

**স্কুল অব বিজনেস**

SCHOOL OF BUSINESS

বাংলাদেশ উন্মুক্ত বিশ্ববিদ্যালয়

## **MBA 2310**

### **Managerial Economics**

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# **MBA 2310**

## **Managerial Economics**

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# Contents

|                                                                                         |     |
|-----------------------------------------------------------------------------------------|-----|
| <b>Chapter-1: Introduction to Managerial Economics</b>                                  |     |
| Lesson 1: Basic Concept of Managerial Economics                                         | 3   |
| Lesson 2: Managerial Economics & Decision Sciences                                      | 9   |
| <b>Chapter-2: Market Demand and Supply</b>                                              |     |
| Lesson 1: Theory of Demand                                                              | 15  |
| Lesson 2: Theory of Supply                                                              | 28  |
| Lesson-3: Price Determination: Equilibrium of Demand and Supply                         | 37  |
| <b>Chapter-3: Consumer Behaviour</b>                                                    |     |
| Lesson 1: Introduction                                                                  | 45  |
| Lesson 2: Cardinal Utility Approach                                                     | 48  |
| Lesson 3: Ordinal Utility Theory - Indifference Curve                                   | 57  |
| <b>Chapter-4: Elasticities of Demand and Supply</b>                                     |     |
| Lesson 1: Elasticity of Demand                                                          | 67  |
| Lesson 2: Elasticity of Supply                                                          | 80  |
| <b>Chapter-5: Production, Cost and Supply</b>                                           |     |
| Lesson 1: Concepts Related to Production                                                | 85  |
| Lesson 2: Short-Run and Long-Run Cost Curves                                            | 92  |
| <b>Chapter-6: Market Structure – Perfect Competition</b>                                |     |
| Lesson 1: Characteristics of Perfect Competition, AR & MR Curves in Perfect Competition | 101 |
| Lesson-2: Equilibrium of a Competitive Firm                                             | 106 |
| <b>Chapter-7: Market Structure – Imperfect Competition</b>                              |     |
| Lesson 1: Monopoly Market                                                               | 117 |
| Lesson 2: Monopolistic Competition                                                      | 125 |
| Lesson 3: Oligopoly                                                                     | 130 |
| <b>Chapter-8: National Income and Macroeconomic Indicators</b>                          |     |
| Lesson 1: Measurement of Economic Activity: The Concept of GDP                          | 141 |
| Lesson 2: Inflation and Related National Income Measures                                | 145 |
| Lesson 3: Three Approaches to GDP Measurement                                           | 149 |
| Lesson 4: The AD-AS Framework, Fiscal Policy, and Monetary Policy                       | 153 |
| Lesson 5: Measures of Aggregate Income and GDP as an Index of Economic Welfare          | 159 |
| Lesson 6: Unemployment: Meaning, Measurement, Causes, and Types                         | 163 |

# Introduction to Managerial Economics



## Highlights

- ❑ Economics: Meaning and Scope
- ❑ Microeconomics and Macroeconomics
- ❑ Definition, Nature and Scope of Managerial Economics
- ❑ Economic Principles
- ❑ Economics and Other Disciplines



## **Lesson 1: Basic Concept of Managerial Economics**

### **Objectives**

After studying this lesson, you will be able to:

- explain the meaning, nature, and conceptual foundations of economics
- distinguish between microeconomics and macroeconomics
- define managerial economics and explain its scope, relevance, and practical application in business and organizational management
- discuss the main economic principles used in managerial decision-making
- explain the relationship of managerial economics with other related disciplines

### **Economics: Meaning and Conceptual Foundations**

Economics is commonly defined in two important ways. One widely accepted definition describes economics as the study of the production, distribution, and consumption of goods and services. This definition emphasizes the functional activities of economic systems: how goods and services are created, how they are transferred from producers to consumers, and how they are ultimately used. Under this perspective, economics encompasses the activities of businesses, nonprofit organizations, and governmental units, since all of these institutions are involved in producing or distributing goods and services.

A second definition views economics as the study of choice in the allocation of scarce resources. This definition shifts attention from economic activity itself to decision-making. Resources such as labor, capital, land, and entrepreneurship are limited, whereas human wants are virtually unlimited. As a result, individuals and organizations must make choices about how best to allocate these scarce resources among competing uses.

The first definition suggests that economics applies to any type of organization engaged in productive or distributive activities. The second establishes that economics lies at the heart of managerial activity, because managers are fundamentally decision-makers who allocate limited resources within organizations.

This book approaches economic concepts from the standpoint of managerial economics, a specialized branch of economics that emphasizes the choice aspect of economic activity. The objective of managerial economics is to provide managers with the terminology, analytical framework, and reasoning tools necessary to improve decision-making within organizations.

### **Microeconomics and Macroeconomics**

The study of economics is generally divided into two major conceptual approaches: microeconomics and macroeconomics. Microeconomics examines economic phenomena from the viewpoint of individual decision-making units such as households and firms. It analyzes how these units make decisions regarding consumption, production, pricing, and resource allocation. Microeconomics is essential for understanding the behavior of the smallest units within an economy.

However, the economy consists of numerous households and firms interacting with one another, and understanding the overall behavior of such a complex system cannot be achieved by analyzing individual units in isolation. This broader perspective is provided by macroeconomics, which studies economic phenomena at an aggregate level. It focuses on total output, overall consumption, inflation, unemployment, national income, and economic growth within a region or country.

Both approaches have distinct merits. Microeconomics provides insight into individual decision-making behavior, while macroeconomics offers theories and measures to understand the systematic functioning of the economy as a whole.

Since managerial economics is concerned with improving managerial decisions within firms, it primarily draws upon microeconomic analysis. Nevertheless, managers operate within a broader economic environment. Macroeconomic conditions such as interest rates, inflation, and business cycles directly influence business decisions. Therefore, managers must also be able to interpret and forecast macroeconomic indicators.

### **Meaning and Definition of Managerial Economics**

Managerial economics is a discipline that integrates economic theory with managerial practice. It seeks to bridge the gap between theoretical economic logic and practical business policy. While economic theorists may focus on abstract models, managers confront real-world problems involving uncertainty, competition, and constraints. Managerial economics connects these two domains.

The subject provides powerful tools and techniques for managerial policy-making. By combining economic theory with decision science methodologies, it assists managers in achieving optimal decisions within existing constraints. The study of managerial economics enhances analytical capability, promotes logical structuring of business problems, and offers systematic solutions to economic challenges faced by firms.

Several scholars have defined managerial economics in precise terms:

- Mansfield states that managerial economics is "concerned with the application of economic concepts and economic analysis to the problems of formulating rational managerial decisions."
- McNair and Meriam describe it as "the use of economic modes of thought to analyse business situations."
- Professor Evan J. Douglas defines it as "the application of economic principles and methodologies to the decision-making process within the firm or organisation under the conditions of uncertainty."
- Spencer and Siegelman characterize it as "the integration of economic theory with business practice for the purpose of facilitating decision-making and forward planning by management."
- Hailstones and Rothwell emphasize that managerial economics is "the application of economic theory and analysis to practice of business firms and other institutions."

Taken together, these definitions highlight that managerial economics is essentially applied economics directed toward rational and systematic managerial decision-making.

### **Why Managerial Economics is Relevant for Managers**

In modern society, individuals depend on organizations for the production and distribution of nearly all goods and services. These organizations, whether business enterprises, nonprofit institutions, or government agencies, exist specifically to provide goods, services, or both.

Executives and managers are responsible for overseeing these organizations and making decisions that determine their performance and survival. While managers may recognize that economics influences their work, some may question whether a deep understanding of economics is necessary for effective management. However, most managers readily acknowledge the importance of applied business disciplines such as marketing, operations management, finance, and business strategy. These subjects form the core of business education and managerial practice, and a careful examination of each reveals that they are grounded in economic theory and terminology.

Although it is possible to apply marketing or financial techniques without explicitly understanding their economic foundations, a thorough understanding of the underlying economic rationale provides deeper insight into why these techniques work and when they are most effective.

The relevance of managerial economics becomes even clearer in a world characterized by scarcity. Resources are limited, and organizations compete for them. Customers also possess limited purchasing power and will allocate their resources only to products and services that provide value. If another organization offers a more favorable exchange, customers will shift accordingly.

Firms must therefore create value, which is the difference between what customers receive and what they sacrifice. Managers who understand economic principles are better equipped to create and sustain competitive advantage in this environment.

### **Nature of Managerial Economics**

Managerial economics developed from the close relationship between management and economics.

#### **Management**

Management involves the guidance, leadership, and control of group efforts toward achieving common objectives. Koontz and O'Donnell define management as "the creation and maintenance of an internal environment in an enterprise where individuals working together in groups can perform efficiently and effectively towards the attainment of group goals." Management may be described as:

1. A process of coordination
2. A continuous activity
3. A purposive process directed toward objectives
4. The art of getting work accomplished through others

## **Economics and Scarcity**

Economics, in its broadest sense, concerns itself with the problem of scarcity. Scarcity arises because:

1. Human wants are virtually unlimited and insatiable.
2. Economic resources available to satisfy these wants are limited.

As a result, societies must address three fundamental questions:

1. What to produce, and how much?
2. How to produce it?
3. For whom to produce it?

Economics has developed analytical tools and concepts to allocate scarce resources among competing uses. Managerial economics applies these tools at the firm level, focusing on resource allocation within business organizations.

## **Economic Principles Relevant to Managerial Decisions**

Key economic principles that are relevant to managerial decisions are discussed in the following sub-sections.

### **Division of Labour**

Adam Smith argued that division of labour is a key cause of improving standards of living. Modern economics addresses this through two closely related concepts:

1. Returns to Scale: Returns to scale may be increasing, constant, or decreasing. Increasing returns to scale produce notable economic effects, and division of labour is widely considered one of its primary causes.
2. Virtuous Circles in Economic Growth: For Smith, a major consequence of division of labour and the resulting increase in productivity was a virtuous circle of continuing growth. Modern theories of virtuous circles incorporate more dimensions, but division of labour and increasing returns to scale remain central to them.

### **Opportunity Cost**

The principle of opportunity cost holds that anything you must give up in order to carry out a particular decision is a cost of that decision. This concept is applied repeatedly throughout modern economics in several important ways:

1. Scarcity: According to modern economics, scarcity exists wherever there is an opportunity cost, that is, wherever a meaningful choice must be made.
2. Production Possibility Frontier: The production possibility frontier is the diagrammatic representation of scarcity in production.
3. Comparative Advantage: A key principle in its own right, comparative advantage is also an application of the opportunity cost principle to trade and is essential for understanding international commerce.
4. Discounting of Investment Returns: Another important application of opportunity cost, this principle explains how to evaluate opportunities that arise at different points in time.

### **Equimarginal Principle**

This is the diagnostic principle for economic efficiency, and it has wide applications in modern economics:

1. The Fundamental Principle of Microeconomics: This principle describes the circumstances under which market outcomes are efficient.
2. The Externality Principle: This describes important circumstances in which markets are not efficient.
3. Marginal Analysis: Widely applied across all major topics in microeconomics, marginal analysis works in close conjunction with the opportunity cost principle.

### **Market Equilibrium**

The market equilibrium model brings together the definitions of supply, demand, quantity supplied and demanded, and equilibrium. Several important subsidiary principles are associated with it:

1. Elasticity and Revenue: These ideas are key to understanding how market changes transform economic outcomes across society.
2. The Entry Principle: This holds that when entry into a field of activity is free, profits beyond opportunity costs will be eliminated by increasing competition. The significance of this varies depending on whether competition is perfect or monopolistic.
3. Cobweb Adjustment: This theory explains situations in which markets experience cyclical price fluctuations rather than smooth adjustment to equilibrium, typically arising from a time lag between production decisions and market outcomes.
4. Competition versus Monopoly: This addresses why economists generally view competition favorably and monopoly unfavorably.

### **Diminishing Returns**

Perhaps the best known of the major economic principles, the principle of diminishing returns is more reliable in short-run applications than long-run ones. The long-run/short-run distinction is therefore an important subsidiary consideration. Modern economists think of diminishing returns primarily in marginal terms, making marginal analysis and the equimarginal principle closely associated with this concept.

### **Game Equilibrium**

Game theory allows strategy to be incorporated into economic analysis. As a result, several kinds of equilibria must be recognized:

1. Non-cooperative equilibrium, which includes:
  - a. Prisoners' Dilemma (dominant strategy) equilibrium
  - b. Nash (best response) equilibrium. Note that not every Nash equilibrium is a dominant strategy equilibrium; every dominant strategy equilibrium is a Nash equilibrium, but the reverse does not hold.
2. Cooperative equilibrium
3. Oligopoly

### **Measurement Principles**

Economics is multidimensional, and this creates challenges in measuring quantities such as production, incomes, and price levels. Some of these challenges can be addressed more fully than others:

1. Value Added and Double Counting: The problem of double counting has a well-established solution, which is to use value added as the basis for measurement.
2. Real Values and Index Numbers: Since production and related quantities are measured in monetary terms, corrections for inflation are necessary. Index numbers provide a workable solution, though they carry certain limitations and have attracted criticism.
3. Measurement of Inequality: Average income may be a poor representation of economic reality because income is distributed unequally. Even where a full correction is not possible, relative inequality can be approximated and tracked over time.

### **Medium of Exchange**

Money is whatever is generally acceptable as a medium of exchange. Fiduciary money is a type of currency accepted on the basis of trust that its issuer, typically a bank or government, will honor it. Because the value of this form of money rests on trust and confidence rather than on any underlying commodity, this trust-based property of money is sometimes referred to as the Fiduciary Principle. It is through this mechanism that banks can effectively create money by issuing credit that others accept as a medium of exchange.

### **Income-Expenditure Equilibrium**

Like the market equilibrium model, the income-expenditure model brings together a number of complementary subsidiary principles that together constitute the Keynesian theory of aggregate demand. Among the key subsidiary principles are:

- Coordination Failure
- The income-consumption relationship
- The Multiplier
- Unplanned inventory investment
- Fiscal Policy
- The Marginal Efficiency of Investment
- The influence of money on interest rates
- Real Money Balances
- Monetary Policy

### **Review Questions**

1. What is economics? Discuss its major definitions and their implications for understanding economic activity and decision-making.
2. What is scarcity? What are the three fundamental economic problems arising from scarcity? Explain their significance.
3. What is the difference between microeconomics and macroeconomics?
4. What is managerial economics? Why is managerial economics important for managers?
5. What are the main economic principles used in managerial decision-making?

## **Lesson 2: Managerial Economics & Decision Sciences**

### **Objectives**

After studying this lesson, you will be able to:

- explain the role of managerial economics in decision-making
- discuss the applications of managerial economics
- explain the contribution of operations research and decision theory
- describe the role of statistics in managerial economics
- explain the relationship of managerial economics with management theory and accounting

### **Relationship of Managerial Economics with Decision Sciences**

Managerial economics helps managers make various strategic decisions. Demand analysis and forecasting assist a manager at the earliest stage in choosing which products to offer and in planning output levels. A study of demand elasticity contributes significantly to the firm's ability to set prices for its products. The theory of cost also forms an essential part of the subject. Cost estimation is necessary for managing output variations with fixed plant capacity and for evaluating new investments, whether in the same line of production or in a different venture.

The firm's goal is profit, and achieving optimal or near-maximum profits depends on sound pricing decisions. Theories of price determination under various market conditions enable the firm to address price-setting problems. Control of costs, appropriate pricing policies, break-even point analysis, and alternative profit strategies are among the important techniques used in profit planning for firms that operate under conditions of uncertainty. Managerial economics thus seeks to identify which course of action is likely to be best for the firm under a given set of conditions.

### **Economics and Other Disciplines**

Managerial economics does not function in isolation. It draws heavily from several quantitative and behavioral disciplines that strengthen managerial decision-making. These related fields provide analytical techniques, empirical tools, and structured approaches that complement economic reasoning. The most important among them are Operations Research, Decision Theory, Statistics, and Management Theory and Accounting.

#### **1. Operations Research**

Operations Research is a scientific approach to decision-making that uses mathematical models, optimization techniques, and quantitative analysis to solve complex business problems. It is closely linked with managerial economics because both disciplines are concerned with the efficient allocation of scarce resources.

While managerial economics provides the theoretical foundation, including cost minimization, profit maximization, and marginal analysis, Operations Research offers precise computational tools to achieve these objectives. Key applications include:

- a. **Production Scheduling:** Determining the optimal sequence of production activities to minimize costs and meet delivery deadlines.

- b. Transportation and Distribution Models: Minimizing transportation costs while ensuring efficient delivery of goods.
- c. Linear Programming: Identifying the optimal product mix that maximizes profit subject to resource constraints.
- d. Inventory Control Models: Determining optimal order quantities to minimize total inventory costs.
- e. Queuing Theory: Analyzing waiting-line problems to balance service efficiency and cost.

Operations Research translates economic objectives into practical, solvable mathematical models that improve operational efficiency.

## **2. Decision Theory**

Decision Theory focuses on systematic methods of making choices under conditions of risk and uncertainty. In real-world management, decisions rarely occur in an environment of complete certainty. Managers must often act without knowing future market conditions, competitor reactions, or changes in consumer demand.

Traditional economic theory often assumes a single objective such as profit maximization. Decision Theory, however, recognizes that organizations may pursue multiple objectives, including growth, market share, social responsibility, or long-term stability. It contributes to managerial economics by:

- a. Providing frameworks for decision-making under risk, where probabilities are known.
- b. Offering strategies for decision-making under uncertainty, where probabilities are unknown.
- c. Introducing concepts such as expected value, payoff matrices, decision trees, and utility analysis.
- d. Addressing behavioral factors that influence decision-making.

Decision Theory expands the economic framework by incorporating the complexity of real-world managerial environments where information is imperfect and goals may conflict.

## **3. Statistics**

Statistics plays a crucial role in managerial economics by enabling empirical validation of economic theories. While economic theory provides logical models, statistical methods allow managers to test these models using real-world data. Managerial decisions require accurate information regarding demand, cost, revenue, production, and market conditions. Statistical tools assist in:

- a. Demand Estimation: Measuring relationships between price, income, and quantity demanded.
- b. Cost Function Estimation: Determining how production costs vary with output.
- c. Forecasting: Predicting future sales, market trends, or economic indicators using time-series analysis.
- d. Regression Analysis: Identifying relationships between dependent and independent variables.

- e. Probability Analysis: Assessing risks and uncertainties.

In modern business environments, data-driven decision-making has become essential. Managerial economics relies heavily on statistical techniques to ensure that decisions are grounded in empirical evidence rather than intuition alone.

#### **4. Management Theory and Accounting**

Managerial economics is deeply connected with management theory and accounting practices. In traditional microeconomic theory, firms are assumed to maximize profits. However, modern organizational theory suggests that firms may aim for "satisficing," a concept developed by Herbert Simon as part of his theory of bounded rationality. Rather than pursuing maximum outcomes, satisficing firms seek results that are satisfactory or good enough, given the limitations of information, cognitive capacity, and multiple competing objectives.

Management theory contributes insights into organizational behavior, leadership, motivation, and strategic planning. It recognizes that economic decisions are influenced by institutional structures and human factors. Accounting provides the financial language of business. Accounting data such as cost statements, balance sheets, and income statements form the basis for economic analysis within firms. The integration of these fields occurs in several ways:

- a. Cost Control: Economic cost analysis complements accounting cost data.
- b. Profit Planning: Break-even analysis links accounting information with economic reasoning.
- c. Capital Budgeting: Investment appraisal methods combine financial metrics with opportunity cost principles.
- d. Performance Measurement: Accounting reports provide data for evaluating managerial efficiency.

The close relationship between these fields has contributed to the development of managerial accounting, which specifically supports internal decision-making processes.

Together, these disciplines enhance the scope and effectiveness of managerial economics. By combining economic reasoning with quantitative methods, behavioral insights, and financial data, managerial economics becomes a comprehensive framework for rational, informed, and strategic managerial action in a complex and uncertain business environment.

#### ***Review Questions***

1. How does managerial economics help in business decision-making under risk and uncertainty?
2. What is the relationship of managerial economics with disciplines like Statistics, Operations Research, and Accounting?



## Market Demand and Supply

# 2

### Highlights

- ❑ Law of Demand
- ❑ Individual Demand Curve
- ❑ Market Demand Curve
- ❑ Law of Supply
- ❑ Individual Supply Curve
- ❑ Market Supply
- ❑ Market Equilibrium and Disequilibrium



## Lesson-1: Theory of Demand

### Objectives

After studying this lesson, you will be able to:

- Define opportunity cost, money price and relative price;
- Define the concept of demand;
- Explain the main influences on demand;
- Explain law of demand;
- Draw demand curve from demand schedule; and
- Describe the relation between individual and market demand.

### Opportunity Cost and Price

We know that the resources are limited compared to our wants. Since our wants are unlimited, we cannot satisfy all of our wants due to resource constraint. So we have to make choices. And in making choices, we are confronted by opportunity costs. The opportunity cost of an action is the best alternative forgone. If the opportunity cost of a good or service increases, people look for less costly substitutes – which is called the principle of substitution – and decrease their purchases of the more costly item.

The number of notes and coins that must be given up in exchange for a commodity is called its money price. For example, if Tk. 5.00 is to be paid for getting a cup of tea, then Tk. 5.00 is the money price of a cup of tea. Similarly, if Tk. 1.00 is to be paid for having a banana then Tk. 1.00 is the money price of a banana. Now think, if you have Tk. 5.00 in your pocket, how can you spend this money? You can buy a cup of tea or 5 pieces of banana. If you buy a cup of tea, then you have to forgo 5 pieces of banana. Here, the opportunity cost of a cup of tea is five pieces of banana. To calculate the opportunity cost of a cup of tea we can use the following

$$\text{Opportunity cost of a cup of tea} = \frac{\text{Money price of a cup of tea } (P_t)}{\text{Money price of a banana } (P_b)} = \frac{P_t}{P_b}$$

formula:

The ratio mentioned above (i.e.,  $P_t/P_b$ ) is called relative price. So, a relative price is an opportunity cost. In the above example, we have seen that the relative price or the opportunity cost of a cup of tea is expressed in terms of the pieces of banana. However, this is not the normal way to express the relative price. The normal way of expressing a relative price is in terms of a *basket* of all goods and services rather than in terms of one particular good or service. That is, we divide the money price of a good by money price of a *basket* of all goods that must be given up to buy it (called a *price index*):

$$\text{Opportunity cost of a cup of tea} = \frac{\text{Money price of a cup of tea } (P_t)}{\text{Money price of all other goods } (P_{\text{others}})} = \frac{P_t}{P_{\text{others}}}$$

Therefore, the resulting relative price tells us the opportunity cost of an item in terms of how much of the *basket* of all goods must be given up to buy it.

Throughout this book, we will mean *price* as *relative price*.

### **Wants**

Wants are the unlimited desires or wishes that people have for goods and services. Every people wants to get more and more of goods and services. A person who has a bicycle likes to get a motorcycle. When he/she gets a motorcycle, she/he wants to have a private car and so on. Wants are always unlimited. In these circumstances, a question arises: can people meet all of their wants? The answer is NO. Why? Because, resources are limited.

### **Need**

Need for a commodity refers to the necessity of the commodity to sustain life. For example, if you tell your friend that you need three tickets for watching a movie if the price is Tk. 30.00 per ticket, it would be easy for your friend to disagree with your statement. She/he could argue that you did not need any movie tickets because watching movie was not necessary to sustain life. But if you say that you want three movie tickets, then it's all right - it cannot be disputed. You can rightly say that you need a glass of water to quench your thirst. In this lesson, we are concerned with *wants*, not *needs* because demand reflects only *wants*.

### **Demand**

You have seen earlier that all of our wants cannot be satisfied due to the limited availability of resources. Only a few number of wants are affordable. Demand reflects the decision about which wants are to satisfy. That is, the affordable wants are considered as demand. So we will say the consumer has demand for commodity X if (if and only if) the following things are true:

- The consumer has want for commodity X, i.e., commodity X has the ability to meet the desire of the consumer.
- The consumer is willing to have it.
- The consumer has sufficient purchasing power to buy the commodity.

### **Quantity Demanded**

The quantity demanded of a good or service is the amount that people are willing and able to purchase at each price in a series of possible prices during a specified period of time. Three important things are to be noticed when someone thinks about *quantity demanded*:

- Quantity demanded is a desired quantity - not necessarily the same amount as the people actually bought. Quantity demanded may be a different amount than people actually succeed in purchasing. If sufficient quantities are not available, the amount people wish to purchase may exceed the amount they actually do purchase. To avoid confusion, we could use quantity demanded to refer to desired purchase and quantity exchanged to refer to actual purchase.
- The word "Desired" does not refer to idle dreams or future possibilities but to effective demands - that is, to the amounts people are willing to buy given the price they must pay for the commodity. For persons willing to spend Tk. 500 this year on a commodity whose price is Tk.

100 per unit, the quantity demanded is 5 units even though they would prefer to consume much more if only they did not have to pay for it.

- Quantity demanded refers to a continuous flow of purchase. It must, therefore, be expressed as so much per period of time: 1 thousand bananas per day, 7 thousand per week, or 100 thousand per year. If you were told, for example, that the quantity of computers demanded (at current prices) in Bangladesh was 50,000, this would mean nothing. Because you were not told the period of time involved.

### **Demand versus Quantity Demanded**

Demand refers to the relationship between price and quantity. When we think about the whole demand curve (shown in figure 2.1), we think of demand - the relationship between price and quantity - for the commodity. However, quantity demanded refers to a particular quantity or point on the demand curve. Thus, when we think of a particular quantity, we can avoid confusion by calling it *quantity demanded* rather than *demand*.

### **Determinants of Quantity Demanded**

The amount of any particular commodity or service that consumers plan to buy depends on many factors. The main ones are:

**The commodity's own price:** The amount of a commodity the people will be willing to buy depends mainly on the commodity's own price. If price of the commodity is low, people desire to buy more; if price is high, then people wish to buy less.

**The prices of related goods:** The quantity of a commodity that a consumer plans to buy depends in part on the prices of related goods and services that fall into two categories: substitutes and complements.

A **substitute** is a good that can be used in place of another good. For example, rice substitutes for wheat, sugar substitutes for saccharin, beef substitutes for chicken, mustard oil substitutes for soabain oil, etc. More similarly, burger has many substitutes - hotdog, pizza, sandwich, etc. If the price of one of the substitutes increases, people economize its use and buy more burger. For example, if the price of hotdog rises, more burgers are bought - the demand for burger increases.

A **complement** is a good that is used in conjunction with another good. Some examples of complements are burger and French fries, snacks and drinks, noodles and sauce, running shoes and jogging pants, cements and sand, etc. If the price of french fries increases, people will buy fewer burgers. If the price of cement increases, people will buy less sand. Thus if the price of the complement increases, the demand for a commodity decreases.

**Income:** Other things remaining the same, when income increases, consumers buy more of most of the goods, and when income decreases, they buy less of most of the goods.

**Tastes:** Tastes are an individual's attitudes towards goods and services. For example, a pop music fanatic has a much greater taste for tapes than does a tune-deaf workaholic. As a consequence, even if they have the same incomes, their demand for tapes will be very different.

**Population:** If the population of the country increases, the quantity demanded of a good increases even though the price of the commodity remains unchanged.

**Other unrelated goods:** If price of a good decreases, you will get more money to spend on books or any other goods or services. On the other hand, if other unrelated goods are not available, then you will have more money to spend on the commodity.

**Expectations :** Expectations have influence on consumer decisions. If someone expects that the price of Sony TV will be decreased within the next few days, she/he will be reluctant to buy a TV set at the moment. If you think that you are going to get a personal computer with more facilities and same price after a few days, would you decide to buy a computer at this moment? Certainly not.

Therefore, due to the expectations about future price, quality, etc. of a product, the demand for the product varies.

Now, think yourself. What is the most important determinant of quantity demanded? Certainly, *own price* of the commodity. Let's know about the relationship between price and demand.

### **Relationship between Price and Quantity Demanded: The Law of Demand**

You have learnt about the determinants of quantity demanded in the above section. Now, if we like to see the influences on the quantity demanded of the commodity's own price, how do we do that? The basic hypothesis is that we have to assume all the determining variables other than commodity's own price are constant.

A basic economic hypothesis about the relationship between price and quantity demanded is:

"Other things remaining the same, the higher the price of a commodity, the smaller the quantity demanded and the lower the price of a commodity, the higher the quantity demanded." Economists call this relationship the ***Law of demand***. Here, *other things* indicate the determining factors of quantity demanded other than commodity's own price (see in the table below).

| Determining factors of quantity demanded                                                                                                           |              |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| Commodity's own price                                                                                                                              |              |
| Prices of related goods<br>Average income of the consumers<br>Tastes<br>Prices of unrelated goods<br>Expectations about future price<br>Population | Other things |

### **On What Basis Does the Price-Demand Relationship (or the Law of Demand) Rest?**

There are several levels of analysis on which to argue the case:

**First**, our common sense says that people ordinarily do buy more of a product at a low price than they do at a high price. A high price discourages

consumers from buying, and a low price encourages them to buy. Businesses, for example, Bata, Arong, etc. declare "Sale" sometimes in the year. At that time the products are sold at low prices. Lots of people gather in the sales centers. Within a short period their inventories are exhausted. This is a concrete evidence which makes our belief in the law of demand consistent.

**Second**, after a given period of time each buyer of a product will get less satisfaction or utility from each successive unit of a product. The second piece of "biscuit" will yield less satisfaction to the consumer than the first one and the third will still add less satisfaction or utility than the second. As consumption is subject to diminishing marginal utility - consuming successive units of a particular product yields less and less additional satisfaction, consumers will agree to buy additional units of the product if its price is reduced.

**Third**, the law of demand also can be explained in terms of income and substitution effects. The *substitution effect* indicates that at a lower price of a good, other things remaining the same, the consumers get the incentive to substitute the cheaper good for goods relatively expensive. Consumers tend to substitute cheap products for dear products.

The *income effect* suggests that, at a lower price, other things remaining the same, a consumer can afford more of the good without giving up other goods. In other words, a decline in the price of a product will increase the purchasing power of the consumer enabling her/him to buy more of the product than before. A higher price will have the higher opposite effect. For example, a decline in the price of beef will increase the purchasing power of consumer enabling her/him to buy more beef (the income effect). At a lower price, beef is more attractive and is substituted for mutton, chicken, and fish (the substitution effect). The income and substitution effects combine to make consumers able and willing to buy more of a product at a lower price than at a higher price.

### **How Can the Relationship between Quantity Demanded and Price be Portrayed?**

Two methods are usually used to do that:

#### ***First Method: Demand schedule***

This is a numerical tabulation showing the quantity that is demanded at selected prices. Table 2.1 shows a hypothetical demand schedule for biscuits. It lists the quantity of biscuits that would be demanded at various prices on the assumption that average households income is fixed at Tk. 1000.00, and other factors like tastes, expectations, prices of other related goods, etc. do not change. The table gives the quantities demanded for five selected prices, but actually there is a separate quantity that would be demanded at each possible price.

**Table 2.1: Demand schedule for biscuits (hypothetical data)**

|   | Price per Kg (Tk.)<br>$P_t$ | Quantity demanded<br>(Kg per week)<br>$Q_t$ |
|---|-----------------------------|---------------------------------------------|
| A | 10                          | 100                                         |
| B | 15                          | 80                                          |
| C | 20                          | 60                                          |
| D | 30                          | 40                                          |
| E | 60                          | 20                                          |

In Table 2.1. we see that as the price of biscuit increases, the quantity demanded for biscuits decreases. That is, there is an inverse relationship between the quantity demanded for biscuit and its own price.

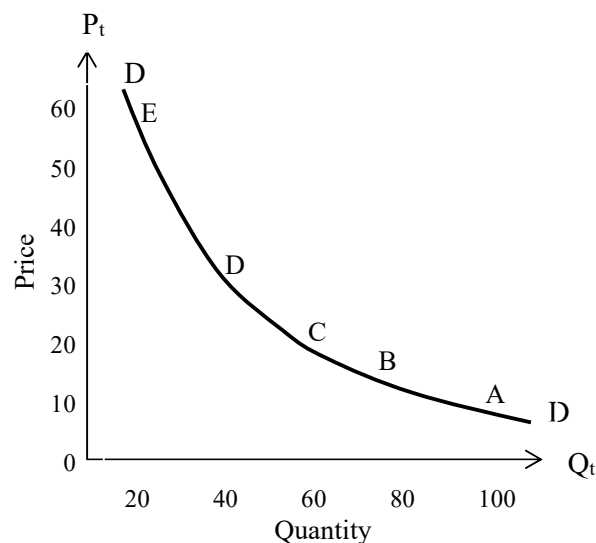
***Second method: Demand curve or willingness and ability to pay curve***

The relationship between quantity demanded and price can be shown by drawing a graph. If we plot the information given in Table 2.1 in a graph, we get demand curve. Figure 2.1 shows a demand curve which represents the points corresponding to price-quantity pairs of Table 2.1.

In Figure 2.1, DD is the demand curve for biscuit. Each point on the DD curve refers to the quantity demanded for biscuit at a particular price. We see that as price of biscuit rises the quantity demanded for biscuit decreases along the DD curve.

**Properties of a Demand Curve**

- Demand Curve shows the relationship between quantity demanded of a

**Figure 2.1: Demand Curve for Biscuit**

good and its own price assuming that other things remain the same.

- Normally, demand curves are downward sloping i.e. the relationship between quantity demanded and price is inverse. The law of demand -

people buy more at a low price than at a high price - is reflected in the downward slope of the demand curve.

- The term *demand* refers to the entire relationship between price and quantity. However, a single point on a demand curve refers to the quantity demanded at a particular price. For example, at point C in Figure 2.1, we see that 60 Kg. of biscuits is demanded at a price of Tk. 20.00 per Kg.
- The *slope* of the demand curve changes if the pattern of the relationship between price and quantity demanded changes.
- The *position* of a demand curve changes if the ceteris paribus assumption is violated, i.e., if *other things* such as tastes, income, price of related goods, expectation, etc. change.

### What is the Advantage of Graphing the Demand Schedule?

We see both Table 2.1 and Figure 2.1 contain exactly the same data and reflect the same relationship between price and quantity demanded. However, an added advantage lies with graphing that we can represent clearly a given relationship - in this case the law of demand - more simply than if we relied on tabular or verbal presentation. A single curve on a graph, if understood, is simpler to state and manipulate than tables and lengthy verbal descriptions. Especially, in economic analysis, graphs are invaluable tools. They permit clear expression and handling of complex relationships.

### Change in the Quantity Demanded Vs. Change in Demand

From the above discussion, you have learnt that *quantity demanded* refers to a particular point on a demand curve, whereas *demand* refers to the entire relationship between price and quantity as shown by the whole demand curve. Therefore, if the own price of a commodity changes (i.e., rises/falls), the quantity demanded of that commodity changes along the demand curve; the position of the demand curve does not change. This is called the *movement along the demand curve* (see Figure 2.3). On the other hand, if factors other than price (i.e., tastes, income, population, expectation, etc.) change, the demand changes, which is reflected by the change in the location of the demand curve, i.e., the demand curve *shifts* (see Figure 2.2 below). Hence, the determinants other than the commodity's own price are called *demand shifters*. The chart below shows the reasons and consequence of the change in the quantity demanded and the change in demand for a commodity:

**Chart 2.1: Consequences of the changes in the determinants of quantity demanded**

| Possible causes     |      | Consequences                |                  |                                                      |
|---------------------|------|-----------------------------|------------------|------------------------------------------------------|
|                     |      | Change in quantity demanded | Change in demand | What happens with the demand curve?                  |
| Own price           | Rise | Decreases                   |                  | upward/leftward movement along the demand curve      |
|                     | fall | Increases                   |                  | A downward/rightward movement along the demand curve |
| Price of substitute | Rise |                             | Increase         | Outward shift of the demand curve                    |
|                     | fall |                             | decrease         | Inward shift of the demand curve                     |

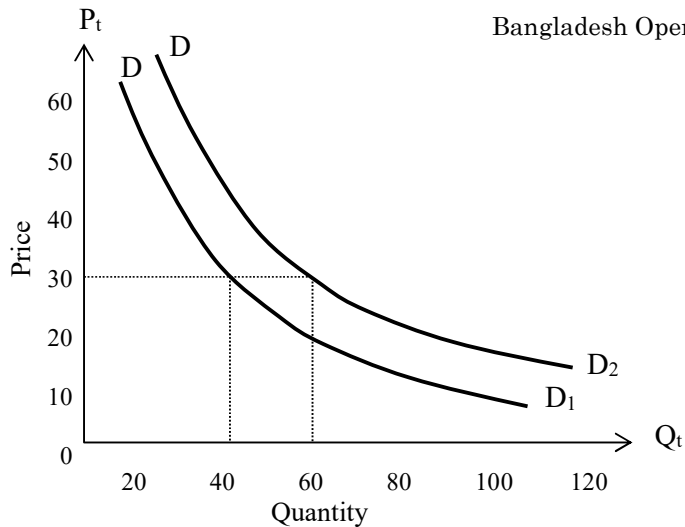
|                                |          |  |          |                                   |
|--------------------------------|----------|--|----------|-----------------------------------|
| Price of complement            | Rise     |  | Decrease | Inward shift of the demand curve  |
|                                | fall     |  | Increase | Outward shift of the demand curve |
| Income                         | Increase |  | Increase | Outward shift of the demand curve |
|                                | decrease |  | decrease | Inward shift of the demand curve  |
| Population                     | Increase |  | Increase | Outward shift of the demand curve |
|                                | decrease |  | decrease | Inward shift of the demand curve  |
| Expectation about future price | Rise     |  | Decrease | Inward shift of the demand curve  |
|                                | fall     |  | Increase | Outward shift of the demand curve |
| Taste                          | Increase |  | Increase | Outward shift of the demand curve |
|                                | decrease |  | decrease | Inward shift of the demand curve  |

Therefore, if the own price of a commodity changes, the quantity demanded changes but demand doesn't change i.e. the demand curve doesn't shift. However, if the factors other than commodity's own price change, the demand does change and the demand curve shifts. Since the demand curve shifts, at any price the quantity demanded will also be different from the previous amount. For example, if the average income of the people increases by 10%, price remaining same, the demand for biscuits will be more than before. Table 2.2 shows the change in demand.

**Table 2.2: Changes in Demand (hypothetical data)**

| Price<br>(Tk. per Kg.) | Quantity demanded<br>(Kg. per week)<br>Average household income =<br>Tk. 1,000 | Quantity demanded<br>(Kg. Per week)<br>Average household income =<br>Tk. 1,500 |
|------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| 10                     | 100                                                                            | 110                                                                            |
| 15                     | 80                                                                             | 90                                                                             |
| 20                     | 60                                                                             | 70                                                                             |
| 30                     | 40                                                                             | 50                                                                             |
| 60                     | 20                                                                             | 30                                                                             |

In Column 2 of Table 2.2, the quantity of biscuits demanded at different prices are shown (same as Table 2.1). But in Column-3, the quantity demanded for biscuits is higher than before at each price, though the prices are the same. What's the reason? Because the average income level has been increased. People are now willing to buy more of the commodity (since biscuit is a normal good) because their purchasing power is now higher than before. Graphically, the change in demand is shown by the outward shift of the demand curve, from  $DD_1$  to  $DD_2$  in Figure 2.2.

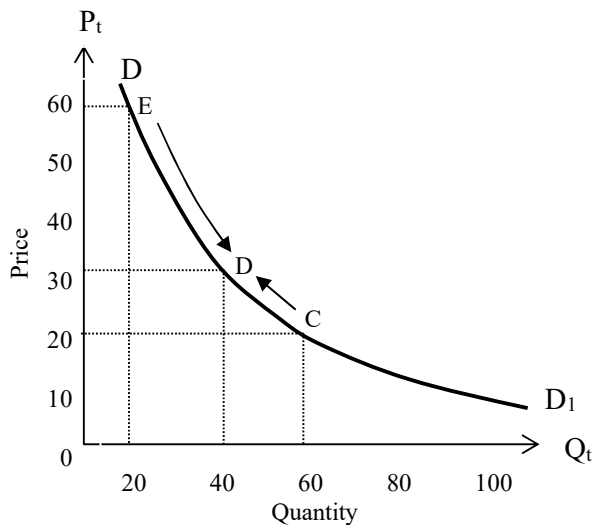


**Figure 2.2: Shift of the demand curve**

In Figure 2.1, the initial location of the demand curve was  $DD_1$ . Due to the increase in income, the demand curve has been shifted to the right, from  $DD_1$  to  $DD_2$ . Conversely, due to a decrease in average household income, the demand curve shifts to the left from the initial position. Notice that due to change in income, people now buy more amount of biscuit at the same price. At price of Tk. 30.00, people now buy 50 Kg. biscuits which is 10 Kg. higher than the initial purchase (40 Kg.).

Similarly, if any other determinant (except the commodity's own price) of demand is changed, the demand will be changed causing the demand curve to shift. For detail please see Chart 2.1.

When the own price of the commodity changes, the quantity demanded of the commodity is changed and thus a *movement along the demand curve* occurs.



**Figure 2.3: movement along the demand curve**

For example, along the demand curve  $DD_1$  in Figure 2.3, a rise in the price of biscuit produces a decrease in the quantity demanded of biscuit and fall in the price produces an increase in the quantity demanded of biscuit. The arrows on the demand curve represent the movements along the demand curve. Due to the fall in the price of biscuit from Tk. 60.00 to Tk. 30.00, the

quantity demanded has been increased by 20 Kg., from 20 Kg. to 40 Kg. This situation is shown by the movement from point E to point D along the  $DD_1$  curve. Conversely, in the case of a rise in price, the consumer moves from point C to point D. In this case, point C is assumed to be the initial point.

Therefore, when any determinant of demand other than commodity's own price changes which increases the quantity people plan to buy, then demand curve shifts rightward (from  $DD_1$  to  $DD_2$  in Figure 2.2) and demand increases. Conversely, if any determinant of demand other than its own price changes that reduces the quantity people plan to buy, the demand curve shifts leftward and demand decreases. On the other hand, if the commodity's own price changes, the quantity demanded changes and the consumer moves from one point to another point along the same demand curve.

