The factor productivity is divided into two: marginal productivity and average productivity. There are different formulas for calculating different divisions of marginal productivity such as:

Marginal physical productivity	$\Delta \text{TPP} \div \Delta \text{N}$
Marginal revenue productivity	$\text{MRP} = \text{MPP} \times \text{MR}$

Value marginal physical productivity MRP or  $MPP \times AR = MPP \times MR$

The average productivity divisions were also learned by you such as:

Average physical productivity  $TPP \div N$

Average revenue productivity  $ARP = APP \times \text{Price (AR)}$

Finally you learned about relationship between ARP and MRP curves.

## 5.0 SUMMARY

In this unit, you learnt about productivity of factors. The average and marginal productivity of factors were fully discussed and calculated for you. You learnt about average revenue product and marginal revenue product and their relationships. The equality between MRP and value of MPP under perfectly competitive market was also explained to you.

Finally you learnt about relationship between ARP and MRP curves.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Calculate total revenue, marginal revenue product, and marginal physical product from the table below:

Unit of factor (Labour)	Unit of output	Price per unit(output)	Total Revenue	Marginal Revenue Product	Marginal Physical Product
0	0	₦1			
1	15	₦1			
2	27	₦1			
3	36	₦1			
4	42	₦1			
5	45	₦1			
6	46	₦1			

2. With the use of graph vividly describe the relationship between average revenue product and marginal revenue product.

## 7.0 REFERENCES/FURTHER READING

Jain, T.R. & Khana, O.P. (2009). *Business Economics*. New Delhi-2, India:V.K. Publications.

Jain, T.R. & Khana, O.P. (2009). *Managerial Economics*. New Delhi-2, India:V.K. Publications.

## **UNIT 3 COST OF THE FACTOR**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Cost of the Factor
    - 3.1.1 Average Factor Cost (AFC)
    - 3.1.2 Marginal Factor Cost (MFC)
    - 3.1.3 AFC and MFC under Perfect Market Competition
    - 3.1.4 AFC and MFC Curves under Imperfect Market
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References /Further Reading

### **1.0 INTRODUCTION**

In the last unit, you studied the concept of productivity and all its divisions. In this unit however, you are going to study the concept of cost and its divisions. Attempt is made to distinguish between marginal cost of factor and average cost of labour. The comparison is made between average factor cost and marginal factor cost under perfectly competitive and imperfectly competitive market. Before we continue, let us see what you should be able to achieve after going through this unit.

### **2.0 OBJECTIVES**

At the end of this unit, you should be able to:

- explain the concept of cost of the factor and its divisions
- differentiate between marginal cost of factor and average cost of factor
- compare AFC and MFC under perfectly competitive market
- compare AFC and MFC under imperfectly competitive market.

### **3.0 MAIN CONTENT**

#### **3.1 Cost of the Factor**

Cost of the factor refers to the expenditure incurred on employing of the factor of production. In other words, total factor cost is the cost of a factor in terms of money, which is called factor cost. It is further divided into average and marginal factor cost.

**Note:** Average factor cost (AFC) and Marginal factor cost (MFC) are considered the cost of variable factors, as it is the employment of variable factors which the firm is concerned with.

### 3.1.1 Average Factor Cost (AFC)

This is obtained by dividing total factor cost TFC by the total number of units of the factor employed N (labour)

$$\text{AFC} = \text{TFC}/N$$

### 3.1.2 Marginal Factor Cost (MFC)

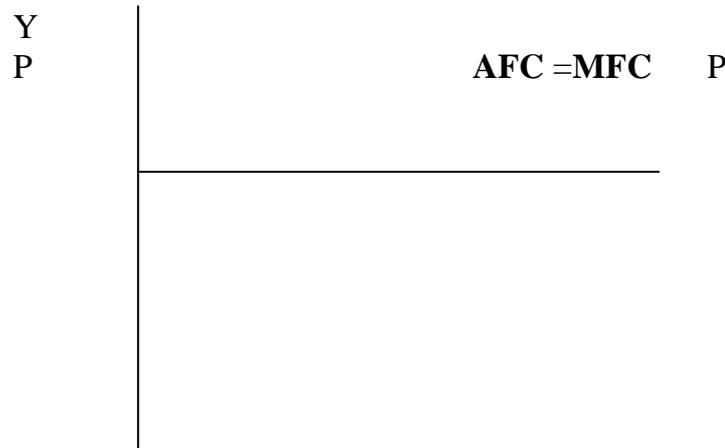
This is defined as the additional cost of employing/purchasing one unit of a factor. In other words, it is the additional cost associated with a one-unit increase in resource use.

$$\text{MFC} = \Delta\text{TFC} = \text{TFC}_n - \text{TFC}_{n-1}$$

**MFC** = Marginal factor cost

**TFC<sub>n</sub>** = Total factor cost of N units

**TFC<sub>n-1</sub>** = Total factor cost N-1 unit



Under perfect competition, demand for a factor by an individual firm in the market is a fraction of the total demand, so that by varying its demand by any extent, it cannot affect the prevailing factor price in the market. If every unit of the factor is available at the same price, average cost of the factor and marginal cost of the factor is the same. Therefore, under perfect market competition,  $\text{AFC} = \text{MFC}$  (as shown in the above graph).