### Exceptions to the Law of Demand

The law of demand does not apply to the following cases:

- **Expectations regarding future prices.** When consumers expect a continuous increase in the price of a durable commodity, they buy more of it despite the increase in its price. They do so with a view to avoiding the pinch of a still higher price in future. Similarly, when consumers anticipate a considerable decrease in the price in future, they postpone their purchases and wait for the price to fall to the expected level rather than buy the commodity when its price initially falls. Such decisions of the consumers are contrary to the law of demand.
- **Prestigious Goods.** The law does not apply to the commodities which serve as a status symbol, enhance social prestige or display wealth and richness, e.g., gold, precious stones, rare paintings and antiques, etc. Rich people buy such goods mainly because their prices are high.
- **Giffen Goods.** An exception to this law is also the classic case of Giffen Goods named after Robert Giffen (1837-1910). A Giffen Good does not mean any specific commodity. It may be any commodity much cheaper than its substitutes, consumed mostly by the poor households claiming a large part of their incomes. If price of such a good increases (price of its substitute remaining constant), its demand increases instead of decreasing. For instance, let us suppose that the monthly minimum consumption of foodgrains by a poor household includes 20 kg. of wheat (an inferior good) at the rate of Tk. 10 per kg. and 5 kg. of flour (a superior good) at Tk. 20.00 per kg. It spends a fixed amount of Tk. 300.00 on these items. Now, if price of wheat increases to Tk 13 per kg., the household will be forced to reduce the consumption of flour by 3 kg. and increase that of wheat by the same quantity in order to meet its minimum monthly consumption requirement within Tk. 300.00. Obviously, the household's demand for wheat increases from 20 to 23 kg. per month despite increase in its price.

### Individual and Market Demand

In the previous sections, we have discussed the things related to the individual demand curve and that time we have assumed just one consumer. Certainly, the choices by individuals are the basis of the theory of demand. But the market demand is of primary interest to managers.

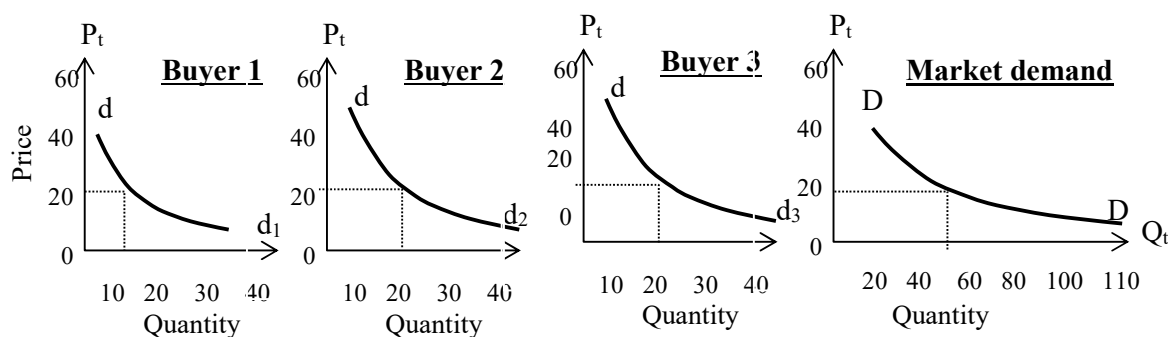
Fortunately, the transition from the individual to the market demand schedule is possible. Market demand curve can easily be derived by summing the

quantity demanded by each consumer at various prices. The aggregation process is not more difficult than simple arithmetic. If there are just three consumers in the market, it would be easy to determine the total quantities demanded (or market demand) at each price. This is shown in Table 2.4.

**Table 2.4 : Market demand for biscuit, three buyers (hypothetical data)**

| Price<br>(Tk. per Kg) | Quantity demanded             |                                |                               | Total quantity<br>Demanded/<br>Market demand<br>(Kg. per week) |
|-----------------------|-------------------------------|--------------------------------|-------------------------------|----------------------------------------------------------------|
|                       | First buyer<br>(Kg. per week) | Second buyer<br>(Kg. per week) | Third buyer<br>(Kg. per week) |                                                                |
| 10                    | 30                            | 35                             | 35                            | 110                                                            |
| 15                    | 25                            | 25                             | 25                            | 75                                                             |
| 20                    | 15                            | 20                             | 20                            | 55                                                             |
| 30                    | 10                            | 15                             | 15                            | 40                                                             |
| 40                    | 5                             | 10                             | 10                            | 25                                                             |

If we plot the data of Table 2.4 in graph, we get the market demand curve as a horizontal summation of the individual demand curves. Figure 2.4 shows this.

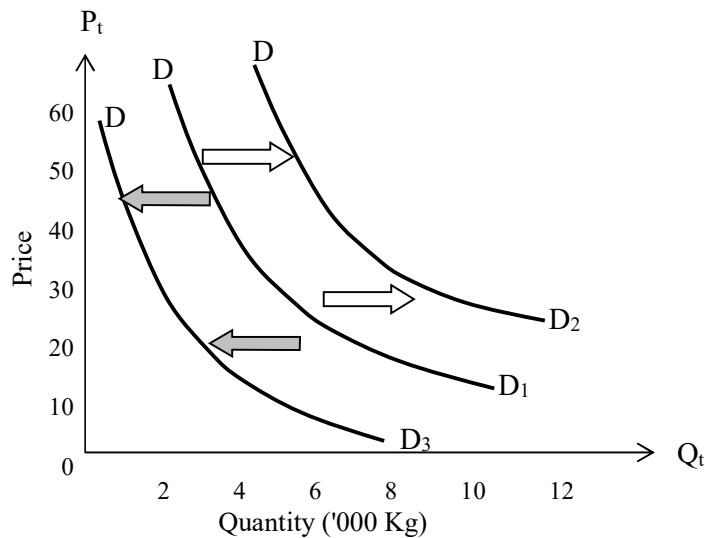


**Figure 2.4: Market demand curve derived from the individual demand curves**

In Figure 2.4, market demand curve is drawn from the individual demand curves. In the figure, we see that at price Tk. 20.00, the demand for biscuit from buyer 1, buyer 2, and buyer 3 are 15 Kg., 20 Kg., and 20 Kg. per week respectively. The market demand at this price is 55 Kg. (=15 + 20 + 20). Similarly, we can see that at each price, the market demand for biscuit is the summation of the quantity demanded by individual buyers at that price.

#### **What Happens With the Derivation of the Market Demand Curve if More Than Three Buyers are in the Market?**

Competition, of course, entails many more than three buyers in the market. So - to avoid a lengthy aggregation process - suppose there are 100 buyers of biscuit in the market, each of whom chooses to buy the same amount at each of the various prices as our original consumer does. Thus we can determine total or market demand by multiplying the quantity-demanded data of Table 2.1 by 100, as in Table 2.5. Curve  $DD_1$  in Figure 2.5 indicates this market demand curve for the 100 buyers.

**Table 2.5: Market demand for biscuits, 100 buyers (hypothetical data)**

| Price per Kg<br>(Tk.)<br>$P_t$ | Quantity demanded<br>(Kg. per week)<br>$Q_t$ | Number of buyers<br>in the market | Total quantity<br>demanded/market<br>demand<br>( '000 Kg. per week) |
|--------------------------------|----------------------------------------------|-----------------------------------|---------------------------------------------------------------------|
| 10                             | 100                                          | $\times 100$                      | $= 10$                                                              |
| 15                             | 80                                           | $\times 100$                      | $= 8$                                                               |
| 20                             | 60                                           | $\times 100$                      | $= 6$                                                               |
| 30                             | 40                                           | $\times 100$                      | $= 4$                                                               |
| 60                             | 20                                           | $\times 100$                      | $= 2$                                                               |

Points on the  $DD_1$  curve represents the price-quantity data of Table 2.5. In the figure we see that as the price of biscuit falls the market demand for biscuit increases because all the individuals are now buying more biscuits than before. Lower price induced the buyers to buy more.

Let's now know the determinants of market demand.

### Determinants of Market Demand

The basic determinants of market demand are:

- The tastes or preferences of consumers,
- The number of consumers in the market,
- The money incomes of the consumers,
- Prices of related goods, and
- Consumer expectations about future prices and incomes.

### Changes in Market Demand

If any of the determinants mentioned above is changed, the market demand for biscuit changes. As a result, the market demand curve shifts. For example, if the money income of the consumers increases, the market demand for biscuit increases and thus the market demand curve shifts rightward, from  $DD_1$  to  $DD_2$  in Figure 2.5. In the case of a decrease in consumers' money income, the market demand curve shifts leftward, from  $DD_1$  to  $DD_3$  in Figure 2.5.

### Review Questions

1. (a) What is demand? How does it differ from need, want and desire?  
(b) Distinguish between demand and quantity demanded.
2. State the law of demand and show it through a demand schedule and a demand curve. What are exceptions to the law of demand?
3. Explain demand schedule, demand curve and demand function.
4. What is implied by the downward sloping characteristic of a demand curve?
5. (a) Define an increase in demand. A decrease.  
(b) Illustrate each on a diagram.
6. (a) What factors are held constant when drawing a given demand curve?  
(b) What happens when one or more of these factors change?
7. (a) What is market demand?  
(b) What are the determinants of market demand?

## Lesson -2: Theory of Supply

### Objectives

After studying this lesson, you will be able to:

- Define the concept of supply;
- Explain the law of supply;
- Describe supply schedule;
- Draw supply curve from supply schedule;
- Describe the relationship between individual and market supply curve;
- Tell the determinants of supply; and
- Explain the difference between quantity supplied and supply.

### What is Supply?

Supply is a schedule which shows the amounts of a product a producer is willing and able to produce and make available for sale at each price in a series of possible prices during a specified period. The amount the firms are willing to sell (desired sales) may not be the same as the amount they succeed in selling. Desired sales may not be equal to the actual sales.

Since desired purchases do not have to equal desired sales, different terms (quantity demanded and quantity supplied) are needed to describe the two separate amounts. But, as the quantity actually purchased must be the same amount as the quantity actually sold, both can be described by a single term *quantity exchanged*.

### Determinants of Quantity Supplied

How much of a commodity will firms be willing to produce and offer for sale?

It depends on a number of factors. The main ones are:

**The price of the commodity:** If the price of the commodity is higher, firms will produce and sell more amount of the commodity and vice versa.

**The price of other goods produced:** The supply of a commodity is influenced by the prices of the other goods produced. For example, a piece of high land can produce either potato or wheat in winter season. So, these two commodities are substituted in production. If the price of potato increases, the supply of wheat will be lower. People will use their land more in producing potatoes. Therefore, an increase in the price of the *substitute in production* lowers the supply of the commodity. Commodities can also be complements in production. *Complements in production* arise when two things are, of necessity, produced together. For example, cattle produce beef and cowhide. An increase in the price of anyone of these by products of cattle increases the supply of the other.

**Prices of factors of production:** The prices of factors of production used to produce a commodity do influence its supply. For example, an increase in the prices of the labour and the capital equipment used to produce audio-cassettes increase the cost of producing audio-cassettes; so the supply of audio-cassettes decrease.

**The goals of the firm:** Normally, the firm is assumed to have the single goal of profit maximization. Firms might, however, have other goals either in addition to or as substitutes for profit maximization. If the firm worries about risk, it will pursue safer lines of activity even though they promise lower probable profits. If the firm values size, it may produce and sell more than the profit-maximizing quantities. If it worries about its image in society, it may avoid highly profitable activities (such as the production of opium) when there is major public disapproval. However, as long as the firm prefers more profits to less, it will respond to changes in the possibilities of alternative lines of actions. A change in the emphasis that firms give to other goals will change the willingness to supply the quantity at given price and hence, the level of profitability will be changed.

**Expected Future Price:** Assume that the price of paddy will rise just after 4 months. What will happen with the supply of paddy presently? Since paddy can be stored for couple of months and the return from selling paddy will be higher than it is in the present, producers will offer a smaller quantity of paddy for sale now. So, the current supply of paddy decreases. Here producers substitute over time. Similarly, if the price of paddy is expected to fall in the future, the return from selling it at present is high relative to what is expected. So, again producers substitute over time. They offer more paddy for sale before its price is expected to fall, so the current supply of paddy increases.

**The state of technology:** Invention of new technologies that enable the producers to produce their commodity at lower cost (use of less factors of production or cheaper factors of production), which increases their profits at any given price of the commodity, and they increase supply. For example, the invention of transistors and silicon chips has revolutionized production in television, high-fidelity equipment, computers, and guidance-control systems.

**Number of suppliers:** Other things remaining the same, the larger the number of firms supplying a commodity, the larger the supply of the commodity.

**Taxes and subsidies:** Producers treat most taxes as costs. Therefore, an increase in sales or property taxes will increase costs and reduce supply. On the other hand, subsidies are reverse of taxes. If the government subsidizes the production of a good, it in effect lowers cost and increases supply.

Let's now look at the relationship between commodity's own price and the quantity supplied.

### **The Relationship between Price and Quantity Supplied: Law of Supply**

In the previous section, you have learnt the determinants of quantity supplied. If all other factors remain constant, there exists a relationship between commodity's own price and quantity supplied. This relationship is called the *law of supply*.

The law of supply simply states:

Others things remaining the same, the higher the price of a commodity, the higher the quantity supplied and vice versa.

**Why does the higher price lead to greater quantity supplied?**

It is because of increasing opportunity cost. The opportunity cost of the commodity increases as the quantity produced increases. So, if the price of commodity is high, only then producers are willing to incur the higher opportunity cost and increase production.

**Does supply always increase with the rise in price?**

NO. For detail please see price elasticity of supply in Later Chapter.

**How can the relationship between quantity supplied and price be portrayed?**

Two methods are usually used to do that:

***First Method: Supply schedule***

This is a numerical tabulation showing the quantity that is supplied at selected prices. Table 2.6 is a hypothetical supply schedule of biscuits. It lists the quantity of biscuits that would be supplied at various prices on the assumption that all the factors influencing supply other than price do not change. The table gives the quantities supplied for five selected prices, but actually there is a separate quantity that would be supplied at each possible price.

**Table 2.6: Supply schedule of biscuits (hypothetical data)**

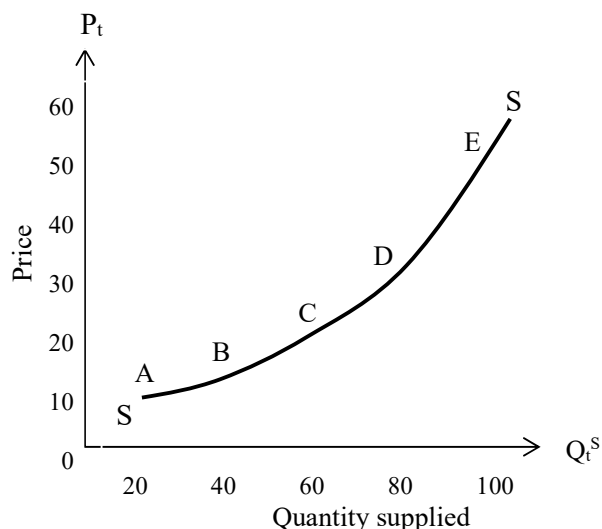
|   | Price per Kg. (Tk.) | Quantity supplied<br>(Kg. per week) |
|---|---------------------|-------------------------------------|
|   | $P_t$               | $Q_t^S$                             |
| A | 10                  | 20                                  |
| B | 15                  | 40                                  |
| C | 20                  | 60                                  |
| D | 30                  | 80                                  |
| E | 60                  | 100                                 |

In Table 2.6, we see that as the price of biscuit increases, the quantity supplied of biscuits increases. That is, there is a positive relationship between the quantity supplied of biscuits and its own price.

***Second method: Supply curve***

The relationship between quantity supplied and price can be shown by drawing a graph. If we plot the information given in Table 2.6 in a graph, we get the supply curve. Figure 2.6 shows a supply curve which represents the points corresponding to price-quantity pairs of Table 2.6.

In Figure 2.6, SS is the supply curve of biscuit. Each point on the SS curve refers to the quantity supplied of biscuit at a particular price. We see that as price of biscuit rises, the quantity supplied of biscuit increases along the SS curve.



**Figure 2.6: Supply curve of biscuit**

### Properties of a Supply Curve

- Supply curve shows the relationship between quantity supplied of a good and its own price assuming that other things remain the same.
- Normally, supply curves are upward sloping i.e. the relationship between quantity supplied and price is direct. The law of supply - producers supply more at a high price than at a low price - is reflected in the upward slope of the supply curve.
- The term *supply* refers to the entire relationship between price and quantity. However, a single point on a supply curve refers to the quantity supplied at a particular price. For example, at point C in Figure 2.6, we see that 60 Kg. of biscuits are supplied at a price of Tk. 20.00 per Kg.
- The *slope* of the supply curve changes if the pattern of the relationship between price and quantity supplied changes.
- The *position* of a supply curve changes if the *ceteris paribus* assumption is violated, i.e., if *other things* such as price of other goods produced, prices of factors of production, the goals of the firm, expected future price, the state of technology, number of suppliers, taxes and subsidies, etc. change.

### Supply versus Quantity Supplied

We have seen in the previous lesson that there is a difference between the concepts *demand* and *quantity demanded*. Similarly, to avoid confusion, we should know the difference between *supply* and *quantity supplied*.

Supply refers to the entire relationship between quantity supplied and price while a single point on the supply curve refers to the quantity supplied at that price.

### Change in the Quantity Supplied versus Change in Supply

From the above discussion, you have learnt that *quantity supplied* refers to a particular point on a supply curve whereas *supply* refers to the entire relationship between price and quantity as shown by the whole supply curve. Therefore, if the own price of a commodity changes (i.e., rises/falls), the

quantity supplied of that commodity changes along the supply curve; the position of the supply curve does not change. This is called the *movement along the supply curve* (see Figure 2.8). On the other hand, if factors other than price (i.e., price of other goods produced, prices of factors of production, the goals of the firm, expected future price, the state of technology, number of suppliers, taxes and subsidies, etc.) change, supply changes, which is reflected by the change in the location of the supply curve, i.e., the supply curve *shifts* (see Figure 2.7 below). Hence, the determinants other than the commodity's own price are called *supply shifters*. The chart below shows the reasons and consequence of the change in the quantity supplied and the change in supply of a commodity:

**Chart 2.2: Consequences of the changes in the determinants of quantity supplied**

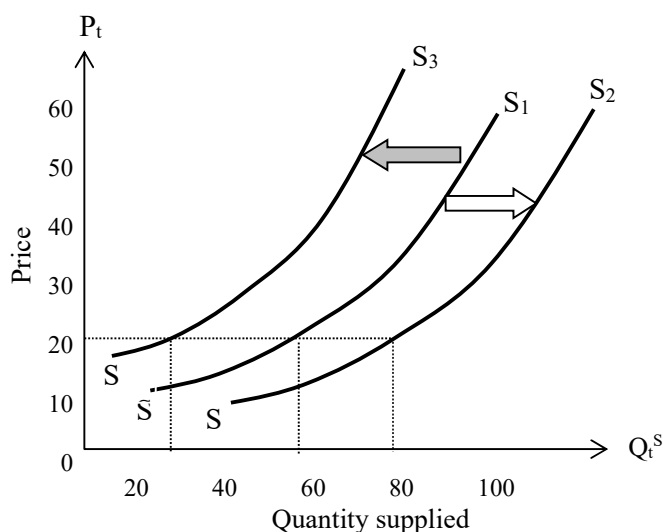
| Possible causes                   |                | Consequences                |                  |                                          |
|-----------------------------------|----------------|-----------------------------|------------------|------------------------------------------|
|                                   |                | Change in quantity supplied | Change in supply | What happens with the supply curve?      |
| Own price                         | Rise           | Increases                   |                  | Upward movement along the supply curve   |
|                                   | Fall           | Decreases                   |                  | Downward movement along the supply curve |
| Price of substitute in production | Rise           |                             | Decrease         | Leftward shift of the supply curve       |
|                                   | Fall           |                             | Increase         | Rightward shift of the supply curve      |
| Price of complement in production | Rise           |                             | Increase         | Rightward shift of the supply curve      |
|                                   | Fall           |                             | Decrease         | Leftward shift of the supply curve       |
| Price of factors of production    | Rise           |                             | Decrease         | Leftward shift of the supply curve       |
|                                   | Fall           |                             | Increase         | Rightward shift of the supply curve      |
| Expected future price             | Increase       |                             | Decrease         | Leftward shift of the supply curve       |
|                                   | Decrease       |                             | Increase         | Rightward shift of the supply curve      |
| State of technology               | New invention  |                             | Increase         | Rightward shift of the supply curve      |
|                                   | Backward trend |                             | Decrease         | Leftward shift of the supply curve       |
| Taxes                             | Rise           |                             | Decrease         | Leftward shift of the supply curve       |
|                                   | Fall           |                             | Increase         | Rightward shift of the supply curve      |
| Subsidies                         | Increase       |                             | Increase         | Rightward shift of the supply curve      |
|                                   | Decrease       |                             | Decrease         | Leftward shift of the supply curve       |
| Number of suppliers               | Increase       |                             | Increase         | Rightward shift of the demand curve      |
|                                   | Decrease       |                             | decrease         | Leftward shift of the demand curve       |

Therefore, if the own price of a commodity changes, the quantity supplied changes but supply doesn't change i.e. the supply curve doesn't shift. However, if the factors other than the commodity's own price change, then supply does change and the supply curve shifts. Since the supply curve shifts, at any price the quantity supplied will also be different from the previous amount. For example, if the government initiates a subsidy to biscuit production, price remaining the same, the quantity supplied will be more than before. Table 2.7 shows the change in supply.

**Table 2.7: Changes in supply (hypothetical data)**

| Price<br>(Tk. per Kg.) | Quantity supplied<br>(Kg. per week)<br>Without subsidy | Quantity supplied<br>(Kg. per week)<br>With subsidy of Tk.2 per Kg. |
|------------------------|--------------------------------------------------------|---------------------------------------------------------------------|
| 10                     | 20                                                     | 40                                                                  |
| 15                     | 40                                                     | 50                                                                  |
| 20                     | 60                                                     | 70                                                                  |
| 30                     | 80                                                     | 90                                                                  |
| 60                     | 100                                                    | 110                                                                 |

In Column-2 of Table 2.7, the quantity of biscuits supplied at different prices are shown (same as Table 2.6). But in Column-3, the quantity supplied of biscuits is higher than before at each price, through the prices are the same. What's the reason? As subsidy is provided with biscuit production, it lowers the cost of producing biscuit. As a result, bakers are now willing to produce more biscuits because producing biscuit is now more profitable than before.

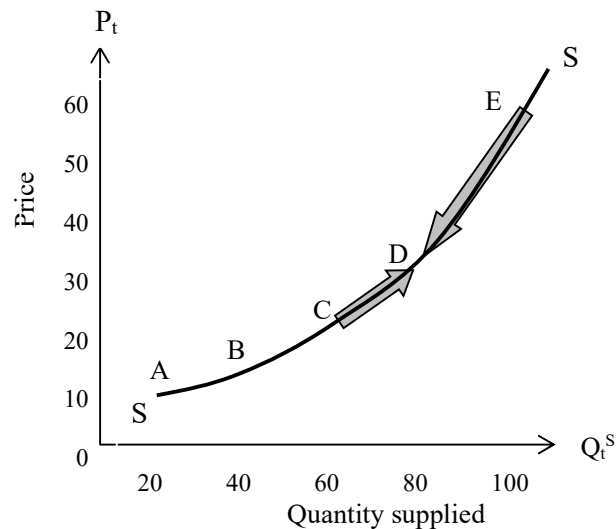
**Figure 2.7: Shift of the supply curve**

Graphically, the change in supply is shown by the rightward shift of the supply curve, from  $SS_1$  to  $SS_2$  in Figure 2.7.

In Figure 2.7, the initial location of the supply curve was  $SS_1$ . Due to the initiation of subsidy to biscuit production, the supply curve has been shifted to the right, from  $SS_1$  to  $SS_2$ . Conversely, due to the imposition of taxes, the supply curve shifts to the left from the initial position, from  $SS_1$  to  $SS_3$ . Notice that due to the initiation of subsidy, more biscuits come out in the market at the same price. At price of Tk. 20.00, bakers now supply 70 Kg. biscuit which is 10 Kg. higher than the initial supply (60 Kg.).

Similarly, if any other determinant (except the commodity's own price) of supply is changed, then supply will be changed causing the supply curve to shift. For detail please see Chart 2.2.

When the own price of the commodity changes, the quantity supplied of the commodity is changed and thus a *movement along the supply curve* occurs. For example, along the supply curve SS in Figure 2.8, a rise in the price of biscuit produces an increase in the quantity supplied of biscuit and fall in the



**Figure 2.8: Movement along the supply curve**

price produces a decrease in the quantity supplied of biscuit. The arrows on the supply curve represent the movements along the supply curve. Due to the fall in the price of biscuit from Tk. 60.00 to Tk. 30.00, the quantity supplied has been decreased by 20 Kg., from 100 Kg. to 80 Kg. This situation is shown by the movement from Point E to Point D along the SS curve. Conversely, in the case of rise in price, the producer moves from Point C to Point D. In this case, Point C is assumed to be the initial point.

Therefore, when any determinant of supply other than commodity's own price changes which increases the quantity supplied, then supply curve shifts rightward (from  $SS_1$  to  $SS_2$  in Figure 2.7) and supply increases. Conversely, if any determinant of supply other than its own price changes that reduces the quantity people plan to buy, the supply curve shifts leftward and supply decreases. On the other hand, if the commodity's own price changes, the quantity supplied changes and the consumer moves from one point to another point along the same supply curve.

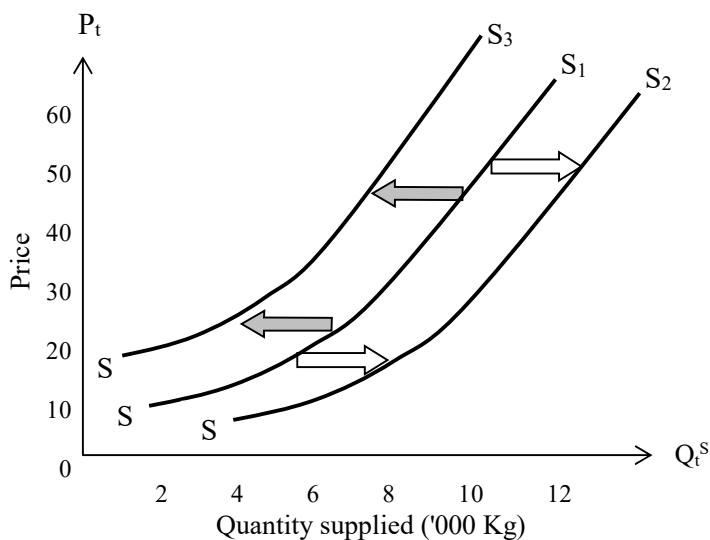
### Market Supply

By adding up the quantity each supplier is willing and able to offer at every price, we can get the market supply. In brief, the market supply is just the summary of the supply intention of all producers. Assume that there are 100 sellers in the market having the same supply schedules. So, the market supply schedule can be found as in Table 2-8.

**Table 2.8: Market supply of biscuit, 100 sellers (hypothetical data)**

| Price per Kg<br>(Tk.)<br>$P_t$ | Quantity supplied<br>(Kg per week)<br>$Q_t^S$ | Number of sellers<br>In the market | Total quantity<br>supplied/market supply<br>('000 Kg per week) |
|--------------------------------|-----------------------------------------------|------------------------------------|----------------------------------------------------------------|
| 10                             | 20                                            | $\times 100$                       | $= 2$                                                          |
| 15                             | 40                                            | $\times 100$                       | $= 4$                                                          |
| 20                             | 60                                            | $\times 100$                       | $= 6$                                                          |
| 30                             | 80                                            | $\times 100$                       | $= 8$                                                          |
| 60                             | 100                                           | $\times 100$                       | $= 10$                                                         |

In Figure 2.9,  $SS_1$  is the market supply of biscuit. As the price of biscuit

**Figure 2.9: Market supply of biscuit, 100 sellers.**

increases, the market supply of biscuit increases because all the bakers are now producing more biscuits than before. Lower price induces the buyers to buy more.

Let's now know the determinants of market supply.

### Determinants of Market Supply

The basic determinants of market supply are:

- Price of other goods produced,
- Prices of factors of production,
- The goals of the firm,
- Expected future price,
- The state of technology,
- Number of suppliers,
- Taxes and subsidies, etc.

### Changes in Market Supply

If any of the determinants mentioned above is changed, the market supply of biscuit changes. As a result, the market supply curve shifts. For example, if the subsidy to biscuit production is initiated, the market supply of biscuit increases and thus the market supply curve shifts rightward, from  $SS_1$  to  $SS_2$  in Figure 2.9. In the case of an imposition of tax on biscuit production, the market supply curve shifts leftward, from  $SS_1$  to  $SS_3$  in Figure 2.9.

### Review Questions

1.
  - (a) What is supply?
  - (b) Distinguish between supply and quantity supplied.
  - (c) What are the determinants of supply?
2.
  - (a) What is the law of supply?
  - (b) Explain the law of supply through a supply schedule and a supply curve.
  - (c) Why does a supply curve slope upward to the right?
  - (d) What factors cause a rightward shift of the supply curve?
3. Explain supply schedule, supply curve and supply function. Derive the supply curve from the supply function  $Q=30 + 5P$ .
4.
  - (a) Define an increase in supply. A decrease.
  - (b) Illustrate each on a diagram.
5.
  - (a) What factors are held constant when drawing a given supply curve?
  - (b) What happens when one or more of these factors change?
6.
  - (a) What is market supply?
  - (b) What are the determinants of market supply?

### **Lesson-3: Price Determination: Equilibrium of Demand and Supply**

#### **Objectives**

After studying this lesson, you will be able to:

- Explain the process of price determination in a market;
- Explain the concepts of equilibrium and disequilibrium in market; and
- Describe the difference among equilibrium price, demand price and supply price.

#### **Introduction**

In last two lessons, demand and supply have been considered separately. You learnt from the previous lessons how demand and supply respond to the change in price and other determinants.

Moreover, you learnt that demand schedule/curve shows the quantities people desire and are able to buy at different prices. But one question was not solved: can the consumers always buy the quantity exactly they desire at any price? The answer is 'No'. Then why do they fail to meet their desire, i.e., what makes the difference between desired and actual purchase?

Similarly, the supply schedule/curve shows the quantity of goods producers desire and able to supply at different prices. But the question arises: can the producers always sell the amount exactly they desire to sell? The answer is again 'No'. So, why do they fail to meet their desire, e.g., what makes the difference between desired and actual sale?

So, in the case of demand as well as supply, the desired quantity is not always identical to the actual quantity. The reason is: the amount of goods people want to buy at a given price, the suppliers do not want to supply exactly that amount at the same price; in other words, the amount of goods the suppliers desire to supply at a given price is not the same as the amount the consumers are interested to buy at that price.

But what is the price at which the desired and actual quantities become identical, i.e., at what price the suppliers will supply exactly the same amount of goods that the consumers desire to buy - no goods will be unsold? There will be no excess demand or excess supply in the market. In this lesson, we will discuss how and when this golden situation comes.

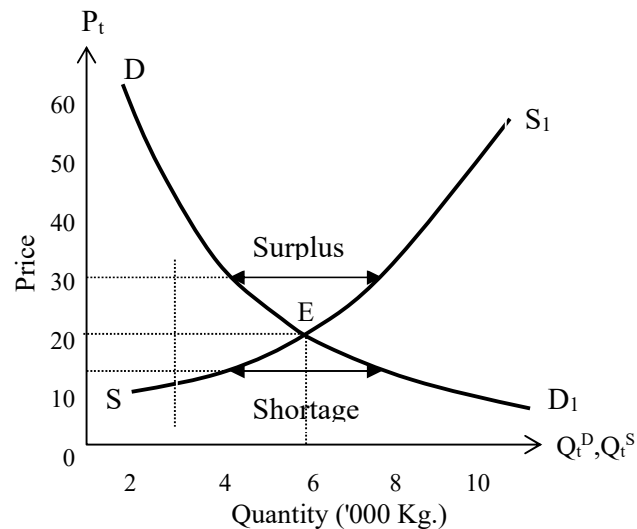
#### **Price Determination**

In a free market, where no outside forces other than commodity's own price are considered to influence supply decisions and buying decisions, adjustments in price coordinate the devices of buyers and sellers. Here price is treated as a regulator. The price of a good regulates the quantities demanded and supplied. If the price is too high, the quantity supplied exceeds the quantity demanded. If the price is too low, the quantity demanded exceeds the quantity supplied. There is one price, and only one price, at which the quantity demanded equals the quantity supplied - that price is called equilibrium price (or market price).

### What is "Equilibrium"?

*Equilibrium* is a situation in which the opposing forces are in balance. So, equilibrium in market occurs when the price is such that the opposing forces of the plans of buyers and sellers balance each other, e.g., in equilibrium situation, the price is such that the quantity demanded equals quantity supplied - there is no surplus or shortage. That's why, the equilibrium price is called the *market-clearing price*.

Now, let's see graphically, how the market-clearing price or equilibrium price is established. Figure 2.10 shows the equilibrium that occurs at the intersection of market demand and market supply curves. In the figure, Point E is the equilibrium point. The equilibrium price is Tk. 20.00 and the equilibrium quantity is 6,000 Kg. of biscuits.



**Figure 2.10: Equilibrium in market**

At point E, the market demand curve intersects market supply curve. Hence, there is no surplus or shortage at this point. At any price level other than Tk. 20.00, the market is in disequilibrium. We see that at the price of Tk. 30.00, market supply of biscuit exceeds market demand by 4,000 Kg. - there is an excess supply or surplus in the market. Similarly, at price of Tk. 10.00, market demand for biscuit exceeds market supply by 4,000 Kg. - there is an excess demand or shortage in the market. But the disequilibrium situations are not long-lived. They disappear through market mechanism. In the case of excess demand, the producers want to supply less than the buyers' desire. The tendency for buyers to offer, and sellers to ask for, higher prices creates upward pressure on price. Price rises till the equilibrium occurs again.

Similarly, in the case of excess supply in market, e.g., the producers want to supply more than the consumers' or buyers' desire, the tendency for buyers to offer, and sellers to ask for, lower prices creates a downward pressure on price. Price falls till the equilibrium occurs again. Table 2.9 below summarizes these events:

**Table 2.9: Equilibrium in the market**

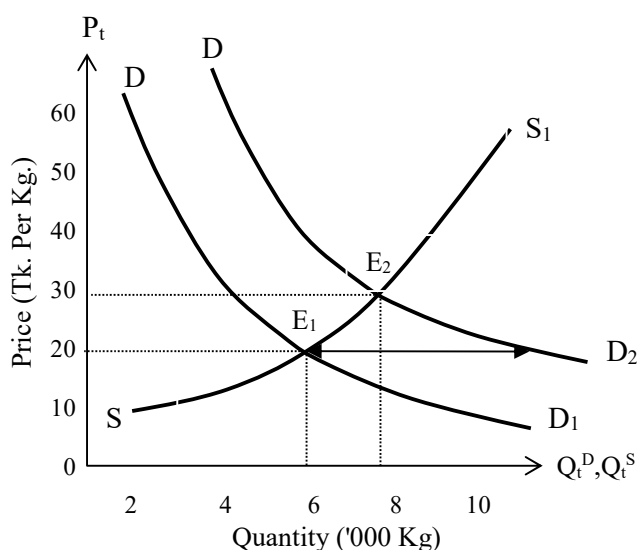
| Price<br>( Tk. per Kg.) | Quantity supplied<br>( '000 Kg. Per week)<br>$Q_t^S$ |                                                   | Quantity demanded<br>( '000 Kg. Per week)<br>$Q_t^D$ |
|-------------------------|------------------------------------------------------|---------------------------------------------------|------------------------------------------------------|
| 10                      | 2                                                    | Excess demand/market shortage ( $Q_t^S < Q_t^D$ ) | 10                                                   |
| 15                      | 4                                                    |                                                   | 8                                                    |
| <b>20</b>               | <b>6</b>                                             | <b>Equilibrium (<math>Q_t^S = Q_t^D</math>)</b>   | <b>6</b>                                             |
| 30                      | 8                                                    | Excess supply/market surplus ( $Q_t^S > Q_t^D$ )  | 4                                                    |
| 60                      | 10                                                   |                                                   | 2                                                    |

**Market Price, Demand Price and Supply Price**

The price at which demand equals supply is called *market price*. On the other hand, the price consumers are willing to pay for a specific amount of commodity is called *demand price*. Similarly, the price suppliers are willing to charge for supplying a specific amount of commodity is called *supply price*. In Figure 2.10, at the 4000<sup>th</sup> Kg. of the commodity, the demand price is Tk. 30 per Kg. and the supply price is Tk. 15 per Kg. Only at the equilibrium point, demand price equals supply price (Tk. 20 per Kg.).

**What Happens With the Equilibrium Situation When Supply or Demand Changes?**

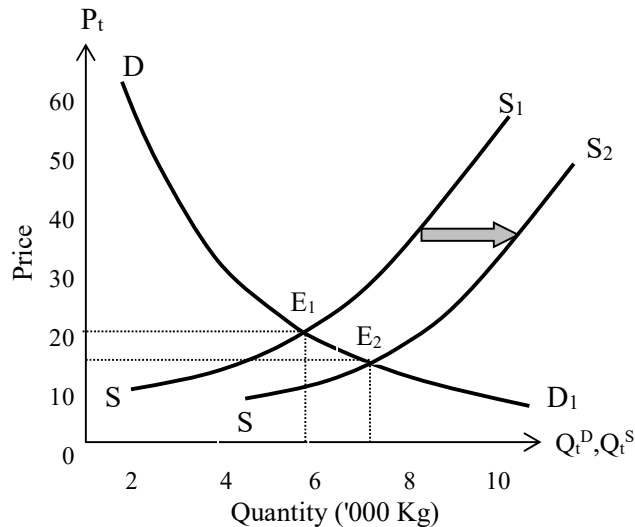
We learnt from the previous lessons that when the determinants of quantity supplied other than commodity's own price change, then supply curve shifts, and when the determinants of quantity demanded other than commodity's own price change, the demand curve shifts. Let's first consider the effect of a change in demand on the equilibrium position. Figure 2. 11 shows the effects

**Figure 2.11: The effects of a change in Demand**

of a change in demand on the equilibrium price and quantity. The figure shows that the original equilibrium price is Tk. 20.00 per Kg. of biscuit, and the quantity is 6,000 Kg. biscuit a week. When demand increases, the demand curve shifts rightwards, from  $DD_1$  to  $DD_2$  in Figure 2.11. The

equilibrium price rises to Tk.30.00 a Kg. of biscuit and the equilibrium quantity increases to 8,000 Kg. of biscuit, which corresponds to the new equilibrium Point  $E_2$ . The effects will be reverse if demand decreases, i.e., the demand curve shifts leftward.

On the other hand, if the supply curve shifts rightward, then equilibrium price of the commodity decreases and the equilibrium quantity increases as in Figure 2.12. The effect will be reverse if the supply curve shifts leftward.



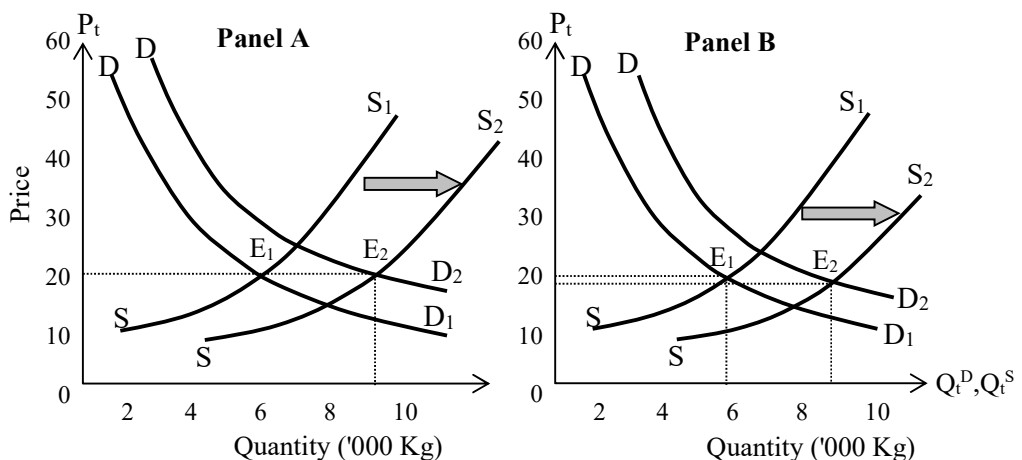
**Figure 2.12: Effect of a change in supply on equilibrium position**

In Figure 2.12, we see that due to the rightward shift of the supply curve, new equilibrium position has been established at Point  $E_2$ . At  $E_2$ , the price of the commodity is lower and the quantity exchanged is higher than those at the initial equilibrium point  $E_1$ .

In the cases described by Figure 2.11 and Figure 2.12, only demand curve or supply curve was assumed to be shifted. There we haven't explained the case where both supply and demand curves shifts simultaneously.

### What Will Happen If Both Demand Curve and Supply Curve Shift?

If they shift in the same direction and same extent, the equilibrium price will



**Figure 2.13: Effect of a change in both supply and demand**

not be changed, but the equilibrium quantity will be changed as in Panel A of Figure 2.13.

In Figure 2.13, we see that the supply curve has been shifted rightward from  $SS_1$  to  $SS_2$  and at the same time, the demand curve has been shifted outward from  $DD_1$  to  $DD_2$ . The extent of change in both demand and supply is the same. We see that at the new equilibrium point  $E_2$ , the equilibrium price is the same as that at the initial equilibrium Point  $E_1$ , but the quantity exchanged has been increased. If the extent of change in both demand and supply is not the same, both equilibrium price and quantity exchanged are changed. Panel B of Figure 2.13 shows that.

Similarly, we can see what happens to the equilibrium price and quantity when supply and demand change in opposite directions.

### Review Questions

1. (a) Define equilibrium price.
- (b) If actual price is above the equilibrium, what will force it down?
- (c) If actual price is below the equilibrium, what will force it up?
2. (a) Plot the corresponding demand and supply curves from the figures below, showing equilibrium price and quantity.

| Price | Quantity Demanded | Quantity Supplied |
|-------|-------------------|-------------------|
| \$100 | 10                | 50                |
| 80    | 20                | 40                |
| 60    | 30                | 30                |
| 40    | 40                | 20                |
| 20    | 50                | 10                |

- (b) If price was \$100, would there be a surplus or a shortage? How much?
- (c) If price was \$20, would there be a surplus or a shortage? How much?
3. State how the stipulated changes in each of the following demand shifters would change the equilibrium price and quantity of new US cars? Assume all other shifters remain constant except the one under consideration:
  - (a) An increase in money income of the car-buying public. Assume new cars are a superior good.
  - (b) A decrease in the price of foreign cars, a substitute for US cars.
  - (c) Consumers expect less unemployment in the near future.
  - (d) Consumers tastes shift in the direction of European styling.
  - (e) Population increases.
4. State how the stipulated changes in the following supply shifters change the equilibrium price and quantities of personal computers. Assume all other shifters remain constant except the one under consideration:

- (a) A decrease in the price of typewriters - an alternative product that can be produced.
  - (b) A decrease in the price of silicon chips.
  - (c) Producers expect prices to be lower next year.
  - (d) Advances are made in electronics technology.
  - (e) There is a decrease in the number of manufacturers of this product.
5. (a) Is it possible for the equilibrium price of a good or service to change Without a change in the equilibrium quantity exchanged in the market? Explain.
- (b) Is it possible for the equilibrium quantity of a good or service to changes without a change in the equilibrium market price? Explain.

# CONSUMER BEHAVIOUR



## Highlights

- ❑ Definition of Utility
- ❑ Different Approaches to the Measurement of Utility
- ❑ Total and Marginal Utility
- ❑ Law of Diminishing Marginal Utility
- ❑ Law of Equi-marginal Utility
- ❑ Indifference Curves and Budget Line
- ❑ Theory of Revealed Preference



## Lesson-1: Introduction

### Objectives

After studying this lesson, you will be able to:

- Explain what does consumer behaviour mean?
- Define the concept of utility; and
- Understand the measurability of utility.

### Introduction

We discussed the concept of demand and the law of demand in the previous unit. There we saw that demand has an important effect on the price of a good. But we didn't analyze what exactly shapes a person's demand? In this unit, we will examine the household or consumer behaviour and its influence on demand. In this regard, we will try to find the answers to the following questions: How does a consumer decide how much of the commodity she/he should buy at a given price? Why she/he buys more of some commodities when their prices fall? Why she/he doesn't change his consumption of some items even if their prices go up? Why the prices of some items are so out of proportion to their total benefits? Lesson-1 of this unit will discuss some important concepts used in the analysis of consumer behaviour, Lesson-2 and Lesson-3 will discuss cardinalist approach and ordinalist approaches to consumer behaviour respectively. Let's take the lessons sequentially.

### The Consumer

Commonly, we think that a *consumer* is one who consumes or uses a commodity. Here, it doesn't matter whether the consumer is a qualified or an unqualified person. However, in Economics, the term *consumer* refers to a person or entity with the following qualifications:

**Rational behaviour:** The consumer is a rational being. She/he tries to spend her/his money income so as to derive the greatest amount of satisfaction, or utility, from it. Consumers want to maximize the total utility.

**Clear-cut preferences:** The consumer has rather clear-cut preferences for different goods and services that are available in the market. She/he can guess about the utility she/he will get from the consumption of the additional units of various products what might purchase.

**Budget constraint:** The consumer has limited money income. Because a consumer supplies limited amounts of human and property resources to businesses, the money income received will be limited.

**Perfect competition:** Perfect competition exists on the demand and supply side of the market, i.e. the product prices are not affected by the amount of specific goods which the individual consumer buys.

### What Is Meant by Consumer Behaviour?

As a consumer, we have to take several decisions on the goods and services we consume in our daily life. For example, we have to decide: whether we should take tea or coffee in the morning, whether we should carry lunch packet or eat in the office canteen, whether we should buy or rent a house, etc. The way a consumer takes decisions on such problems is called *consumer's decision-making behaviour* or, in brief, *consumer behaviour*.

Economists constructed a theory of consumer behaviour based on the hypothesis that how each consumer spends income between the goods depends on her/his likes or dislikes - her/his preferences. Consumers are willing to pay more for the good that is expected to give them additional satisfaction or pleasure. If the oral sensation of mango juice at the cricket matches really turns you on, you are likely to be willing to pay more prices for it. If you don't have great taste or desire for mango juice, you are not likely to pay more money for it. Consumers always want to allocate their spending among the goods and services in the way that yields the greatest amount of satisfaction, or pleasure. Economists use the term **utility** to refer the expected pleasure, or satisfaction, obtained from the goods and services.

### What Is Utility?

The notion of *utility* was first introduced to social thought by the British philosopher, Jeremy Bentham, in the 18<sup>th</sup> century. Later William Stanley Jevons introduced it to Economics in the 19<sup>th</sup> century.

In its economic meaning, the term *utility* refers to the benefit or satisfaction or pleasure a person gets from the consumption of a commodity or service. In abstract sense, *utility* is the power of a commodity to satisfy human want, i.e. *utility* is want-satisfying power. A commodity is likely to have utility if it can satisfy a want. For example, rice has the power to satisfy hunger; water quenches our thirst; books fulfil our desire for having knowledge, and so on.

### Characteristics of Utility

The following characteristics of the concept of utility must be emphasized:

***Utility and usefulness are not synonymous:*** Usefulness is not necessary for a commodity to satisfy one's want. An useless commodity may yield substantial utility. For example, Paintings by Picasso may be useless in a functional sense and yet be of tremendous utility to art connoisseurs.

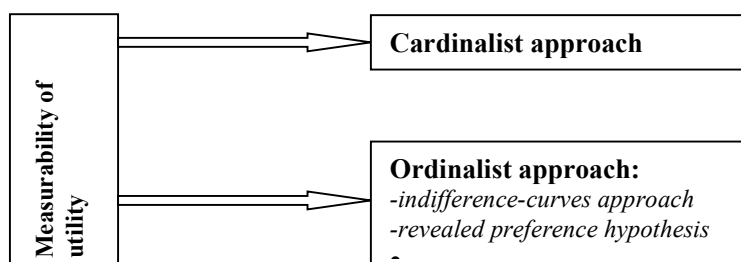
***Utility is a subjective notion:*** The utility of a specific product varies widely from person to person. All persons need not derive utility from all commodities. For example, non-drinkers do not derive any utility from wine, but alcoholic people derive great utility from wine; non-smokers do not get utility from cigarettes, but smokers derive utility from smoking; strict vegetarians do not derive any utility from beef and chicken, but non-vegetarians get utility from beef and chicken; eyeglasses have no utility to a person having 20-20 vision, but great utility to someone who is extremely far- or near-sighted; and so on.

***Utility is ethically neutral:*** Utility is neutral between good and bad and between useful and harmful. For example, opium is bad and harmful, but it yields utility to the people who takes it. Utility is free from moral values. It is not subject to social desirability of consuming a good.

### Measurability of Utility

As you have learnt at the beginning of this lesson, the consumer is a rational being. Given her/his income and the market prices of the various commodities, he plans her/his income so as to attain the highest possible satisfaction or utility - this is the *axiom of utility maximization*. In order to attain this objective the consumer must be able to compare the utility of the various baskets of goods which he/she can buy with her/his income. To compare utilities we need to know whether utility can be measured or not.

Economists have different views on this point. There are two basic approaches to the problem: the *cardinalist approach* and the *ordinalist approach*:



The cardinalist school held the views that utility can be measured. But how can it be measured? What units can it be measured in? Various suggestions have been made for the measurement of the utility. Some economists have suggested that utility can be measured in *monetary units* while others suggested the measurement of utility in subjective units, called *utils*.

On the contrary, the ordinalist school postulated that utility is not measurable, but is an ordinal magnitude. The consumer need not know the units of utility she/he gets from the commodities to make her/his choice. It is sufficient for him if he is able to rank the various baskets of goods according to the satisfaction that each bundle gives him.

In this lesson, we are not going to discuss the approaches to the analysis of consumer behaviour, i.e., the cardinalist approach and the ordinalist approach, in detail. We will thoroughly examine them in the following lessons.

### Review Questions

1. What is meant by the term 'consumer'? Write down the characteristics of a consumer.
2. What is utility? Is it measurable? Describe different approaches to the measurement of utility.

## Lesson-2: The Cardinal Utility Approach

### Objectives

After studying this lesson, you will be able to:

- Explain how utility is measured cardinally or quantitatively;
- Define the concepts of marginal and total utility;
- Describe the law of diminishing marginal utility;
- Explain the law of equimarginal utility;
- Derive the demand curve using the concept of marginal utility

### Introduction

Classical and neo-classical economists including Gossen (1854) of Germany, William Stanley Jevons (1871) of England, Leon Walras (1874) of France and Karl Menger of Austria held views that utility is quantitatively or cardinally measurable entity. It can be measured like any other entities, such as temperature, height, weight, and length. But what exactly is utility and in what units can we measure it? Starting with the answer to this question, this lesson will discuss the different concepts of utility, such as marginal utility, total utility, and the concept of consumer surplus.

### How Can We Measure Utility?

Utility is an abstract concept. It cannot be observed or touched anyway. That's why, the measuring units of this entity are arbitrary. Just like temperature, utility can be measured in arbitrary units. Let's know how temperature is measured, that will help us understand how the measurability of utility in arbitrary units is justifiable:

*Temperature is an abstract concept. We cannot observe it - only we can feel it. However, we can observe water turning to steam if it is hot enough or turning to ice if it is cold enough. And we can construct an instrument, called thermometer that can help us predict when such changes will occur. The scale on the thermometer is what we call temperature. But the units in which we measure temperature are arbitrary. For example, we can accurately predict that when a Celsius thermometer shows a temperature of 0, water will turn to ice. But the units of measurement do not matter because this same event also occurs when a Fahrenheit thermometer shows a temperature of 32°.*

In the above example, we have seen that temperature helps us to make predictions about physical phenomena. In the same way utility helps us make predictions about consumption choices. However, utility theory is not as precise as the theory that helps us to predict when water will turn to ice or steam.

From the above discussion, one thing is now clear to us that utility is measurable, though it is not so precise as other measurements. But it is still unclear how to measure utility, i.e. in what units we can measure the utility we get from the consumption of a commodity?

About a hundred years ago, economists thought utility as an indicator of the pleasure a person gets from the consumption of some set of goods, and they thought that utility could be measured directly in some psychological units called **utils**, after somehow reading the consumer's mind. But it was an impossible task to guess the satisfaction one gets from consuming a commodity. Can you say how many utils did you get from the last cricket match you saw at the Bangabandhu National Stadium? Probably your answer

is NO, because you have no idea what util is. The same thing would happen to anyone else.

But if you are asked: how many Shingara would you give up to get the ticket to watch that cricket match? Now you can answer this question confidently - for example, five Shingaras. Remember that still you don't know how many utils you got from watching the cricket match. But you do know that your satisfaction from the cricket match is more than the satisfaction from a piece of Shingara. In this case, Shingaras, rather than utils, become the unit of measurement. We can say that the utility you derived from the cricket match is five Singagas. Actually, this indirect way of measuring utility is the basis of the cardinalist theory of consumer behaviour. In the early twentieth century, economists used this indirect way of measuring utility to analyze the consumer behaviour.

We can measure utility derived from a commodity (like a ticket for watching cricket match) in terms of any other commodity (such as Shingara, Samucha, money, etc.) we are willing to give up for it. In our discussion, we will use the commodity which is the simplest and commonly used as a medium of exchange- that is, MONEY- to measure utility.

Thus we can define the utility of a commodity to a consumer as the amount of money she/he is willing to give up for it. For example, suppose Modhu decides to buy one Chicken Patty by Tk. 10.00, she will not buy any Chicken Patty if the price is higher than 10.00 taka. Then the utility of one piece of Chicken Patty is Tk. 10.00 - the maximum amount of money she is willing to pay to have it. If she wants to buy five pieces of Chicken Patty and is willing to pay Tk.30.00 at a maximum, then the *total utility* of five pieces of Chicken Patty to her is Tk. 30.00. Here one thing is noticeable that though Modhu is willing to pay Tk. 10.00 for one piece of Chicken Patty, she is willing to spend Tk. 30.00 only - not Tk. 50.00 = 5 @Tk. 10.00 - for five pieces of Chicken Patty. This happens because she is willing to pay less for each additional piece of Chicken Patty, which indicates that she gets lower utility from additional unit. The utility derived from an additional piece of Chicken Patty is called *marginal utility*. Marginal utility and Total utility are two related concepts. Let's now see how these concepts are related.

### **Total and Marginal Utility**

Total utility refers to the amount of satisfaction from consumer's entire consumption of a commodity. In the example cited earlier, the utilities Modhu derives from the 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> pieces of Chicken Patty are Tk. 10.00, Tk. 9.00, Tk. 7.00, Tk. 4.00 and Tk. 0.00 respectively. Therefore, the total utility derived from five pieces of Chicken Patty is Tk.30.00 = Tk. 10.00 + Tk. 9.00 + Tk. 7.00 + Tk. 4.00 + Tk. 0.00.

On the contrary, marginal utility is the amount of utility a consumer derives from consuming the last, i.e. marginal, unit of a commodity. In other words, marginal utility can be defined as the amount of utility a consumer derives from the consumption of an additional unit of the commodity. Marginal utility can also be defined as the change in the total utility resulting from the change in the consumption - that is:

$$MU = \Delta TU / \Delta C$$

Here, MU = marginal utility,  $\Delta TU$  = change in total utility and  $\Delta C$  = change in consumption.

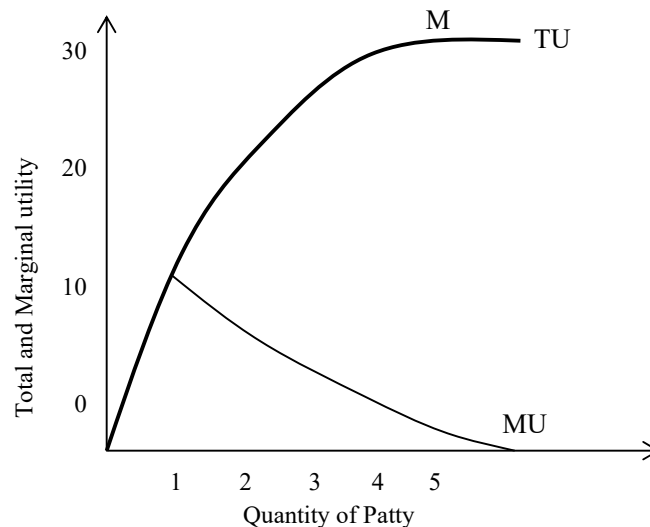
Recall our example of Chicken Patty consumption. Modhu gets the utility of Tk.10.00 from the first piece of Chicken Patty. When she takes the second one, she gets the utility of Tk. 9.00. This additional utility is called marginal utility. When she takes the third one, her marginal utility becomes Tk. 7.00. For the fifth one, she is not willing to pay any money, i.e., the marginal utility is zero.

Table 3.1 helps clarify the distinction between marginal and total utility and shows how the two are related. First two columns show how much total utility Modhu derives from various quantities of Chicken Patty. For example, one Chicken Patty is worth Tk.10.00 to her, two Chicken Patties are worth Tk.19.00, in total, to her and so on.

**Table 3.1: Total and Marginal Utility**

| Quantity of Chicken Patties | Total Utility (TU)<br>( in taka) | Marginal Utility (MU)<br>( in taka) |
|-----------------------------|----------------------------------|-------------------------------------|
| 0                           | 00                               |                                     |
| 1                           | 10                               | 10 (=10-00)                         |
| 2                           | 19                               | 09 (=19-10)                         |
| 3                           | <b>26</b>                        | 07 (=26-19)                         |
| 4                           | 30                               | 04 (=30-26)                         |
| 5                           | 30                               | 00 (=30-30)                         |

The marginal utility is the difference between any two successive total utility figures, which is shown in the third column of the Table 3.1. For example, if Modhu already consumed three pieces of Chicken Patty which are worth Tk.26.00 to her, consumption of an extra piece of Chicken Patty makes her total utility Tk.30.00. Thus her marginal utility is the difference between the two, i.e., Tk.4.00 (= Tk. 30.00 - Tk. 26.00). If we plot the data of Table 3.1 into the graph, we get total and marginal utility curves. Figure 3.1 portrayed the total utility and the marginal utility curves in the same plot area.



**Figure 3.1: Total and marginal utility curves**

In Figure 3.1, the TU curve indicates the total utility Modhu derives from Chicken Patties at different consumption levels. We see that the total utility curve is upward up to a level of consumption (Point M), which means that the more patties Modhu consumes, the more total utility she gets up to a certain level of consumption. Notice that the total utility curve is rising but at a diminishing rate (Why?- see the *law of diminishing marginal utility*). We see the MU (Marginal Utility) curve lying just under the TU curve in the same plot area. The downward sloping MU curve tells us that as she increases her consumption, the amount of utility Modhu gets from each extra piece of Patty decreases.

Therefore, if we summarize the message given in Figure 3.1, we get the following characteristics of total and marginal utility, which tells us how total and marginal utility are related:

- Up to a certain level of consumption, total utility increases as the consumption increases.
- Marginal utility is decreasing with the increase in consumption.
- Total utility increases till marginal utility is positive, but at a diminishing rate.
- When marginal utility becomes *zero*, then total utility is the maximum.
- Total utility decreases if marginal utility becomes negative.
- The area under the marginal utility curve indicates the total utility derived from various pieces of Patty.

In the previous discussion, we have learnt that marginal utility diminishes as the consumer increases her consumption of Chicken Patty - this very nature of marginal utility is described by the *law of diminishing marginal utility*. Let's know the law in detail.

### **The Law of Diminishing Marginal Utility**

This law is the main instrument used in the cardinal utility analysis of the consumer behaviour. It explains why the demand curve of a specific commodity is downward sloping? It also explains the elasticity of demand for a product. Except these, there are many other applications of this law in our everyday life.

#### **Main theme of the law**

The additional units of a specific commodity are worth less and less to a consumer as more of the commodity she/he consumes. In other words, marginal utility of a specific commodity declines as more of it is consumed.

#### **Assumptions**

The assumptions upon which this law is based are as follows:

**Given time period:** Units of the commodity are consumed in a given time period. The time period must be appropriate. If you drink ten cans of cold drinks during the whole day, the idea of diminishing marginal utility will not hold. However, if you are asked to drink all of the cans in two hours of time, then the idea of diminishing marginal utility makes sense.

**Continual consumption:** The units of the commodity are consumed continually, but the time interval between the consumption of two units of the commodity must be appropriately short.

**Normal behaviour of the consumer:** The mental condition of the consumer remains normal during the period of consumption of the commodity. She/he has a hierarchy of uses to which she/he will put a particular commodity. All of these uses are valuable, but some are more valuable than others.

**Standard units of the commodity:** The units of the commodity must be standard, i.e., a can of cold drinks, a glass of juice, a cone of ice-cream, a cup of tea, a pair of shoes, etc. If the units are excessively small or large, the law may not hold.

**Consumption of other commodities is given:** During the consumption of the commodity, the consumption of all other commodities remains constant.

### Logic behind the law

Our wants are unlimited. However, the want for a specific commodity is not unlimited - we can meet it. How? Simply think of your personal desire to have a specific commodity. Do you want more and more of a specific commodity? Are you willing to spend the same amount of money for each unit of it? Will you Consume endless quantities of the commodity if you can afford it? The answer to all of the questions is NO, because, the thrill diminishes with the consumption of each unit of the commodity. Even people who love sea-fish (for example, Rupchanda or pomfret), i.e. get great utility from it, and can afford it, don't eat endless quantities of it, presumably because, satisfaction from each piece of fish diminishes as the consumption increases. The first piece of fish may bring sensual gratification, but the second or third piece is likely to bring a stomach ache. If we express this change in perceptions in terms of utility, we find that the marginal utility derived from the first piece of Rupchanda (pomfret) fish is higher than the marginal utility derived from the second piece, i.e. the marginal utility from each extra piece of Rupchanda fish diminishes as the consumption of it increases.

The behaviour of the sea-fish connoisseurs is not abnormal. Generally speaking, as we consume more and more of a commodity, even the most favorite one, we become bored with it and our satisfaction from additional units of it diminishes. Indeed, this phenomenon of diminishing is so nearly universal that economists have fashioned a law around it which is called the *law of diminishing utility*.

Note that this law does not say that we won't like the third or fourth piece of a commodity; it just says we won't like them as much as the ones we have already consumed.

### Numerical and graphical illustration of the law

Recall the hypothetical data in Table 3.1. In the table, we see that as the consumption of Chicken Patty increases, the total utility increases, but at a decreasing rate, which indicates that the additional or marginal utility derived from each extra piece of Chicken Patty diminishes with the increase in consumption. This is shown in the third column of the table.

Graphically, the law of diminishing marginal utility has been illustrated in Figure 3.1. The downward sloping MU curve in the figure indicates that the marginal utility derived from each extra piece of Chicken Patty diminishes as the consumption of it increases.

### Exceptions of the law

The law of diminishing marginal utility is plausible for most consumers and for most commodities. However, like most laws, it has some exceptions. There are some commodities particularly significant to some people. The more of those commodities they get, the more they want. For example, the need for second glass of alcohol is higher than the need for the first glass to an alcoholic, the need for additional stamps do not diminish to a stamp collector, the desire to have more rare paintings doesn't diminish to a painting connoisseur, the need for more gold doesn't dwindle to women, and the want for money doesn't diminish to anybody. In these cases, the marginal utility increases rather than decreases. Economists, however, generally treat such cases of *increasing marginal utility* as anomalies. For most goods and most people, marginal utility probably diminishes as consumption increases.

### Utility-maximizing rule: The general case

If the consumer consumes more than one commodity, then the rule to be followed in maximizing satisfaction is that the consumer's money income should be allocated so that the last unit of money spent on each product purchased yields the same amount of extra (marginal) utility. Symbolically, the utility-maximizing rule can be illustrated as follows:

$$MU_X / P_X = MU_Y / P_Y = \dots\dots\dots = MU_N / P_N$$

Here,  $MU_X$ ,  $MU_Y$ ,  $\dots\dots\dots$ ,  $MU_N$  are the marginal utilities of commodity-X, commodity-Y,  $\dots\dots\dots$ , commodity-N respectively.  $P_X$ ,  $P_Y$ ,  $\dots\dots\dots$ ,  $P_N$ , are the prices of X, Y,  $\dots\dots\dots$ , N commodities respectively. The ratio between marginal utility and price of the commodity indicates the marginal utility per unit of money spent on that commodity. For example,

$$\frac{MU_X}{P_X} = \text{Marginal utility per taka spent on commodity-X}$$

$$\frac{MU_Y}{P_Y} = \text{Marginal utility per taka spent on commodity-Y}$$

$$\frac{MU_N}{P_N} = \text{Marginal utility per taka spent on commodity-N}$$

Therefore, to maximize utility, we should try to allocate our income in a way so that marginal utility per taka spent on each commodity becomes equal. This rule is called as the ***law of equi-marginal utility***.

Let's use the above formula to find Modhu's utility-maximization allocation of her income. Assume that Modhu consumes only two commodities: Chicken Patty and Shingara. Now we have to identify the combination of these two commodities which yields her maximum satisfaction. Modhu, to maximize utility, should allocate all of her money income so that the following condition is fulfilled:

$$\frac{MU_{Patty}}{P_{Patty}} = \frac{MU_{Shingara}}{P_{Shingara}}$$

If the marginal utility per taka spent on Patty exceeds the marginal utility per taka spent on Shingara (i.e., the left-side ratio is greater than the right-side ratio in the above condition), she will be in disequilibrium. Then she can regain equilibrium by increasing the consumption of Patty. She will continue to consume Patty till the marginal utility per taka spent on it again becomes equal to the marginal utility per taka spent on Shingara.

Conversely, if the marginal utility per taka spent on Patty is less than the marginal utility per taka spent on Shingara (i.e., the left-side ratio is lower than the right-side ratio in the above condition), she will also be in disequilibrium. She can regain the equilibrium by decreasing the consumption of Patty. Decrease in the consumption highers the marginal utility, which makes the ratio between the marginal utility and price of the commodity high. She will continue to consume Patty less till the marginal utility per taka spent on it again becomes equal to the marginal utility per taka spent on Shingara.

**Numerical and diagrammatic illustration:** Table 3.3 below shows Modhu's marginal utilities from different quantities of Patty and Shingara. The table also shows her marginal utility per taka spent on Patty and Shingara.

**Table 3.3: Utility-maximizing combination of Patty & Shingara**

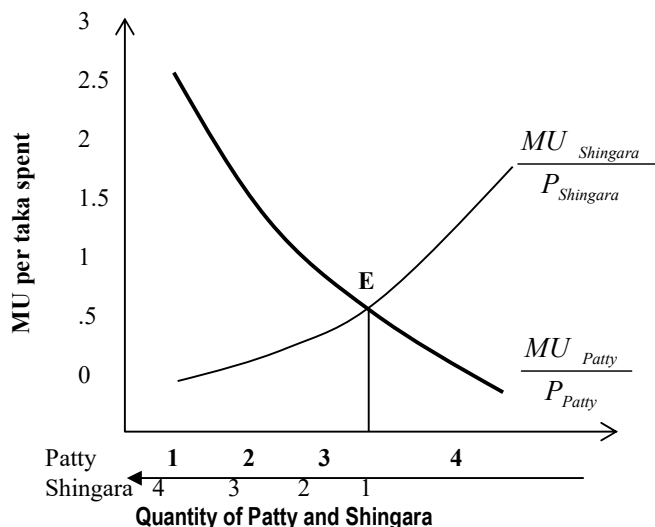
| Chicken Patty<br>(Tk. 5.00 each) |                                |                                                                       | Shingara<br>(Tk. 4.00 each) |                                |                                                                             |
|----------------------------------|--------------------------------|-----------------------------------------------------------------------|-----------------------------|--------------------------------|-----------------------------------------------------------------------------|
| Quantity                         | Marginal utility<br>( in taka) | Marginal utility<br>per taka spent<br>( $MU_{Patty} \div P_{Patty}$ ) | Quantity                    | Marginal utility<br>( in taka) | Marginal utility<br>Per taka spent<br>( $MU_{Shingara} \div P_{Shingara}$ ) |
| 0                                |                                |                                                                       | 0                           |                                |                                                                             |
| 1                                | 15                             | 3                                                                     | 1                           | 08                             | 2                                                                           |
| 2                                | 9                              | 1.8                                                                   | 2                           | 04                             | 1                                                                           |
| 3                                | 5                              | 1                                                                     | 3                           | 03                             | .75                                                                         |
| 4                                | 2                              | 0.4                                                                   | 4                           | 02                             | .5                                                                          |

In Table 3.3, we see that utility-maximizing combination of Patty and Shingara to Modhu is ***{3 pieces of Patty, 2 pieces of Shingara}***, because at this combination marginal utility per taka spent on Patty equals the marginal utility per taka spent on Shingara - that is,

$$\frac{MU_{Patty}}{P_{Patty}} = \frac{MU_{Shingara}}{P_{Shingara}} = 1$$

Therefore, Modhu reaches her equilibrium when she consumes ***three*** pieces of Patty and ***two*** pieces of Shingara. Any other combinations cannot give her maximum satisfaction, then she is in disequilibrium. Figure 4.3 illustrates the equilibrium and disequilibrium of the consumer.

In Figure 3.3, the bold line indicates the marginal utility per taka spent on Patty whereas the normal line indicates the marginal utility per taka spent on



**Figure 3.3: Utility-maximizing combination of Patty & Shingara**

Shingara. The direction of the bold line is from left to right, whereas the direction of the normal line is from right to left. Coming from opposite direction, the two lines intersect each other at Point E. At E, the utility-maximizing condition is satisfied. Therefore, E is the equilibrium point of Modhu and the utility-maximizing combination is {3 pieces of Patty and 2 pieces of Shingara}. Any points to the left or to the right of E do not satisfy the utility-maximizing condition. For example, if Modhu decides to consume 2 pieces of Patty and 3 pieces of Shingara, then her marginal utility per taka spent on Patty exceeds the marginal utility per taka spent on Shingara. In this case, she loses some amount of net utility, which lowers her net total utility gain. At this stage, she is not in equilibrium, because she can increase her net total utility by moving to another combination. To regain her equilibrium, she has to adjust her consumption until the marginal utility per taka spent on Patty equals the marginal utility per taka spent on Shingara. By consuming one more piece of Patty and reducing the consumption of one piece of Shingara, she can get more net utility and she regains her equilibrium position.

## Review Questions

1. (a) What is marginal utility?  
 (b) What is the law of diminishing marginal utility?  
 (c) What evidence is there to suggest that diminishing marginal utility exists?  
 (d) Calculate the marginal utilities of additional glasses of orange juice from the following figures:

| Number of Glasses | Total Utility |
|-------------------|---------------|
| 0                 | 0             |
| 1                 | 100           |
| 2                 | 190           |
| 3                 | 200           |
| 4                 | 150           |

2. "The more the merrier" contradicts the law of diminishing marginal utility. True or false? Explain.
3. The marginal utility of a steak and a fish dinner for an individual is given below. Under the following prices, is the individual maximizing utility for a given expenditure? Why or why not?

|              | MU  | Price |
|--------------|-----|-------|
| Steak dinner | 100 | \$10  |
| Fish dinner  | 75  | 5     |

4. Let's say that the combination of food that maximizes your satisfaction for lunch consists of one cheeseburger, one slice of apple pie, and one cup of coffee. According to the marginal-utility-over-price approach to making consumer decisions, you should continue to consume this mix of foods for lunch the rest of your life. True or false? Explain.
5. It is a common practice in restaurants for customers to be given as much coffee as they desire free of charge when they purchase a meal. Under these circumstances, what is the marginal utility of the last cup of coffee; that is, what should be the marginal utility of the last unit consumed of goods received 'free'.

### Lesson-3: Ordinal Utility Theory - Indifference Curve

#### Objectives

After studying this lesson, you will be able to:

- Describe the basic difference between the ordinalist theory and cardinalist theory;
- Explain the indifference curve;
- Explain the budget line;
- Explain the equilibrium position of the consumer; and
- Derive the demand curve from the indifference curve analysis.

#### Introduction

At the end of the previous lesson, we learnt that there are some basic weaknesses in the cardinalist approach. The main weakness in the cardinalist approach is the assumption of cardinal utility. In the cardinalist approach, the taste or satisfaction or utility derived from the consumption of a commodity can be measured objectively. In Table 3.1, we saw that the marginal utility Modhu got from the first piece of Patty was Tk. 10.00, while the second piece of Patty had the marginal utility of Tk.9.00. Now, the question is: can we really be so specific about our tastes? Is it reasonable to say that you got the marginal utility of Tk.10.00 from the consumption of the first can of Virgin? Should we calculate a psychological entity, like *utility*, arithmetically?

Till early twentieth century, the above questions were left unanswered. In 1906, Vilfredo Pareto first opposed the idea of cardinal utility and initiated the idea of ordinal utility to consumer behaviour analysis. Later Eugen E. Slutsky, W.E. Johnson, A.L. Bowley, John R. Hicks, and R.G.D. Allen systematically developed the ordinal utility theory as a powerful tool of consumer behaviour analysis. There are several theories which are based on the concept of ordinal utility. For example, the indifference curve analysis, theory of revealed preference, etc.

This lesson presents the indifference curve analysis of consumer behaviour. Let's first know something about the concept of *ordinal utility*.

#### The Concept of Ordinal Utility

The word ***ordinal*** is synonymous to the word ***rank***. We know that rank is not a quantity, rather it indicates the position of something in a group in terms of magnitude or satisfaction or any other attributes. For example, if you are asked to express your preference among three commodities such as Patty, Shingara and Orange, you may express your best favour to Orange, less favour to Shingara and very low favour to Patty, i.e., the ranking of your preference according to the satisfaction of each commodity is:

| <u>Commodities</u> | <u>Ranks</u> |
|--------------------|--------------|
| Patty              | 3            |
| Shingara           | 2            |
| Orange             | 1            |

Therefore, the ***ordinal utility*** is the expression of the consumer's preference for one commodity over another or one basket of goods over another, but not a numerical figure of utility derived from different commodities or baskets.

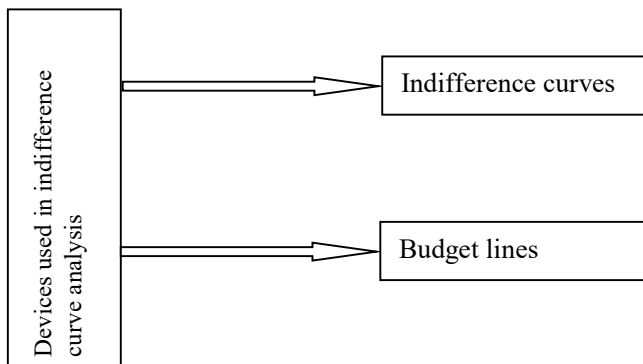
In this case, it is assumed that the utility derived from the consumption of various commodities cannot be measured in quantities, but the consumer can rank her/his preferences according to the satisfaction of each commodity or basket. For example, you can say that you prefer Orange to Shingara, but it is extremely doubtful if you say that the utility you will receive from Orange and Shingara is Tk.10.00 and Tk.5.00 respectively.

So *ordinal utility analysis* is a more advanced explanation of consumer behaviour than *cardinal utility analysis*.

Let's now discuss *indifference curve analysis* which is based on the ordinal utility concept.

### Indifference Curve Analysis

Two geometric devices are used in this analysis: ***indifference curves*** and ***budget lines***. Both of them are the locus of various combinations of two commodities. However, the first one is concerned with those combinations from which the consumer gets same satisfaction or she/he is indifferent among them, while the second one is concerned with such combinations or bundles which she/he can afford by spending the same amount of money.



Let's first discuss the assumptions underlying the indifference curve analysis. Later, we will discuss *indifference curves* and *budget lines* in detail.

### Assumptions

The indifference curve analysis of consumer's behaviour is based on the following assumptions:

**Rationality:** The consumer is rational - she/he aims at the maximization of her/his utility, given her/his income and market prices. She/he has full knowledge of all relevant information.

**Ordinal utility:** The consumer can rank her/his preferences according to the satisfaction of each basket. She/he doesn't need to care the arithmetic calculation of utility or satisfaction. Only ordinal measurement of utility is required.

**Diminishing marginal rate of substitution:** The slope of the indifference curve is called the marginal rate of substitution of the commodities. The indifference curve analysis is based on the axiom of diminishing marginal rate of substitution.

**Total utility depends on the quantities consumed:** The total utility depends on the quantities of the commodities consumed. That is,

$$U = f(q_1, q_1, \dots, q_x, q_y, \dots, q_n)$$

**Consistency of choice:** The consumer is consistent in her/his choice, which means if the consumer once chooses Bundle A over Bundle B, she/he will not choose B over A in another period if both bundles are available to her/him. Symbolically, the assumption of consistency may be written as follows:

$$\text{If } A > B, \text{ then } B \not> A$$

**Transitivity of choice:** Consumer's choices are characterized by transitivity, i.e., if Bundle A is preferred to B, and B is preferred to C, then Bundle A is preferred to C. Symbolically,

$$\text{If } A > B, \text{ and } B > C, \text{ then } A > C$$

**Non-satiation:** The consumer is assumed never to be satiated with goods. That's why, the more of each goods the bundle contains the more it is preferred to the consumer. She/he always prefers the bundle which contains the larger quantity of the commodities.

### Indifference curve: What the Consumer Prefers

An indifference curve is the locus of points which indicates various combinations of two commodities that yield the same level of satisfaction or utility to the consumer. So, the indifference curve embody subjective information about consumer preferences for two commodities.

Table 3.4 shows an indifference schedule and Figure 3.6 shows the indifference curve which is derived by plotting the hypothetical data in Table 3.4.

**Indifference schedule:** Let us assume that a consumer named Modhu is indifferent between the various combinations of orange and Patty. In Table 3.4, some combinations of Orange and Patty are presented. These combinations yield her equal satisfaction. Table 3.4 is, thus, called an indifference schedule.

**Table 3.4: Indifference schedule (hypothetical data)**

| Combinations | Units of Orange | Units of Patty |
|--------------|-----------------|----------------|
| a            | 12              | 2              |
| b            | 7               | 4              |
| c            | 4               | 6              |
| d            | 2               | 8              |
| e            | 1               | 10             |

In Table 3.4, five combinations of Orange and Patty have been shown. Combination-a contains 12 pieces of Orange and 2 pieces of Patty, combination-b contains 7 pieces of Orange and 4 pieces of Patty, combination-c contains 4 pieces of Orange and 6 pieces of Patty, and so on. We see that the quantity figures are not the same in all the combinations. If a combination contains more Oranges, it has to contain less Patty. This is necessary, because all the combinations should yield the consumer the same satisfaction. Note that as the combinations include more of Patty, the quantity of Oranges in the combinations becomes lower. That means, the

consumer has to give up Oranges for getting more Patties to keep her satisfaction same. So, there is a substitution between the two commodities. But what is about the rate of substitution? Does she always give up or substitute the same amount of Oranges for every extra piece of Patty? Look at Table 3.4. When Modhu moves from combination-a to combination-b, she substitutes 2 pieces of Patty for 5 pieces of Orange; if she moves further, i.e., from combination-b to combination-c, she substitutes same amount of Patty (2 pieces of Patty) for 3 pieces of Orange; and so on. Therefore, the rate of substitution of each extra piece of Patty (marginal rate of substitution) diminishes. This is shown in Table 3.5.

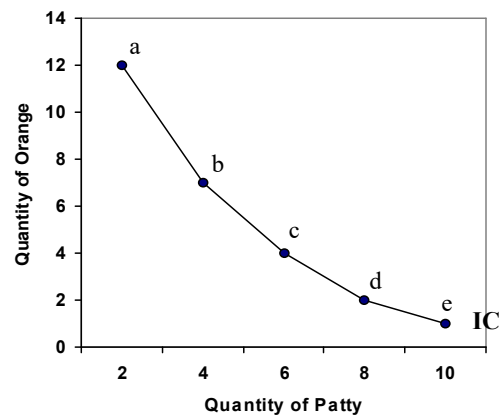
**Table 3.5: Marginal rate of substitution (hypothetical data)**

| Combinations | Units of Orange | Change in the quantity of Orange ( $\Delta Q_{\text{Orange}}$ ) | Units of Patty | Change in the quantity of Patty ( $\Delta Q_{\text{Patty}}$ ) | Marginal rate of substitution $\frac{\Delta Q_{\text{Orange}}}{\Delta Q_{\text{Patty}}}$ |
|--------------|-----------------|-----------------------------------------------------------------|----------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------|
| A            | 12              |                                                                 | 2              |                                                               |                                                                                          |
| B            | 7               | 5 (=12-7)                                                       | 4              | 2 (= 4-2)                                                     | 2.5                                                                                      |
| C            | 4               | 3 (= 7-4)                                                       | 6              | 2 (= 6-4)                                                     | 1.5                                                                                      |
| D            | 2               | 2 (= 4-2)                                                       | 8              | 2 (= 8-6)                                                     | 1.0                                                                                      |
| E            | 1               | 1 (= 2-1)                                                       | 10             | 2 (= 10-8)                                                    | 0.5                                                                                      |

In Table 3.5, it is shown that for every extra 2 pieces of Patty the consumer is not willing to give up the same quantity of Oranges - her willingness to giving up Oranges becomes lower as she gets more of Patty. This means, her attraction toward Patty reduces as she gets more of it. Column-6 of the table shows the diminishing marginal rate of substitution of Patty for Orange.

**Indifference curve:** Plotting the data given in Table 3.4 we get the indifferent curve of the consumer. Figure 3.6 shows it.

In the above figure, IC indicates the indifference curve. Any point on the indifference curve indicates a combination of two commodities - Orange and Patty. At all the points the consumer is indifferent, i.e., throughout this curve the consumer's utility or satisfaction is the same. That's why, indifference curve is also called *Iso-utility* or *Equal-utility* curve.



**Figure 3.6: Indifference curve of Modhu**

*Indifference map*

An indifference map is the collection of all indifference curves which rank the preferences of the consumer. As we move out from the origin each successive indifference curve entails a higher level of utility. That means, combinations of goods lying on a higher indifference curve yield higher level of satisfaction and are preferred. Figure 3.7 shows an *indifference map*.

Figure 3.7 depicts a partial indifference map, because only three indifference curves are shown here. Like  $IC_1$ ,  $IC_2$  and  $IC_3$  there may be many other indifference curves in the indifference plane. The area between the two axes is called *indifference plane*.

### Properties of the indifference curve

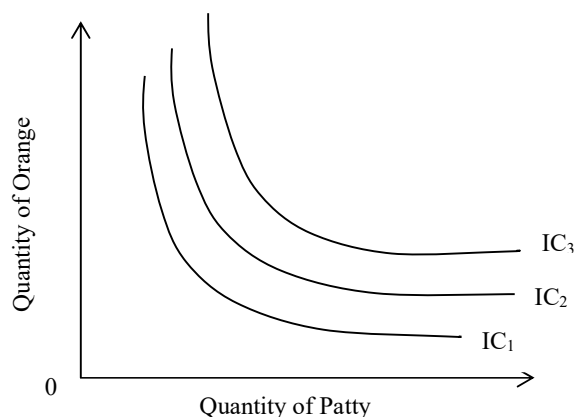
The indifference curve has the following basic properties:

**Downward sloping:** The indifference curve is downward sloping, which implies that: the two commodities can be substituted for each other; and if quantity of one commodity decreases, quantity of the other commodity must increase if the consumer has to stay at the same level of satisfaction. Technically, the slope of the indifference curve is called the *Marginal Rate of Substitution (MRS)*, because it shows the rate, at the margin, at which the consumer will substitute one good for the other to remain equally satisfied.

**Convex to the origin:** Downward slope is the necessary, not sufficient, property of the indifference curve. As viewed from the origin, a downward sloping curve can be concave (bowed outward) or convex (bowed inward). The indifference curve is convex to the origin, which means that slope of the indifference curve, the marginal rate of substitution, diminishes as we move down the curve. The diminishing slope of the indifference curve means the willingness to substitute one commodity (orange) for the other (Patty) diminishes as one moves down the curve.

**Indifference curves do not intersect nor be tangent to one another:** By definition, we know that along an indifference curve the consumer's satisfaction remains the same. If indifference curves intersect, the point of their intersection would imply two different levels of satisfaction, which is impossible.

**Upper indifference curves represent higher level of satisfaction than the lower ones:** The further away from the origin an indifference curve lies, the higher the level of utility it denotes. Bundles of commodities on an upper indifference contain a larger quantity of one or both of the commodities than the lower indifference curve. Thus bundles of commodities on a higher indifference curve are more preferred by the rational consumer.



**Figure 3.7: Indifference map**

### Budget Line: What the Consumer Can Afford

In the previous section, we learnt that an indifference curve shows such combinations of commodities from which the consumer gets the same level of satisfaction. In that case, we haven't considered any constraint. Is the consumer able to consume any combination she/he prefers? Certainly the answer is NO. Why? Because her/his income is limited. Thus which bundle or combination of the commodities the consumer can afford depends on her/his income and the prices of the commodities.