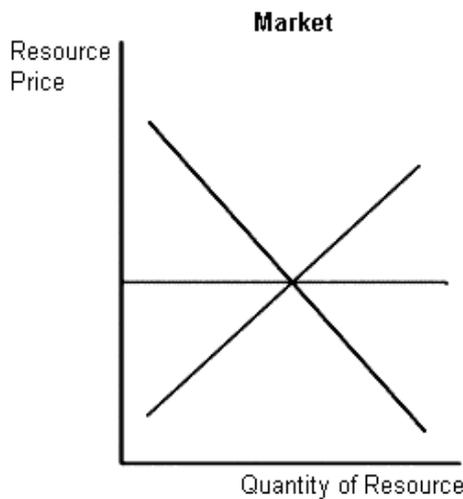
### SELF-ASSESSMENT EXERCISE

Vividly explain the concept of cost of factor.

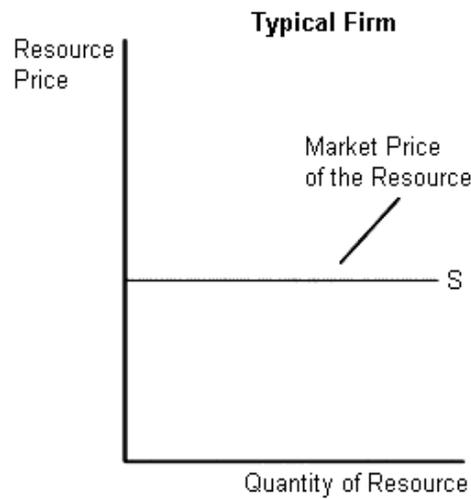
### 3.1.3 AFC and MFC under Perfect Market Competition

Since the price of factor is determined by the forces of its market demand and market supply and at the prevailing market price, a firm can employ/purchase any number of units desired of the factor.

3a

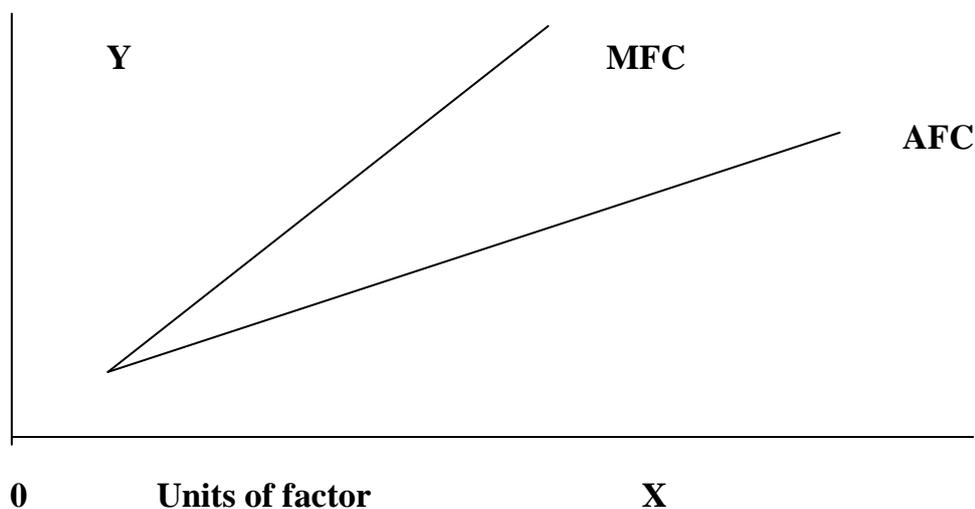


b



### 3.1.4 AFC and MFC Curves under Imperfect Market

Since the supply of factor is not perfectly elastic as we have it under perfect market competition, a firm can employ additional units of a factor only by paying higher factor cost. An extra unit of factor will be available only at the higher cost. So, marginal cost of the factor tends to rise. Rising MFC tends to pull AFC upward.



## SELF-ASSESSMENT EXERCISE

Briefly explain the following:

- i. Average factor cost
- ii. Marginal factor cost

## 4.0 CONCLUSION

In this unit, you have been able to understand that the cost to the producer is the income to the households that possess factors of production used to produce goods and services. The expenditure incurred on the factors of production in the process of producing goods and services is considered as cost of factor. You further learned that marginal factor cost is the extra amount expended on the factor to have extra unit of output. In this unit you are able to get the relationship between Average Factor Cost and marginal factor cost, and how prices of factors are determined under perfectly competitive market and imperfectly competitive market.

## 5.0 SUMMARY

By now you should have learnt the difference between the productivity of factor and cost of factor. In this unit, you learnt about the concept of cost factor and its various divisions such as average factor cost and marginal factor cost. You learnt the concept of these factors under perfectly competitive market and imperfect market. Finally, you were taught how to calculate each of them.

## 6.0 TUTOR-MARKED ASSIGNMENT

Critically examine the difference between the concept AFC and MFC under the following market:

- a. perfectly competitive factor market
- b. imperfectly competitive factor market

## 7.0 REFERENCES /FURTHER READING

Jain, T.R. & Khana, O.P. (2009). *Business Economics*. New Delhi-2, India:V.K. Publications.

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## **UNIT 4 THE CONCEPT MARGINAL PRODUCTIVITY THEORY OF DISTRIBUTION (OR FACTOR PRICING)**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 The Concept of Marginal Productivity Theory of Distribution (Factor Pricing)
  - 3.2 Assumptions of the Marginal Productivity Theory
  - 3.3 Problem Inherent in the Use of Marginal Productivity Theory
  - 3.4 Demand for a Factor of Production
    - 3.4.1 The Magnitude of Demand
    - 3.4.2 Elasticity of Demand for Factors
  - 3.5 Market Demand Curve for a Factor of Production
  - 3.6 Supply of a Factor of Production
  - 3.7 Equilibrium in Factor Market
  - 3.8 Problem Inherent in the Theory of Factor Pricing
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References /Further Reading

### **1.0 INTRODUCTION**

Having understood the basic concepts related to productivity of the factor and cost of factor and cost of factor, we now take up detailed analysis of a principal theory related to factor pricing- marginal productivity theory of distribution and its assumptions. Here, you will learn factors that affect demand for factors, factors that affect supply for factors, and the equilibrium in factor market. Furthermore, you will learn about problems inherent the theory of factor pricing.

### **2.0 OBJECTIVES**

At the end of this unit, you should be able to:

- explain the concept of marginal productivity theory of distribution (or factor pricing)
- enumerate the limitations of using marginal productivity theory in reality
- explain factors that affect demand for factors

- explain factors that affect supply for factors
- determine the equilibrium in factor market.

### 3.0 MAIN CONTENT

#### 3.1 The Concept of Marginal Productivity Theory of Distribution (Factor Pricing)

According to Leibhafasky, ‘The marginal productivity theory of income distribution states that under perfect competition, factor tends to receive a real rate of return which was exactly just equal to their marginal productivity.’

The marginal productivity theory of distribution determines the prices of factors of production. This theory states that a factor of production is paid price equal to its marginal product. For example, a labourer gets his wage according its marginal product. He is rewarded based on contribution he makes to the total output.

Factors of production are demanded because they have productivity. The higher the productivity of a factor, the greater will be its price. Marginal product or otherwise called marginal physical product (MPP) refers to addition to the total physical product by employing one more unit of a factor.

When **MPP** is multiplied by price, it is called value of marginal product (**VMP**). Marginal revenue product (MRP) is the addition made to total revenue by employing an additional unit of a factor. Average revenue product (**ARP**) is the average revenue per unit of a factor of production. Marginal productivity theory explains the following facts:

- (a) Reward of each factor is equal to its marginal productivity
- (b) Reward for each factor is same in every use.

#### **Reward of each factor is equal to its marginal productivity**

Under perfect competition, a firm employs various units of a factor up to that point where the price paid to the factor is equal to its marginal productivity. Every producer compares the price with its productivity. The price paid to a factor is income to it while it is cost to the producer. The point of equilibrium reaches at that point where **MPP=Price**. If the producer employs fewer units of factors, the productivity will be more and the cost will be less. Thus, in such a case the producer will increase his profit by employing more units of factors and reaches the equilibrium point. On the other hand, if the number of factor employed is more than the equilibrium level, the cost will be more than the

productivity. The producer will lower the units of factors so long he reaches equilibrium. Thus his profit is maximised at the point of equilibrium ( $MRP=MC$ ). In other words, a producer will employ the factors only up to the point where the cost of an additional factor unit equals its marginal revenue.

### **Reward for each factor is same in every use**

Marginal productivity theory assumes that productivity of a factor is equal in all its uses. If the factor cost in two different uses is not uniform i.e. the factor cost in one use is greater than other use, factors will move to that use where the factor cost is high.

This price will continue so long as the productivity of a factor becomes equal in all its uses. Besides this the marginal productivity, all factors is the same in a particular use and thus they are the perfect substitutes of each other. The producer goes on substituting nearer factors by the cheaper factors so long as the marginal productivity of the factor becomes proportional to their prices. This condition for achieving equilibrium is stated as follows.

When producer employs more factor unit, the marginal physical productivity of additional factor will start diminishing. That is why marginal productivity curve diminishes after a particular point of employment of a factor. Since the objective of a firm is to maximise profit, he will always compare the cost of employing (**MR**) an additional labourer with the contribution (**MP**) made by that additional labourer. He will go on employing additional factor so long as marginal factor cost is equal to marginal productivity. The moment the productivity of an additional factor equals the marginal factor cost, he will stop employing additional factors and thereby his profit is maximised. The equilibrium situation is explained under the perfectly competitive market and imperfect market.

### **3.2 Assumptions of the Marginal Productivity Theory**

1. Prevalence of perfect competition in factor as well as product market.
2. All factors are identical.
3. Factors are perfect substitute for each other.
4. Factors are perfectly mobile.
5. Perfect divisibility of factors.
6. The theory operates in the long-run.
7. The theory is based on full employment.

## SELF-ASSESSMENT EXERCISE

Describe two assumptions of marginal productivity theory.