A **budget line** shows such combinations of two commodities which the consumer can afford, given her/his money income and prices of the commodities. Table 3.6 shows the combinations of Orange and Patty which the consumer can purchase when her/his money income is Tk.36.00, price of Orange is Tk.3.00 and price of Patty is Tk.4.00.

**Table 3.6: Combinations of Orange and Patty attainable with an income of Tk.36.00 (hypothetical data)**

| Combinations | Quantity of Orange<br>(price = Tk.3.00) | Quantity of Patty<br>(price = Tk.4.00) | Expenditure on Orange<br>(in taka) | Expenditure on Patty<br>(in taka) | Total Expenditure<br>(in taka) |
|--------------|-----------------------------------------|----------------------------------------|------------------------------------|-----------------------------------|--------------------------------|
| A            | 12                                      | 0                                      | $3 \times 12 = 36$                 | $4 \times 0 = 0$                  | $36 + 0 = 36$                  |
| B            | 8                                       | 3                                      | $3 \times 8 = 24$                  | $4 \times 3 = 12$                 | $24 + 12 = 36$                 |
| C            | 4                                       | 6                                      | $3 \times 4 = 12$                  | $4 \times 6 = 24$                 | $12 + 24 = 36$                 |
| D            | 0                                       | 9                                      | $3 \times 0 = 0$                   | $4 \times 9 = 36$                 | $0 + 36 = 36$                  |

In the table above, four combinations are shown such as *combination-a* {12 pieces of Orange and 0 piece of Patty}, *combination-b* { 8 pieces of Orange and 3 pieces of Patty}, *combination-c* { 4 pieces of Orange and 6 pieces of Patty} and *combination-d* {0 piece of Orange and 9 pieces of Patty}. Each of the combinations can be purchased with Tk.36.00 of money income.

Algebraically, we can write the **income constraint**, in the case of two commodities, as follows:

$$P_{or} \times Q_{or} + P_{pa} \times Q_{pa} = M \dots \dots \dots (3.1)$$

Here,  $P_{or}$  = Price of Orange;  $Q_{or}$  = Quantity of Orange;  $P_{pa}$  = price of Patty;  $Q_{pa}$  = Quantity of Patty; and M = Money income.

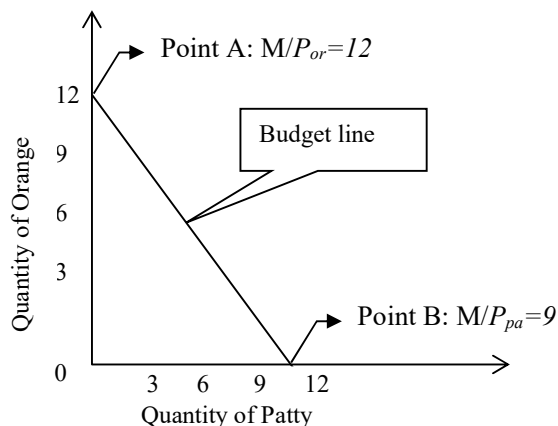
Solving the above equation (4.1) for  $Q_{pa}$ , we derive:

$$Q_{pa} = \frac{1}{P_{pa}} M - \frac{P_{or}}{P_{pa}} Q_{or} \dots \dots \dots (3.2)$$

Equation (4.2) is called **budget equation**.

Assigning successive values to  $Q_{or}$  ( M,  $P_{or}$  and  $P_{pa}$  remain the same), we may find the corresponding values of  $Q_{pa}$ . Thus, if  $Q_{or} = 0$  (that is, if the consumer spends all her/his income on Patty), then the consumer can buy  $M/P_{pa}$  units of Patty. Similarly, if  $Q_{pa} = 0$  ( that is, if the consumer spends all her/his income on Orange), then the consumer can buy  $M/P_{or}$  units of Orange. These results are shown in Figure 3.8 by Points A and B. If we join these points with a line, we obtain the **budget line**. Budget line is also called as **price line**. In the above figure, AB is the budget line. Any point on or

under the budget line indicates the combination of Orange and Patty which is affordable to the consumer, but the points on the north-east area of the budget line indicate such combinations which are out of the purchasing capacity of the consumer. Thus the south-west area of the budget line is **feasibility area** and the north-east area of the budget line is **non-feasibility area**. We can geometrically calculate the slope of the budget line as follows:



**Figure 3.8: Budget line (representing the data in table 3.1)**

$$\frac{OA}{OB} = \frac{M / P_{or}}{M / P_{pa}} = \frac{P_{pa}}{P_{or}}$$

So, we can draw the budget line easily if we know the prices of the commodities and the money income of the consumer. Let's consider the prices and money income assumed in Table 3.6. We find:

$P_{or}$  = price of Orange = Tk.3.00

$P_{pa}$  = price of Patty = Tk.4.00

$M$  = Money income of the consumer = Tk.36.00

Therefore,  $M/P_{or} = 36/3 = 12$  units of Orange

$M/P_{pa} = 36/4 = 9$  units of Patty

These two results are shown in Figure 3.8 by Points A and B. If we join these points with a line, we obtain the budget line, AB. Points on the budget line represents the combinations of Orange and Patty which can be purchased with Tk.36.00. All the combinations in Table 3.6 fall on the budget line. Thus, without plotting the data in Table 3.6 budget line can be derived if we have the information about the prices of the commodities and the money income of the consumer.

### **Review Questions**

1. Explain the concept of ordinal utility. What are the assumptions in ordering consumer preference?
2. What is an indifference curve? What are the main properties of indifference curve?
3. Why are the indifference curves convex to the point of origin?
4. What is marginal rate of substitution? Why does the MRS diminish along the indifference curve?

# ELASTICITIES OF DEMAND AND SUPPLY

## 4

### Highlights

- ❑ Price Elasticity of Demand
- ❑ Point and Arc Elasticity
- ❑ Determinants of Price Elasticity of Demand
- ❑ Income Elasticity of Demand
- ❑ Determinants of Income Elasticity of Demand
- ❑ Cross Elasticity of Demand and Its Determinants
- ❑ Elasticity of Supply and Its Determinants



## Lesson -1: Elasticity of Demand

### Objectives

After Studying this lesson, you will be able to:

- Define the concept of elasticity;
- Describe the techniques of measuring elasticity; and
- Explain the elasticity of demand.

### What Is Elasticity?

Elasticity is the ratio which measures the responsiveness or sensitiveness of a dependent variable to the changes in any of the independent variables. Specifically, the term *elasticity* refers to the percentage change in dependent variable divided by the percentage change in independent variable. That is,

If  $Y = f(X)$ , i.e., Y depends on X, then the elasticity of Y with respect to X is

$$\text{Elasticity} = \frac{\text{Percentage change in dependent variable}}{\text{Percentage change in the independent variable}}$$

as follows:

$$\text{Elasticity of Y} = \frac{\text{Percentage change in Y}}{\text{Percentage change in X}} = \frac{\% \Delta Y}{\% \Delta X}$$

If  $Y = f(X_1, X_2, \dots, X_n)$ , then we can calculate elasticity of Y with respect all X's, which is called *total elasticity*, as follows:

$$\text{Elasticity of Y} = \frac{\text{Percentage change in Y}}{\text{Percentage change in X}} = \frac{\% \Delta Y}{\% \Delta X_1} + \frac{\% \Delta Y}{\% \Delta X_2} + \dots + \frac{\% \Delta Y}{\% \Delta X_n}$$

$$\text{Elasticity of Y with respect to } X_1 = \frac{\text{Percentage change in Y}}{\text{Percentage change in } X_1} = \frac{\% \Delta Y}{\% \Delta X_1}$$

or we can calculate the elasticity of Y with respect to each of the X's, which is called *partial elasticity*, as follows:

$$\text{Elasticity of Y with respect to } X_2 = \frac{\text{Percentage change in Y}}{\text{Percentage change in } X_2} = \frac{\% \Delta Y}{\% \Delta X_2}$$

$$\text{Elasticity of Y with respect to } X_n = \frac{\text{Percentage change in Y}}{\text{Percentage change in } X_n} = \frac{\% \Delta Y}{\% \Delta X_n}$$

Now let's think about the elasticity of demand.

## Elasticity of Demand

The elasticity of demand is the measure of responsiveness of demand for a commodity to the changes in any of its determinants. We studied in the previous lessons that the determinants of demand are the commodity's own price, income, price of related goods (substitutes and complements), and consumers expectations regarding future price, i.e.,

$$Q_X^D = f(P_X, M, P_Y, P_Z, \text{etc.})$$

Here,  $Q_X^D$  = Quantity demanded of commodity X

$P_X$  = Price of commodity X

$M$  = Money income of the consumer

$P_Y$  = Price of the substitute, X and Y are substitutes to each other

$P_Z$  = Price of the complement, X and Z are complements to each other

Therefore, we can calculate the elasticity of demand with respect to each of the determinants. When we calculate the responsiveness of demand to the change in commodity's own price, then we call it *price elasticity of demand*. If we calculate the elasticity of demand with respect to the change in consumer's money income, we call it *income elasticity of demand*. If we calculate the elasticity of demand with respect to the change in the price of any related goods (substitutes or complements), we call it *cross elasticity of demand*.

Now let's start with *price elasticity of demand*.

### Price Elasticity of Demand

If the price of a commodity changes, then do consumers change their attitude in buying that commodity?

The answer may be one of the following three:

- They do not change their attitude;
- They slightly change their attitude;
- They change their attitude drastically.

How much consumers respond to the price changes is measured by price elasticity of demand. In other words, the response of consumers to a change in price is measured by the price elasticity of demand. Specifically, the price elasticity of demand refers to the percentage change in quantity

demand divided by the percentage change in price. That is, the price elasticity of demand,

$$E_P^D = \frac{\text{percentage change in quantity demanded of X}}{\text{percentage change in price of X}} = \frac{\% \Delta Q_X^D}{\% \Delta P_X}$$

Here,  $Q_X$  = Quantity demanded for commodity X

$P_X$  = Price of commodity X

$\% \Delta P_X$  denotes percentage change in price which is calculated by dividing the change in price by the original price and  $\% \Delta Q_X^D$  denotes percentage change in quantity demanded which is calculated by dividing the change in quantity by the original quantity. That is:

$$\% \Delta P_X = \frac{\Delta P_X}{P_X^O} \times 100, \text{ where } P_X^O = \text{Original Price}$$

$$\text{and } \% \Delta Q_X^D = \frac{\Delta Q_X}{Q_X^O} \times 100, \text{ where } Q_X^O = \text{Original Quantity}$$

Thus, our formula restated:

$$E_P^D = \frac{\Delta Q_X / Q_X^O}{\Delta P_X / P_X^O} = \frac{\Delta Q_X}{\Delta P_X} \cdot \frac{P_X^O}{Q_X^O}$$

As we know from the demand law that one of the changes ( $\Delta Q_X$  or  $\Delta P_X$ ) in the elasticity formula will be negative. As a result, the sign of the elasticity coefficient will be negative. For convenience, we ignore the sign of the elasticity formula.

At the moment, some questions may arise in your mind:

***(a) Why are percentages used rather than absolute amounts in measuring consumer responsiveness?***

The answer is two fold:

- If we use absolute changes, our impression of buyer responsiveness will be arbitrarily affected by the choice of units. For example, the price of product X falls from Tk. 5 to Tk. 3, and consumers increase their purchases from 70 to 100 Kg., it appears that consumers are quite sensitive to price changes, and, therefore, that demand is elastic. After all, a price change of 'two' has caused a change in the amount demanded of 'thirty'. But by changing the monetary unit from taka to paisa, we find a price change of 'two hundred' causes a quantity change of 'forty', giving the impression of inelasticity. Using percentage changes avoids this problem. The given price decline is 33 per cent whether measured in term of taka (Tk. 2 / Tk. 5) or paisa (200 p / 500 p). Therefore, elasticity is a *unit-free* measure.
- The other reason for using percentage is that we can more meaningfully compare consumer responsiveness to changes in the prices of different products. It makes little sense to compare the effects on quantity demanded of a Tk. 1 increase in the price of a Tk. 10,000 washing machine with a Tk. 1 increase in the price of a Tk. 1 shaving blade. Here the price of washing machine is rising by .0001 per cent while the blade price is up by 100 per cent! If the price of both products were increased by 1 percent - Tk. 100 for the washing machine and 1 p for the blade - we would obtain a sensible comparison of consumer sensitivity to the price changes.

***(b) Why should we ignore the 'minus sign' in the price elasticity of demand formula?***

We know from the downward sloping demand curve that price and quantity demanded are inversely related (demand law). This means that the price elasticity coefficient of demand will always yield a negative number. For example, if price declines, then quantity demanded will increase. This means that the numerator in our formula will be positive and denominator negative, yielding a negative coefficient. Conversely, for an increase in price, the coefficient will also be negative.

This negative sign is usually ignored and it is simply presented the *absolute value* of the elasticity coefficient to avoid an ambiguity which might otherwise arise. It can be confusing to say that an elasticity coefficient of '- 4' is greater than one of '- 2', this possible confusion is avoided when we say a coefficient of 4 indicates greater elasticity than one of 2. Hence, we ignore the minus sign in the coefficient of price elasticity of demand and merely show the absolute value. However, the noted ambiguity does not arise with supply because price and quantity are positively related.

***(b) Does elasticity coefficient give the same message as the slope of demand curve gives?***

Certainly not. Slope depends on the units in which we measure the price and quantities. This is why, if we want to compare two demand curves, we can't do that simply by their slopes. Also, we often need to compare the demand curves for different goods and services. For example, when deciding by how much to change the tax rates, the government needs to compare the demand for oil and the demand for tobacco. Which is more responsive to price? Which can be taxed at an even higher rate without decreasing the tax revenue? Comparing the slope of the demand curve for oil with the slope of the demand curve for tobacco has no meaning because oil is measured in gallons and tobacco in pounds- completely unrelated units.

In this case, for meaningful comparison, we should have a measure of responsiveness that is independent of the units of measurement of prices and quantities. Elasticity is such a measure.

On the other hand, at every point on a straight line demand curve, the slope is the same. But the elasticity coefficient varies from one point to another point on the straight line demand curve.

***(d) Is elasticity of demand the ratio of percentage changes or proportionate changes?***

Elasticity is the ratio of the percentage change in the quantity demanded to the percentage change in the price. It is also, equivalently, the proportionate change in the quantity demanded by the proportionate change in the price. This can be shown as follows:

$$\text{Percentage change in quantity demanded} = \% \Delta Q = \frac{\Delta Q}{Q} \times 100$$

$$\text{Percentage change in price} = \% \Delta P = \frac{\Delta P}{P} \times 100$$

$$\text{Proportionate change in quantity demanded} = \frac{\Delta Q}{Q}$$

$$\text{Proportionate change in price} = \frac{\Delta P}{P}$$

Now, the formula of elasticity of demand is:

$$\begin{aligned} E_p^D &= \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}} \\ &= \frac{\frac{\Delta Q}{Q} \times 100}{\frac{\Delta P}{P} \times 100} \\ &= \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{\text{Proportionate change in quantity demanded}}{\text{Proportionate change in price}} \end{aligned}$$

Therefore, elasticity is the ratio of percentage changes, which ultimately stands as a ratio of proportionate changes after the cancellation of the 100s.

### Approaches to Computing Price Elasticity : Point versus Arc Elasticity

There are two approaches to computing price elasticities: *point* and *arc* elasticities. What approach we will choose depends on the available data and the intended use. For analyzing the effect of discrete (i.e., measurable) change in price, arc elasticity is appropriate. For example, a price increase from Tk. 5.00 to Tk. 6.00 could be evaluated by computing the arc elasticity. In practice, most elasticity computations involve the *arc method*.

On the other hand, *point elasticity* can be used to evaluate the effect of infinitesimally small change in price or to compute the price elasticity at a particular price. Point elasticities are important in theoretical Economics.

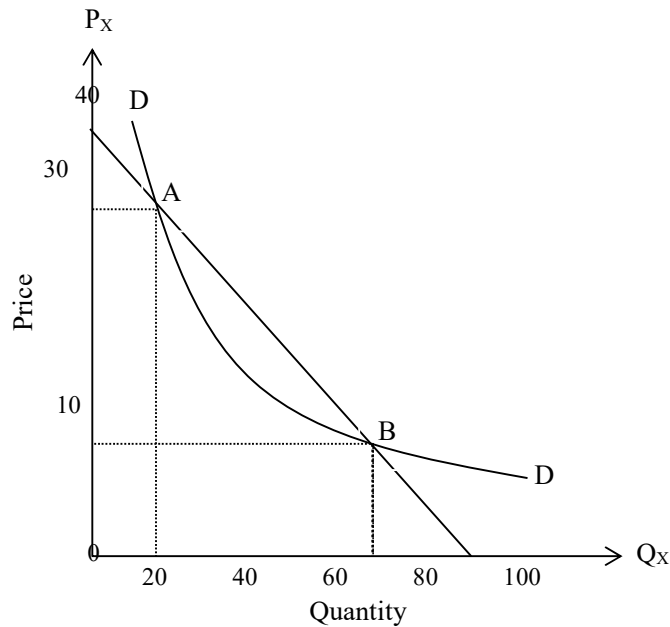
Now let's know about arc and point elasticities in detail.

### Arc Elasticity

The formula used to computing arc elasticity is:

$$E_p = \frac{\Delta Q_x / Q_x^O}{\Delta P_x / P_x^O} = \frac{\Delta Q_x}{\Delta P_x} \cdot \frac{P_x^O}{Q_x^O}$$

Graphically, arc elasticity is the measure of elasticity of demand between two finite points on a demand curve. For example, in Figure 4.1, the measure of elasticity between points A and B is arc elasticity.



**Figure 4.1 : Arc elasticity**

### Point Elasticity

If the changes in price are infinitesimally small, we use the point elasticity of demand as a measure of the responsiveness of demand. The point elasticity of demand is defined as the percentage change in the quantity demanded resulting from an infinitesimally small change in prices. Symbolically, we may write the formula of point elasticity as follows:

$$E_p = \frac{dQ_x}{Q_x} \bigg/ \frac{dP_x}{P_x}$$

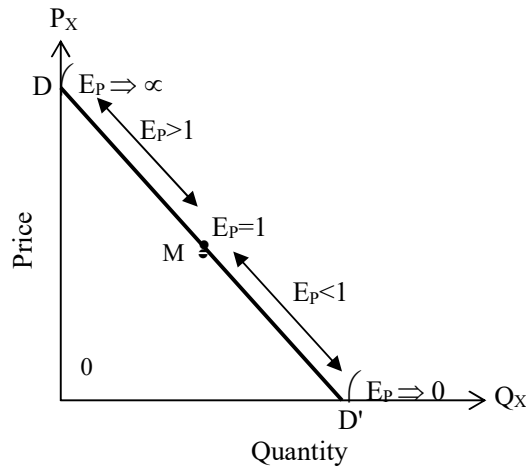
$$= \frac{dQ_x}{dP_x} \cdot \frac{P_x}{Q_x} \dots\dots\dots (3)$$

In this formula, the first part,  $\frac{dQ_x}{dP_x}$  is reciprocal of the slope of the demand curve. So, the slope is the part of the elasticity formula. But it is not the only part : The ratio  $P_x/Q_x$  is invalid as well.

### *Elasticities at different points on a demand curve*

According to the graphical measurement of point elasticity, we can easily identify the elasticity coefficients at different points on a demand curve. Let's first deal with the linear demand curve.

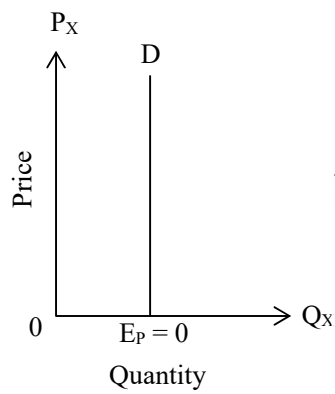
**Point elasticities of a linear demand curve:** See the Figure 4.2. DD' is a straight-line or linear demand curve.



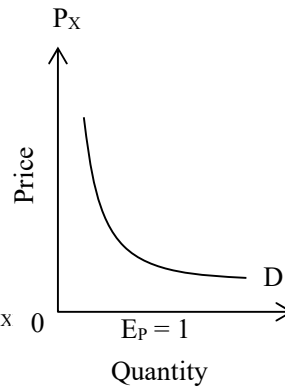
**Figure 4.2 : Point elasticities at point on a straight line**

At mid-point, M, of the demand curve the  $E_P = 1$ . At any point right of M the  $E_P < 1$  and at any point left of M the  $E_P > 1$ . At Point D the  $E_P \Rightarrow \alpha$ , while at Point D' the  $E_P \Rightarrow 0$ . So, the range of values of the elasticity are:  $0 \leq E_P \leq \alpha$ . Let's now know the explanation of different elasticity coefficients and about the shape of the corresponding demand curves presented as below:

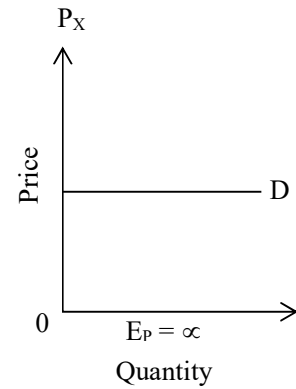
| Elasticity coefficients  | Explanation                   | Shape of the demand curve           |
|--------------------------|-------------------------------|-------------------------------------|
| $E_P = 0$                | Demand is perfectly inelastic | Vertical (Figure 4.3)               |
| $E_P = 1$                | Demand is unitary elastic     | Rectangular hyperbolic (Figure 4.4) |
| $E_P \Rightarrow \alpha$ | Demand is perfectly elastic   | Horizontal (Figure 4.5)             |
| $0 < E_P < 1$            | Demand is inelastic           |                                     |
| $1 < E_P < \alpha$       | Demand is elastic             |                                     |



**Figure 4.3**



**Figure 4.4**



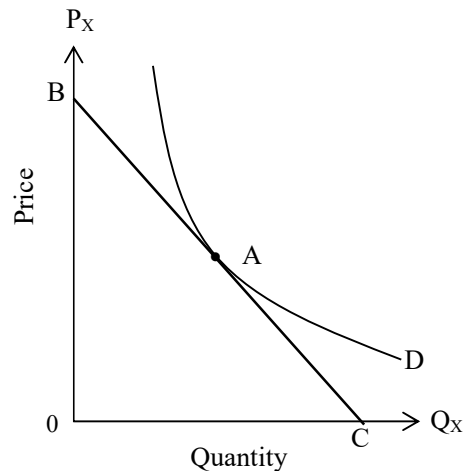
**Figure 4.5**

**Point elasticities of a non-linear demand curve:** The elasticity at a point (say A) on a non-linear demand curve can be computed in the following way:

*First*, draw a tangent to the demand curve at Point A.

*Second*, divide the segment of the tangent to the right of A by the segment to the left of A. Then you will get the elasticity coefficient of the demand curve at Point A.

This is shown in Figure 4.6.



**Figure 4.6 : Point elasticity of a non-linear demand curve**

At Point A the  $E_P = AC / AB$ . Similarly, we can find the elasticity at any other point on the demand curve.

## Determinants of Price Elasticity of Demand

What factors make demand for a commodity more elastic or less elastic? Why are people price-sensitive ( $e > 1$ ) with some goods and not ( $e < 1$ ) with others? To find answers to these questions, we have to go back to the demand curve itself. The elasticity of demand is computed between points on a given demand curve. Hence, the price elasticity of demand is influenced by all the determinants of demand. Anyway, there are no iron-clad generalizations concerning determinants of the elasticity of demand. The following factors, however, are worth noting:

**Nature of the Goods (Luxuries versus Necessities):** Necessities such as food stuff are price inelastic, meaning they are not very responsive to change in prices. For example, the quantity of rice demanded does not decline much when the price of rice rises. This happens because people do not reduce their consumption of rice even if the price is very high. People cannot live without rice. Therefore, rise in price cannot influence the demand for necessities very much.

In contrast, any luxury good such as air conditioner, decoration item, etc. are price elastic, meaning they are very responsive to changes in prices. People can postpone the consumption of luxury goods when their prices rise.

**Availability of Close Substitutes:** This is a critical determinant of price elasticity of demand. If consumers can easily get a good substitute Y for a product X, they will switch readily to Y if the price of X rises. Thus the closer the substitutes for X that are available, the more elastic its demand will be. For example, the demand for a particular brand of toothpaste is quite elastic; because another brand will work just as well. If the price of Close-Up toothpaste rises, people will switch readily to any other brands such as Pepsodent, Colgate, etc. Here an important thing should be remembered that availability of close substitutes depend on how narrowly or broadly the commodity is defined. If we define a commodity narrowly (such as Close-Up toothpaste), many substitutes are available for that commodity. So, the elasticity of demand for that commodity is high. On the other hand, if the commodity is broadly defined (such as toothpaste), no many substitutes for that commodity are available and thus the elasticity of the demand for that commodity is low. Similarly, the elasticity of demand for meat in general is low, but the elasticity of demand for beef, lamb, or chicken is high. The elasticity of demand for personal computers is low, but the elasticity of demand for a Compaq, Dell, Intel or IBM is high.

Therefore, the demand for narrowly defined commodity is more elastic than the demand for more broadly defined commodities.

**Fraction of the Income Absorbed:** Other things remaining the same, the higher the proportion of income spent on a good, the more elastic the demand for it. If only a small fraction of income is spent on a good, then a change in its price has little impact on the consumer's overall budget. In contrast, even a small rise in the price of a good that commands a large part of a consumer's budget induces the consumer to make a radical reappraisal of expenditures.

For example, think about the elasticity of demand for textbooks and chewing gum. If price of textbooks doubles (rises by 100%), there will be a big

decrease in the quantity of textbooks bought. Thus, students will share and photocopy the textbook instead of buying new ones. If the price of chewing gum doubles, also a 100% increase, there will be no change in the quantity of gum demanded. Why is the difference? Because textbooks take a large proportion of the budget, while gum takes only a tiny portion.

Evidence (1989) shows that in, Tanzania, a poor African nation where average income is 3.3% of that in the United States and where 62% of income is spent on food, the price elasticity of demand for food is 0.77. In contrast, in the United States, where 12 percent of income is spent on food, the elasticity of demand for food is 0.12.

**Time:** The demand for many products is more elastic in the long run than in the short run. When the price of a product rises, it takes time to find and experiment with other products to see if they are acceptable. Consumers may not immediately reduce their purchases very much when the price of chicken rises by 10 percent, but in time they may shift to beef or fish. Therefore, since consumers do not reduce the demand for a commodity (for example, chicken) immediately after the rise in its price, the demand for that commodity is inelastic in the short run. But if the price of chicken remains high for a long time, then consumers switch to any convenient (or less costly) substitutes for chicken (for example, beef, fish, etc.), which makes the demand for chicken elastic in the long run.

**Alternative uses of a commodity:** The more the alternative uses of a commodity, the highly elastic is the demand for it. For example, if the price of milk falls, the demand for milk will increase more than the proportionate fall in its price, because milk can be used in different purposes such as in making curds, ghees, butter, sweets, etc. Therefore, the demand for milk is highly elastic.

In the previous paragraphs, we learnt about price elasticity of demand. However, we know there are some other factors which influence our buying plans. Among the *other factors*, the prices of other goods and income are important. We can calculate an elasticity of demand for each of these other factors as well as for own price. Let's now know the elasticities of demand with respect to income, which is called *income elasticity*, and with respect to the prices of related goods, which is called *cross elasticity* of demand.

### **Income Elasticity of Demand**

The income elasticity of demand is a measure of the responsiveness of demand to a change in income, other things remaining the same. It is calculated by using the following formula :

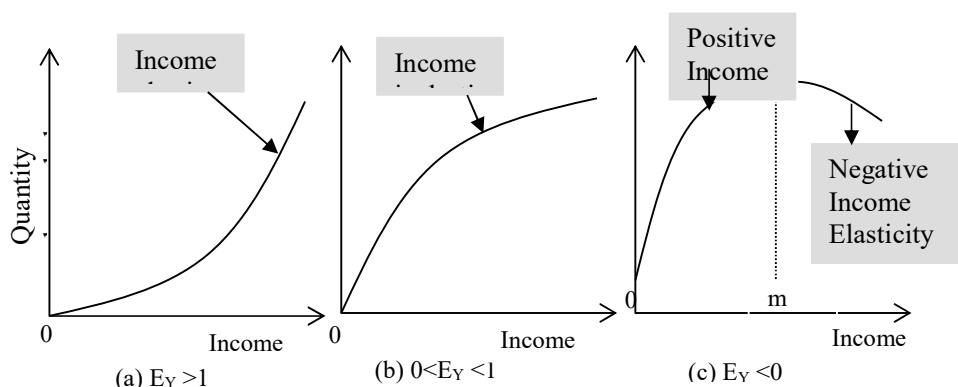
$$\text{Income elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$$

As price elasticity, income elasticity can be expressed in either arc or point terms.

### **Nature of the Commodity and Income Elasticity**

Income elasticity of demand can be positive or negative and falls into the following interesting ranges:

| Value of elasticity coefficient         | Terminology      | Description                                                          | Nature of the commodity | Example                                             |
|-----------------------------------------|------------------|----------------------------------------------------------------------|-------------------------|-----------------------------------------------------|
| Greater than 1<br>( $E_Y > 1$ )         | Elastic demand   | Quantity demanded changes by a larger percentage than does income    | Normal                  | International travel, jewelry, works of arts, etc.  |
| Between zero and 1<br>( $0 < E_Y < 1$ ) | Inelastic Demand | Quantity demanded changes by a smaller percentage than does income   | Normal                  | Food, clothing, furniture, newspaper, and magazines |
| Less than 0<br>( $E_Y < 0$ )            | Inelastic demand | Quantity demanded changes in opposite direction of the income change | Inferior                | Potatoes, rice, etc.                                |



**Figure 4.7: Income elasticity of demand**

The three cases cited above can be illustrated by diagrams. Figure 4.7 does it.

Part (a) shows an income elasticity that is greater than 1, i.e., as income increases,

quantity demanded increases, but the quantity demanded increases faster than income.

Part (b) shows an income elasticity of demand that is between zero and 1. In this case, the quantity demanded increases as income increases, but income increases faster than the quantity demanded.

Part (c) shows an income elasticity of demand that eventually becomes negative. In this case, the quantity demanded increases as income increases until it reaches a maximum at income **m**. After that point, as income continues to increase, the quantity demanded declines. Up to the income **m**,

the income elasticity of demand is positive but less than 1. After income **m**, the income elasticity of demand is negative.

The low-income people normally buy bicycles, potatoes, and rice. Up to a level of income, they increase buying of these commodities as income increases. But as income goes above the Point **m**, consumers replace these goods with superior alternatives. For example, a motorcycle replaces bicycle; fruit, vegetables and meat begin to appear in a diet that was heavy in rice or potato.

### Determinants of Income Elasticity

The income elasticity of demand for different categories of goods may, however, vary from household to household and from time to time. The main factors that determine the income elasticity of demand are:

**The nature of the need that the commodity covers:** The percentage of income spent on necessities (for example, food, clothing, etc.) declines as income increases (see Engel's law).

**The initial level of income of a country:** A TV set is a luxury in an underdeveloped, poor country while it is a necessity in a country with high per capita income.

**The time period:** Time period is one of the determining factors of elasticity, because, consumption patterns adjust with time-lag to changes in income.

### Uses of Income Elasticity

Some important uses of income elasticity of demand are as follows:

**Estimating Future demand:** If the rate of increase in income and income elasticity of demand are known, then income elasticity can be used to estimate the future demand.

**Defining the nature of goods:** The goods whose income elasticity is positive for all levels of income are termed as *normal goods*. On the other hand, the goods for which income-elasticity is negative, beyond a certain level of income, are termed as *inferior goods*.

### Cross Elasticity of Demand

We already talked about the response of demand for a commodity to its own price and also to consumers' income. Now, we will discuss the responsiveness of quantity demanded for a commodity to the prices of related commodities (substitutes and complements).

When we measure the responsiveness of demand of a commodity to the price of its substitutes or complements, then we call it *cross elasticity of demand*. Symbolically, we have

$$E_{xy} = \frac{dQ_x}{Q_x} \bigg/ \frac{dP_y}{P_y} = \frac{dQ_x}{dP_y} \cdot \frac{P_y}{Q_x}$$

Here X and Y are related goods.

If X and Y are complementary goods, the sign of the cross-elasticity is negative. If X and Y are substitutes, the sign is positive.

The higher the value of the cross-elasticity the stronger will be the degree of substitutability or complementarity of X and Y.

### **Determinants of Cross Elasticity**

***Nature of the commodities relative to their uses:*** The main determinant of cross elasticity is the nature of the commodities relative to their uses. If two commodities can satisfy equally well the same need, the cross elasticity is high, and vice versa.

### **Use of Cross Elasticity**

- The cross elasticity is used for the definition of the firms which form an industry.
- It is used in defining whether producers in similar products are in competition with each other. *Econo ball pen* and *Writer ball pen* have a high cross elasticity of demand. The producer of Econo ball pen is thus in competition with the producer of Writer ball pen. If the Econo ball pen company raises its price, it will lose substantial sales to the Writer ball pen producer. Men's shoes and women's shoes have low cross elasticity. Thus a producer of men's shoes is not in close competition with a producer of women's shoes. If the former raises its price, it will not lose many sales to the latter.

### **Review Questions**

1. (a) Explain the following concepts separately
  - (i) Price-elasticity of demand
  - (ii) Income-elasticity of demand
  - (iii) Cross elasticity of demand(b) What are the uses of these concepts of elasticity in the analysis of the market?
2. Explain the concepts of arc and point elasticities of a demand curve for a commodity.
5. What are the determinants of price elasticity of demand?
6. What does price elasticity of demand measure?
7. Explain cross elasticity of demand and income elasticity of demand.

## Lesson-2: Elasticity of Supply

### Objectives

After studying this lesson, you will be able to:

- Explain the elasticity of supply; and
- Determinants of elasticity of supply.

### Introduction

We normally know that if price rises, the supply of the product will be increased. But if we like to know how much supply will be increased with the rise in price, we have to know how responsive of the quantity supplied is to the price of the good. That is, we need to know the elasticity of supply.

The concept of elasticity relates to supply as well as to demand just as elasticity of demand measures the response of quantity demanded to changes in any of its determinants. So, elasticity of supply measures the response of quantity supplied to changes in any of its determinants.

In this section, we only discuss the influence of the commodity's own price on supply - that is, price elasticity of supply.

### Price Elasticity of Supply

The price elasticity of supply measures the responsiveness of the quantity supplied of a commodity to a change in its price. The formula used to

$$E_p^S = \frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}} = \frac{\% \Delta Q_X^S}{\% \Delta P_X}$$
$$= \frac{\Delta Q_X^S / Q_X^{ave}}{\Delta P_X / P_X^{ave}} = \frac{\Delta Q_X^S}{\Delta P_X} \cdot \frac{P_X^{ave}}{Q_X^{ave}}$$

calculate the price elasticity of supply is:

Note that the formula for measuring price elasticity of supply is similar to the formula used in measuring price elasticity of demand. In this formula, the only alternation is the substitution of *percentage change in quantity supplied* for *percentage change in quantity demanded*. As in the elasticity of demand formula, the mid-point of the changes in quantity supplied and price are used in calculation. The sign of the coefficient of the elasticity of supply is always positive because the supply curves are positively sloped - that is, direct relation exists between price and quantity supplied.

### Magnitude of the Price Elasticity of Supply

There are two extreme cases of price elasticity of supply:

- If the quantity supplied is fixed regardless of the price, the supply curve is vertical and the elasticity of supply is zero. Supply is perfectly inelastic. This would be the case, for example, if suppliers produce a given quantity and dump it on the market for whatever it would bring.
- If there is a price at which suppliers are willing to sell any quantity demanded, the supply curve is horizontal and the elasticity of supply is infinite. Supply is perfectly elastic.

- If the percentage increase in quantity supplied exceeds the percentage increase in the price, the elasticity of supply is greater than 1 but less than infinity. Supply is elastic.
- If the percentage increase in the quantity supplied is less than the percentage increase in the price the elasticity of supply is less than 1 but greater than zero. Supply is inelastic.

### **Determinants of Price Elasticity of Supply**

In the previous section, we have learnt that the magnitude of the price elasticity of supply varies from zero to infinity. Now we will know, what things determine the magnitude of the price elasticity of supply? The following factors are the main determinants:

**Factor substitution possibilities:** If any goods or services are produced by using unique or rare factors of production, these goods or services have low elasticity of supply. For example, Banaroshi Shari of Mirpur is produced by a unique type of labour. No other factor of production can be substituted for this labour. For this reason, even if the demand for this item increases, it is almost impossible to increase the production of this item. So, the supply curve of Banaroshi Shari of Mirpur is almost vertical and its elasticity is about zero.

At the other extent, if any goods and services are produced by using factors of production that are more common and that can be calculated to a wide variety of alternative tasks. Such items have a high elasticity of supply. For example, wheat can be grown on land that is almost equally good for growing paddy. So it is just as easy to grow wheat as corn, and the opportunity cost of wheat in terms of forgone paddy is almost constant. As a result, the supply curve of wheat is almost horizontal and its elasticity is very large.

Similarly, when a good is produced in many different countries (for example, sugar and beef), the supply of the good is highly elastic.

### **Review Questions**

1. What is price elasticity of supply?
2. Describe the determinants of price elasticity of supply.



# PRODUCTION, COST AND SUPPLY



## Highlights

- ❑ Defining the Concept of Production
- ❑ Total, Marginal and Average Product Curves
- ❑ Short-run and Long-run Product Curves
- ❑ Total, Marginal Cost and Average Cost Curves
- ❑ Short-run and Long-run Cost Curves
- ❑ Laws of Returns



## Lesson 1: Concepts Related to Production

### Objectives

After studying this lesson, you will be able to:

- State the meaning of production in Economics;
- State the nature of short-run and long-run production functions;
- Define equal product curve and state its characteristics;
- State how the least cost combination of factors is obtained; and
- Show returns to scale with the help of equal product curves.

### Meaning of Production

In popular language, the term *production* is used to mean creation of a new commodity or a service. In Economics, production means creation of new utility. The law of indestructibility of matters in physics states that human beings cannot create or destroy matters. She/he can only change the shape of matters so that these transformed matters satisfy human wants. In other words, a human being creates new utility by rendering her/his services. Suppose a person gets a piece of wood, free of cost, from her/his friend. As long as the piece of wood lies unused in his courtyard, it will not be a production activity. The person hires a carpenter who puts her/his services on the piece of wood to change it to an item of furniture.

The carpenter creates new utility by changing the piece of the wood to the shape of a furniture item. Thus, the carpenter produces a commodity which satisfies human wants. There are four factors of production - land, labour, capital, and entrepreneur. The owners of land, labour, and capital and the entrepreneur get rent, wages, interest income and profit respectively as their remunerations. The entrepreneur organizes the production activities. She/he buys a piece of land, hires the workers and borrow the necessary capital from the financial institutions for investing in her/his production firm. Her/his ultimate objective is to maximize her/his profit which can be defined as the difference between total revenue and total cost. A production firm generally consists of a few production plants; each production plant in turn consists of one production unit with one big furnace, machinery and equipments. The collection of all firms producing one commodity is called an industry. For example, the sugar industry in Bangladesh consists of all production firms engaged in producing sugar.

### Production Function

A production function is a technical relationship between the inputs of production and output of the firm; the relationship is such that the level of output depends on the levels of inputs used, not vice versa. A production function is traditionally expressed by the following equation:

$$Q = f(K, L)$$

where,

Q = the level of output

f = the symbol of relationship, which is determined by the production engineers.

K = the amount of capital

L = the amount of labour

A production function may be a short run or a long run production function depending on the period of time. In a short run production function, at least one input of production cannot be changed. In a long run production function, all inputs of production can be changed. Short run does not specify a specific period of time; it depends on the nature of the commodity in question. It may be six months for one commodity and one year for another commodity, etc. The inputs of production consists of raw materials that a particular firm buys to use in the production process and the inputs may be the commodities produced by other firms.

### The Short-run Production Function

In the case of short run production function, at least one input cannot be changed. For example, the firm owner increases her/his production level by hiring more labour and by buying more raw materials if the demand for her/his commodity increases in the short run. She/he cannot add a new production plant in the short run, because it takes some time to erect a new building, to buy machinery and other fixed inputs in the short run. Even if she/he can add another production unit, she/he would not do so, because the increase in the demand for his commodity may be very much transitory. Whatever be the cause, some factors of production would remain fixed in the short run.

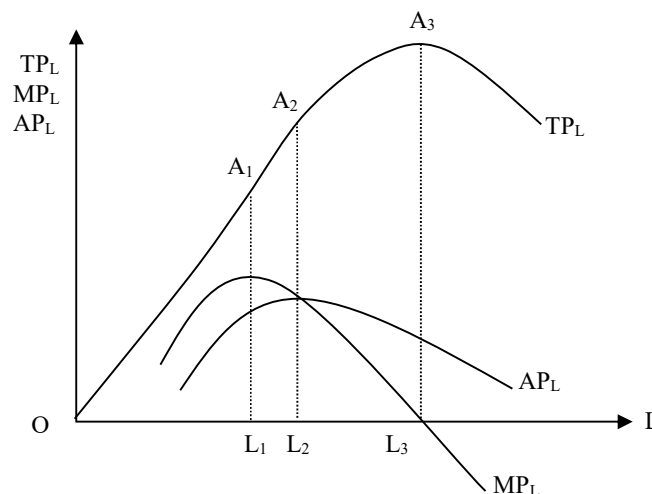
Symbolically, a short run production function can be expressed as follows:

$$Y = f(K^0, L)$$

Where,

$K^0$  means fixed level of capital.

Suppose there are two factors of production, capital (K) and labour (L). Also suppose capital is fixed in the short run. We are interested to examine how total, average, and marginal product would be affected if we keep increasing the level of labour input. The following diagram shows the behaviour of total, average, and marginal product curves in the short run.



**Figure 5.1: Total, average and marginal product curve in the short-run**

In Figure 5.1, we measure productivity along the vertical axis, and quantity of labour along the horizontal axis. The TP curve in the diagram shows how total product behaves if we increase the quantity of labour keeping the quantity of other factors fixed in the short run. It is evident that total product increases at an increasing rate initially. It starts increasing at a decreasing rate after point  $L_1$  along the horizontal axis and after  $A_1$  along the TP curve. Total product becomes the maximum when  $OL_3$  amount of labour is used. Then it starts diminishing. Marginal product increases as long as total product increases at an increasing rate. Marginal product becomes the maximum at the inflection point where total product starts increasing at a decreasing rate. Marginal product becomes zero when total product is the maximum. Marginal product remains negative as long as total product diminishes. Average product increases initially upto point  $L_2$  along the horizontal axis and upto point  $A_2$  along the TP curve. It begins to fall after  $OL_2$  amount of labour. It should be noted that average product can never be zero or negative.