### 3.3 Problem Inherent in the Use of Marginal Productivity Theory

- (1) **Assumptions are not realistic:** The theory is founded on certain unrealistic assumptions like prevalence of perfect competition and they are perfectly mobile. In reality there assumptions are not found.
- (2) **MRP is difficult to calculate:** It is difficult to measure marginal revenue productivity of a factor. Marginal revenue productivity is the addition made to total revenue by employing an additional unit of a factor. However, it is difficult to get it. In a large-scale industry, if the work of a labourer is decreased, it will have no corresponding decrease in total production.
- (3) **Heterogeneous factors:** In reality, different units of a factor are not identical. They are heterogeneous and hence cannot be substituted by one another. Land and capital cannot be substituted for each other. Labour as a factor cannot be equal in health and efficiency. They are not equally productive.
- (4) **Reward determines productivity:** The reward of a factor is determined by the factor's marginal productivity. Therefore, MRP is the cause and reward is the effect. When a labourer is given higher wages, his living standard will develop and his health and efficiency will increase. Hence, reward is the cause and not the wage.

### 3.4 Demand for a Factor of Production

It is a known fact that the demand for factors is a derived demand. Factors of production are not demanded for their own sake but their services are required for the production of other goods and services which the consumers need as we have discussed earlier. For example, labour is hired /engaged because it helps in the production of the commodities. Similarly, land is not desired for itself. It is demanded for the things which it grows or for the construction of a factory or shop.

The demand for a factor of production, like the price of commodity, is a function of price. How much a factor of production will be demanded in the market depends upon two parameters:

- (1) the magnitude of demand and
- (2) the elasticity of demand for that factor.

### 3.4.1 The Magnitude of Demand

- (i) If a factor of production is very important in the process of production of a particular commodity or commodities, it will have a higher demand in the factor market.
- (ii) If the demand for final product is expected to be high, then the demand for all the factors which produce the product will go up.
- (iii) If a factor of production has close substitutes, then its demand will not rise even if the demand for final product in which it is used increase. The reason is that the employers of factors of production would prefer to engage a substitute which is available in the market at an attractive price.

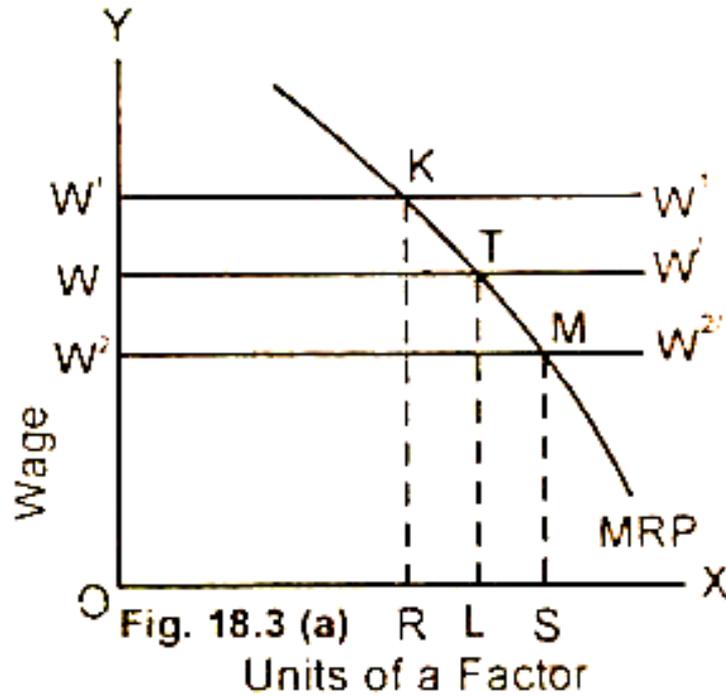
### 3.4.2 Elasticity of Demand for Factors

By elasticity of demand for factors is refers to the degree of responsiveness of demand for the various factors to changes in their prices. The main propositions on which the elasticity of demand for the factors of production depends are as follows:

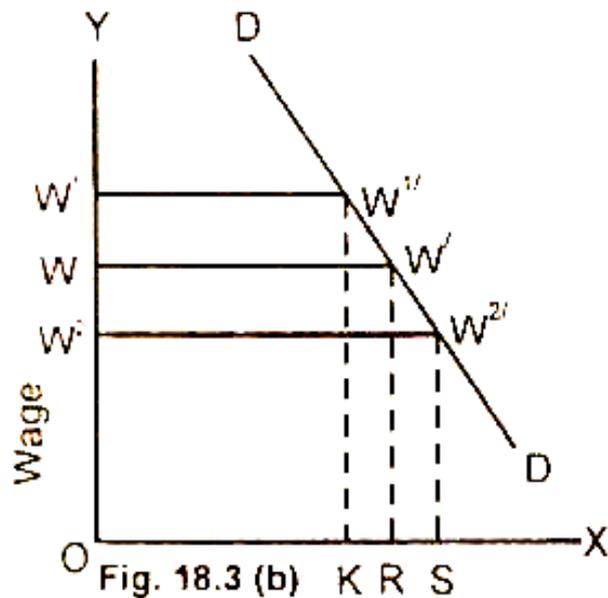
- (i) If the price of a factor of production forms a very small proportion in the total costs of a product, then its demand will be inelastic. If cost forms a greater proportion of the total cost, then its demand will be elastic.
- (ii) The demand for a factor of production also depends upon the elasticity of demand for a commodity in which it is used. If the demand for a commodity is fairly elastic, then the demand for factors which go to make the product will also be elastic and vice versa.
- (iii) If a factor of production is easily substitutable in the market, then its demand will be fairly elastic. In case, it is indispensable, the demand will be inelastic.

### 3.5 Market Demand Curve for a Factor of Production

We have stated earlier that the demand curve for a factor is the marginal revenue productivity curve of a firm. If we add up laterally individual demand curves of all the firms, we get market demand curve for a factor. This is illustrated below.



In the diagram above, when the wage is  $OW^1$  the firm is in equilibrium at point K and the demand for the factor is OR. When wage is  $OW^2$ , the firm is in equilibrium at point M. The firm engages OS units of a factor. If we sum up laterally the individual demand curves of all the firms, we get  $DD'$  market demand curve for a factor.



It is clear from this Fig. 18.3 (b) that with the fall in wages, the demand for a factor increases and vice versa. For instance, at  $OW^1$ , market is OK units (in thousands) of factor are demanded. When wage falls to  $OW$ , the demand for factor increases from OK to OR. With further fall in wage to  $OW^2$ , the market demand for factor increase from OR to OS. The market demand curve for a factory is a negatively sloped curve

indicating inverse relationship between price of a factor and its quantity demanded.

### **SELF-ASSESSMENT EXERCISE**

Evaluate the concept of marginal productivity theory in light of inherent deficiencies.

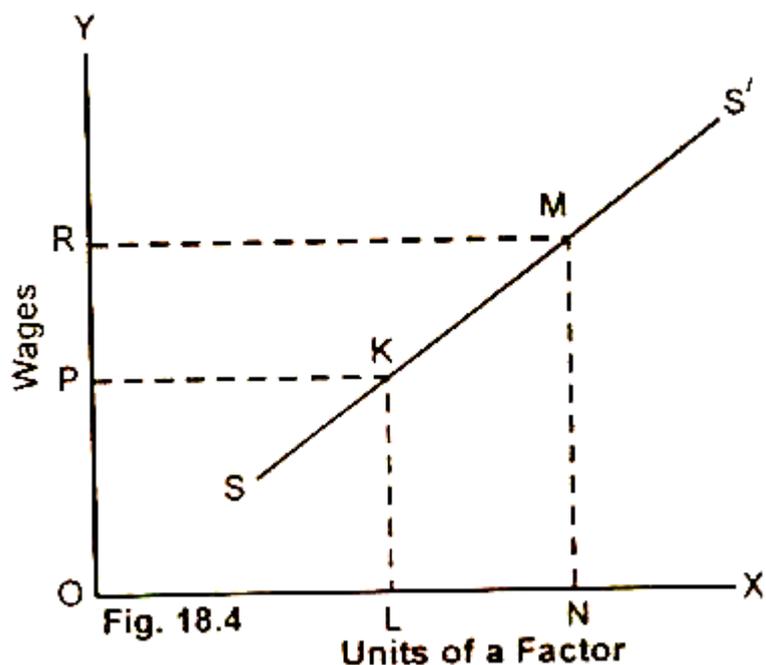
### **3.6 Supply of a Factor of Production**

The supply of a factor of production can be defined as a schedule of the various quantities of a factor of production that would be offered for sale at all possible prices at any one instant of time.

We have stated earlier that the demand for various factors of production is a derived demand. Just as the supply and stock of a commodity can be different, similarly, the supply and stock of a factor of production can also vary. If the supply price of a factor is high, other things remaining the same, the larger will be the units of factor offered for sale. If the supply price is low, less quantity of factors of production will be supplied in the factor market. The supply of a factor to an industry depends upon the transfer earnings of the various units of factor. Another characteristic of factors of production is that they do not bear direct relation between the prices of services offered by the factors of production and their cost of production.

The supply of factors of production is very complicated because each factor presents a peculiar problem of its own. Land, for instance, is fixed in quantity and its total supply cannot be increased even if its price rises. However, for a particular use, its supply can be varied. Similar is the case with labour. The total supply of labour in the country depends upon various factors, such as size of population, labour efficiency, expenses of training and education, geographical distribution, attitude towards work, etc. The total supply of labour in the country is fixed but for a particular occupation it can be increased by drawing workers from other occupations and by increasing the working hours of the labour already employed. The supply of capital is also complicated as it depends upon the power and willingness of the people to save. The marginal efficiency of capital and the rate of interest also play a very important role in the supply of capital in the country.

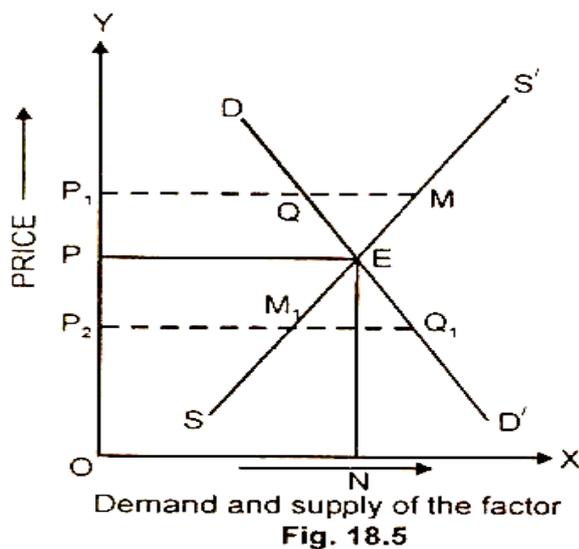
In a nutshell, we can say that the supply of a factor is also a function of price. The higher the price of a factor of production, other things remaining the same, and the greater will be its supply and vice versa. The supply curve of a factor of production is positively inclined, i.e., its slopes upward from left to right as is shown below:



In the diagram above, we measure units of a factor, say labour, along OX-axis and wage on OY-axis. If the wage is OP, OL workers are supplied. At wage OR, the supply of workers increases from OL to ON. The normal supply curve of a factor is positively sloped. It rises from left to-right upward indicating that at higher factor prices, greater quantity of factor is offered in the factor market and vice versa.