### Law of Variable Proportions

Depending on the nature of various product curves, the economists have divided the diagram in Figure 5.1 into three parts on the basis of quantity of labour used in the production process. These three regions are O-  $L_2$ ,  $L_2$ -  $L_3$ ,  $L_3$  - infinite. The first region is called the region of increasing returns, because marginal productivity of the variable input increases here. The producer will not stop here. The second region,  $L_2$ -  $L_3$ , is known as the region of diminishing returns, because marginal productivity diminishes in this region. The entrepreneurs find that increased doses of labour applied to a fixed quantity of other inputs result in decreasing amount of marginal products. Diminishing returns are frequently found in agricultural production functions. The second stage is also called the economic stage, because the entrepreneur produces at some point in this stage. The point of production, of course, depends on the prices of the two inputs, the variable input and the fixed input. For example, the producer will produce at  $OL_2$  if the fixed input is free but the variable input is not free. Similarly, the producer will produce at  $OL_3$  if the variable input is free but the fixed input is not free. She/he will produce at some point in the second stage if both the inputs are not free. The third stage is called the stage of negative returns. The producer will not produce in this stage, because the marginal product of the variable input is negative here. In this case, the producer can increase her/his total product by withdrawing labour from production process. Some economists call this the stage of disguised unemployment. Labour used at this stage seems to be employed but their employment decreases total output rather than increasing it. Total product in the short run is also called returns to variable proportions. The ratio of variable input to fixed inputs changes when quantity of variable input increases with the quantity of other factors remaining the same.

### The Long Run Production Function

In a long run production function, all factors are variable. The factors, however, can be varied in two ways. We can vary all factors of production proportionately so that the initial ratio of the two inputs remains constant. Alternatively, the two inputs can be varied by changing the initial ratio between them. Let us examine how total product changes when we increase all factors of production at the same rate. Total product and the inputs may increase at the same rate. This is the case of constant returns to scale. Total

product may increase at a rate higher than the rate at which the inputs increase. This is the case of increasing returns to scale. Finally, the rate of increment of total output may be less than the rate of increment of inputs. That is the case of decreasing returns to scale. The following table illustrates the three cases of returns to scale clearly.

| Step | Capital<br>K | Labour<br>L | Capital-labour<br>ratio<br>K/L | Total output |
|------|--------------|-------------|--------------------------------|--------------|
| 1    | 10           | 20          | $10/20 = \frac{1}{2}$          | 100          |
| 2    | 20           | 40          | $20/40 = \frac{1}{2}$          | 300          |
| 3    | 40           | 80          | $40/80 = \frac{1}{2}$          | 600          |
| 4    | 80           | 160         | $80/160 = \frac{1}{2}$         | 1000         |

It is evident from the table that we change all factors of production keeping the ratio of capital (K) to labour (L) always equal to half. From step 1 to step 2, we double both the factors, capital and labour. Total product however, becomes more than double. It is a case of increasing returns to scale. From step 2 to step 3, total output and the two inputs increase at the same rate - all double in step 3. We have constant returns to scale here. From step 3 to step 4, total product becomes less than double though the inputs double in step 4. The final case shows decreasing returns to scale. It should be noted that production functions showing any kind of returns to scale are known as homogeneous production functions. We must use equal product curves in order to show returns to scale diagrammatically. At the end of this lesson returns to scale will be shown by equal product curves.

## Equal Product Curves and Budget Lines

### Equal Product Curve

An equal product curve is the locus of different combinations of two inputs that can produce a give level of output. It should be noted that an equal product curve is very much similar to an indifference curve. An indifference curve consists of different combinations of two commodities. An indifference curve represents the same level of satisfaction at all points on it; an equal product curve shows the same level of output at all points on it. There is one difference between two: the given level of satisfaction cannot be quantified in the case of indifference curve whereas the given level of output can be quantified in the case of an equal product curve. The following figure shows an equal product curve.

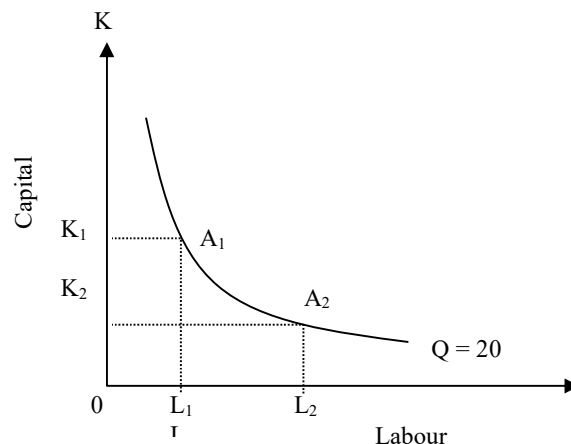


Figure 5.2: Equal product curve

In Figure 5.2, we measure quantity of capital (K) along the vertical axis and the quantity of labour (L) along the horizontal axis.  $Q = 20$  is an equal product curve showing the different combinations of two inputs capable of producing 20 units of output. For example, both combination  $A_1$  with  $OK_1$  units of capital and  $OL_1$  units of labour and combination  $A_2$  with  $OK_2$  units of capital and  $OL_2$  units of labour can produce 20 units of output. The other points on  $Q = 20$  are also capable of producing 20 units of output.

### ***Characteristics of Equal Product Curve***

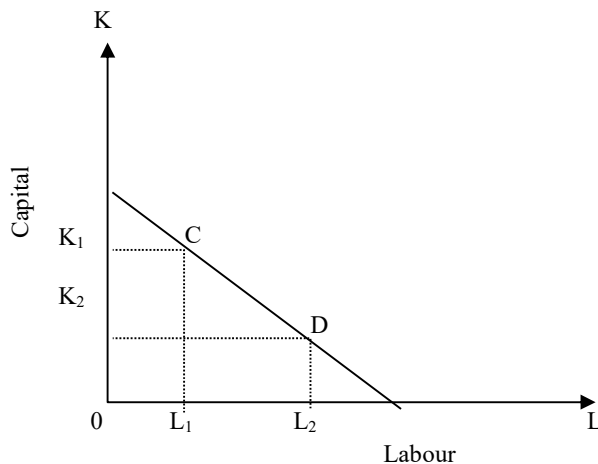
Equal product curves possess characteristics similar to those of indifference curves. These are cited below:

- ❑ Equal product curves are downward sloping;
- ❑ Equal product curves are convex to the origin;
- ❑ Two equal product curves cannot intersect each other; and
- ❑ A higher level of equal product curve indicates higher level of output.

Let's now discuss the concept of budget line in production analysis.

### **Budget Line or Iso-Cost Line**

A budget line in production analysis shows the different combinations of two inputs that a firm owner can buy with a given amount of money and given prices of two inputs. Figure 5.3 shows a budget line with capital measured along the vertical axis and labour along the horizontal axis.



**Figure 5.3: Budget line or Iso-Cost Line**

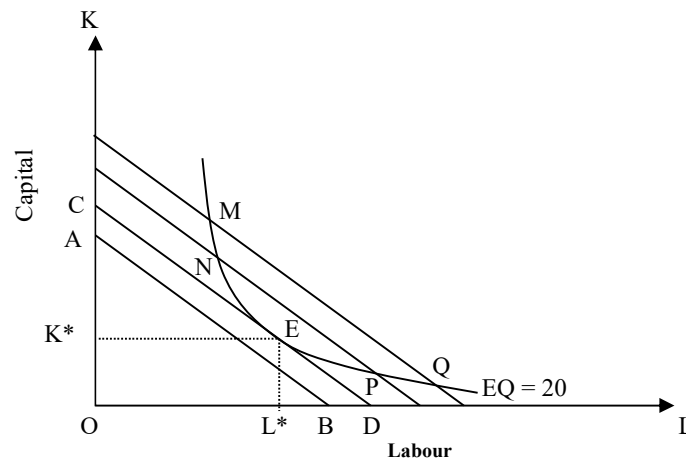
The combination C with  $OK_1$  of capital of  $OL_1$  of labour costs as much as the combination D with  $OK_2$  of capital and  $OL_2$  of labour. All other points on the budget line cause the firm owner to spend the same amount of money.

### **Least Cost Combination of Factors**

The ultimate objective of a firm owner is to maximize her/his profit. This can be done in two steps. First, the entrepreneur minimizes the cost of producing a given level of output. Second, she/he maximizes the total revenue by selling her/his product. The following analysis explains how a producer

minimizes the cost of producing a given level of output when the prices of two inputs are given. Figure 5.4 illustrates the minimization problem.

The producer wants to minimize the costs of producing 20 units of output shown by the equal product curve  $Q = 20$ . The producer can obtain 20 units of output by producing at points M, N, P and Q, because these points are located on her/his equal product curve  $Q = 20$ . The producer, however, will not produce at M, N, P and Q, because these points lie on higher budget lines. A higher budget line means higher level of cost. Her/his cost of producing 20 units of output will be minimum at point E at which the budget line is tangent with the equal product curve. At point E the entrepreneur uses the least cost combination of  $K^*$  units of capital and  $L^*$  units of labour.



**Figure 5.4: Least-cost combination of factors**

Her/his minimum cost is given by the budget line CD. She/he would like to go to budget line AB, but she/he cannot produce 20 units of output by going to budget line AB. Thus, geometric condition for minimum cost is that at the least cost combination, the equal product curve must be tangent with the budget line. We can formalize the necessary and sufficient conditions for cost minimization as follows:

***Necessary Condition:***

$$P_L/P_K = MP_L/MP_K$$

Where,

$P_L$  = Price of labour input

$P_K$  = Price of capital input

$MP_L$  = Marginal productivity of labour

$MP_K$  = Marginal productivity of capital

***Sufficient Condition:***

At the least cost combination, the equal product curve must be convex to the origin.

### Review Questions

1. What is a production function? Distinguish between short-run and long-run production functions.
2. Explain the concepts of total product, average product, and marginal product. How are they related to one another?
3. With the help of a diagram, explain the behaviour of total product, average product, and marginal product in the short run.
4. State and explain the law of variable proportions. Why is the second stage of production called the economic stage?
5. Explain the following condition:  $PL / PK = MPL / MPK$
6. What is returns to scale? Distinguish among increasing returns to scale, constant returns to scale, and decreasing returns to scale.
7. Why does a rational producer not operate in the first and third stages of production?
8. What is meant by increasing returns, diminishing returns, and negative returns in the short-run production process?

## Lesson-2: Short-run and Long-run Cost Curves

### Objectives

After studying this lesson, you will be able to:

- Derive the different short-run cost curves;
- State the nature of different short-run average cost curves;
- Derive the different long-run cost curves; and
- State the nature of different long-run cost curves.

### Derivation of Short-Run Cost Curves

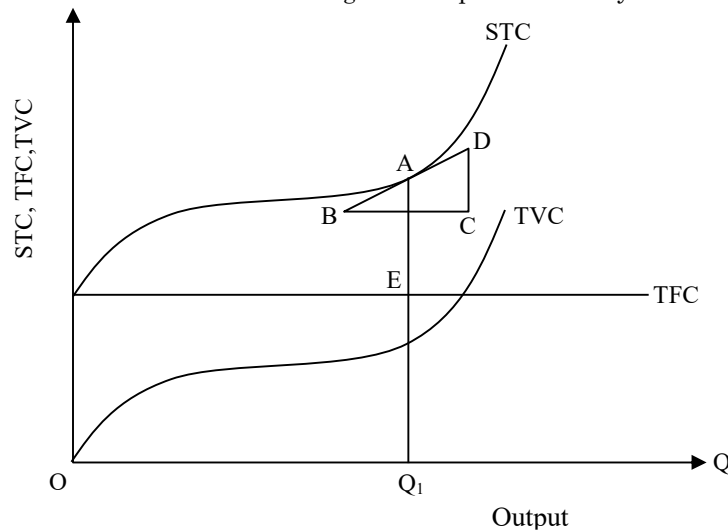
A firm owner has to incur costs when she/he undertakes production activities. She/he has to pay rent to the landowner, wages to the labour, and interest to the owner of capital. In other words, she/he has to buy her/his raw materials to be used in the production process. The nature of cost of production depends on two things, viz., (a) the physical conditions of production and the input prices and (b) the period of time.

In the production analysis, we defined short run as a period of time in which certain types of inputs cannot be changed regardless of the level of output. At least one input must be fixed in the short run. The usage of the variable inputs, however, can be changed in the short run. In the long run, on the other hand, all inputs can be varied to obtain the minimum cost of production. The amount of money spent for fixed inputs are short-run fixed cost. The various fixed inputs have unit prices. The fixed explicit cost is simply the sum of unit prices multiplied by the fixed number of units used. In the short run, implicit costs are also fixed. Thus, it is an element of fixed cost. Total fixed cost (TFC) is the sum of the short-run explicit fixed cost and the implicit cost incurred by an entrepreneur. Variable inputs in the short run give rise to variable cost. The entrepreneur has to increase the usage of the variable inputs if she/he wants to increase her/his output level in the short run. As a result, total variable cost (TVC) increases when output level increases. If there is zero output, no units of the variable input need to be employed. Variable cost is zero and total cost is equal to fixed cost at the zero level of output. Total variable cost is the sum of the amounts spent for each of the variable inputs used. The short-run total cost (STC) is the sum of total variable cost and total fixed cost. It is shown by the following equation:

$$STC = TFC + TVC$$

An explanation of different types of the short-run cost curves is given in Figure 5.6.

In Figure 5.6, we measure output level along the horizontal axis and different types of cost along the vertical axis. The horizontal line marked TFC shows that total fixed cost does not depend on the level of output; it is fixed at all levels of output. The curve STC shows how short-run total cost increases with the level of output. The gap between short-run total cost (STC) and total fixed cost (TFC) measures the total variable cost (TVC) of production. It can easily be seen from the figure that both STC and TVC increase at a decreasing rate initially when output level increases, and then both increase at an increasing rate. The shape of STC derives from the shape of the short-run total product curve; the shape of STC is just the opposite of the shape of the short-run total product curve. We know that the short-run total product curve increases at an increasing rate and then it increases at a decreasing rate.



**Figure 5.6: Different types of short-run cost curves**

If we divide short-run total cost (STC), total variable cost (TVC), and total fixed cost (TFC) by the level of output, we obtain short-run average total cost SATC, short-run average variable cost (SAVC) and short run average fixed cost (SAFC) respectively. The relations are shown below:

$$\text{SATC} = \text{STC}/Q$$

$$\text{SAVC} = \text{TVC}/Q$$

$$\text{SAFC} = \text{TFC}/Q$$

$$\therefore \text{SATC} = \text{STC}/Q = (\text{TVC} + \text{TFC})/Q = \text{TVC}/Q + \text{TFC}/Q = \text{SAVC} + \text{SAFC}$$

Short-run marginal cost is defined as the change in short-run total cost due to one unit change in output.

$$\text{SMC} = \Delta \text{STC} / \Delta Q = \Delta \text{TVC} / \Delta Q$$

Alternatively, the average cost curves can be derived geometrically from the STC and TFC curves. First, we find the values of SAC, SAVC, SAFC, and SMC at a particular level of output like  $Q_1$  along the horizontal axis. Then we find these values at all levels of output. Finally, by plotting these values, we get the different types of average cost curves. For example, we are interested in finding the values of SAC, SAVC, SAFC, and SMC at output level  $Q_1$  in Figure 5.6. SATC at  $Q_1$  is found by dividing total cost,  $Q_1A$ , by the level of output,  $Q_1$ . SAFC is equal to total fixed cost,  $Q_1E$ , divided by the level of output,  $Q_1$ . Finally, SMC is calculated as the value of the slope of the tangent at point A, which is equal to DC divided by BC.

### **Nature of Short-run Average Cost Curves**

Short-run average total cost SATC is the sum of short-run average fixed cost (SAFC) and short-run average variable cost (SAVC).

$$\text{SATC} = \text{SAFC} + \text{SAVC}$$

SAFC declines continuously when the level of output increases, because the quotient  $\text{TFC}/Q$  falls continuously with increasing units of output. SAFC is a rectangular hyperbola approaching both axes asymptotically. SAVC is normally U-shaped, falling initially as output level increases. It reaches a minimum value at a certain level of output and starts rising after that.

### **Why is Short-run Average Variable Cost Curve (SAVC) U-shaped?**

There are two explanations for the U-shape of SAVC:

**First**, SAVC is related to average productivity of the variable input in the short run. We know that SAVC is equal to TVC divided by Q:

$$\text{SAVC} = \text{TVC}/Q$$

But TVC is nothing but the of product price of the variable input and quantity of the variable input. Assuming labour to be our variable input, we can write SAVC as follows:

$$\text{SAVC} = \text{TVC}/Q = P_L L/Q = P_L/(Q/L) = P_L/AP_L$$

Where,

$P_L$  = Price of labour

$L$  = Quantity of labour

$Q$  = Output level

$AP_L = Q/L$  = Average productivity of labour

SAVC is found to be the reciprocal of average productivity of labour if we assume that price of labour does not depend on the level of employment. We know that the average productivity curve is inverted U-shaped in the short run. Hence the SAVC curve is U-shaped in the short run.

**Second**, in the short run certain inputs are fixed. Each fixed input needs a certain number of labour force for its optimum utilization. We assume that the number of labour force applied to each fixed input in the short run increases gradually starting from zero. Initially, a small number of labour input is applied to the fixed input. Average productivity is, therefore, low and short run average variable cost is high at the initial stage. Average productivity of labour starts rising as the number of labour input increases. As a result, SAVC starts falling. As the number of variable input, labour, keeps increasing, average productivity of labour becomes maximum when the fixed inputs are put to optimum their utilization. Corresponding to this point of labour employment, SAVC becomes the minimum. If we increase the number of labour force beyond the optimum utilization point, average and marginal productivity of labour start falling due to mismanagement and chaotic conditions prevailing in the firm. Consequently, SAVC starts rising after the optimum utilization points of the fixed inputs. This ends the explanation of the U-shape of SAVC.

### **Why Is Short-run Average Total Cost Curve (SATC) U-shaped?**

The shape of short run average total cost SATC curve depends on the shapes of SAFC and SAVC. Initially SATC falls because both SAFC and SAVC fall initially. SATC continues to fall even when SAVC starts rising after its minimum point. This happens, because the rate of fall of SAFC is greater than the rate of rise of SAVC. After some units of output, the rate of rise of SAVC becomes greater than the rate of fall of SAFC.

From that point, rise in SAVC offsets the fall in SAFC. As a result, SATC starts rising with the increase in the level of output.

The preceding discussion explains why SATC is also U-shaped. Like SATC, short-run marginal cost (SMC) curve is also U-shaped. SMC derives its

shape from the shape of short-run marginal productivity curve. The following equation shows how SMC and marginal productivity ( $MP_L$ ) are related to each other.

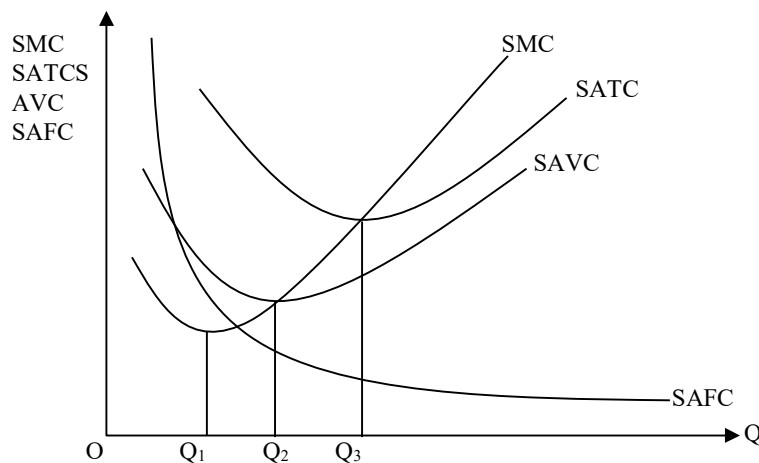
$$SMC = \Delta STC / \Delta Q = \Delta (L \cdot P_L) / \Delta Q = P_L / (\Delta Q / \Delta L) = P_L / MP_L$$

If we assume  $P_L$  to be fixed regardless of the level of employment, we find SMC to be the reciprocal of  $MP_L$ . Since  $MP_L$  curve is inverted U-shaped, SMC curve will be U-shaped.

Now let's explain how short-run marginal cost (SMC) curve is related to SAFC, SAVC and SATC curves.

### Relationship Among Short-run Average Cost Curves

It should be noted that SMC has no relationship with TFC and hence with SAFC. SMC is less than SAVC as long as SAVC continues to fall in the initial stage. SMC equals SAVC at the minimum point of SAVC. SMC is greater than SAVC as long as SAVC continues to rise. Similar relationship holds between SMC and SATC. SMC is less than SATC as long as SATC



**Figure 5.7: Short-run average cost curves**

decreases, the two become equal at the minimum point of SATC and SMC remains greater than SATC as long as SATC increases. Figure 5.7 shows the different types of short-run average cost curves.

In the Figure 5.7, we measure different types of costs along the vertical axis and the level of output along the horizontal axis. It is evident from the Figure 5.7 that SAFC declines continuously and becomes asymptotic to the horizontal axis as the level of output increases. SAFC is also measured by the gap between SATC and SAVC. The gap is very large initially and narrows down as SAVC becomes asymptotic to SATC as Q increases. SAVC declines initially and becomes minimum at  $Q_2$  level of output. It begins to rise after  $Q_2$ . The SATC curve falls initially to its minimum at output level  $Q_3$ , and it starts rising after that. Both the SATC and SAVC curves are U-shaped for reasons discussed earlier. The SMC curve is also U-shaped, falling initially to  $Q_1$  level of output and then starts rising. The SMC curve cuts the SAVC and SATC curves at their minimum points corresponding to  $Q_2$  and  $Q_3$  levels of output, respectively.

### Derivation of Long-run Cost Curves

In the long run, all inputs are variable. The firm can increase its output level by changing production plants in the long run. There is no fixed input and hence no fixed cost in the long run. Hence the long-run total cost curve starts from the origin indicating that total cost is zero when output is zero. Moreover, it can be shown that the long-run total cost curve is an envelope of the short-run total cost curves, the firm owner faces a new short run total cost (STC) curve when she/he changes production plant, she/he can reduce total cost of production by changing production plants and STCs.

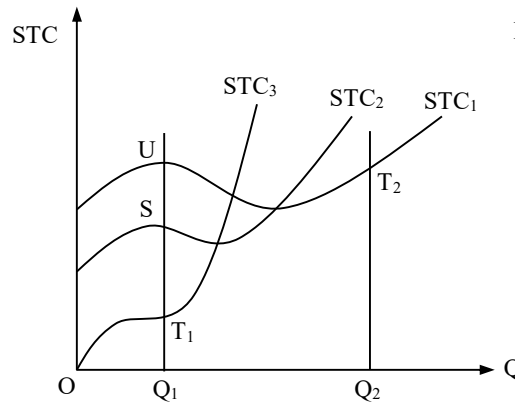


Figure 5.8

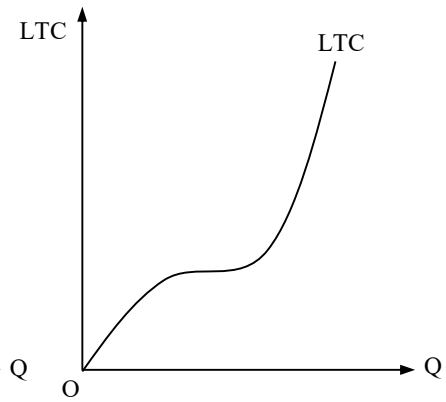
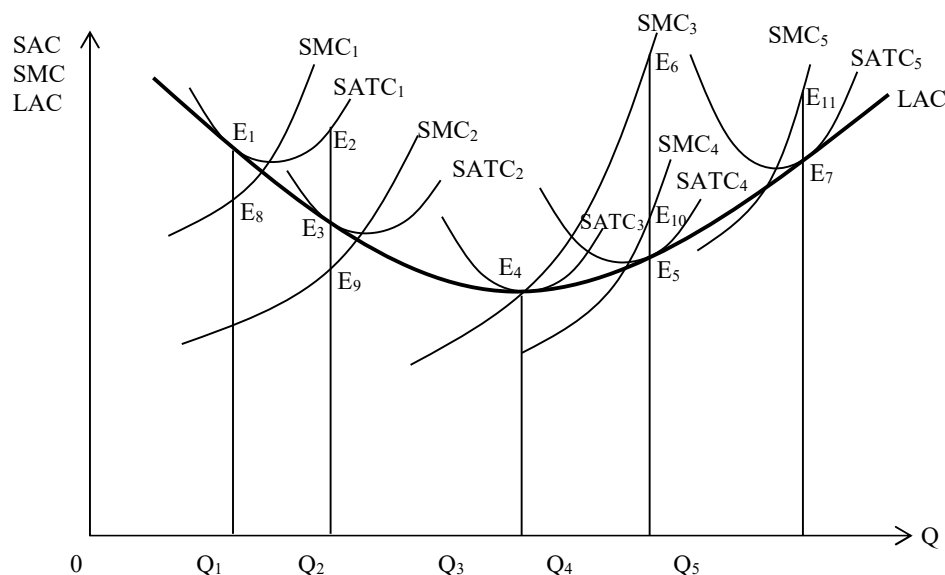


Figure 5.9

In Figure 5.8, we showed three STC curves for three plants. If the entrepreneur wants to produce  $Q_1$  level of output, she/he can use one of the three production plants. Her/his total cost of production is  $Q_1U$  with plant-1,  $Q_1S$  with plant-2 and  $Q_1T$  with plant-3. Her/his minimum total cost is  $Q_1T_1$  with plant-3. By joining minimum cost points like  $T_1$  and  $T_2$ , we obtain the long-run total cost curve (LTC) which starts from the origin as shown in Figure 5.9. Like STC, LTC also increases at a decreasing rate initially and then it increases at an increasing rate.

### Derivation of Long-Run Average and Marginal Cost Curves

It can be shown that long-run average cost (LAC) curve is also an envelope of short-run average cost (SAC) curves. It is true, because, the producer can lower the average cost of production by changing production plants in the long run. Figure-5.10 shows the derivation of LAC from a number of SATC curves.

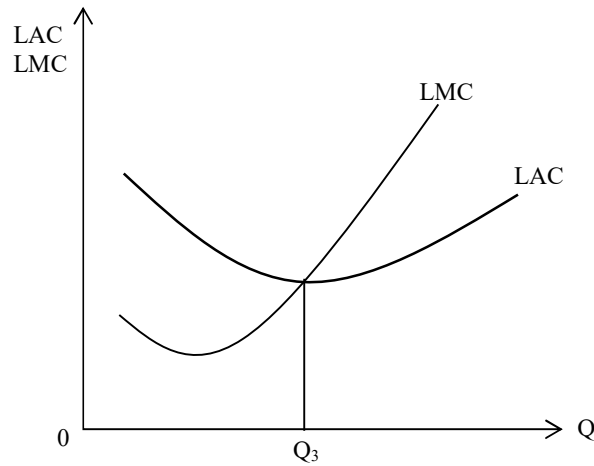


**Figure 5.10: Derivation of long-run average cost curve (LAC)**

In Figure 5.10, we measure short-run costs along the vertical axis and level of output along the horizontal axis. In this diagram, we show five short-run average total cost (SATC) curves, each representing one production plant. The SATC curves have been numbered according to the number of production plants. Suppose the producer produces  $Q_1$  level of output with production plant-1. The producer wants to increase his production level to  $Q_2$ , which he can produce using his old plant-1 or using the new plant-2. Her/his average cost of production is  $Q_2E_2$  in plant-1 and  $Q_2E_3$  in plant-2. Her/his will use plant-2 since his average cost of producing  $Q_2$  level of output is lower in plant-2 ( $Q_2E_3 < Q_2E_2$ ). Similarly, she/he will produce  $Q_3$  level of output using plant-3. Her/his average cost of production of  $Q_4$  level of output will be lower if she/he uses plant-4 instead using plant-3 ( $Q_4E_5 < Q_4E_6$ ). She/he will use plant-5 for producing  $Q_5$  level of output. By joining the points of minimum average cost like  $E_1$ ,  $E_3$ ,  $E_4$ ,  $E_5$  and  $E_7$ , we get the long-run average cost (LAC) curve. It is easily seen that the long-run average cost of production will be minimum if the producer produces  $Q_3$  level of output using plant-3. The plant giving rise to long-run minimum average cost is known as the optimum plant, which is plant-3 in Figure 5.10. We also notice that LAC is tangent to the SATC curves in their falling portions to the left of the optimum plant. LAC is tangent to the SATC curves in their rising portions to the right of the optimum plant. At the long run minimum cost level of output  $Q_3$ , the LAC curve is tangent to the SATC curve at its minimum point. It should be noted here that like SATC, LAC curve is also U-shaped, though it is flatter than the SATC curve. Unlike the LAC curve, the long-run marginal cost curve is not the envelope of the short-run marginal cost (SMC) curves. We know that there is a short-run marginal cost curve corresponding to each short-run average cost curve. We find the short-run marginal cost of each level of output produced in the long run. We obtain the long run marginal cost (LMC) curve by joining the points showing short-run marginal cost of producing the different levels of output in the long run. For example, the short-run marginal cost is  $Q_1E_8$  for  $Q_1$ ,  $Q_2E_9$  for  $Q_2$ ,  $Q_3E_4$  for  $Q_3$ ,  $Q_4E_{10}$  for  $Q_4$  and  $Q_5E_{11}$  for  $Q_5$  level of output. We obtain the LMC curve by

joining the points like  $E_8$ ,  $E_9$ ,  $E_4$ ,  $E_{10}$  and  $E_{11}$ . In Figure 5.11, we show both the LAC and LMC curves derived in Figure 5.10.

We observe that LMC is less than LAC as long as LAC continues to fall. LMC is equal to LAC at the minimum point of LAC curve LMC is greater than LAC as long as LAC continues to rise.



**Figure 5.11: Long-run average and marginal cost curves**

### Review Questions

1. Derive different short run cost curves? Is there any relation among them?
2. Explain the different nature of short run cost curves.
3. Derive the long run cost curves and explain their natures.

## Market Structure- PERFECT COMPETITION



### Highlights

- ☐ Characteristics of Perfect Competition
- ☐ AR & MR Curves in Perfect Competition
- ☐ Equilibrium of a Competitive Firm
- ☐ Supply Curve of Firm and Industry



## **Lesson 1: Characteristics of Perfect Competition, AR & MR Curves in Perfect Competition**

### **Objectives**

After studying this lesson, you will be able to:

- State the characteristics of perfect competition;
- Describe the shapes of average revenue and marginal revenue curves of a firm; and
- Describe the shapes of average revenue and marginal revenue curves of an industry.

### **Introduction**

A firm owner, popularly known as factory owner, may have different motives when she/ he organizes production activities. For example, she/he may be interested in increasing her/his social status as an industrialist. In Economics, however, profit maximization is identified as the sole motive for undertaking production activities. Profit is the difference between total revenue and total cost of production, both depending on the nature of market. Total revenue is equal to the product of price of the commodity and quantity of the commodity sold. The price which a seller can charge its buyers for his commodity depends on the nature of market. Total cost of production depends, among others, on the prices of inputs of production which in turn are determined by the forces of input market. Total cost of production also depends on the productivity of inputs. The important point is that profit of an entrepreneur depends on the nature of both product market and input market. A study of market structure is, therefore, important to realize the price and output determination process. Economists conceptualize two broad categories of market structures: perfect competition and imperfect competition. In this unit, we undertake the study of the ideal form of market structure which is called perfect competition.

### **Characteristics of Perfect Competition**

The economists' concept of perfect competition is quite opposite of the businessmen's concept of competition. Businessmen would describe the market for tooth paste as highly competitive indicating the rigorous competition among the few brands of tooth paste in the market. This type of market is quite distinct from what the economist calls perfect competition. The concept of perfect competition in Economics is entirely impersonal. The economists always refer to large number of buyers and sellers in perfect competition so that no one seller or no one buyer can exert a perceptible influence on the market price. The market price is determined at the level where aggregate demand from all consumers of the product just equals the aggregate supply of the product from all sellers. Perfect competition is better known as the market of price takers as opposed to the market of price makers. Both the buyers and sellers in perfect competition are price takers. A price taker is a firm or consumer who sells or buys at the given price. If the price of Aman rice is Tk. 16 per Kg. the next door grocer charges the same price of Tk. 16 for each Kilogram of Aman rice sold when the consumer buys 100 Kg. or 1000 Kg. The seller does not give any kind of price rebate whatever be the volume of the sale.

We now turn to a systematic description of the characteristics of perfect competition. It should be noted at this point that all the characteristics of perfect competition ensure price-taking behaviour of firms and buyers.

**Large number of buyers and sellers:** Presence of many buyers and sellers in the market is the most important feature of perfect competition. Because of a large number of buyers and sellers, each buyer buys and each seller sells a very small fraction of total output sold in the market. Consequently, no single seller or no single buyer can exert a perceptible effect on price. Not only the buyers and the sellers are many in number, but also they are widely scattered all over the country so that they find it difficult to organize themselves into groups. By forming groups or associations, the buyers as a group can claim price rebate. Similarly, the sellers can raise the price of the product by forming guilds of sellers. Because of multiplicity of numbers and lack of concerted pressure, no single seller or no single buyer can exert a perceptible effect on the price of the product. If a seller charges a higher price than her/his rivals, she/he loses customers. Though a seller cannot sell at a price higher than the market price, why cannot he sell at a lower price? He cannot sell at lower price because by doing so he incurs unnecessary loss - he can sell all of his product at the market price.

**Homogeneous product:** All the firms in perfect competition produce and sell identical product. Product of one firm cannot be distinguished from the product of another firm. If the product of one firm can be differentiated from the product of other firms by any means, the said firm may have some fixed customers who will be willing to pay even a higher price for their preferred product. Since the product in perfect competition is homogeneous the question of paying a different price for the product of any firm does not arise.

**No barriers to entry or exit:** Perfectly competitive firms face no barriers in moving into and leaving the industry in three senses. Industry is a collection of all firms producing a homogeneous product. A firm is production unit comprising one or more production plants which is independent in decision making.

First, firms from other industries or new firms can enter into the industry if existing firms make supernormal profit. Similarly, some of the losing firms may leave the industry in the long run. Second, barriers to entry might arise due to economic reasons. New firms may be prevented from entering into an industry due to the existence of patent laws and other legal barriers. Economies of scale enjoyed by large firms prevent other firms from entering into the industry because entry of new firms would cause average cost of production to rise and to drive away the small firms. Cost of providing funds may be high for new firms due to imperfections in the capital markets. These kinds of economic barriers may restrict entry or exit of firms. Third, barriers to entry or exit might arise from immobility of some specific factors of production or when the resources are owned by one firm. It is assumed that such immobility of factors of production or sole ownership of resources does not exist in perfect competition.

**Complete information:** The consumers, producers and resource-owners are assumed to possess perfect knowledge about prices and quality of the commodities and inputs. An ignorant consumer may buy the product at a price higher than the market price. Similarly, the unaware input-supplier may be offered a lower price than the market price of input. The profit maximizing entrepreneur must be fully knowledgeable about both the prices of output and input.

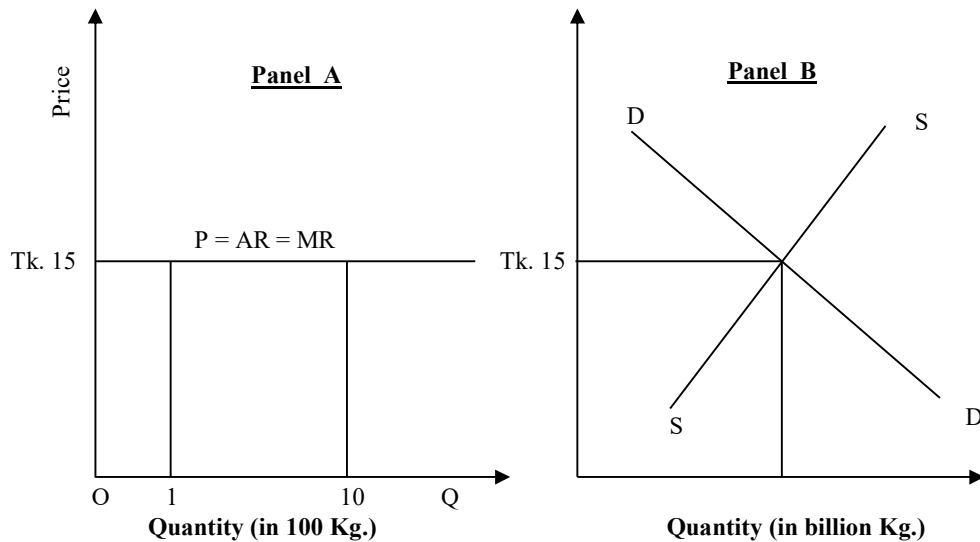
### **The Average Revenue (AR) and Marginal Revenue (MR) Curves of a Competitive Firm**

The total income or total revenue (TR) of a firm is equal to the product of the price of the commodity and the number of units sold:  $TR = P \times q$ . Conversely, the average income or average revenue (AR) is calculated by dividing total revenue by the quantity of output sold:  $AR = TR/q$ . Another related concept is marginal revenue which is defined as the change in total revenue resulting from one unit change in output. For a better understanding of profit maximizing behaviour of a competitive firm, we need to examine what happens to total revenue (TR) when quantity of output sold increases. The curve showing the relationship between total revenue and the quantity of output sold is known as total revenue curve. Similarly, the average revenue curve shows the relationship between AR and Q. Marginal revenue curve shows how marginal revenue changes when quantity of output increases. Our next discussion focusses on the shapes of the TR, AR and MR curves of a competitive firm.

It was mentioned earlier that a competitive firm is a price-taker. Its perception is that it can sell any quantity of output at the given market price. This perception arises, because, the maximum amount of output that an individual firm can produce and sell in the market using all of its production capacity constitutes a very small fraction of aggregate output produced and sold in the market. Consequently, the firm cannot exert any influence on the market price. The following example clarifies this point:

Suppose, the amount of total annual sale of Pajam rice in Bangladesh at a price of Tk. 15 per kg. is ten thousand million kg. A grocer or a farmer cannot charge a price higher than Tk. 15 per kg. for this brand of rice when a buyer buys 100 kg. or 1000 kg. or any other quantity the farmer can sell. The individual firm charges the same price of Tk. 15 for any quantity of the product it can sell. In other words, price or AR of the firm remains fixed at Tk. 15 when quantity of output of sold increases. As a result, the AR curve of a competitive firm becomes a horizontal line at the given market price. Panel A of Figure-6.1 shows the AR curve of a hypothetical competitive firm. In this diagram, price or AR is measured along the vertical axis and quantity sold along the horizontal axis. It can be seen from panel A of the Figure-6.1 that the price of the commodity is Tk. 15 if the firm sells 100 kg or 1000 kg or any other quantity the firm can produce using 100% of production capacity. One question still remains to be answered: How is the market price of Tk. 15 determined? The answer is given in panel B of Figure 6.1. The units of measurements in both the panels of Figure 6.1 are the same along the vertical axes but the units are not, however, the same along the horizontal axes.

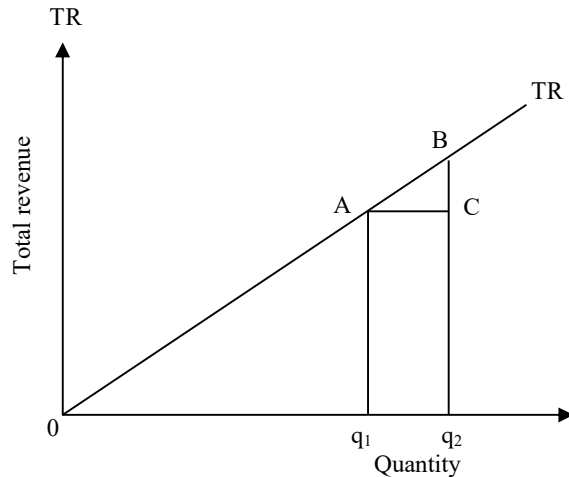
The units are 100 kg. of rice along the horizontal axis of panel A and one billion kg. of rice along the horizontal axis of panel B. The DD and SS curves are aggregate demand curve for and aggregate supply curve of the product respectively. It is shown in Panel B that the market price of Tk. 15 is determined at the intersection point of the aggregate demand and supply curves. We can conclude that the price determined in the market gives the horizontal price or AR curves of the firm.



**Figure 6.1: AR and MR Curves of a Competitive Firm**

Having determined the shape of the AR curve, we now turn to the discussion of the shape of the MR curve of a competitive firm. Marginal revenue is the change in total revenue brought about by sale of one additional unit of output. Since a competitive firm sells all units of output at the same price, the additional total revenue from the sale of one extra unit becomes equal to price. If the firm sells 100 units of output at a price of Tk. 15, the 101st unit is also sold at the same price of Tk. 15. So that the additional revenue from the sale of that last unit of output also becomes Tk. 15. In other words, the MR curve of the firm coincides with the price curve or the AR curve of the firm. This is why the horizontal AR curve in panel A of Figure 6.1 has been labelled as the  $P = AR = MR$  curve.

Finally, we discuss the nature of the total revenue (TR) curve of a competitive firm. Since the competitive firm can sell any quantity of its output at a constant price, its total revenue will increase at a constant rate with the increase in the level of output. The result is that the total revenue curve will be a straight line starting from the origin as shown in Figure 6.2.



**Figure 6.2: TR curve of a competitive firm**

In the figure we measure TR along the vertical axis and quantity of output along the horizontal axis. The shape of the total revenue curve is important because it gives values of AR and MR at a particular level of output of the firm. Average revenue at a particular level of output is given by the slope value of a straight line joining the origin and the point at which a vertical line drawn upward from that particular level of output intersects the TR curve. For example, AR at  $q_2$  is given by the slope of the line segment OB:  $AR = Bq_2 / Oq_2$ . To find MR between two levels of output, we draw two vertical lines from the two levels of output to determine the points at which these vertical lines intersect the TR curve. The slope value of the line segment between these two intersection points gives the MR value. For example, MR between  $q_1$  and  $q_2$  in Figure 6.2 is given by the slope value of line segment AB :  $BC/AC$ .