### 3.7 Equilibrium in Factor Market

In a perfect competitive market, there are large number of firms to demand the services of a factor of production and also large number of households to supply the services of a factor. In such a factor market, the price of a factor is determined by the interaction of the forces and demand and supply as is shown in the figure below.



In the diagram above,  $DD'$  is the demand curve and  $SS'$  is the supply curve of a factor, the demand and supply curves intersect at point E. The equilibrium factor price is OP. The price of a factor cannot be stable at the level higher than or lower than OP. For example, the price cannot be established at  $OP^1$  since at price  $OP^1$ , the quantity offered to supply, is greater than the quantity demand (QM). Therefore, the competition between the owners of the factor will force down the price to OP level. Similarly, the price of factor cannot be determined at the level of  $OP^2$  because at this price, the supply of a factor is less than demand by  $M^1Q^1$ . The competition among the producers demanding the factor of production will push the price to OP level. We thus find that the reward of a factor of production is determined by the interaction of the forces of demand and supply.

### **SELF-ASSESSMENT EXERCISE**

With the use of graphical illustration explain how the forces of demand and supply determine the price of factor in the factor market.

### **3.8 Problem Inherent in the Theory of Factor Pricing**

The theory of factor pricing is criticised on the ground of its weak assumptions.

- i. The theory is based on the assumption of perfect competition in both the product and factor markets. While in reality, it is the imperfect competition which prevails in both the markets.
- ii. The theory assumes that all the unit of a factor is homogenous. But in the real life, they are different from each other.
- iii. The theory assumes that different factors of production are capable of being substituted for one another. In the real world, we find that factors of production are not close substitutes of one another.
- iv. The theory ignores the increasing returns in factor pricing.

### **4.0 CONCLUSION**

Marginal productivity theory explains how factor prices are determined in markets, not how factor prices should be determined. However, marginal productivity theory has been criticised even as a positive theory. Since, product markets are not perfect, the marginal productivity theory may not always offer a realistic explanation of short-run factor pricing. However, over a long period of time, marginal productivity theory does offer a good explanation of factor prices.

## 5.0 SUMMARY

In this unit, you learnt about marginal productivity theory, which states that a factor of production is paid price equal to its marginal product. You were also taught the assumptions of marginal productivity theory such as prevalence of perfect competition in factor as well as product market, all factors are identical, perfect substitute for each other, perfectly mobile, perfect divisibility of factors and so on. You also learnt that the demand for factor is a derived demand and supply for factor is directly related to price of offer. The equilibrium in this market is determined by the forces of demand and supply. You also learnt about factors that determine both the demand and supply of factor in the factor market.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. Define marginal productivity of factor and explain its assumptions as well as its limitations.
2. Explain how the interplay of demand and supply in the factor market determine its equilibrium point.

## 7.0 REFERENCES /FURTHER READING

Jain, T.R. & Khana, O.P. (2009). *Business Economics*. New Delhi-2, India:V.K. Publications.

Jain T.R. & Khana, O.P. (2009). *Managerial Economics*. New Delhi-2, India:V.K. Publications.

## **UNIT 5 THE FACTOR MARKET UNDER PERFECT COMPETITION**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 The Factor Market under Perfect Competition
    - 3.2 The Factor Market Equilibrium under Perfect Competition of the Firm
    - 3.3 Firm's Equilibrium
    - 3.4 Factor Pricing under Imperfect Competition
    - 3.5 Factors Price Determination under Imperfect Market
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References /Further Reading

### **1.0 INTRODUCTION**

In this unit, you will learn how the factor market under perfectly competitive market and imperfect competition operate. Furthermore, the firm's equilibrium, factor pricing under imperfect competition, factors price determination under imperfect market are also examined.

### **2.0 OBJECTIVES**

At the end of the unit, you should be able to:

- describe how factor market works under perfect market
- describe how factor market works under imperfect market
- explain factors price determination under perfect market
- explain factors price determination under imperfect market.

### **3.0 MAIN CONTENT**

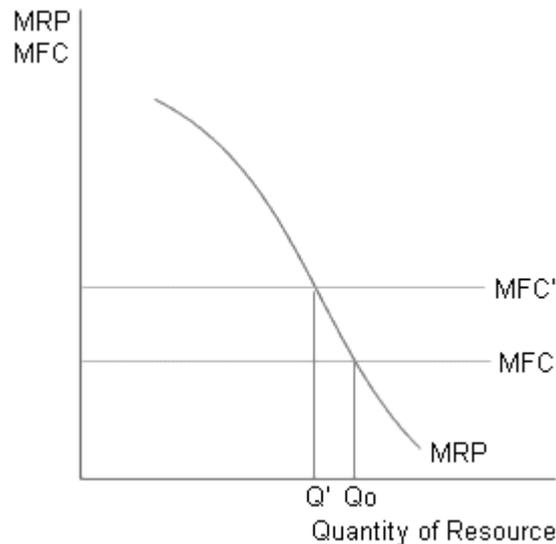
#### **3.1 The Factor Market under Perfect Competition**

In a perfectly competitive market, an individual firm cannot influence the market price of a factor by increasing or decreasing its demand. So it has to hire units of a factor at its prevailing price in the market. Same is the case with the supplier of a factor. As the supplier of a factor sells an insignificant quantity of the total supply, it is therefore not in a position to alter the market price of a factor by its own individual action. The

individual buyers and sellers of a factor take the market price of a factor as given and adjust the quantity of a factor in the light of market factor price. The buyers and sellers of a factor are therefore called price takers.

Each firm faces a perfectly elastic resource supply curve. The diagram below illustrates this relationship. The market price of the resource is determined by the interaction of market demand and supply. As you have known that each firm is a price taker in a perfectly competitive resource market, each firm faces a resource supply curve that is perfectly elastic at the equilibrium resource price.

Since each firm is a price taker in a perfectly competitive resource market, the additional cost that results from the use of an additional unit of the resource is just equal to the resource price. Thus, the marginal factor cost curve is horizontal at the market price of the resource in such a market. Two possible MFC curves are illustrated in the diagram below.



As the diagram above suggests, the optimal level of employment occurs at the level of resource use at which  $MRP = MFC$ . When the level of marginal factor costs is given by the MFC curve, the optimal level of resource use is  $Q_0$ . If MFC increases to  $MFC'$ , the optimal level of resource use will fall to  $Q'$ . A bit of reflection should convince one that at any given level of resource price ( $= MFC$ ), the MRP curve determines the quantity of the resource that is demanded by a firm. Since the MRP curve determines the quantity of resource demanded at each level of the resource price, it serves as the firm's resource demand curve.

Since a firm in a perfect competitive factor market is a price taker, so the marginal product of the factor (MP) and the average product (AP) are the same and their curves coincide. They are a horizontal straight line and parallel to the X-axis.

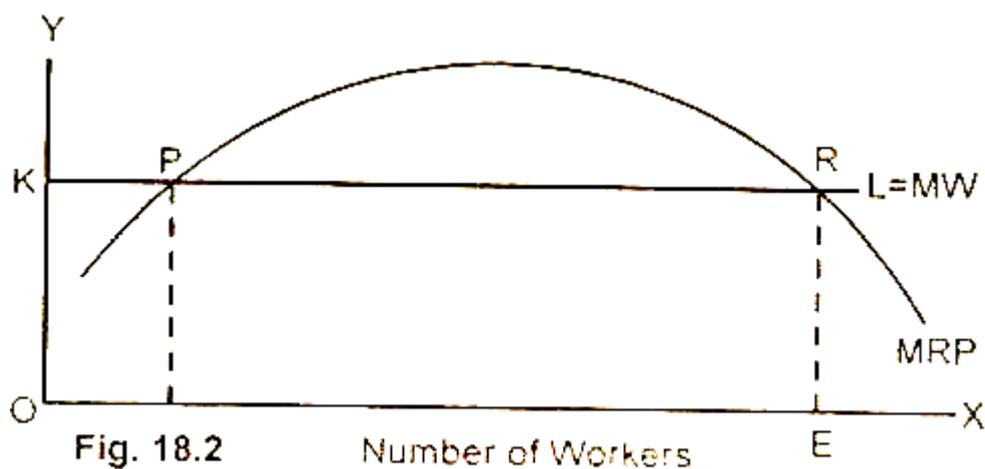
### 3.2 The Factor Market Equilibrium under Perfect Competition of the Firm

When a factor of product is to be hired by a firm, it compares the marginal revenue productivity of the factor (MRP) with that of its marginal factor cost (MFC). So long as the MRP of the factor is greater than its marginal factor cost. ( $MRP > MFC$ ), a firm will continue hiring the units of a factor (because the factor adds more to its total revenue than to its total cost). When the marginal revenue productivity of a factor is equal to the marginal cost of the factor, the firm will be in equilibrium and its profits maximised  $MRP = MFC$ .

If the output is increased by hiring additional units of the factor, then the  $MRP < MFC$ , and firm incurs loss.

### 3.3 Firm's Equilibrium

Marginal revenue productivity of labour = Marginal factor cost (labour)  
The equilibrium of the firm in the factor market is explained with the help of a diagram.



In the figure above, we assume that labour is the only variable factor in the factor market. KL straight line represents the marginal wage rate. All the firms in the factor market can hire any number of workers at the ruling wage of OK. The marginal revenue product curve of labour cuts the wage line KL at two points P and R. The firm is not in equilibrium at point P because by the employment of increasing number of workers, the marginal revenue product raises higher than the marginal factor cost (MFC) or the marginal wage OK. At point R, the marginal revenue productivity of the labour is equal to its marginal factor cost. When the firm employs OE number of workers, it is in equilibrium because at point R, marginal revenue product of the variable factor is equal to

marginal factor cost (MFC). In case a firm decides to engage more than OE workers, the marginal factor cost (marginal wage) will exceed its marginal revenue productivity. The firm will therefore not be in equilibrium.