Since line segment AB is a portion of line segment OB in Figure 6.2, both the line segments will have the same slope value. We come back to the previous conclusion: for a competitive firm both the AR and MR curves coincide with each other.

### Review Questions

1. What is a perfectly competitive firm?
2. What are the characteristics that give rise to such a firm?
3. (a) What is the shape of the demand curve facing a perfectly competitive firm?  
(b) What is implied by such a demand curve?

## Lesson-2: Equilibrium of a Competitive Firm

### Objectives

After studying this lesson, you will be able to:

- State when a competitive firm operates and when it shuts down in the short run ;
- Explain the profit maximizing conditions of a firm;
- State how a competitive firm determines its equilibrium level of output in the short run; and
- State how a competitive firm determines its profit and shut-down point in the short run.

### Short-run Equilibrium of a Competitive Firm

We need to make one additional assumption about the competitive firms and explain one definition before we illustrate the profit-maximizing behaviour of a firm. We assume that all firms in the industry face identical cost conditions so that the short-run and long-run cost curves are the same for all firms. As mentioned earlier, the goal of a competitive firm is to maximize its profit. A firm is said to reach its equilibrium when it maximizes its profit. The term 'equilibrium', often used in physical sciences, refers to a static position of a matter when opposite forces balance each other. A production firm also has no tendency to change its profit maximizing level of output.

A competitive firm makes changes in the level of output until it obtains maximum profit. Since at least one input of production is fixed in the short run, changes in the level of output can be brought about by varying the level of its variable inputs. The firm has to make two decisions in the short run:

- *Under what conditions, is it profitable for the firm to continue its production activities?*
- *If the firm decides to operate, how much output will it produce to maximize its profit?*

The first question is pertinent because in the short run the firm may face market price which is less than short run average variable cost (SAVC) at all levels of output. It implied that the market price is less than minimum average variable cost:  $P < \text{minimum SAVC}$ . Obviously, the firm incurs a loss which is equal to average fixed cost plus a fraction of SAVC. Total loss of the firm equals total fixed cost plus a portion of total variable cost if the firm continues to produce where as total loss equals total fixed cost (TFC) if the firm shuts down. Since the firm's total loss is less if it shuts down than it operates, it is reasonable to shut down when the market price goes below minimum AVC. Conversely, if the market price is greater than the minimum SAVC but less than short-run average total cost (SATC), at some levels of output price will be greater than SAVC. Then total loss of the firm will be less than TFC if the firm operates and greater than TFC if it stops producing. Therefore, a price lying between SATC and the minimum AVC pays the firm to stay in the production process, though it incurs a loss in the short run.

Once a firm has decided to keep its production line busy in the short run, its next task is to decide the profit maximizing level of output when  $P > \text{SATC}$  at all levels of output and to decide the loss minimizing level of output when the minimum  $\text{SAVC} < P < \text{SATC}$ . The profit maximizing or loss minimizing level of output is known as equilibrium level of output since the firm cannot do better by producing any other quantity of output.

### Deciding the Short-run Equilibrium Level of Output

The competitive firm is a price-taker. Moreover, it cannot change the quantity of at least one input in the short run. It can only make changes in the level of output by changing the quantities of the variable inputs until the equilibrium level of output is determined. Suppose, at the initial output level of the firm, market price is greater than SATC so that it can make super normal profit. But the firm is not satisfied with the present level of profit - it wants more profit by increasing its output level. The firm makes a decision rule for itself to follow. It will increase its output by one unit each time if it can earn profit by doing so. It will stop increasing its output level when profit is zero or negative. The firm starts increasing its output level by one unit and finds that the addition to total revenue, known as marginal revenue (MR), is greater than the change in total cost, known as marginal cost (MC). The firm makes super normal profit from such a move and is tempted to increase the level of output further. With the increase in the level of output, MC decreases initially and then it increases whereas MR always remains the same. In the process of increasing its output level by one unit each time, the firm-owner notices that her/his MC is gradually increasing to the level MR. The firm, however, earns supernormal profit as long as MR remains greater than MC and the firm's total profit keeps increasing at that time. In the process, the firm reaches a level of output where MC equals MR, total profit becomes the maximum. Further increase in the level of output will cause MC to be greater than MR yielding negative profit and reducing total profit of the firm. Total profit of the firm thus becomes the maximum when the following two conditions are satisfied:

Necessary Condition:  $MR = SMC$

Sufficient Condition: MC increases at the level of output where  $MR = SMC$ .

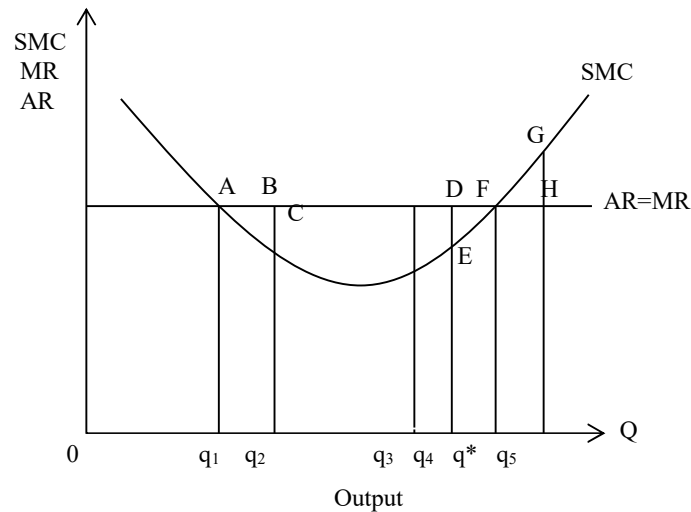
The above conditions of profit maximization are universal and applicable in all market structures. Since in perfect competition  $P = AR = MR$ , the necessary condition can be rewritten as

$$P = AR = MR = SMC$$

In the preceding paragraphs, we have analyzed the economic reasoning underlying the profit maximizing conditions of a competitive firm. Application of these conditions to determine the profit maximizing or loss minimizing quantity of output of a competitive firm can be illustrated with the help of three devices: (i) the graphical method with MR and MC curves; (ii) the tabular method; and (iii) the graphical method with TR and TC curves.

### The Graphical Method with MR and MC curves

The graphical method of determining the profit maximizing level of output with the help of MR and MC curves has been shown in Figure 6.3 with MR and MC measured along the vertical axis and quantity of output along the horizontal axis.



**Figure 6.3: Profit maximization with MR and MC curves**

Suppose, the market price of the commodity is  $P_0$  which the firm accepts as fixed. The horizontal line at price  $P_0$  is virtually the  $AR = MR$  curve of the firm. The SMC curve shows the nature of short-run marginal cost of the firm. Suppose, the firm's initial production level is  $q_3$ . If the firm decides to increase its output level to  $q_4$ , its MR becomes  $q_4D$  but its MC equals  $q_4E$  so that MR exceeds MC. The firm makes supernormal profit of Tk.  $DE$  from the last unit of output and its total profit increases. The firm increases its sale by one unit again to increase its total profit further. The process of increasing output level continues until the firm produces output level  $q^*$  where  $MR = MC$ . The firm earns no profit from the last unit and total profit turns out to be maximum at  $q^*$ . If the firm increases output to  $q_5$ , its MR falls short of MC.  $q_5H < q_5G$ . Profit becomes negative for the last unit of output sold and the firm's total profit decreases from the maximum level. If the initial output level were  $q_5$ , the firm would reduce it  $q^*$ , which is the profit maximizing level of output in the figure. It is easily seen that at  $q^*$ , MR equals MC and MC is increasing in the neighbourhood. At  $q_1$ ,  $MR = MC$  but  $q_1$  is not the profit maximizing level of output. An increase in the quantity of output from  $q_1$  to  $q_2$  leads to a fall in marginal cost from  $q_1A$  to  $q_2B$  when MR remains fixed at the previous level of  $q_1A$ , i.e.,  $q_1A = q_2B$ . Since the firm can make a profit of Tk.  $BC$  by increasing its sale level from  $q_1$  to  $q_2$ ,  $q_1$  cannot qualify as the profit maximizing level of output. It is thus shown that  $MR = MC$  is only the necessary condition, not the sufficient condition, of profit maximization. The sufficient condition requires that the MC curve be increasing in the neighborhood of output level where  $MR = MC$ .

### The Tabular Method

The process of determining the profit maximizing level of output can also be explained with the help of a table similar to that given below. The first

column of the table shows the units of output. It is evident from the first column that the sale of the product is increasing by one unit each time. The price of the product, which is also MR of the firm, is assumed to be Tk. 25 for all units of output as shown in the second column. In the third column, we show MC which falls from an initial high level and then starts rising from a minimum level. The fourth column gives the amount of marginal profit obtained from successive marginal units of output. Satisfaction of necessary condition of profit maximization,  $MR = MC$ , yields zero profit for the marginal unit at the equilibrium point. Only the units before the marginal unit yield positive profits. Though we notice zero profit for the second and 6th units, the second unit cannot be the equilibrium output level. If output level is increased by one additional unit to 3 units, marginal cost decreases to Tk. 20 when MR remains at Tk. 25 so that the third unit brings profit of Tk. 5.

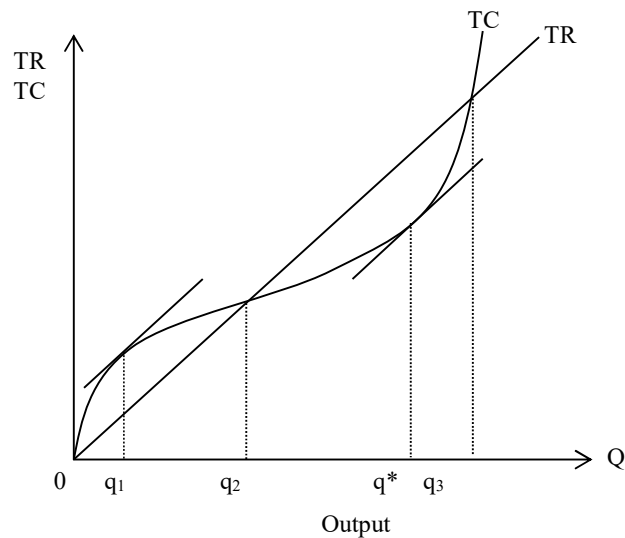
**Table 6.1: Profit maximizing level of output of a competitive firm**

| Unit of output | P=AR=MR<br>(Tk.) | MC(Tk.) | Marginal Profit (Tk.) | Total profit (Tk.) |
|----------------|------------------|---------|-----------------------|--------------------|
| 1st            | 25               | 31      | -6                    | -6                 |
| 2nd            | 25               | 25      | 0                     | -6                 |
| 3rd            | 25               | 20      | 5                     | -1                 |
| 4th            | 25               | 18      | 7                     | 6                  |
| 5th            | 25               | 23      | 2                     | 8                  |
| 6th            | 25               | 25      | 0                     | 8                  |
| 7th            | 25               | 34      | -9                    | -1                 |
| 8th            | 25               | 40      | -15                   | -16                |

Similarly, a profit of Tk. 7 can be earned from the 4th unit. The firm will increase its output level as long as it can earn a positive profit from sale of the last unit of output. At the sixth unit of output, MR equals MC yielding zero profit. It can be easily seen from Table 6.1 that profit becomes negative for output level beyond the sixth unit. Sixth unit of output becomes the profit maximizing level of output where  $MR = MC$ . Moreover, MC is found to increase in the neighbourhood of the sixth unit of output. The fifth column of the table gives the amount of total profit which is calculated by adding the marginal profits of previous units to the marginal profit of the current unit. The maximum profit in this table is found to be Tk. 8 at the sixth unit of output.

### The Graphical Method With TR and TC Curves

Another method of determining the equilibrium level of output uses the total revenue and total cost curves. Figure-6.4 illustrates the use of these curves for finding the profit maximizing level of output. The vertical axis measures TC and TR in taka and the horizontal axis measures the level of output Q. The TR curve shows the changing pattern of total revenue of a competitive firm and the TC curve shows the changing pattern of short-run total cost of a firm when output level increases. Profit is the difference between TR and TC so that the gap between these two curves measures total profit at different output levels. We observe that profit is negative upto  $q_2$ , positive between  $q_2$  and  $q_3$  and again negative after  $q_3$  level of output. The maximum profit is obtained at output level  $q^*$ .



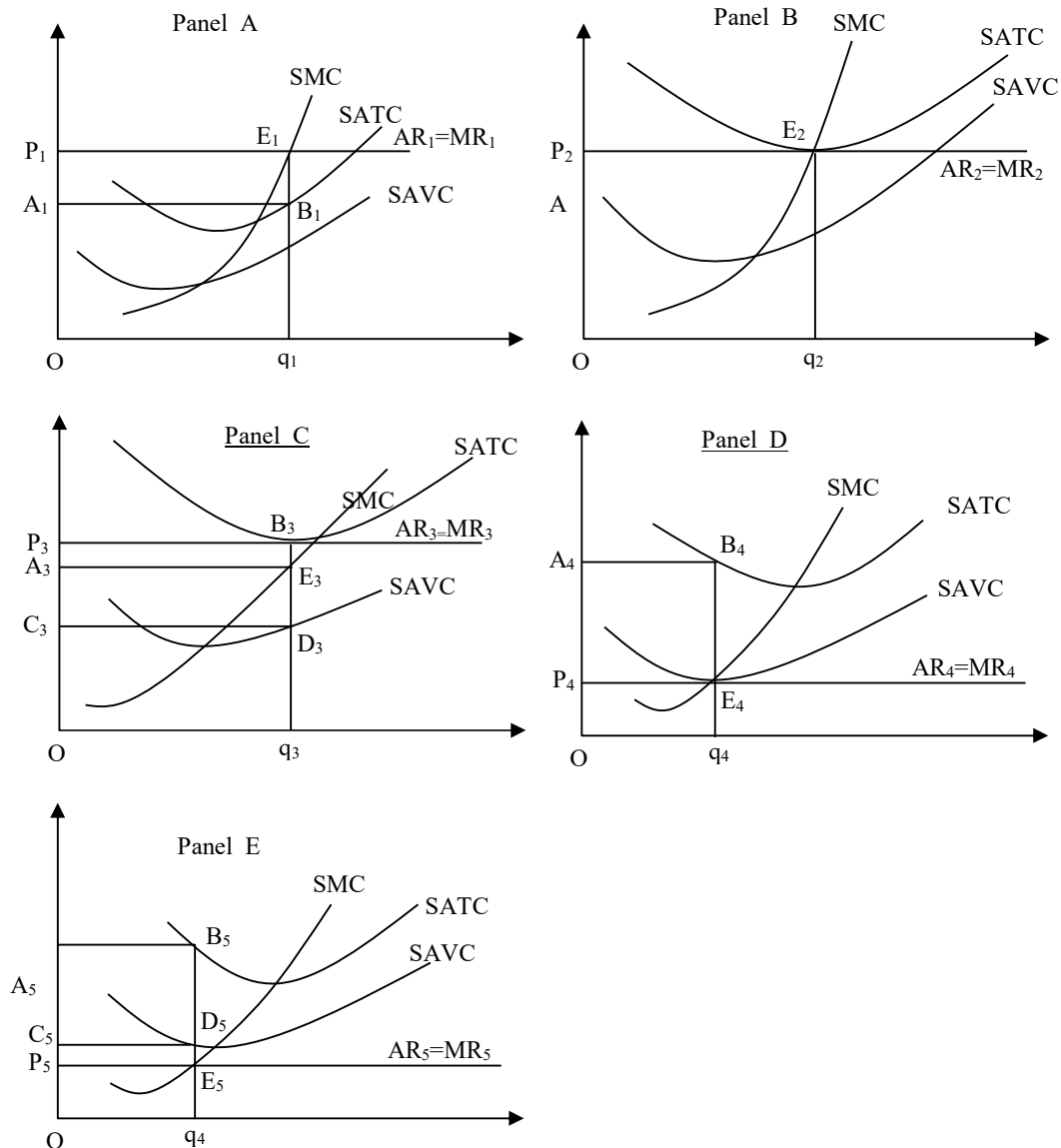
**Figure 6.4: Profit maximization with TR and TC curves**

At  $q^*$ , a tangent drawn on the TC curve becomes parallel to the TR curve indicating that the slope of the TC curve, which is MC, equals the slope of the TR curve, which is MR. Once again, we find that MR equals MC at the profit maximizing level of output. Moreover, the TC curve is found to be upward sloping and convex to the origin. The mathematical implication of upward sloping and convex to the origin TC curve is that MC is positive and rising in the neighborhood of equilibrium level of output. The slopes of the TC and TR curves, which are MC and MR values respectively, are also found to be equal at  $q_1$ , but this level of output maximizes loss, not profit. At  $q_1$ , the necessary condition of profit maximization is satisfied, but the sufficient condition is not satisfied.

### **Determining Profit and the Shut-down Point.**

In the preceding analysis, our primary concern was related to determination of the profit maximizing level of output. We discussed three equivalent methods of doing that and showed how to find the maximum profit in each of three cases. Here, we demonstrate another method of determining total profit with the help of short-run average total cost (SATC) and short-run average variable cost (SAVC) curves. Before doing that we must distinguish between the economists' definition of profit and the accountants' definition of profit. As we know, total profit is the difference between total revenue and total cost. The economists incorporate the opportunity cost of the entrepreneur as an item of total cost. The entrepreneur's opportunity cost is the nominal value of all financial and fringe benefits she/he could earn in her/his next best occupation. Instead of engaging himself full-time in organizing and managing the current firm, the entrepreneur could work elsewhere in different capacities and earn some income as remuneration for her/his work in his next best occupation. She/he forgoes this income when she/he takes over as the entrepreneur of the current firm and the forgone income thus becomes the opportunity cost of her/his current occupation. The accountants do not include this opportunity cost in total cost of the firm whereas the economists take this item of cost into consideration. According to the economists, the firm is said to earn normal profit when total revenue equals total cost inclusive of entrepreneur's opportunity cost. The firm earns supernormal profit if total revenue exceeds total cost and incurs loss if total

revenue becomes less than total cost. A firm finds its short-run equilibrium level of output where the two conditions of profit maximization are satisfied. At the equilibrium output level, the firm may find itself in one of the five situations of profit. It may earn supernormal profit, or normal profit. It may also incur loss which may be less than, equal to, or greater than total fixed cost. The five situations of profit are demonstrated in five panels of Figure-6.5.



**Figure 6.5: Five situations of profit**

In each panel, we determine the equilibrium level of output of the competitive firm using the two conditions of profit maximization, viz, (i)  $MR = MC$ ; (ii)  $MC$  is increasing.

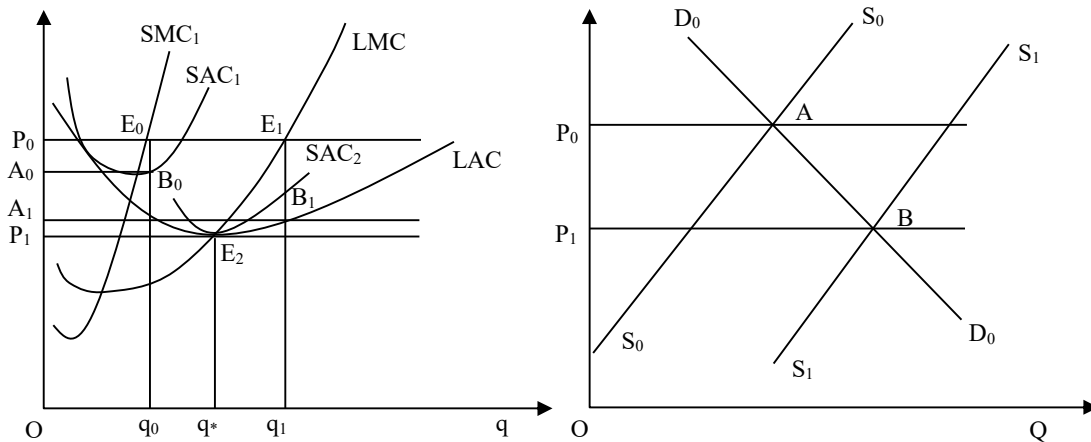
In Panel A, equilibrium output is  $q_1$  at which per unit profit is  $E_1B_1$ . Total profit at equilibrium output level is  $E_1B_1A_1P_1$ . Suppose, the market price falls to  $p_2$  in panel B. The two conditions of profit maximization are satisfied at  $E_2$

where price equals SATC yielding normal profit to the firm. If market price goes down further to  $p_3$  in panel C, equilibrium output becomes  $q_3$  corresponding to equilibrium point  $E_3$ . The firm, however, incurs loss at  $E_3$ , because, price  $q_3E_3$  falls short of short-run average total cost  $q_3B_3$ . Per unit loss is  $B_3E_3$  and total loss is  $B_3E_3A_3P_3$ . We know that the gap between the SATC and SAVC curves gives a measure of SAFC which is  $B_3D_3$  at equilibrium level of output. Multiplying  $B_3D_3$  by quantity of equilibrium output  $q_3$ , we get total fixed cost equal to area  $C_3D_3B_3P_3$  which is greater than total loss  $B_3E_3P_3A_3$ . Since the firm's operating loss  $B_3E_3P_3A_3$  is less than the shut-down loss, which is equal to total fixed cost  $C_3D_3B_3P_3$ , the firm keeps its production activities running. In Panel D, the market price falls to the level of the minimum SAVC the firm incurs loss equal to total fixed cost  $P_4E_4B_4A_4$  at equilibrium output  $q_4$ . The firm's total loss remains the same when it keeps operating it or it shuts down. In panel E, the market price of the commodity dips down further and goes below the minimum SAVC to  $P_5$ . Equilibrium output now becomes  $q_5$  corresponding to equilibrium point  $E_5$ . The firm's total loss  $P_5E_5B_5A_5$  will be greater than total fixed cost  $C_5D_5B_5A_5$  if the firm continues its production activities but this loss will be equal to total fixed cost if it shuts down. The firm will, of course, shut down in such a situation.

### The Long-Run Equilibrium of a Competitive Firm

In the long run, a competitive firm can change all inputs of production. Moreover, new firms can enter and old firms can exit the industry. A firm keeps changing the plant of production in the long run until the average cost of production becomes the minimum. In other words, the firm makes movements along the long-run average cost LAC and the long-run marginal cost LMC curves. We have already discussed the nature of long-run average cost curve and long run marginal cost curve in Lesson-2 of Unit-4. These curves are used in determining the long-run equilibrium of the firm. We explain the long-run equilibrium of a competitive firm in Figure 6.6 which has two panels. As in previous figures, the vertical axes of the two panels measure production costs and price using the same unit of measurement. The horizontal axis measures the level of output in both panels, but unit of output level is much higher in panel B. We use small-letter  $q$  for the firm's output level in panel A and capital-letter  $Q$  for the industry output level in panel B. We have drawn the cost curves of a typical firm in panel A and the demand and short-run supply curves of the industry in panel B. Suppose, the initial market price is  $P_o$ , which is determined at the intersection point of the market demand curve  $D_oD_o$  and the initial short-run supply curve of the industry  $S_oS_o$ . The typical firm accepts the market price  $P_o$  as given and accordingly determines its equilibrium output level  $q_o$  corresponding to equilibrium point  $E_o$ . The firm makes supernormal profit equal to the area  $A_oB_oE_oP_o$  in the short-run. Since we are considering the long-run equilibrium of the firm, we must take into account two types of market forces that work here. First, the typical firm will be tempted to increase its output level by increasing its plant size and start producing at  $q_1$  corresponding to equilibrium point  $E_1$ , where the LMC curve intersects the  $MR = \text{Price}$  line. The supernormal profit of the firm increases from area  $A_oB_oE_oP_o$  to  $A_1B_1E_1P_o$ . Remember that the adjustment of output is made along the LAC curve. Figure 6.6 demonstrates the behaviour of a typical firm. If all firms behave in the same way under identical cost conditions, all firms of the industry increase their output levels causing the short-run supply curve to shift upward. Observing the

supernormal profit earned by each of the existing firms in the industry new firms will enter into the industry with a view to making supernormal profit. Increased production by each of the old firms and new firms will shift the short-run supply curve to the right until it shifts to  $S_1S_1$ . The new equilibrium for the industry as a whole is attained at the new intersection Point B



**Figure 6.6: Long-run equilibrium of a firm**

yeilding a new market price  $P_1$ . An important feature of this new price is that a horizontal line at price level  $P_1$  must be tangent with the LAC curve at its minimum point. The typical firm accepts the new price level  $P_1$  as given and determines its new profit maximizing level of output  $q^*$  which yields normal profit for the firm. It is not a mere coincidence that the equilibrium point occurs at the minimum point of LAC. The market sets and monitors a few forces in the long run to ensure the following features of long-run equilibrium of the firm:

- (i) Each firm of the industry determines its equilibrium level of output according to the two conditions of equilibrium.
  - (a)  $MR = SMC = LMC$ .
  - (b) Both SMC and LMC will be increasing.
- (ii) The Price line in the long-run equilibrium of the firm will be tangent to the LAC curve at its minimum point so that each firm earns only normal profit. This condition ensures that there will be no tendency for the new firms to enter into and for the old firms to leave the industry.
- (iii) At the long-run equilibrium of the firm, market price will be determined such that the total demand from all consumers for the commodity will just be equal to the total supply of the commodity.

In Figure 6.6, these three conditions are met if the typical firm and hence each firm produces the output level  $q^*$  at the minimum point of the LAC curve and uses the optimum plant with the short-run average cost curve  $SAC_2$ . Here, the long-run price level  $P_1$  is equal to the minimum LAC.

### Review Questions

1. Explain the short run equilibrium of a competitive firm. When would a competitive firm close down its business in the short run?
2. Show how under the condition of perfect competition in the long run, the price of a commodity equal to its average and marginal cost.
3. Expalin the long run equilibrium of a competitive firm.
4. Does a competitive firm incur loss in the long run?



## Market Structure- Imperfect Competition



### Highlights

- ☐ Monopoly & it's nature and Characteristics
- ☐ AR & MR curves in monopoly
- ☐ Equilibrium of monopolist
- ☐ Monopolistic Market & it's Characteristics
- ☐ Oligopoly & it's Characteristics
- ☐ Equilibrium of monopolistically competitive market
- ☐ Different models under Oligopoly



## **Lesson 1: Monopoly Market**

### **Objectives**

After studying this lesson, you will be able to state :

- The characteristics of a monopoly market;
- Why a monopoly market endures;
- The shapes of the AR and MR curves under monopoly market; and
- Determination of profit maximizing levels' of output and price in the short run;
- Determination of profit maximizing levels of output and price in the long run;
- Why a monopolist does not have a supply curve; and
- The rule of thumb for pricing in monopoly.
- How a price discriminating monopolist makes price and output decisions.

### **Nature of Monopoly Market**

In a monopoly market, only one producer sells a homogeneous commodity to all buyers in the market. Moreover, no substitute goods for the commodity of the monopolist are available in the market. The above definition of monopoly market brings out two basic ingredients: sole ownership of industry of the commodity in absence of substitute goods. Both these criteria need further qualification. There are examples of commodity markets each of which has a single seller but substitutes for each commodity are readily available in the market. For example, one can consider Bangladesh Railway as having a monopoly in railway transportation services in the country. However, in Bangladesh people also use other means of transport such as buses, private cars, launches, domestic flights, and ride-sharing services for travelling from one place to another. These alternative modes of transport serve as substitutes for railway services, although they are not perfect substitutes because they differ in terms of cost, speed, comfort, safety, and availability. Since it is very difficult to find a commodity without substitutes, pure monopoly market as defined above is rare in the real world. Though each commodity must face competition from its substitutes, the degree of substitutability varies among different pairs of commodities. Two commodities may be close substitutes as in case of two tooth-paste brands or these commodities may be distant substitutes like electric bulb and candle when used for lighting rooms. Alternatively, the same two commodities, electric bulb and candle may be close substitutes when used for lighting. The degree of substitutability is also dependent on time. A commodity might not have close substitutes at present, but such substitutes may eventually be developed in future in response to higher price of the commodity charged by the monopolist. It is, therefore, the degree of substitutability rather than availability of substitutes which should be used as a criterion in the definition of monopoly market. Lack of precise measurement of degree of substitutability between two commodities may give rise to subjectivity and value judgements in the process of defining monopoly market in reality. The second element about ownership of production enterprise can also be changed. Two or more producers can form a monopoly market if they merge together to form a joint firm and act in concert to take price and output decisions like a monopolist.

Now that we have defined a monopoly market, the next question that arises is why does a monopoly market endure once it has been created? The answer is simple: A monopoly market exists because barriers to entry into market prevents other firms from entering and competing with the monopolist. These barriers to entry can take different forms.

Sometimes a firm might have sole ownership of an important input to a product, which makes the firm the only producer and seller of the product. The barriers may be created by legal authorities. In some cases, the government permits only one firm the right to produce and sell a commodity or service. The license to run a restaurant in a railway station is an example of a local monopoly created by legal authority. Another legal monopoly is patent which is legal protection of an innovation given out to a firm or a person for the time, energy and merit expended on the innovation. A patent allows the patent holder to be a monopoly in using the innovation. Patent is given to encourage research and development activities. New firms cannot attain the level of technological progress profitably utilized by the monopolist. Lack of advanced technology works as a barrier to entry. Barriers to entry are also created by natural monopolist. A natural monopolist enjoys economies of scale in the form of falling average and marginal costs with increase in the level of output. These economies of scale disappear if monopoly is abolished and two more firms share the market. As a result, the monopolist can drive away the potential competitors. Natural monopolies occur in the case of production enterprises with very large amount of overhead costs compared to minimal variable cost.

### Nature of AR and MR Curves

Since there is one producer in monopoly market, the monopolist has enough power to exert control over price or output. She/he is not a price taker like the competitive firm; rather she/he is a price-maker. She/he can set the price of the commodity at any level she/he likes. She/he can charge a higher price or she/he can be satisfied with a low price. Though the monopolist can set the price, she/he cannot set simultaneously the quantity she/he will sell at the predetermined price. The consumers are sovereign and it is to the consumers to decide how much output to demand and consume at the given price. Normally the consumers are supposed to be guided by the principle of equimarginal utility which requires that marginal utility per taka spent on each commodity be equal. Other things remaining the same, consumers demand and consume more at a low price and less at a higher price. The monopolist cannot force the consumers to buy more at a high price.

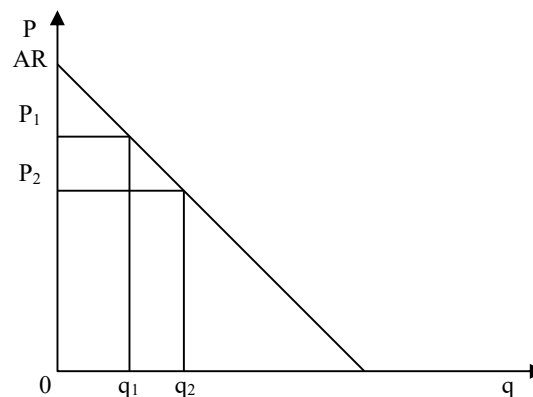
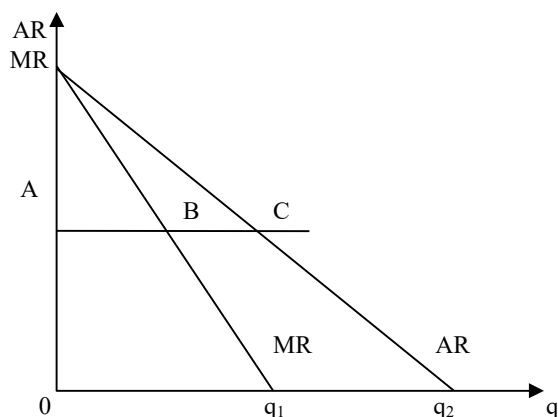


Figure 7.1: AR curve of the monopolist

Ultimately the monopolist finds that she/he can sell more if she/he sets a low price and can sell less if she/he sets a high price. Alternatively, the monopolist can set the amount of her/his sale and leave the price to be determined by the consumers' preferences. This time, the monopolist observes that the consumers are willing to pay a lower price at a higher level of sale and a higher price at a lower level of sale. This means that the average revenue curve of the monopolist, which is demand curve of the consumers, is a downward sloping curve. A typical AR curve of the monopolist is shown in Figure-7.1 with AR or price measured along the vertical axis and quantity sold or quantity demanded along the horizontal axis.

As it can be seen from the Figure, the monopolist can sell  $q_1$  if she/he sets the price at  $P_1$  and  $q_2$  if she/he sets the price at  $P_2$ . The final result is that the AR or price always falls with increase in the level of output sold.

Let's now discuss the shape of the MR curve in a monopoly market. In the case of perfect competition the firm can sell any amount of the commodity within its capacity at a constant price. As a result, price equals marginal revenue for a competitive firm. The monopolist has to reduce the price level if she/he wants to sell one extra unit. If she/he didn't want to sell the extra unit, she/he could get the higher price for all previous units. Now that she/he sells one more unit, she/he gets a lower price for all previous units as well as for the extra unit. The change in total revenue from the sale of last unit or MR of the monopolist will be less than the price of the last unit because she/he is getting a lower price on each of the previous units. In fact, MR will be equal to price of the last unit minus the total loss due to a low price on all



**Figure 7.2: AR and MR curve of the monopolist**

previous units. It means that when AR falls with the increase in output sold, MR becomes less than AR at all levels of output except at the starting point. We state an additional result without proving that the MR curve always lies at mid point between the price axis and the straight line AR curve.

Figure 7.2 shows the positions of the AR and MR curves of a monopolist. It shows that the MR curve lies below the AR curve at all levels of output between O and  $q_1$ . After output  $q_1$ , MR, however, becomes negative whereas AR becomes negative after output  $q_2$ . Draw a horizontal line that intersects the MR and AR curves from point A on the vertical axis. It can be seen that  $AB = BC$ , which shows that the MR curve lies halfway between the price axis and the AR curve. The nature of the AR and MR curves and the relationship between them can also be explained with the help of a table.

Table 7.1 shows the values of AR = Price, TR and MR for a hypothetical commodity of a monopolist.

**Table 7.1: Relationship among AR, MR and TR**

| AR = Price | Output = q | TR = AR.q | MR = $\Delta TR / \Delta q$ |
|------------|------------|-----------|-----------------------------|
| 40         | 10         | 400       |                             |
| 38         | 11         | 418       | 18                          |
| 36         | 12         | 432       | 14                          |
| 34         | 13         | 442       | 10                          |
| 32         | 14         | 448       | 6                           |

As we can see from Table 7.1, the monopolist's initial sale is 10 units of output at price of Tk. 40 yielding a total revenue of Tk. 400. To sell one more unit of the commodity, the monopolist has to lower the price from Tk. 40 to Tk. 38. Total revenue now stands at Tk. 418 giving a marginal revenue of Tk. 18. We find that marginal revenue is less than price Tk. 38 at which 11 units were sold. The monopolist lost Tk. 2 (Tk. 40 - Tk. 38) on each of the previous 10 units so that her/his total loss on previous units amounts to Tk. 20 ( $10 \times \text{Tk. } 2$ ). Deducting the loss of Tk. 20 from the price of Tk. 38 for the last unit, we get the marginal revenue of Tk. 18 (Tk. 38 - Tk. 20). We notice from the table that MR is less than AR = Price at all levels of output starting from the 11th unit. For example, at 13 units of output, AR is Tk. 34, whereas MR is Tk. 10. Here, both the AR and MR values are found to decrease with the increase in the quantity of output. Moreover, the rate of decrease of MR is Tk. 4 which is two times Tk. 2, the rate of decrease of AR. This is not a mere coincidence. The values of AR and q in Table-7.1 have been chosen such that these values correspond to a straight line downward sloping AR curve. In the case of linear AR curve, the rate of fall of MR is always double the rate of fall of AR. We can summarize the results on the shapes of the AR and MR curves in a monopoly market as follows:

- (i) Both the AR and MR curves are downward sloping;
- (ii) The MR curve falls at a faster rate than the AR curve; and
- (iii) In the case of a straight line AR curve, the rate of decrease of the MR curve is always double the rate of decrease of the AR curve.

### **Price and Output Determination Under Monopoly: Equilibrium of Monopolist**

#### **Short-Run Equilibrium of a Monopolist**

Like a firm owner in perfect competition, a monopolist undertakes production activities with the sole objective of maximizing profit. The conditions of profit maximization here are the same as in perfect competition:

**Necessary condition:**  $MR = SMC$

**Sufficient condition:** SMC increases in the neighbourhood of equilibrium point

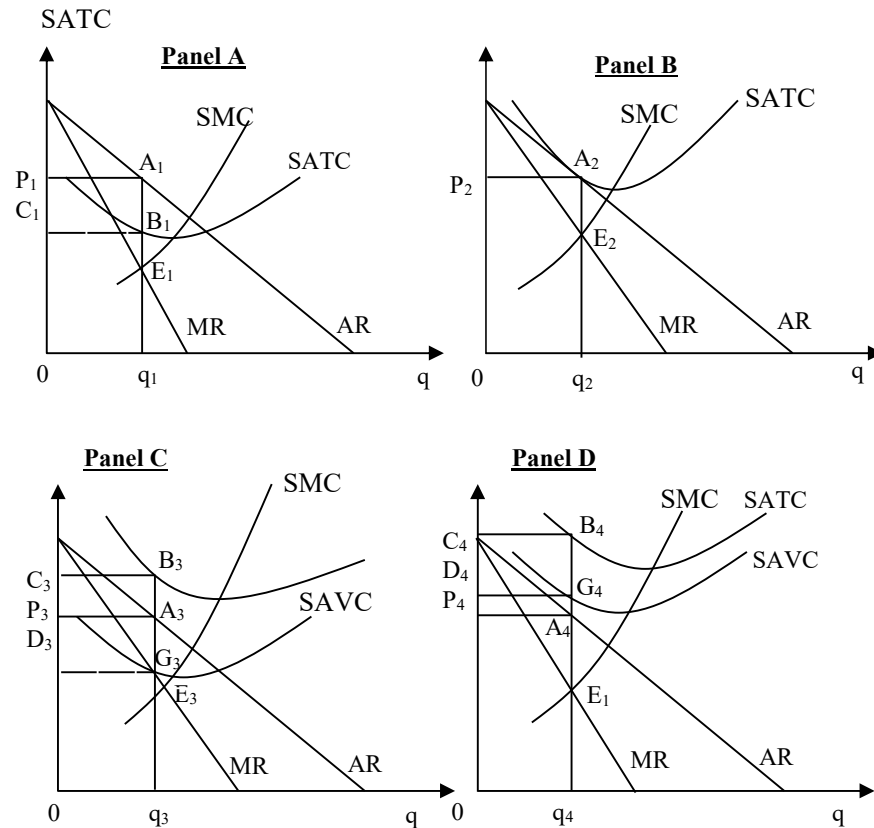
The intuitive explanation is simple. Total profit will increase as long as the addition to total revenue (MR) is greater than the addition to total cost (SMC) when the firm increases its output level by one unit at each step. In other words, total profit increases as long as MR remains greater than SMC.

The SMC curve initially falls and then rises with increase in the level of output whereas the MR curve is downward sloping in monopoly market. It means that the monopolist will face a level of output where SMC equals MR. At this level of output, marginal profit is zero and total profit is the maximum. If the monopolist increases her/his output level by one unit beyond the profit maximizing level, MC becomes greater than MR yielding negative marginal profit and making total profit less than the maximum.

The preceding discussion shows how the profit maximizing conditions developed earlier in the context of perfect competition remain valid in the case of monopoly. There is, however, one difference between the monopoly and competitive equilibrium points, with regard to the price level at equilibrium point. Since price or AR is greater than MR in monopoly market, price will be higher than both MR and MC at the monopoly equilibrium. The extended condition of profit maximization in monopoly market can then be rewritten as  $\text{Price} > \text{MR} = \text{SMC}$ .

In perfect competition, price equalled SMC at the equilibrium level of output. We now turn to graphical presentation of short-run equilibrium of the monopolist. In monopoly, the question of entry and exit of firms does not arise in the long run. The monopolist changes its output and price levels by changing its plant size in the long run. Since the monopolist cannot change the plant size in the short run, she/he can bring changes in her/ his output level by changing the variable inputs of production. Figure 7.3 shows that the monopolist can face any of the four situations of profit in the short run. These four situations have been depicted in four panels of Figure 7.3. The vertical axis in each of the four panel measures short-run costs, price and MR, whereas the horizontal axis measures output level. In each panel, the equilibrium output is determined corresponding to the point where the SMC curve intersects the MR curve. A vertical line drawn from the equilibrium point to the output axis determines the profit maximizing level of output. The vertical line is then extended upward to the AR curve to find the price level at the equilibrium level of output. The point at which the vertical line intersects the SATC curve is also located and the difference between the AR and SATC curves is taken as a measure of profit per unit of output. Multiplying the profit per unit of output by the equilibrium level of output gives the maximum total profit.

In panel A, the equilibrium point is  $E_1$  which determines the equilibrium output  $q_1$ . Price is  $q_1 A_1$  or  $P_1$  and average cost is  $q_1 B_1$  so that profit per unit of output becomes  $A_1 B_1$  and total profit becomes  $P_1 A_1 B_1 C_1$ . In panel B, equilibrium output is  $q_2$  corresponding to equilibrium point  $E_2$ . Both AR and SATC here are equal to  $q_2 A_2$  yielding normal profit for the monopolist. In Panel C, equilibrium output is  $q_3$  at which price  $q_3 A_3$  is less than average cost (SATC)  $q_3 B_3$ .



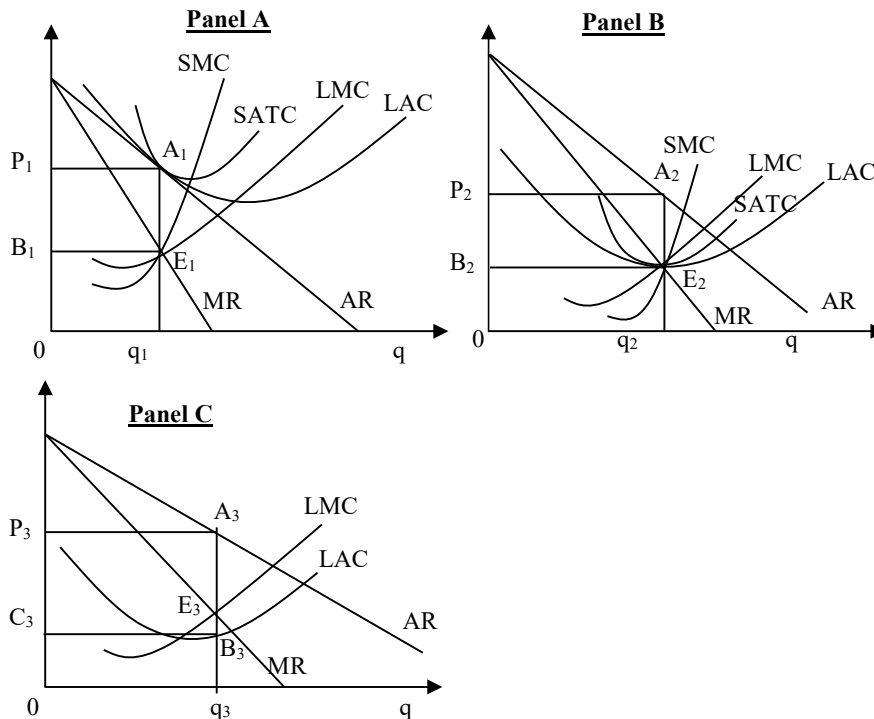
**Figure 7.3: Four situations of profit in monopolist's short-run equilibrium**

The monopolist incurs a loss of  $B_3A_3$  per unit of output and her/his total loss is  $P_3A_3B_3C_3$ . Since the monopolist's total loss is less than her/his total fixed cost  $D_3G_3B_3C_3$ , it means the portion  $D_3G_3A_3P_3$  of his total fixed cost is being covered in the short run. Since the monopolist's loss becomes less when she/he runs the production firm than when she/he shuts down, it pays the monopolist to keep the firm open in the short run. In panel D of the figure, the loss minimizing level of output  $q_4$  dictates a price level of  $q_4A_4$  which is even less than short run average variable cost (SAVC) of  $q_4G_4$ . The monopolist's total loss will be equal to total fixed cost when it shuts down and it will be more than total fixed cost when it operates. Since the monopolist's total loss becomes more when it operates than when it shuts down, he would certainly shut down her/his plant in a situation depicted in panel D.

### Long-Run Equilibrium of the Monopolist

In the long-run, the monopolist can change her/his plant in order to increase her/his profit. The monopolist does not run with any risk of losing profit due to entry of firms in the long-run. Different types of barriers to entry successfully prevent new firms from entering the monopoly market.

The monopolist tries to maximize her/his profit lying within the constraints of given demand and cost conditions. Her/his choice of output and price levels change when these constraints change. Depending on the nature of demand and cost conditions, the monopolist may make supernormal profit or normal profit, but she/he will never incur a loss in the long run. At the worst situation, the monopolist may quit the production process in the long run. Unlike the competitive firm, in the long run, the monopolist may not produce at the minimum point of LAC. The monopolist may produce at the optimum plant or at less than optimum plant or at more than the optimum plant. The long run equilibrium of the monopolist is attained when the following two conditions are met:



**Figure 7.4: Long-run equilibrium of monopolist**

**Necessary condition:**  $SMC = LMC = MR < \text{Price}$

**Sufficient condition:** LMC and hence SMC increases at the neighbourhood

The long-run equilibrium of the monopolist can be characterized by one of the three probable situations shown in three panels of Figure 7.4.

In Panel A, the equilibrium point  $E_1$  gives rise to equilibrium output  $q_1$ . At equilibrium level of output, both price and long-run average cost are equal to  $q_1A_1$  so that the monopolist earns only normal profit. The monopolist is, however, producing at less than the optimum plant in the long run. In panel B, the conditions of profit maximization are met at point  $E_2$  which is also the minimum point of LAC. The firm is producing at the optimum plant in the long-run. At equilibrium output  $q_2$ , price  $q_2A_2$  is found to be greater than long-run average cost  $q_2E_2$  so that the monopolist earns supernormal profit equal to the area  $B_2E_2A_2P_2$ . In panel C, profit maximizing level of output is  $q_3$  corresponding to long-run equilibrium point  $E_3$ . It is easily seen that the equilibrium output  $q_3$  is produced by using a plant larger than the optimum

plant. At  $q_3$ , price is  $q_3A_3$  and long-run average cost is  $q_3B_3$  yielding a total profit equal to area  $C_3B_3A_3P_3$ . Examination of the three diagrams in Figure 7.4 reveals two facts about the monopolist. First, a monopolist in the long-run equilibrium may use or may not use the optimum plant of production. Second, in the long-run, the monopolist may earn normal profit or supernormal profit, but she/he will never incur loss.

### Review Questions

1. What is monopoly?
2. (a) How does a monopoly firm differ from one that is perfectly competitive?  
(b) If a monopoly firm wishes to increase quantity sold, what must it do to price?
3. What is marginal revenue (MR) and why is MR less than price for a firm facing a downward-sloping demand curve?
4. Explain the equilibrium of a monopoly firm in the short run. Is monopoly price always higher than the competitive price?
5. Explain the equilibrium of a monopoly firm in the long run.

## Lesson 2: Monopolistic Competition

### Objectives

After studying this lesson, you will be able to:

- State the characteristics of monopolistic competition;
- Explain the short-run equilibrium of a monopolistically competitive firm;
- Explain the long-run equilibrium of a monopolistically competitive firm;
- Explain the concept of excess capacity that arises in monopolistic competition;
- Compare monopolistic competition with perfect competition and monopoly; and
- Explain the nature of profit maximizing level of selling cost.

### Characteristics of Monopolistic Competition

Monopolistic competition is characterized by many firms selling differentiated products to the buyers. The number of sellers in monopolistic competition is large but not so large as to make each firm a price-taker as in perfect competition. Since there are many sellers in monopolistic competition, a single firm does not take into account the reactions of its rivals when it makes output and pricing decisions. The rivals are not likely to take any retaliatory action because the pricing and output decision of a particular firm will have a very negligible effect on their price and output levels. Most often such effects go unnoticed and unassessed so that the rivals don't show any reactions. There is, of course, one reason for a firm's being price-maker in monopolistic competition. The monopolistically competitive firms sell differentiated products in the market. Each firm's product is made different from the similar products of other firms for attracting customers. All the monopolistically competitive firms producing and selling similar but differentiated products comprise what may be called a product group. Product differentiation can be real or fancied, but its effectiveness in stimulating the sale level depends on the perception of the customers about the superiority and peculiarity of the product. The perception of product differentiation can be created using different techniques and a few familiar techniques of product differentiation in making differences in the quality and quantity of the product, brand names and packages, salesmanship and post-sale customer services. Since the commodities are similar though not homogeneous, they are close substitutes for each other. Cross elasticity of demand for any pair of these commodities is very high. Product differentiation leads to attachment of some customers to the product of a firm. The physical traits and the external appearance of the product match with the preferences of these consumers who are rather willing to pay a high price for the commodity than going for some other products. The association between customers and the product enables the monopolistically competitive firm to exert some influence on the price and quantity of the product. In other words, the firm possesses some monopoly power for the product and the average revenue curve of the firm slopes downward to the right. Though the demand curves for both the monopolist and monopolistically competitive firm are downward sloping, they differ in values of price elasticity of demand. The presence of a large number of close substitutes for the product of a monopolistically competitive firm makes its demand curve highly elastic - more elastic than the demand curve of the monopolist. The monopolistically competitive firm has policy instruments other than price to

choose for maximizing its profit. Sometimes a firm under monopolistic competition is reluctant to engage in price wars because such price changes may lead to reduced sale or reduced revenue. Instead it can increase its profit by making changes in the variety of the product. It keeps changing the variety of the product until it selects the best product which brings the maximum profit at a given price. Similarly, the firm can increase its profit by spending some money on advertising while keeping the price and variety of the product fixed. The advertisement expenditures known as selling costs help a firm hold on to its old customers as well as attract new customers and other customers from its rivals. The firm chooses the profit maximizing level of selling costs while the variety and price of the product are kept fixed. Finally, the firms in monopolistic competition can leave or exit the group in the long run. This feature of monopolistic competition is identical with that of perfect competition. It is said that monopolistic competition contains elements of both perfect competition and monopoly. The competitive elements are the presence of a large number of sellers in the market and the independence to enter or leave the group in the long run. The monopoly element stems from the privilege of creating product differentiation which make the demand curve of the monopolistically competitive firms downward sloping. To sum up, there are four essential features of monopolistic competition:

1. Many Sellers;
2. Differentiated products;
3. Multiple policy variables viz. price, product and selling cost; and
4. Free Entry or exit.

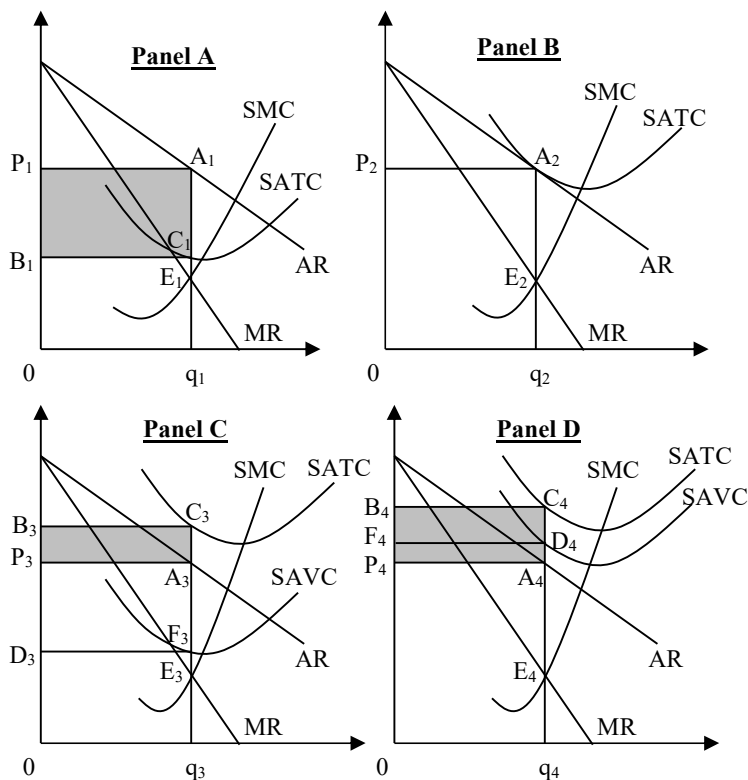
### **Short-Run Equilibrium of a Monopolistically Competitive Firm**

As in other market structure, the goal of a firm in monopolistic competition is to maximize its profit. The profit maximizing conditions are also the same as in other market forms:

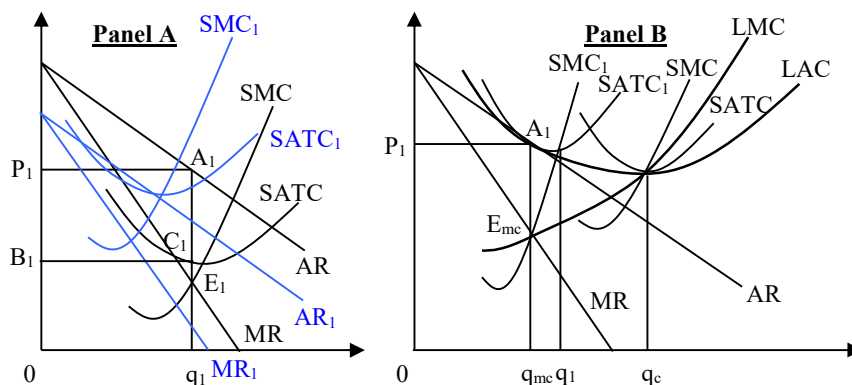
**Necessary condition:**  $MR=SMC$

**Sufficient condition:** SMC increases in the neighbourhood of equilibrium

Since the profit maximizing and entry conditions are the same as in perfect competition, the short-run equilibrium of a monopolistically competitive firm is identical with that of a perfectly competitive firm with regard to profit. In other words, the firm under monopolistic competition may earn normal profit, or it may earn supernormal profit or it may incur loss in the short run. The firm shuts down in the short-run if its total loss exceeds total fixed cost. Figure 7.5 shows the four positions of short-run equilibrium of a firm under monopolistic competition. There are four panels in Figure 7.5, Panel A shows the short-run equilibrium point  $E_1$  at which output and price are  $q_1$  and  $P_1$  respectively. The firm makes a supernormal profit equal to area  $P_1B_1C_1A_1$ . In panel B, the equilibrium point is  $E_2$  which gives rise to output  $q_2$  and price  $P_2$ . Here the firm earns normal profit. In Panel C, corresponding to equilibrium point  $E_3$ , output is  $q_3$  and price is  $P_3$ . The firm here incurs a loss equal to area  $A_3C_3B_3P_3$  which is, however, less than total fixed cost  $D_3F_3C_3B_3$ . In panel D, the equilibrium point  $E_4$  shows a total loss equal to area  $P_4A_4C_4B_4$  which is greater than total fixed cost  $F_4D_4C_4B_4$ . The firm shuts down in a situation depicted by Panel D of Figure 7.5.



**Figure 7.5: Short-Run Equilibrium of Monopolistically competitive firm**



**Figure 7.6 : Long run equilibrium of a firm in monopolistic competition**

### Long-Run Equilibrium of Monopolistically Competitive firm

In monopolistic competition, firms can enter or leave the group in the long run. This feature of monopolistic competition makes it impossible for a firm to earn supernormal profit and incur loss in the long run. The long run equilibrium of a monopolistically competitive firm is characterized by the presence of normal profit. To see why it is so, we consider the case of a firm which makes supernormal profit in the short run as shown by Panel A of Figure 7.6. We assume identical cost and demand conditions of all firms in the group, though their products are differentiated. Since each of the firms in the group is making supernormal profit equal to the area  $B_1C_1A_1P_1$  in Panel A, new firms will enter the group and produce similar but differentiated

products. As a result, the share of each firm in total output of the group will fall as shown by the leftward shift of the AR and MR curves in Panel A. The falling share of each firm will reduce the level of supernormal profit and in an attempt to regain the previous level of supernormal profit, the firm will improve the variety of the product. Such improvement and innovations entail some expense which cause the AC and MC curves to shift to the right. This process of shifting the demand and cost curves will continue until the demand curve becomes tangent to the average cost curve at the falling portion of the average cost curve. Supernormal profit will be totally eliminated and in the long run each monopolistically competitive firm will only earn normal profit. Similarly, if each firm incurs loss in the short run, some firms will leave the group enabling some of the existing firms to earn normal profit. It should be noted that the firm will also try to minimize its cost of production in the long run by changing the production plant. In other words, each firm will be producing at some point on the long run average cost curve. We can summarize the following features of long-run equilibrium of a monopolistically competitive firm:

**Necessary condition:**  $MR=LMC=SMC$

**Sufficient condition:** (i) LMC increases in the neighbourhood of equilibrium point.  
(ii)  $LAC=AR$

In Panel B of Figure 7.6, we show the long run equilibrium of the firm under monopolistic competition. At equilibrium point  $E_{mc}$ , LMC equals MR. Equilibrium output level is  $q_{mc}$  at which the LAC curve is tangent to AR. Since at  $q_{mc}$ , LAC equals AR, the firm earns only normal profit.

### Excess Capacity in Monopolistic Competition

It is alleged that the long run equilibrium of a monopolistically competitive firm is characterized by excess capacity. It can be seen in Panel B of Figure 7.6 that at the long-run equilibrium of the firm, the AR curve is tangent with the LAC curve at its falling portion to the left of minimum LAC. Unlike the perfectly competitive firm, the firm in monopolistic competition is not minimizing long run average cost in the long-run equilibrium. In other words, the firm is not utilizing its resources efficiently and is not taking advantage of economies of scale to reduce the cost of production when it could do so. In Panel B of Figure 7.6, this excess capacity is given by the range of output  $q_c-q_{mc}$ . This excess capacity is composed to two components:

$$q_c-q_{mc}=q_1-q_{mc}+q_c-q_1$$

At output  $q_{mc}$ , the firm used the production plant with the short-run average cost curve  $SATC_1$ . The firm is producing at point A which is on the falling portion of  $SATC_1$  and is not producing at B which is the minimum point of  $SATC_1$ . The firm could use the lowest cost plant with the short-run average cost curve SATC instead of using the plant with  $SATC_1$ . The output range  $q_c-q_1$  then shows the portion of excess capacity that results due to the failure of the firm to use the lowest cost plant in the long run.

From the preceding discussion, the presence of excess capacity seems to be a measure of inefficiency of monopolistically competitive market. Professor Chamberlin, one of the two pioneers of the theory of monopolistic competition, opined that excess capacity reflects cost of product diversity provided by monopolistic competition. He held the view that the consumers benefit from having the opportunity to choose from a number of similar but

differentiated products. There are many brands of a commodity with different quality, style and appearance. The benefits from this opportunity may well outweigh the cost of the opportunity measured by excess capacity.

### **Review Questions**

1. Discuss the characteristic features of monopolistic competition. How does it differ from perfect competition?
2. What is monopolistic competition? What are the effects of product differentiation on:
  - (i) Firm's MR and AR curves; and
  - (ii) Firm's equilibrium
3. Discuss the equilibrium of a firm under monopolistic competition under the condition of price competition among the firms.

### Lesson 3: Oligopoly

#### Objectives

After studying this lesson, you will be able to:

- State the characteristics of oligopoly;
- State the concept of Nash equilibrium;
- State how price and output are determined in Cournot Model;
- State why price remains rigid in the Kinked demand curve Model; and
- State how Game theory can be applied in oligopoly market.

#### Introduction

Oligopoly is one of the most important forms of market structure because many industries in the modern world are dominated by only a small number of large firms. In such industries, each firm is powerful enough to influence market conditions, and therefore no firm can make decisions in isolation. Whenever one firm changes its price, output, advertising, or product policy, competing firms are likely to react. As a result, an oligopolistic firm must always take into account the possible behavior of its rivals before making any decision. This makes oligopoly a market structure of strategic behavior and mutual dependence.

The analysis of oligopoly is more difficult than the analysis of perfect competition, monopoly, or monopolistic competition. In perfect competition, a firm is too small to affect price. In monopoly, a single seller faces no direct rival. In monopolistic competition, there are many firms, and although they compete, no one firm has enough influence to require continuous strategic calculation against a few large opponents. Oligopoly is different because each firm must consider the expected reactions of other firms. This feature makes the theory of oligopoly richer, more realistic, and also more complicated.

Because firm behavior in oligopoly depends on expectations about rival reactions, economists have not developed one single complete theory of oligopoly. Instead, several models have been developed, each based on a different assumption about how firms behave, whether they cooperate, and how they interpret the likely responses of competitors. This chapter discusses the main ideas and models of oligopoly, including the concept of Nash equilibrium, the Cournot model, the kinked demand curve model, cartel arrangements, price signalling, price leadership, and the revenue-maximization model.

#### Meaning and Characteristics of Oligopoly

An oligopoly is a market structure in which there are only a few sellers supplying a product to a large number of buyers. Since the number of firms is small, each firm controls a substantial part of the market. Therefore, the actions of one firm have a noticeable effect on the sales and profits of other firms. This gives rise to **interdependence**, which is the most fundamental characteristic of oligopoly. In such a market, each firm must consider not only its own costs and demand conditions, but also the likely behavior of rival firms.

The products produced under oligopoly may be either homogeneous or differentiated. In some industries, firms produce similar or identical goods, such as cement, petroleum, or steel. In other industries, firms produce differentiated products, such as automobiles, soft drinks, electronics, or

branded consumer goods. In either case, the number of firms is small enough for strategic competition to be important.

Another major characteristic of oligopoly is the existence of barriers to entry. New firms may find it difficult to enter such industries because of the need for very large capital investment, possession of advanced technology, large-scale production, control over raw materials, economies of scale, strong brand image, or established distribution networks. Because of these barriers, firms already operating in the market may continue to earn supernormal profits in the long run.

Decision-making in oligopoly is full of uncertainty. If a firm lowers its price, it cannot know in advance whether rivals will follow the price cut or keep their prices unchanged. If rivals also lower price, the firm may not gain much extra market share. But if rivals do not respond, the firm may attract a large number of customers. The same uncertainty exists when a firm considers raising price. Rival firms may ignore the increase and capture customers, or they may also raise price. Since the results of any decision depend so much on competitor reactions, oligopoly is characterized by strategic uncertainty.

In order to deal with this uncertainty, firms make assumptions about how their rivals are likely to behave. Such assumptions are called **conjectural variations**. A decision taken on the basis of these assumptions is called a **strategic decision**. Different firms may make different assumptions depending on their size, objectives, financial strength, and market experience. For this reason, different theories of oligopoly have emerged.

### **Why No Single Theory of Oligopoly Is Possible**

No single theory of oligopoly is possible because oligopolistic behavior depends heavily on the assumptions firms make about the reactions of their competitors. In some situations, firms may ignore rival reactions. In others, they may recognize interdependence and behave cautiously. In still others, they may cooperate explicitly or implicitly. Since the possible patterns of behavior are many, economists have had to develop different models to explain different situations.

In perfect competition and monopoly, firm behavior can be explained more simply because strategic rivalry is absent. In oligopoly, however, each firm's optimal choice depends on what it expects others to do. Since those expectations may differ from one industry to another, and even from one firm to another, no single theory can fully explain all oligopolistic outcomes.

The lesson classifies the possible assumptions about rival reactions into three broad groups:

- non-cooperation with ignored interdependence;
- non-cooperation with recognized interdependence; and
- cooperation with the abolition of interdependence.

The major models of oligopoly can be understood within these three broad categories.

### **The Concept of Nash Equilibrium**

Before discussing the specific models of oligopoly, it is essential to understand the concept of **Nash equilibrium**, which provides a general principle of equilibrium in strategic situations. Nash equilibrium may be stated as follows: **each firm is doing the best it can, given what its competitors are doing.**

This means that each firm chooses the best possible action for itself on the assumption that the competitors have already chosen their actions. At equilibrium, no firm has an incentive to change its decision alone. If one firm were to change its price or output while the other firms kept their decisions unchanged, that firm would not improve its position. Thus, Nash equilibrium is a stable outcome in a strategic environment.

The lesson points out that this idea is especially relevant in oligopoly because firms in oligopoly act under strategic considerations. Every firm tries to do the best it can in the light of what rivals are doing. At the same time, it is natural to assume that rivals are also doing the best they can in response to the firm's own actions. This mutual best-response situation is the essence of Nash equilibrium.

Nash equilibrium is not the same as the equilibrium concept commonly used in markets like perfect competition or monopoly. In those markets, a firm simply produces the best output it can and has no reason to change, because it does not need to think strategically about a few strong rivals. In oligopoly, by contrast, equilibrium is closely tied to rival behavior and strategic interdependence.

The lesson also distinguishes between two broad settings in oligopoly. In the **non-cooperation environment**, firms act independently and face uncertainty about rival behavior, even though each may make some assumption about what competitors will do. In the **cooperation environment**, firms work together and remove much of this uncertainty. Some models apply to the first setting, while others apply to the second.

### **Non-Cooperation with Ignored Interdependence**

Under one assumption, firms do not cooperate and also behave as though their rivals will not retaliate when they make decisions about price or output. This does not mean that interdependence does not exist. Rather, firms simplify their decision-making by assuming that competitors will maintain their current behavior.

The lesson suggests two reasons why firms may behave in this way. First, rival reactions may be too complex and diverse to predict accurately. In that case, management may choose to ignore the possible reactions of competitors rather than attempt impossible calculations. Second, in many modern corporations, decisions are taken by salaried executives and managers rather than owners. These managers may be more interested in the smooth running of the enterprise, growth of sales, or administrative success than in carefully calculating the strategic responses of rivals.

The most important model developed under this assumption is the **Cournot model**, which explains output determination in a duopoly.

### **The Cournot Model**

The Cournot model was introduced in 1838 by the French economist Augustin Cournot. It is one of the earliest formal models of oligopoly and remains one of the most influential. The model explains how two firms producing a homogeneous product determine their output levels when each assumes that the rival's output will remain unchanged.

### **Assumptions of the Cournot Model**

The Cournot model is based on the following assumptions:

1. There are two firms in the market.
2. Both firms produce and sell a homogeneous product.

3. Each firm is fully aware of the market demand curve.
4. The price of the product depends inversely on the total output sold by both firms.
5. Marginal cost of production is constant for each firm.
6. Each firm assumes that when it chooses its own output, the other firm will not change its current output level.

These assumptions provide a simplified but powerful framework for understanding strategic output choice.

### **Reaction Functions**

The central concept in the Cournot model is the **reaction function**. A reaction function shows the profit-maximizing output of one firm corresponding to each possible output level of the other firm. Since market price depends on total output, an increase in one firm's output lowers market price and therefore affects the profit-maximizing output of the rival. As a result, one firm's desired output decreases when the other firm's output increases. This gives the reaction functions a downward slope.

For example, if Firm 2 produces nothing, Firm 1 can produce a relatively high quantity and still earn maximum profit. But if Firm 2 increases output, Firm 1 must reduce its own output to maintain the most profitable position. Similarly, Firm 2 has its own reaction function showing how much it wishes to produce for every output level of Firm 1.

### **Adjustment Process and Equilibrium**

Suppose Firm 1 believes that Firm 2 is producing a certain quantity. Based on this belief, Firm 1 chooses its own profit-maximizing output from its reaction function. Then Firm 2 observes or assumes Firm 1's output and adjusts its own output according to its own reaction function. If the initial assumptions were wrong, the firms go through a process of adjustment and readjustment. Each firm changes output in response to the other's last choice.

This process continues until the two reaction functions intersect. At that point, both firms' expectations about each other are fulfilled. Firm 1 is producing the output that maximizes profit given Firm 2's output, and Firm 2 is producing the output that maximizes profit given Firm 1's output. Since neither firm has any reason to change output unilaterally, this outcome is a **Nash equilibrium**.

### **Importance of the Cournot Model**

The Cournot model is important because it shows that equilibrium can exist even in a non-cooperative oligopoly. It demonstrates that firms in such a market do not behave independently like competitive firms, nor do they possess complete control like a monopolist. Instead, they choose output strategically, taking into account the presence of a rival.

### **Non-Cooperation with Recognized Interdependence**

A second possibility in oligopoly is that firms fully recognize their interdependence but still do not cooperate. They know that their actions affect rivals and that rivals are likely to respond. However, they are unable or unwilling to reach formal or informal agreements. In such circumstances, uncertainty remains, and one likely result is the tendency of firms to maintain stable prices rather than risk provoking unpredictable responses. This idea is explained by the **kinked demand curve model**.

### **The Kinked Demand Curve Model**

The kinked demand curve model is designed to explain **price rigidity** in oligopolistic markets. It is based on the assumption that rival firms react differently to a price increase and to a price decrease. If one firm raises its price, rival firms do not follow. But if one firm lowers its price, rivals quickly match the price cut.

Because rivals do not follow a price increase, the firm that raises price loses many customers. This makes the upper portion of its demand curve relatively elastic. By contrast, because rivals match a price cut, the firm gains only a small increase in sales when it lowers price. This makes the lower portion of the demand curve relatively inelastic. The two parts of the demand curve meet at the current market price, creating a kink.

A kinked demand curve gives rise to a discontinuous marginal revenue curve. There is a gap in the marginal revenue curve corresponding to the kink in the demand curve. If the firm's marginal cost curve shifts within this gap, the equilibrium price and output remain unchanged. This means that moderate increases or decreases in cost may not affect the firm's chosen price and quantity. The model therefore explains why prices in oligopolistic industries often remain rigid over time.

Although the kinked demand curve model explains why prices may remain stable, it has an important limitation. It does not explain how the current price was originally determined. In other words, it explains price rigidity after a price has already been established, but it does not explain the origin of that prevailing price.

### **Cooperation and the Abolition of Interdependence**

Oligopolistic firms may try to avoid the uncertainty created by interdependence through cooperation. By cooperating, they reduce the need to guess rival reactions and can often earn higher profits. Cooperation may take the form of explicit collusion, where firms openly agree on price and output, or implicit collusion, where firms coordinate behavior without a formal agreement.

Explicit collusion is illegal in many countries because it restricts competition and harms consumers. Nevertheless, it remains important in economic theory because it helps explain how firms may behave when they act jointly. The lesson discusses centralized cartels as an example of explicit collusion, and price leadership and price signalling as examples of implicit collusion.

### **The Centralized Cartel**

A **centralized cartel** is a formal arrangement in which firms cooperate and behave like a single multi-plant monopolist. Instead of competing against one another, they collectively determine output and price in order to maximize total industry profit.

To determine equilibrium, the marginal cost curves of the individual firms are added horizontally to obtain the combined marginal cost curve of the cartel. Industry marginal revenue is then compared with this combined marginal cost. The total output of the cartel is fixed where industry marginal revenue equals total marginal cost. Once this total output is determined, it is allocated among the member firms in such a way that each firm produces where its own marginal cost equals the common marginal revenue. All firms then sell the product at a single agreed price.

This system resembles the behavior of a monopolist operating several plants. The purpose is not to maximize the profit of any one firm individually, but rather to maximize joint profits for the industry as a whole.

Although a centralized cartel can theoretically maximize joint profits, it is difficult to maintain in practice. The main problem is that each firm may be dissatisfied with its assigned output quota and may secretly try to sell more by charging a slightly lower price. This creates a temptation to cheat. Since monitoring compliance is costly and difficult, cartels are often unstable.

The lesson notes that centralized cartels are more likely to work successfully when the following conditions are present:

1. the firms are large and few in number;
2. the products are very similar;
3. the firms are located close to one another; and
4. the economy is experiencing an upswing in the business cycle.

Even under these conditions, centralized cartels face legal barriers because anti-trust laws generally prohibit their formation.

### **Market-Sharing Cartel**

A **market-sharing cartel** is a looser type of collusive arrangement. In this form of cartel, a central authority or association decides certain common matters and leaves other decisions to the individual firms.

For example, the central authority may set a common price, while each firm is allowed to determine its own level of output and compete through non-price methods such as product differentiation, personal service, advertising, or selling cost. In another version, the cartel may divide the market by allocating production quotas. Firms are then expected to remain within their quotas, and punitive action may be taken if they exceed them. Markets may also be shared on a geographical basis, where each firm dominates a particular territory and avoids competing in the territories of others.

However, these arrangements are usually unstable. Since quotas and market divisions are often the result of bargaining rather than objective criteria, they easily lead to dissatisfaction, cheating, underpricing, and hidden competition. For this reason, market-sharing cartels are often short-lived.

### **Price Leadership**

A common form of implicit collusion in oligopoly is **price leadership**. Under price leadership, one firm takes the initiative in fixing the price, and the other firms accept and follow that price. This allows firms to avoid intense price competition without entering into a formal agreement.

The lesson discusses three forms of price leadership: price signalling, price leadership by a low-cost firm, and price leadership by the dominant firm.

### **Price Signalling**

**Price signalling** is an informal method of coordination. It often occurs when one firm is dominant in size and influence. Suppose the dominant firm wants industry prices to rise. It may publicly announce a price increase through the business press or in a press conference. Smaller firms interpret this public announcement as a signal that the leader wants a coordinated increase in price. They may then respond by raising their own prices.

Smaller firms could, in theory, refuse to follow the dominant firm and try to increase sales by keeping prices lower. However, such short-term gains may be followed by retaliation from the dominant firm, leading to a price war that

reduces profits for everyone. Therefore, it is often in the interest of smaller firms to follow the price signal given by the dominant firm.

### **Price Leadership by a Low-Cost Firm**

Another form of implicit collusion is **price leadership by a low-cost firm**. In this case, one firm has lower production costs than the others. Because of this cost advantage, it can profitably set a price that the high-cost firms cannot easily improve upon.

If the product is homogeneous, there cannot be different prices in the market for the same product. Therefore, the high-cost firms must sell at the price set by the low-cost firm, even though that price may not be the most profitable for them. The low-cost firm thus becomes the natural leader because its cost position allows it to determine the market price.

### **Price Leadership by the Dominant Firm**

A more elaborate model is **price leadership by the dominant firm**. Here the industry consists of one large dominant firm and a number of smaller firms. The dominant firm sets the market price, while the smaller firms behave like price-takers.

Each small firm decides how much to produce at the price fixed by the dominant firm, according to the rule that price equals marginal cost. The outputs of all small firms are added together to obtain the total supply of the small-firm group. This total supply is then subtracted from total market demand to determine the **residual demand** faced by the dominant firm.

The dominant firm derives its marginal revenue curve from this residual demand curve and chooses the output level where its marginal revenue equals its marginal cost. This determines both the dominant firm's output and the market price. At that price, the smaller firms supply the remainder of total market demand. Thus, the total market output is shared between the dominant firm and the smaller firms.

This model is important because it explains how one powerful firm can lead the market even without a formal agreement, while smaller firms behave as followers.

### **Revenue Maximization Model**

The lesson also presents another important model of oligopoly behavior: the **revenue-maximization model** associated with Professor Baumol. This model suggests that managers of large modern firms may be more interested in maximizing total revenue than in maximizing profit.

In large corporations, ownership belongs to shareholders, but the actual running of the firm is done by salaried managers and executives. These managers may not always place the greatest importance on maximum profit. Instead, they may focus on sales growth, market expansion, size of the enterprise, prestige, or the appearance of success in administration. Since total sales revenue is often a visible and measurable sign of success, managers may prefer revenue maximization.

According to the model, total revenue is maximized at the output level where **marginal revenue is zero**. As long as marginal revenue is positive, increasing output raises total revenue. Once marginal revenue becomes zero, total revenue reaches its maximum value.

This output level is greater than the profit-maximizing output, which occurs where marginal cost equals marginal revenue. Since marginal cost is positive, the profit-maximizing point must occur while marginal revenue is

still positive. Therefore, the revenue-maximizing firm produces more output than the profit-maximizing firm.

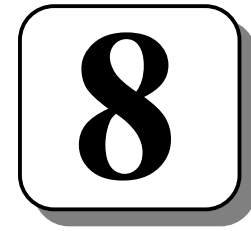
The revenue-maximization model widens our understanding of oligopolistic behavior by showing that firms may pursue objectives other than profit maximization. It is especially relevant for modern large-scale enterprises run by professional managers.

### **Review Questions**

1. What is oligopoly? Explain its main characteristics.
2. Why is no single theory of oligopoly possible?
3. Explain the concept of Nash equilibrium and discuss its importance in oligopoly analysis.
4. Explain the assumptions and working of the Cournot model.
5. Show why the equilibrium in the Cournot model is a Nash equilibrium.
6. Explain the kinked demand curve model. Why does it suggest price rigidity in oligopoly?
7. What is a centralized cartel? How does it determine price and output?
8. Why are centralized cartels difficult to maintain in practice?
9. What is meant by a market-sharing cartel? How does it operate?
10. What is price signalling? How can it help firms coordinate price behavior?



# National Income and Macroeconomic Indicators



## Highlights

- Gross Domestic Product (GDP)
- Inflation and National Income Measures
- Three Approaches to GDP Measurement
- Aggregate Demand and Aggregate Supply (AD–AS) Framework
- Fiscal Policy and Monetary Policy
- GDP and Economic Welfare
- Unemployment



## **Lesson 1: Measurement of Economic Activity: The Concept of GDP**

### **Objectives**

After studying this lesson, you will be able to:

- understand the importance of measuring macroeconomic performance
- explain how GDP is used as an indicator of total output produced in a country during a given period
- understand the difference between final goods and intermediate goods
- explain why some practical compromises are necessary in computing GDP
- distinguish between nominal GDP, real GDP, and the GDP deflator

### **Introduction**

Macroeconomic analysis depends heavily on concepts such as national output, income, employment, unemployment, inflation, and the general price level. These concepts are very important because they help economists understand the performance of the entire economy. However, these ideas are abstract. They cannot be used effectively unless they can be measured.

For example, when economists say that the economy is growing, they must be able to show this growth through numerical data. When they say that inflation is rising, they need a price index to measure the increase in the general price level. When they discuss unemployment, they need a method for measuring how many people are willing and able to work but cannot find employment.

In the early development of macroeconomics, many theories could not be tested properly because reliable national income data were not available. John Maynard Keynes published *The General Theory of Employment, Interest and Money* in 1936, but at that time, comprehensive national income statistics were still under development, making empirical testing of macroeconomic theories difficult. Later, economists and statisticians developed a formal system of national income accounting. One of the most important figures in this development was Simon Kuznets, who made pioneering contributions to the measurement of national income and economic growth. He received the Nobel Prize in Economic Sciences in 1971.

National income accounting is therefore the system through which the economic activity of a country is measured in a systematic way. The most widely used measure in this system is Gross Domestic Product, commonly known as GDP.

### **The Gross Domestic Product (GDP)**

Gross Domestic Product, or GDP, is the most widely used summary measure of a country's domestic production over a given period of time. It is defined as the total market value of all **final goods and services** produced within the geographical boundaries of a country during a specified period, usually one year.

This definition contains several important ideas.

First, GDP is measured in monetary terms. Different goods and services cannot be added directly in physical terms. For example, we cannot add 10 kilograms of rice, 5 shirts, 2 mobile phones, and 1 haircut in physical units.

Therefore, market prices are used as a common measuring unit. The quantity of each good or service is multiplied by its market price, and the resulting money values are added together.

Second, GDP includes only currently produced goods and services. Goods produced in earlier years are not counted again when they are resold. For example, if a second-hand car is sold this year, the value of the car itself is not included in this year's GDP because it was already counted when it was first produced. However, if a dealer earns a commission from selling the used car, that service commission is included in GDP because it is a currently produced service.

Third, GDP includes only final goods and services. Final goods are goods purchased for final use. Intermediate goods are goods used in the production of other goods. If intermediate goods are counted separately along with final goods, the same value will be counted more than once. This problem is known as double counting.

For example, wheat is used to make flour, flour is used to make bread, and bread is sold to the final consumer. If the value of wheat, flour, and bread are all added together without adjustment, the value of wheat and flour will be counted more than once. To avoid this, GDP counts only final goods or uses the value added method.

Fourth, GDP mainly includes goods and services that pass through markets. Many activities that are valuable to human welfare are excluded because they do not have observable market prices. For example, unpaid household work, care work done within the family, voluntary services, and leisure are not fully included in GDP. However, national accounts do include some imputed values, such as owner-occupied housing services and government services valued at cost.

Finally, GDP is a flow variable. It measures production over a period of time, such as one year or one quarter. It is not a stock variable measured at a particular point in time.

### **Practical Compromises in Computing GDP**

Although the concept of GDP appears simple, its actual measurement involves many practical difficulties. National income accountants must make several compromises to measure GDP consistently.

### **Government Output**

Many government services do not have market prices. For example, services provided by public schools, police departments, courts, and public hospitals are not usually sold in ordinary markets. Since market prices are unavailable, the value of government output is usually estimated by the cost of producing those services. This includes wages, salaries, and other input costs.

This is a practical compromise. It does not necessarily mean that the value of government services is exactly equal to their cost. However, in the absence of market prices, cost-based valuation is used.

### **Investment Goods**

Capital goods such as machinery, factories, equipment, buildings, and infrastructure are included in GDP when they are newly produced. They are counted as investment goods. GDP is a gross measure, which means it includes total investment before deducting depreciation. Depreciation refers to the loss of value of capital goods due to wear and tear, age, or

obsolescence. Depreciation is deducted later when calculating Net Domestic Product, or NDP. Therefore, newly produced capital goods are counted fully in GDP as gross investment. Only when we move from GDP to NDP do we subtract depreciation.

### **Inventory Investment**

Sometimes firms produce goods that are not sold immediately. These unsold goods are added to business inventories. Goods produced but not yet sold are included in GDP as inventory investment. This is because production has taken place, even though final sale has not yet occurred. If inventory increases, it is counted as positive investment. If firms sell goods from previous inventories, inventory investment may be negative.

### **Non-Market Activities**

Many productive activities are not included in GDP because they do not involve market transactions. For example, cooking food at home, caring for family members, and helping neighbors may create real value but are usually excluded from GDP. If the same services are purchased in the market, they are included.

This creates a limitation of GDP. GDP measures market-based production more effectively than total human welfare.

### **Nominal and Real GDP**

GDP is measured in monetary terms. However, money values can increase for two different reasons. They may increase because more goods and services are produced, or they may increase because prices have risen. Therefore, economists distinguish between nominal GDP and real GDP.

Nominal GDP is the value of final goods and services measured at current market prices. It reflects both changes in output and changes in prices.

Real GDP is the value of final goods and services measured using the prices of a selected base year. It removes the effect of price changes and shows changes in actual output.

For example, suppose a country produces 100 units of a good in one year and each unit sells for \$10. Nominal GDP is \$1,000. If in the next year the country still produces 100 units but the price rises to \$20, nominal GDP becomes \$2,000. However, real output has not increased. Only prices have increased. Real GDP helps us identify this difference.

### **GDP Deflator**

The GDP deflator is a price index that measures the overall price level of goods and services included in GDP. It is calculated as:

$$\text{GDP Deflator} = \text{Nominal GDP} / \text{Real GDP} \times 100$$

If the GDP deflator rises, it means the general price level of domestically produced final goods and services has increased. Inflation can be measured by calculating the percentage change in the GDP deflator from one period to another.

## Review Questions

1. Why is it important to measure economic activity and macroeconomic performance?
2. What is Gross Domestic Product (GDP)? Why is it considered the broadest measure of a country's output?
3. What practical problems arise in computing GDP in actual practice?

### **CASE STUDY: India Surpasses the United Kingdom: GDP Measurement in a Large Developing Economy**

Around 2022, IMF-based current-dollar estimates showed India overtaking the United Kingdom to become the world's fifth-largest economy by nominal GDP at that time. This milestone was widely discussed as evidence of India's growing economic scale. India's nominal GDP was in the mid-\$3 trillion range, while the UK's was slightly above \$3 trillion.

However, this comparison illustrates both the usefulness and the limitations of GDP as a measurement tool. Total GDP measures the size of an economy, but it does not show how income is distributed among the population. India has a much larger population than the United Kingdom. Therefore, even though India's total GDP exceeded that of the United Kingdom, its GDP per capita remained much lower.

For example, India's GDP per capita in 2022 was around the low \$2,000 range, while the United Kingdom's GDP per capita was above \$40,000. This shows that total GDP and GDP per capita tell very different stories. Total GDP measures the overall economic size of a country, while GDP per capita gives a better indication of average income and living standards.

India's case also highlights the measurement challenge created by the informal sector. A large share of India's economic activity takes place in informal activities such as smallholder farming, street vending, household services, small workshops, and self-employment. Official national accounts attempt to estimate such activities through surveys and indirect methods, but informal production is harder to measure accurately than formal market production.

Another important issue is the method of international comparison. If GDP is compared using market exchange rates, lower-cost countries may appear smaller than they really are in terms of domestic purchasing power. Purchasing Power Parity, or PPP, adjusts for differences in price levels across countries. When PPP is used, India's economic size appears much larger relative to many advanced economies.