In conclusion, we can say that a firm in the labour market is in equilibrium when:

- (i) Marginal revenue productivity of labour = Marginal cost of labour.
- (ii) Marginal revenue productivity curve of labour cuts the marginal factor cost curve (marginal wage) from above.

### 3.4 Factor Pricing under Imperfect Competition

Marginal productivity theory of factor theory applies to conditions of perfect competition; but in real life, we experience competition. We shall only discuss one form of imperfect competition called monopsony. Monopsony is a market situation in which there is only one buyer of the factors of production. It is a market situation where only a single firm provides employment to the factors. If the firm demands for more factors, it will have to offer higher factor price. In other words, factor price will go up. On the contrary, if the firm demands fewer factors, then the price will go down. As a result in this type of market, not only average factor cost curve (AFC) and marginal factor cost curve (MFC) will be separated from one another but also upward sloping.

### 3.5 Factors Price Determination under Imperfect Market

Assuming in the factor market there is only one firm to employ while there is perfect competition in the product market. As the demand of this firm for the labourer goes on increasing, marginal factor cost (MFC) and average factor cost (AFC) of these labourers will also go on increasing. Both MFC curve and AFC curve will be upward sloping and MFC curve will rise more steeply than average factor cost curve. AFC and MFC are referred here as supply curve while marginal revenue product is the demand curve for labour. In the imperfect market (monopsony), a firm will employ that number of labourers at which their marginal revenue productivity (MRP) is equal to their MFC. This is the equilibrium situation.

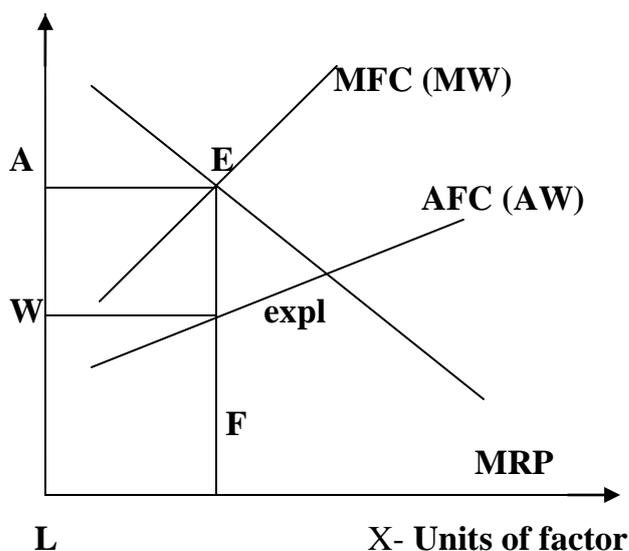
Average factor cost is the price of the factor concerned with labour. Since marginal wage or MRP is more than average wage, the labourers will be receiving a wage rate which will be less than their marginal productivity. Therefore, under monopsony, labourers will suffer exploitation. Exploitation of factor refers to a situation in which it is

employed at a price that is less than its marginal productivity. The extent of exploitation depends upon the difference between marginal wage or marginal revenue productivity and AVC.

In the graph, units of labour are shown on OX-axis and wages rate/productivity on OY-axis. Marginal factor cost curve/marginal wage and average factor cost curve/average wage represents marginal revenue productivity curve.

A monopsony firm will employ that number of labourers at which their marginal wage (MW) is equal to their marginal revenue productivity (MRP). In the graph, firm is in equilibrium at point E where  $MW = MRP$ . Consequently, firm will employ OL units of labour. Labour will be paid OW wage rate, as indicated by point F on AW curve. It is because FL is the corresponding average wage (AW) to EL marginal wage (MW). This is less than the marginal revenue productivity of labour ( $MRP = OA$ ). Monopsony firm will therefore earn AW profit per unit of labour. This profit to the firm arises on account of exploitation of labourers. Total profit would be equal to the area AWFE.

#### Y- Factor cost



## 4.0 CONCLUSION

Price of a factor of production under imperfect competition will be less than marginal revenue productivity. In imperfect factor market, firms can influence the price whereas; in the perfectly competitive market the firm has no power to influence the price factor given the assumptions earlier stated for this market. Average factor cost (AFC) and marginal factor cost (MFC) are supply curves while marginal revenue product is the demand curve for labour under monopsony (a market situation in which there is only one buyer of the factors of production). In the

perfectly competitive market, marginal revenue productivity of labour (MRP) = Marginal factor cost (labour). Finally, you learnt that exploitation of factor refers to a situation in which it is employed at a price that is less than its marginal productivity.

## **5.0 SUMMARY**

In this unit, you learnt about the operations of factor market under perfectly competitive market and under imperfect market. You also studied how the equilibrium is established in the market by the forces of demand and supply. Factor pricing in these two distinct markets were also explained.

## **6.0 TUTOR-MARKED ASSIGNMENT**

Describe exploitation in the imperfect factor market.

## **7.0 REFERENCES/FURTHER READING**

Jain, T.R. & Khana, O.P. (2009). *Business Economics*. New Delhi, India: V.K. Publications.

Jain T.R. & Khana, O.P. (2009). *Managerial Economics*. New Delhi-2, India: V.K. Publications.