The India-UK comparison therefore teaches an important lesson. GDP is a powerful measure of economic size, but it must be interpreted carefully. Total GDP, GDP per capita, nominal GDP, and PPP-adjusted GDP each answer different questions. A country may have a very large total GDP while still having low average income. Therefore, GDP figures should always be used with proper context.

## Lesson 2: Inflation and Related National Income Measures

### Objectives

After studying this lesson, you will be able to:

- explain the meaning of inflation and the general price level
- distinguish between headline inflation and core inflation
- measure inflation using the Consumer Price Index and the GDP deflator
- discuss the major causes, types, effects, and control measures of inflation
- distinguish between GDP and GNP
- explain the difference between gross domestic product and net domestic product

### Inflation: Meaning and the General Price Level

Inflation refers to a sustained increase in the general price level of goods and services over time. It does not mean that the price of only one or two commodities has risen. Instead, it means that prices in general are moving upward, so the purchasing power of money is falling. The general price level refers to the average level of prices in the economy, summarized through price indexes. Inflation is one of the central concerns of macroeconomics because price stability is essential for healthy economic functioning.

### Measurement of Inflation

**Consumer Price Index (CPI):** The CPI measures the cost of a fixed basket of goods and services consumed by a typical urban household, relative to its cost in a base year.  $\text{CPI in a given year} = (\text{Cost of basket in given year} / \text{Cost of basket in base year}) \times 100$ . For example, if the base year basket costs \$550 and rises to \$660,  $\text{CPI} = (660/550) \times 100 = 120$ , indicating a 20% rise in the cost of living. Because not all households buy the same bundle, no single index perfectly captures everyone's experience. This is known as the index number problem.

**GDP Deflator:**  $\text{The GDP deflator} = (\text{Nominal GDP} / \text{Real GDP}) \times 100$ . Unlike the CPI, it covers all final goods and services produced in the economy, including investment goods and government services, making it a broader measure of inflation.

**Rate of Inflation:** Using GDP deflator:  $\text{Rate} = ((\text{Current deflator} - \text{Previous deflator}) / \text{Previous deflator}) \times 100$ . Using CPI:  $\text{Rate} = ((\text{CPI current year} - \text{CPI previous year}) / \text{CPI previous year}) \times 100$ .

### Types of Inflation and Their Origins

Inflation can arise from different sources. The most important types are demand-pull inflation, cost-push inflation, built-in inflation, monetary inflation, and structural inflation.

### Demand-Pull Inflation

Demand-pull inflation occurs when aggregate demand rises faster than aggregate supply. In simple words, it happens when too much spending chases too few goods.

This may occur during periods of rapid economic expansion, easy credit, rising consumer confidence, strong investment, or increased government spending. When households, firms, and government all increase spending, total demand rises. If the economy cannot increase output quickly enough, prices rise.

### **Cost-Push Inflation**

Cost-push inflation occurs when the cost of production increases and firms pass these higher costs on to consumers. For example, if fuel prices, raw material prices, wages, or transportation costs rise, firms may raise the prices of their goods and services.

Cost-push inflation can be especially harmful because it may reduce output while increasing prices. This creates a situation where inflation and unemployment rise together.

### **Built-In Inflation**

Built-in inflation occurs when people expect inflation to continue. Workers demand higher wages to maintain their purchasing power. Firms then raise prices to cover higher wage costs. This creates a wage-price spiral.

### **Monetary Causes of Inflation**

Inflation may also occur if the money supply grows faster than real output. If there is too much money in circulation relative to the quantity of goods and services available, prices tend to rise.

### **Structural Causes of Inflation**

In developing economies, inflation may arise from structural weaknesses. These include poor infrastructure, supply bottlenecks, weak market integration, dependence on imports, low agricultural productivity, and limited industrial capacity. In such cases, even moderate increases in demand can cause prices to rise significantly.

### **Effects of Inflation**

**Purchasing Power:** Inflation reduces the real value of money income, harming low-income and fixed-income groups most severely.

**Income Distribution:** Creditors and pensioners typically lose; borrowers may gain.

**Savings and Investment:** High inflation discourages savings if real interest rates are negative and creates uncertainty that reduces long-term investment.

**Production:** Distorts price signals and complicates business planning.

**External Trade:** Raises export prices and attracts cheaper imports, worsening the balance of payments.

### **Measures to Control Inflation**

#### **Monetary Policy**

The central bank can control inflation by reducing money supply growth or raising interest rates. Higher interest rates reduce borrowing, investment, and consumption. This reduces aggregate demand and helps control inflation.

#### **Fiscal Policy**

The government can reduce inflationary pressure by reducing public spending or increasing taxes. This lowers aggregate demand.

#### **Supply-Side Measures**

Supply-side measures aim to increase production and remove bottlenecks. These include improving infrastructure, increasing agricultural productivity, reducing transport costs, and expanding productive capacity.

#### **Direct Controls**

Governments may use price controls, rationing, or subsidies in emergency situations. However, these measures should usually be temporary because they may create shortages and distortions if used for a long time.

### **GDP and GNP**

GDP measures the value of final goods and services produced within the domestic territory of a country, regardless of who owns the factors of production.

GNP, or Gross National Product, measures the value of final goods and services produced by the residents or nationals of a country, regardless of where they are located.

The relationship is:

$$\text{GNP} = \text{GDP} + \text{Net Factor Income from Abroad}$$

Net Factor Income from Abroad refers to income earned by residents from abroad minus income earned by foreigners from the domestic economy.

This distinction is important for countries with many migrant workers, large remittance inflows, or significant foreign-owned companies.

### **Gross Domestic Product and Net Domestic Product**

GDP is a gross measure because it does not deduct depreciation. Depreciation is the loss of value of capital goods due to wear and tear, age, or obsolescence.

Net Domestic Product, or NDP, is calculated as:

$$\text{NDP} = \text{GDP} - \text{Depreciation}$$

NDP is conceptually useful because it shows how much output remains after maintaining the existing capital stock. However, GDP is more commonly used because depreciation is difficult to estimate accurately.

### **Review Questions**

1. What is the difference between nominal GDP and real GDP?
2. What is the GDP deflator, and how is it used to measure inflation?
3. What is the Consumer Price Index (CPI), and how does it differ from the GDP deflator?
4. What are the main causes and types of inflation?
5. What are the major effects of inflation on purchasing power, savings, and investment?
6. What is the difference between GDP and GNP?
7. What is the difference between gross domestic product and net domestic product?

### **CASE STUDY: The Great US Inflation of 2021-2023 and Zimbabwe's Hyperinflation**

The United States experienced its highest inflation in about four decades during 2021 and 2022. CPI inflation was low in 2020, but it rose sharply in 2021 and reached about 8 percent in 2022. Several factors contributed to this inflationary episode.

First, the COVID-19 pandemic disrupted global supply chains. Factories closed, shipping was delayed, transport costs increased, and many industries faced shortages of inputs. This created cost-push inflation.

Second, governments introduced large stimulus packages to protect households and businesses during the pandemic. In the United States, the CARES Act of March 2020 provided about \$2.2 trillion in economic relief. Additional fiscal support followed. These policies helped prevent a deeper recession, but they also increased purchasing power at a time when supply was constrained.

Third, demand recovered faster than supply. Households increased spending on goods, housing, and services as restrictions eased. Firms could not always expand supply quickly enough. As a result, both demand-pull inflation and cost-push inflation operated at the same time.

The Federal Reserve initially kept interest rates near zero during the pandemic. Later, as inflation increased, it began raising interest rates in March 2022. The federal funds target range eventually reached 5.25 percent to 5.50 percent by mid-2023. Higher interest rates reduced borrowing and spending, which helped bring inflation down. By 2024, inflation had declined significantly, although it had not permanently returned exactly to the 2 percent target.

A much more extreme example of inflation occurred in Zimbabwe between 2007 and 2009. Zimbabwe experienced one of the worst hyperinflations in modern history. By November 2008, annual inflation was estimated at approximately 89.7 sextillion percent, or about  $8.97 \times 10^{22}$  percent. Prices were doubling roughly every 24 hours.

Several factors caused Zimbabwe's hyperinflation. Agricultural production collapsed after land redistribution policies disrupted farming. Government revenue fell, while public spending remained high. The government financed its deficits by creating money. As confidence in the Zimbabwean dollar collapsed, people tried to spend money as quickly as possible before it lost more value. This further accelerated inflation.

The Zimbabwean dollar became almost worthless, and the government eventually printed extremely large banknotes, including a 100 trillion dollar note. In 2009, Zimbabwe abandoned its own currency for most transactions and allowed the use of foreign currencies such as the US dollar and the South African rand.

The cases of the United States and Zimbabwe show two very different inflationary experiences. The US case shows how supply shocks and demand stimulus can create high inflation even in an advanced economy. Zimbabwe's case shows how uncontrolled money creation, falling production, and loss of confidence can destroy a monetary system.

### Lesson 3: Three Approaches to GDP Measurement

#### Objectives

After studying this lesson, you will be able to:

- understand how expenditure flows and income flows provide the basic framework of national accounts
- explain how GDP is calculated as the sum of expenditure flows
- understand how GDP can be computed as the sum of income flows
- know how GDP can also be measured as the sum of value added by all firms in the country

#### The Circular Flow of Income and Expenditure

The measurement of GDP is based on a fundamental principle: the value of final goods and services produced in an economy must equal the income generated from producing them. This is because every transaction has two sides. When a firm sells a good, the buyer makes an expenditure, and the firm receives income. The firm then uses this income to pay wages, rent, interest, profit, taxes, and depreciation allowances.

This relationship is shown through the circular flow of income and expenditure. In a simple economy, households provide factors of production such as labor, land, capital, and entrepreneurship to firms. Firms use these factors to produce goods and services. In return, firms pay income to households in the form of wages, rent, interest, and profit. Households then use their income to buy goods and services from firms.

In a more realistic economy, there are also government, financial institutions, and foreign trade. Some income leaks out of the spending stream through savings, taxes, and imports. At the same time, injections enter the spending stream through investment, government spending, and exports.

So, the total receipts of the producing sector are \$1,100. The firms distribute this, \$1,100 as: \$930 is paid to households as factor payments; Now, consider an economy in which firms sell goods and services worth \$1,100. \$130 to government as indirect taxes; \$40 is retained as depreciation. Thus,  $\$930 + \$130 + \$40 = \$1,100$ .

Households receive \$930 is income. They use this income in three ways – \$900 is spent on consumption goods and services, \$20 is saved, \$10 is paid to the government as direct taxes. Thus,  $\$900 + \$20 + \$10 = \$930$ .

The \$900 spent by households returns to the firms as revenue.

However, some income has leaked out of the circular flow through savings - \$20, direct taxes - \$10, Indirect taxes - \$130 and Depreciation = \$40.

Thus Total leakages,  $\$20 + \$10 + \$130 + \$40 = \$200$ .

To maintain the circular flow, these leakages must be matched by injections into the economy. Suppose govt. spends \$140 and firms invest \$60. Thus, Total injections =  $\$140 + \$60 = \$200$ .

Therefore, total leakages = total injections.

#### The Expenditure Approach

The expenditure approach measures GDP by adding all expenditures on final goods and services produced within the economy.

In a closed economy, GDP is calculated as:

$$\text{GDP} = C + I + G$$

In an open economy, GDP is calculated as:

$$\text{GDP} = C + I + G + \text{NX}$$

Here:

C = Consumption expenditure

I = Investment expenditure

G = Government purchases of goods and services

NX = Net exports = Exports - Imports

### **Consumption**

Consumption refers to household spending on goods and services. It includes spending on food, clothing, rent, education, health care, transport, and many other items. Consumption is usually the largest component of GDP.

### **Investment**

Investment refers to spending on capital goods, residential construction, business equipment, structures, and inventory accumulation. It does not mean the purchase of financial assets such as stocks and bonds. In national income accounting, investment means the creation of new physical capital or additions to inventories.

### **Government Purchases**

Government purchases include spending by government on goods and services. Examples include salaries of government employees, construction of roads, public education, public health services, and defense.

Transfer payments are not included in government purchases. Examples of transfer payments include pensions, unemployment benefits, and social assistance. These payments are not made in exchange for currently produced goods or services. If households later spend transfer payments, that spending is counted under consumption.

### **Net Exports**

Net exports equal exports minus imports. Exports are included because they are goods and services produced domestically and sold abroad. Imports are subtracted because they are produced abroad but included in domestic consumption, investment, or government spending.

In the circular flow example:  $\text{GDP} = \$900 + \$60 + \$140 = \$1,100$ .

### **The Income Approach**

The income approach measures GDP by adding the incomes earned by factors of production in the process of producing goods and services.

In a simplified form:

$$\text{GDP} = \text{Wages} + \text{Rent} + \text{Interest} + \text{Profit} + \text{Indirect Taxes} + \text{Depreciation}$$

Wages are payments to labor.

Rent is income from land and property.

Interest is income from capital lending.

Profit is income earned by entrepreneurs and business owners.

Indirect taxes are included because GDP is measured at market prices.

Depreciation is added because GDP is a gross measure.

In official national accounts, additional adjustments may be made for subsidies, statistical discrepancies, and other accounting items. However, the basic idea remains the same: GDP can be measured by adding the incomes generated in production.

In the example: \$930 (factor earnings) + \$130 (indirect taxes) + \$40 (depreciation) = \$1,100. The income approach and the expenditure approach must give the same result because receipts from selling output and payments for producing it are two sides of the same transaction.

### The Value Added Approach

The value added approach measures GDP by adding the value added at each stage of production.

Value Added = Sales Revenue - Cost of Intermediate Goods

This method avoids double counting. Instead of adding the full value of every transaction, it adds only the new value created at each stage.

For example, consider the production of bread. A farmer produces wheat and sells it to a miller. The miller turns wheat into flour and sells it to a baker. The baker makes bread and sells it to a retailer. The retailer sells the bread to the final consumer. If the value of wheat, flour, and bread are all added together without adjustment, the value of wheat and flour will be counted more than once. The value added method avoids this problem.

| Stage           | Sales Receipts<br>(cents) | Intermediate<br>Cost (cents) | Value Added<br>(cents) |
|-----------------|---------------------------|------------------------------|------------------------|
| Wheat           | 30                        | 0                            | 30                     |
| Flour           | 45                        | 30                           | 15                     |
| Baked dough     | 68                        | 45                           | 23                     |
| Delivered bread | 85                        | 68                           | 17                     |
| Total           | 228                       | 143                          | 85                     |

In this examples GDP = 85 cents which is equal to the final selling price of the bread. The value added approach particularly avoids double counting without requiring case-by-case judgments about whether each good is final or intermediate.

### Review Questions

1. What is meant by the circular flow of income and expenditure?
2. Why are total income and total expenditure equal in the circular flow?
3. How is GDP measured by the expenditure approach?
4. What are the main components of GDP under the expenditure approach?
5. Why are transfer payments excluded from GDP?
6. How is GDP measured by the income approach?
7. What is value added, and why is it important in measuring GDP?

### **CASE STUDY: The United Kingdom: Reconciling Three GDP Estimates in Practice**

The United Kingdom's Office for National Statistics, or ONS, publishes GDP estimates using the output approach, expenditure approach, and income approach. In theory, all three approaches should produce the same GDP figure. In practice, they often differ slightly because they rely on different data sources, surveys, timing, and estimation methods.

The output approach measures the value added by industries. It uses production data from sectors such as manufacturing, construction, services, agriculture, and public administration. The expenditure approach measures spending by households, firms, government, and the foreign sector. The income approach measures the income generated from production, including wages, profits, and other factor incomes.

Because the three measures are based on different information, they may not match perfectly. The ONS therefore uses a process called balancing to reconcile the estimates. In early estimates, the output approach often carries more weight because monthly output data are more timely and detailed. However, final GDP estimates use evidence from all three approaches.

The ONS also reports statistical discrepancies. A statistical discrepancy is the difference between estimates derived from different approaches. Such discrepancies do not mean that the economy itself is inconsistent. They simply reflect measurement difficulties.

This case shows that GDP measurement is both a conceptual and practical exercise. In theory, production, income, and expenditure are equal. In reality, economists must collect data from millions of households, firms, government agencies, and international transactions. Because of this, high-quality national statistical institutions are essential for reliable economic policymaking.

## **Lesson 4: The AD-AS Framework, Fiscal Policy, and Monetary Policy**

### **Objectives**

After studying this lesson, you will be able to:

- understand the concept of aggregate demand and the factors that shift it
- distinguish between short-run aggregate supply and long-run aggregate supply
- use the AD-AS model to explain changes in real GDP and the price level
- explain how fiscal policy works through government spending and taxation
- explain how monetary policy works through interest rates and the money supply

### **Introduction**

The previous lessons discussed how GDP, inflation, and national income are measured. However, measurement alone does not explain why output rises or falls, why inflation occurs, or why unemployment changes. To answer these questions, macroeconomics uses the Aggregate Demand and Aggregate Supply framework, commonly known as the AD-AS model.

The AD-AS model explains how the overall price level and real GDP are determined. It also helps economists understand recessions, inflation, unemployment, stagflation, and the effects of fiscal and monetary policy.

### **Aggregate Demand (AD)**

Aggregate demand refers to the total quantity of goods and services that households, firms, government, and foreign buyers are willing and able to purchase at different price levels.

Aggregate demand is expressed as:

$$AD = C + I + G + NX$$

Here:

C = Consumption

I = Investment

G = Government spending

NX = Net exports

The aggregate demand curve slopes downward. This means that when the general price level falls, the quantity of real GDP demanded rises. When the general price level rises, the quantity of real GDP demanded falls.

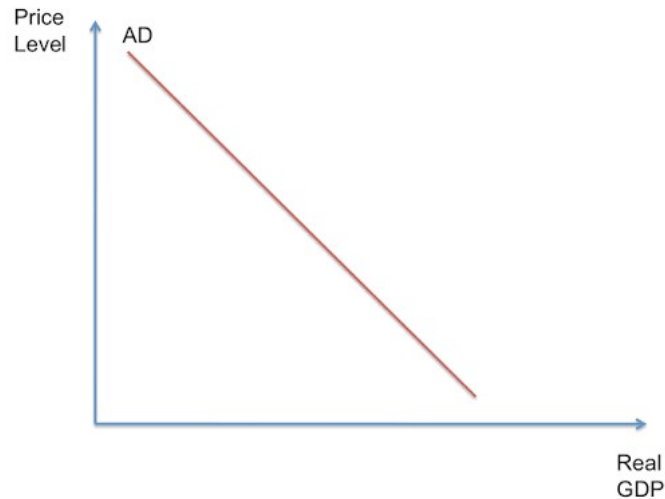


Figure 4.1: The Aggregate Demand Curve

### Why the AD Curve Slopes Downward:

There are three main reasons why the AD curve slopes downward.

#### Real Wealth Effect

When the price level rises, the purchasing power of money and financial assets falls. People feel poorer and reduce consumption. When the price level falls, purchasing power rises and consumption increases.

#### Interest Rate Effect

When the price level rises, people need more money for transactions. This increases the demand for money. If the money supply is fixed, interest rates rise. Higher interest rates reduce investment and interest-sensitive consumption. Therefore, aggregate demand falls.

#### International Trade Effect

When domestic prices rise relative to foreign prices, exports become more expensive and imports become relatively cheaper. Exports fall and imports rise. As a result, net exports decrease, reducing aggregate demand.

**Factors That Shift Aggregate Demand:** The AD curve shifts when total spending changes at every price level.

Aggregate demand may increase because of:

1. higher consumer confidence
2. increased household wealth
3. lower interest rates
4. increased investment expectations
5. higher government spending
6. lower taxes
7. higher foreign income
8. depreciation of the domestic currency, which may increase exports

Aggregate demand may decrease because of:

1. lower consumer confidence
2. falling household wealth

3. higher interest rates
4. lower investment expectations
5. reduced government spending
6. higher taxes
7. lower foreign income
8. appreciation of the domestic currency, which may reduce exports

### Aggregate Supply: Short-Run and Long-Run

Aggregate supply refers to the total quantity of goods and services that producers are willing and able to supply at each possible price level. A crucial distinction exists between the short run and the long run.

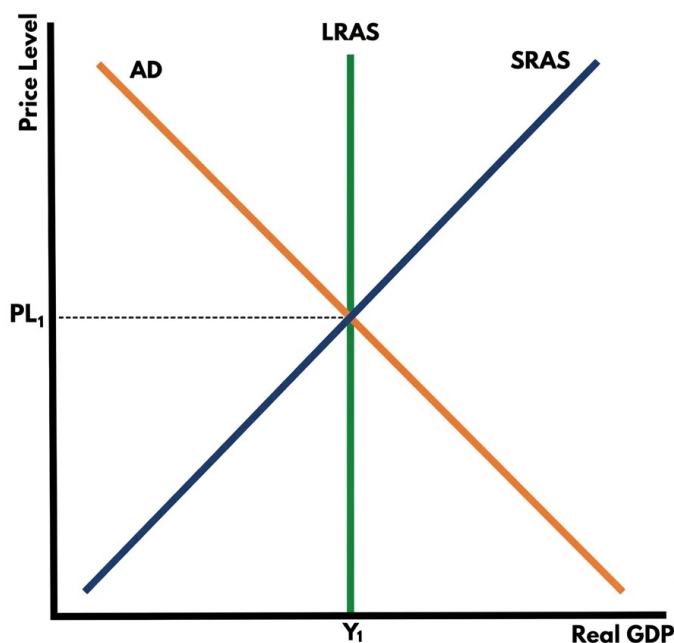


Figure 4.2: Short-Run Aggregate Supply (SRAS) and Long-Run Aggregate Supply (LRAS).

**Short-Run AS (SRAS):** The short-run aggregate supply curve, or SRAS curve, slopes upward. In the short run, wages and some input prices are sticky. This means they do not adjust immediately when the price level changes.

When the price level rises, firms may receive higher prices for their output while some costs remain temporarily unchanged. Production becomes more profitable, so firms increase output. When the price level falls, production becomes less profitable, so firms reduce output.

The SRAS curve may shift because of:

1. changes in wages
2. changes in raw material prices
3. changes in energy prices
4. changes in productivity
5. changes in business taxes and regulations
6. supply shocks such as natural disasters, wars, pandemics, or oil price increases

**Long-Run AS (LRAS):** The long-run aggregate supply curve, or LRAS curve, is vertical at potential GDP. Potential GDP is the level of output an economy can produce when resources are fully and efficiently employed.

In the long run, wages and prices adjust fully. Therefore, the price level does not determine the economy's long-run output. Long-run output depends on real factors such as:

1. labor force size
2. human capital
3. physical capital
4. technology
5. natural resources
6. institutions and productivity

### **Fiscal Policy**

Fiscal policy refers to the use of government spending and taxation to influence aggregate demand. It is one of the two main instruments of macroeconomic stabilization.

**Expansionary Fiscal Policy:** During a recession gap, government increases spending (G) or cuts taxes (T). Higher G directly raises AD. Lower T raises disposable income, boosting consumption. The total effect on GDP is amplified by the fiscal multiplier:  $\text{Multiplier} = 1 / (1 - \text{Marginal Propensity to Consume})$ . If  $\text{MPC} = 0.8$ , a \$100 million increase in G raises GDP by \$500 million.

**Contractionary Fiscal Policy:** During an inflationary gap, government reduces spending or raises taxes to cool aggregate demand and reduce inflationary pressure.

**Automatic Stabilizers:** Tax revenues fall and transfer payments rise automatically during recessions, and rise and fall respectively during booms, partially offsetting cyclical fluctuations without requiring new legislation.

**Limitations:** Time lags (recognition, implementation, and impact); crowding out (higher government borrowing may raise interest rates, reducing private investment); political constraints; and the risk of unsustainable public debt.

### **Monetary Policy**

Monetary policy refers to central bank actions that influence the money supply, interest rates, credit conditions, output, employment, and inflation. Monetary policy is conducted by the central bank. In Bangladesh, this role is performed by Bangladesh Bank. In the United States, it is performed by the Federal Reserve. In the United Kingdom, it is performed by the Bank of England.

### **Instruments of Monetary Policy**

#### **Open Market Operations**

Open market operations involve the buying and selling of government securities by the central bank. If the central bank buys securities, it injects money into the banking system. This may lower interest rates and increase lending. If the central bank sells securities, it withdraws money from the banking system.

### **Policy Interest Rate**

The central bank can influence the economy by changing its policy interest rate. A lower policy rate reduces borrowing costs and encourages consumption and investment. A higher policy rate increases borrowing costs and reduces spending.

### **Reserve Requirements**

The reserve requirement is the minimum proportion of deposits that commercial banks must hold as reserves. If the central bank lowers the reserve requirement, banks can lend more. If it raises the reserve requirement, banks can lend less.

### **Expansionary Monetary Policy**

Expansionary monetary policy is used during a recession. The central bank lowers interest rates or increases the money supply. This encourages borrowing, investment, and consumption. Aggregate demand shifts to the right, increasing output and employment.

### **Contractionary Monetary Policy**

Contractionary monetary policy is used to control inflation. The central bank raises interest rates or reduces money supply growth. Borrowing becomes more expensive, and spending falls. Aggregate demand shifts to the left, reducing inflationary pressure.

### **Limitations of Monetary Policy**

Monetary policy also has limitations.

First, there are time lags. It takes time for interest rate changes to affect borrowing, spending, output, and inflation.

Second, monetary policy may be weak during a liquidity trap. If interest rates are already very low, further reductions may not encourage borrowing.

Third, banks may be unwilling to lend even when they have reserves, especially during financial crises.

Fourth, in open economies, changes in interest rates may affect exchange rates and capital flows.

### **Stagflation and the Limits of Policy**

Stagflation refers to a situation where high inflation and high unemployment occur at the same time. It usually results from an adverse supply shock, such as a sharp increase in oil prices.

When short-run aggregate supply shifts left, output falls and the price level rises. This creates a policy dilemma. If the government stimulates demand to reduce unemployment, inflation may worsen. If it reduces demand to control inflation, unemployment may rise further.

### **Review Questions**

1. What is aggregate demand, and why does the AD curve slope downward?
2. What factors shift the AD curve to the right?
3. What is the difference between the short-run and long-run aggregate supply curves?

4. How does the AD-AS model explain stagflation?
5. What is fiscal policy, and how does expansionary fiscal policy work?
6. What is the fiscal multiplier, and how is it calculated?
7. What are automatic stabilizers?
8. What is monetary policy, and what are its main instruments?
9. What are the main limitations of fiscal policy and monetary policy?

## **Lesson 5: Measures of Aggregate Income and GDP as an Index of Economic Welfare**

### **Objectives**

After studying this lesson, you will be able to:

- understand how National Income and Disposable Personal Income are derived from GDP
- explain why additional income measures are necessary
- understand why GDP is an imperfect measure of economic welfare
- explain how modified welfare measures can improve upon GDP

### **From GDP to National Income**

GDP measures the market value of final goods and services produced within a country. However, economists often need other income measures to understand different aspects of the economy. These include GNP, NNP, National Income, Personal Income, and Disposable Personal Income.

GDP measures production within domestic territory. GNP measures production by the residents of a country, regardless of where they are located.

The relationship is:

$$\text{GNP} = \text{GDP} + \text{Net Factor Income from Abroad}$$

Net National Product, or NNP, is obtained by subtracting depreciation from GNP.

$$\text{NNP} = \text{GNP} - \text{Depreciation}$$

National Income, or NI, measures income earned by factors of production. It values output at factor cost rather than market prices. Since market prices include indirect taxes and may be affected by subsidies, adjustments are needed to move from market prices to factor cost.

In simplified form:

$$\text{NI} = \text{NNP} - \text{Indirect Taxes} + \text{Subsidies}$$

If subsidies are ignored for simplicity, the relationship may be shown as:

$$\text{NI} = \text{NNP} - \text{Indirect Taxes}$$

### **Personal Income and Disposable Personal Income**

National Income does not equal the income actually received by households. Some income earned in production does not go directly to individuals. For example, corporations may retain part of their profits, and governments may collect corporate taxes and payroll taxes. At the same time, households may receive transfer payments that are not part of National Income.

Personal Income, or PI, is the income actually received by individuals from all sources before personal income taxes.

In simplified form:

$$\text{PI} = \text{NI} - \text{Retained Earnings} - \text{Corporate Taxes} - \text{Payroll Taxes} + \text{Transfer Payments}$$

Disposable Personal Income, or DPI, is the income households have available for consumption and saving after paying personal taxes.

$$\text{DPI} = \text{PI} - \text{Personal Taxes}$$

DPI is important because household consumption depends more directly on disposable income than on national income.

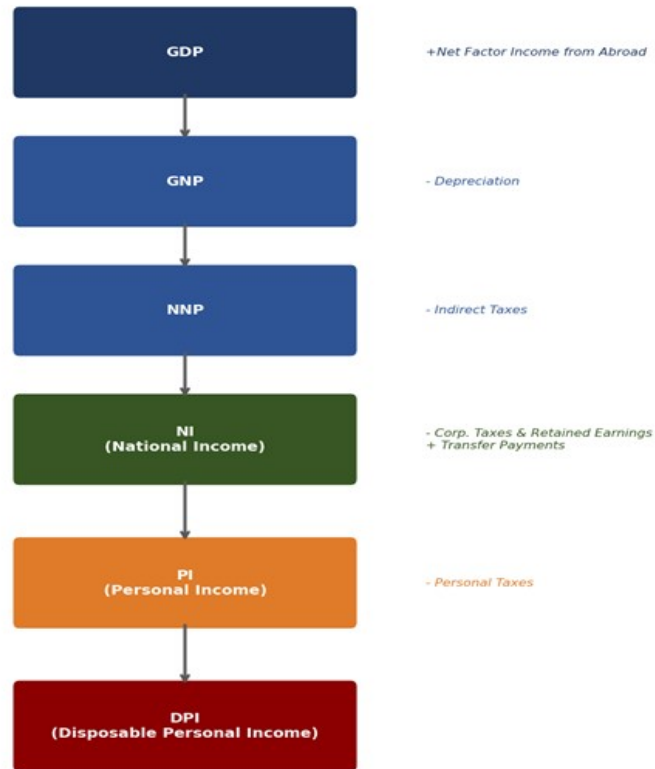


Figure 5.1: The Chain from GDP to Disposable Personal Income. Each step removes one set of deductions or adds one category of income, progressively narrowing the aggregate toward the income actually available for household use.

#### Illustrative Example (Simplified Figures, \$bn)

| Measure                          | Amount (\$bn) | Adjustment                                               |
|----------------------------------|---------------|----------------------------------------------------------|
| Gross Domestic Product (GDP)     | 5,677.5       |                                                          |
| Gross National Product (GNP)     | 5,695.0       | +17.5 (Net Factor Income)                                |
| Net National Product (NNP)       | 5,068.8       | -626.1 (Depreciation)                                    |
| National Income (NI)             | 4,544.2       | -524.6 (Indirect Taxes)                                  |
| Personal Income (PI)             | 4,828.1       | -875.1 corp. taxes/retained earnings; +1,159.2 transfers |
| Disposable Personal Income (DPI) | 4,209.4       | -618.7 (Personal Taxes)                                  |

#### GDP as an Index of Economic Welfare

GDP is often used as an indicator of economic performance, but it was not designed as a complete measure of welfare. A higher GDP usually means that more goods and services are being produced. However, more production does not always mean greater social welfare.

GDP may understate welfare in some cases and overstate welfare in others.

## **How GDP Understates Welfare**

### **Leisure**

Leisure has value, but it is not included in GDP. If people work fewer hours and enjoy more leisure while maintaining a decent standard of living, their welfare may increase. However, GDP may not show this improvement.

### **Non-Market Activities**

Unpaid household work, childcare, elder care, voluntary work, and community services contribute to welfare but are usually excluded from GDP.

### **Informal Economic Activity**

In many developing countries, a large amount of production takes place in informal markets. If these activities are not fully recorded, measured GDP may understate actual economic activity.

## **How GDP Overstates Welfare**

### **Defensive Expenditures**

Some spending increases GDP but does not necessarily improve welfare. For example, spending on pollution cleanup, crime prevention, or repairing accident damage may increase GDP, but these expenditures are made to correct harm.

### **Environmental Damage**

GDP does not deduct the cost of pollution, deforestation, soil degradation, or depletion of natural resources. A country may increase GDP by exploiting natural resources while reducing long-term welfare.

### **War and Conflict**

Military spending increases GDP, but war may destroy lives, infrastructure, security, and social welfare.

### **Net Economic Welfare**

Net Economic Welfare, or NEW, is an attempt to modify GDP so that it better reflects well-being. It adds the estimated value of leisure and non-market activities and subtracts environmental damage and defensive expenditures.

There is no universally accepted formula for NEW. However, the idea is useful because it reminds us that GDP measures market activity, not total human welfare.

## **GDP Per Capita and International Comparisons**

GDP per capita is calculated as:

$$\text{GDP per capita} = \text{GDP} / \text{Population}$$

It is often used as a measure of average income. However, it has limitations.

First, GDP per capita does not show income distribution. A country may have high GDP per capita, but income may be concentrated among a small group of people.

Second, GDP per capita does not measure health, education, security, environmental quality, or social equality.

Third, international comparisons are affected by exchange rates. Market exchange rates may not reflect the actual purchasing power of income within each country. For this reason, economists often use Purchasing Power Parity, or PPP, to compare living standards.

Fourth, developing countries may have more non-market and informal production, which may not be fully included in official GDP.

Therefore, GDP per capita should be used along with other indicators such as life expectancy, literacy, infant mortality, school enrollment, environmental quality, and the Human Development Index.

### Review Questions

1. What is the difference between GDP, GNP, NNP, National Income, Personal Income, and Disposable Personal Income?
2. Why is Disposable Personal Income considered important for understanding household spending and saving?
3. Why is GDP not a perfect measure of economic welfare?
4. How can non-market activities and leisure make GDP understate well-being?
5. How can war, natural disasters, and environmental damage make GDP overstate well-being?
6. Why can international comparisons of GDP per capita sometimes be misleading?

### CASE STUDY: New Zealand's Wellbeing Budget: Moving Beyond GDP

In 2019, New Zealand introduced its first Wellbeing Budget. It became one of the most prominent national examples of using wellbeing indicators to guide public spending decisions. The initiative was led by the government of Prime Minister Jacinda Ardern and Finance Minister Grant Robertson.

The Wellbeing Budget reflected the idea that GDP growth alone is not enough to measure national progress. A country may experience economic growth while still facing poverty, poor mental health, environmental degradation, housing problems, or social inequality. Therefore, New Zealand attempted to link budget decisions to broader social objectives.

The 2019 Wellbeing Budget focused on five main priorities. These included improving mental health, reducing child poverty, supporting Maori and Pasifika communities, building a productive nation in the digital age, and moving toward a low-emissions economy.

The approach was influenced by international discussions about the limitations of GDP. Economists such as Joseph Stiglitz, Amartya Sen, and Jean-Paul Fitoussi argued in their 2009 report that GDP is useful for measuring market production but insufficient as a measure of social progress. GDP may count pollution cleanup as positive output while ignoring unpaid care work, leisure, and environmental loss.

New Zealand's approach attracted international attention. Other countries and regions, including Scotland, Iceland, Wales, and Finland, have also shown interest in wellbeing-based policy frameworks through the Wellbeing Economy Governments partnership.

This case study shows that economic measurement affects policy priorities. If governments focus only on GDP, they may emphasize production and income growth. If they also measure health, education, poverty, environmental quality, and subjective wellbeing, they may design policies that better reflect human welfare.

## **Lesson 6: Unemployment: Meaning, Measurement, Causes, and Types**

### **Objectives**

After studying this lesson, you will be able to:

- explain the meaning of unemployment and the unemployment rate
- describe the main causes of unemployment
- identify and distinguish among the major types of unemployment
- explain the relationship between inflation and unemployment
- describe GDP, inflation, and unemployment as core macroeconomic indicators

### **Meaning and Definition**

Unemployment refers to a situation in which people who are able and willing to work at the prevailing wage rate cannot find employment. It represents the underutilization of labour, one of the most important productive resources in the economy. Unemployment is both an economic and a social problem: it reduces output and income, increases poverty, creates frustration, and may lead to social unrest.

### **Labour Force and Unemployment Rate**

The labour force comprises those who are employed and those who are unemployed but actively seeking work. People not working and not seeking work retirees, full-time students, discouraged workers who have stopped work are excluded from the labour force.

Unemployment Rate =  $(\text{Number of Unemployed} / \text{Labour Force}) \times 100$

### **Causes of Unemployment**

- Decline in aggregate demand during recessions, causing firms to reduce output and lay off workers
- Technological change making certain skills obsolete
- Mismatch between workers' skills and available job vacancies
- Seasonal variation in production in agriculture, tourism, and construction
- Labour force growth outpacing the economy's capacity to create jobs
- In developing countries: weak industrialization, low investment, and agricultural dependence

### **Types of Unemployment**

**Frictional Unemployment:** Arises when people are temporarily between jobs or entering the labour market for the first time. It reflects normal labour market search and is typically short-term.

**Structural Unemployment:** Occurs when the skills, qualifications, or location of workers no longer match available job vacancies, often because of long-term shifts in technology or industry structure. More serious and long-lasting than frictional unemployment; requires retraining and education reform.

**Cyclical Unemployment:** Caused by fluctuations in the business cycle. Rises sharply during recessions when aggregate demand falls; addressed by expansionary fiscal and monetary policy (see Lesson 4).

**Seasonal Unemployment:** Arises when work is available only during certain periods, common in agriculture, tourism, and some construction activities.

**Technological Unemployment:** Results from labour-saving automation and new production methods. May be temporary if new industries emerge.

**Disguised Unemployment:** A hidden form in which more workers are employed in a task than are productively necessary, common in developing-country agriculture. If some were removed, total output would be unchanged.

**Open Unemployment:** The visible form in which a person has no work at all despite actively seeking it, captured in official unemployment statistics.

**Underemployment:** A person works but is not fully employed in terms of hours, income, or use of skills.

**Educated Unemployment:** Graduates unable to find work matching their qualifications, common where educational output exceeds economy's capacity to absorb skilled labour.

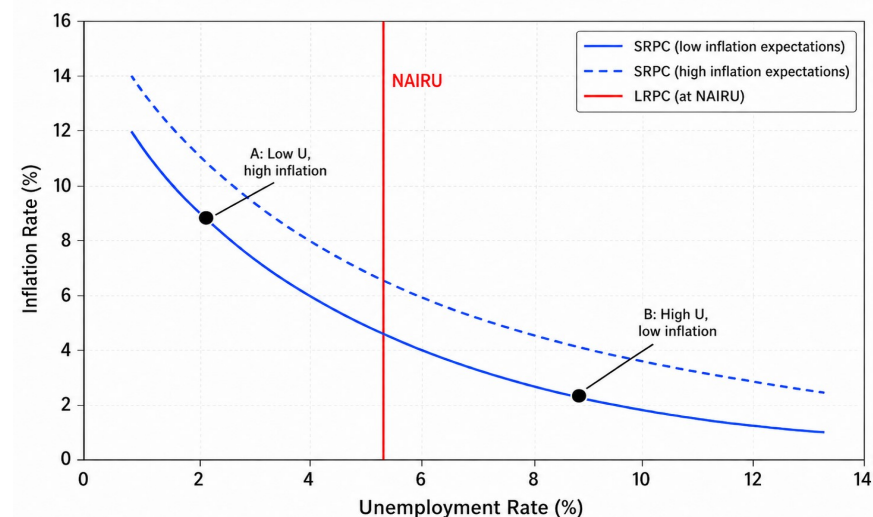
**Voluntary Unemployment:** A person chooses not to work at the prevailing wage or conditions.

**Involuntary Unemployment:** A person is willing and able to work at the prevailing wage but cannot find employment. The primary concern of macroeconomic policy.

### Full Employment and the Natural Rate of Unemployment

Full employment does not mean zero unemployment. Even in a well-functioning economy, frictional and structural unemployment always exist. Full employment means the elimination of cyclical unemployment only. The unavoidable residual mainly frictional and structural unemployment, is called the Natural Rate of Unemployment, or NAIRU (Non-Accelerating Inflation Rate of Unemployment). Below the NAIRU, inflation tends to accelerate; above it, inflation tends to decelerate.

### Relationship Between Inflation and Unemployment: The Phillips Curve



*Figure 6.2: The Phillips Curve. In the short run, there is a trade-off between inflation and unemployment: point A (low unemployment, high inflation) and point B (high unemployment, low inflation) both lie on the same SRPC. In the long run (LRPC), the economy always returns to the NAIRU regardless of inflation, making the curve vertical. Higher inflation expectations shift the SRPC upward.*

The Phillips Curve shows the relationship between inflation and unemployment. In the short run, there may be a trade-off between inflation and unemployment. When unemployment is low, inflation may be high because strong demand puts upward pressure on wages and prices. When

unemployment is high, inflation may be low because weak demand reduces wage and price pressure.

However, economists Milton Friedman and Edmund Phelps argued that this trade-off exists only in the short run. In the long run, workers and firms adjust their expectations about inflation. As expectations adjust, the short-run Phillips Curve shifts. In the long run, there is no permanent trade-off between inflation and unemployment.

The long-run Phillips Curve is vertical at the natural rate of unemployment. This means that attempts to keep unemployment permanently below the natural rate may only result in accelerating inflation.

Stagflation creates a challenge for the simple Phillips Curve. Stagflation means high inflation and high unemployment at the same time. It can occur when an adverse supply shock, such as a sharp oil price increase, shifts short-run aggregate supply leftward. Prices rise while output and employment fall.

### **GDP, Inflation, and Unemployment: The Three Core Indicators**

GDP, inflation, and unemployment are the three core indicators of macroeconomic performance. GDP measures the level of production and income. Inflation measures the rate of increase in the general price level. Unemployment measures the extent to which labor resources are unused. These indicators are closely connected. If aggregate demand rises, GDP may increase and unemployment may fall, but inflation may also rise. If aggregate demand falls, GDP may decline and unemployment may rise, while inflation may fall. If aggregate supply falls, inflation and unemployment may rise together. Macroeconomic policy aims to achieve stable economic growth, low and stable inflation, and low involuntary unemployment.

### **Review Questions**

1. What is unemployment, and how is the unemployment rate measured?
2. Why is unemployment considered both an economic and a social problem?
3. What are the main causes of unemployment?
4. What is the difference between frictional, structural, and cyclical unemployment?
5. What are disguised unemployment, underemployment, and educated unemployment?
6. What is meant by full employment and the natural rate of unemployment?
7. How can different types of unemployment be reduced?
8. What is the relationship between inflation and unemployment?