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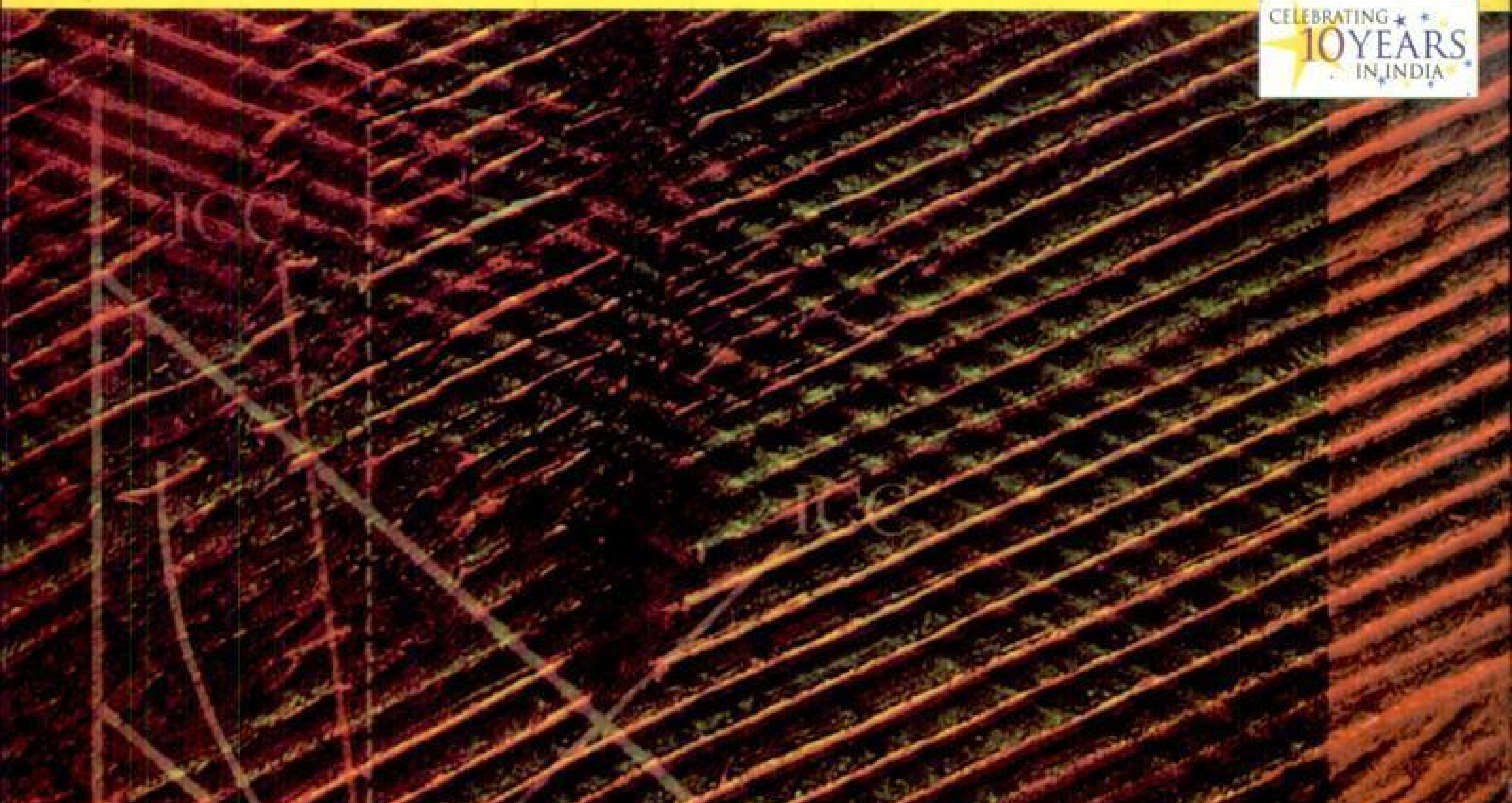

Microeconomics

Theory & Applications

D. N. Dwivedi

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PART I

INTRODUCTION

1 Introduction to Microeconomics

CHAPTER OUTLINE

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1.1 AN OVERVIEW OF ECONOMICS

Economics is a social science. The basic function of a science is to study a certain kind of natural or social phenomenon. Economics as a social science studies *economic behaviour* of the people and *economic phenomena. Economic behaviour* is essentially a *conscious effort* of the people to derive maximum gains from the use of scarce resources and opportunities available to them. *Economics is, fundamentally, the study of how people allocate their limited resources to their alternative uses to produce and consume goods and services to satisfy their endless wants or to maximize their gains.* In their efforts to maximize their gains from their limited resources, people (individuals, households, firms, and the government) as *producers* and *consumers* have to make a number of choices regarding the use of their resources and spending their earnings. The need for making choices arises due to following basic facts of economic life:

- ***human wants are unlimited***
- ***resources available to satisfy human wants are scarce***
- ***people want to maximize their gains***

Let us look at these facts in some detail. Human wants, desire and needs are endless in the sense that they go on increasing with increase in people's ability to satisfy them. Human wants continue to increase without meeting their end because (i) people have insatiable desire to raise their standard of living, comforts and efficiency; (ii) human tendency is to accumulate things beyond their present need; (iii) human wants increase with increase in knowledge, inventions and innovations; (iv) satisfying one want (e.g., buying a car) creates want for many other things (e.g., petrol, driver, parking place, safety locks, spare parts, insurance, etc.); (v) the moment one want is satisfied, other wants come up from nowhere; (vi) biological needs (e.g., food, water, etc.) are repetitive; and (vii) in modern times, advertisements influence consumer's taste and preferences and create new kind of wants. The end of wants for an individual comes only with the end of his/her life. But, human wants continue to increase. Another and an equally important feature of human wants is that they are not equally urgent and equally important. Satisfying some wants gives more pleasure than others. Therefore, gain maximizing consumers have to make a choice between wants.

Resources can be classified as (i) *natural resources* (including land, space, water, minerals, forest, climate, jointly called *land*); (ii) *human resources* (including man-power, its energy, talent, professional skills, and innovative ability and organizational skill, jointly called *labour*); (iii) *man-made resources* (including machinery, equipments, tools, technology and building, jointly called *capital*). To this economists add another category of resource called *entrepreneurship*, i.e., those who organizes the resources and assume *risk* in business. *Time* and *information* are two other kinds of resources which have economic value. All these resources available to a person, society, country—howsoever rich—at any point of time are limited. Resource scarcity is a relative term. It implies that resources are scarce in relation to the demand for resources. The *scarcity of resources is, in fact, the mother of all economic problems.* If resources were unlimited, like human wants, there would be no economic problem and no economics. It is the scarcity of resources in relation to human wants which forces people to make choices.

Furthermore, the problem of choice arises also because resources have *alternative uses* and alternative uses have *different returns or earnings.* For example, a building in Delhi used to set up a 'public school' yields more income than when used for residential purpose. Therefore, gain maximizing resource owners have to make choices between the alternative uses of scarce resources. Economics as a social science analyses how people (individuals and society) make their choices between the economic goals they want to achieve, between the goods and services they want to produce, and between the alternative uses of their resources with the objective of *maximizing their gains.* The gain maximizers will have to evaluate the cost and benefit of alternative options in making their choices. Economics studies the process of evaluation of alternatives.

In addition, economics provides logic and reasoning, tools and technique, and analytical framework to analyse economic phenomena and to predict the consequences of change in economic conditions. It may, thus, be concluded that *economics as a science studies economic behaviour of the people and its consequences; it brings out cause-and-effect relationships between economic events; provides the tools and techniques of analysing economic phenomena and the tools and techniques for predicting the consequences of economic decisions and economic events.* Economics studies economic phenomena *systematically and methodically.* This approach to economic inquiry imparts economics the status of a 'social science'.

The *subject matter of economics* continues to grow and expand in scope, size and character right from the days of its founders, Adam Smith to date. Boundaries of economic science are not yet precisely marked, nor can it be. In the opinion of some economists, "Economics is still a very young science and many problems in it are almost untouched" (Charles Schultz) and "Economics is an unfinished science" (Zeuthen). Yet, economics is claimed to be 'the oldest and best developed of the social sciences' and continues to grow in content and level of analytical sophistication. However,

1. Some economists do not agree with the division of Economics into Microeconomics and Macroeconomics. Fritz Machlup remarks, " ... there is no agreement on the meaning and scope of the concept of micro and macro theory". (For details see his "Micro and macroeconomics: Contested Boundaries and Claims of Superiority" in Machlup (ed.), *Essays on Economic Semantics*, New York, W.W. Norton, 1977), pp. 98-103. A.P. Lerner is of the opinion that the division of economics between micro-and macroeconomics "often contributes more to fuzzy confusion than to rigorous understanding" (See his paper "Microeconomic Theory" in *Perspective in Economics — Economists Look at Their Fields of Study*, ed. by A.A. Brown, E. Neuberger and M. Palmatier, (McGraw-Hill, New York), p. 36.

the mainstream *economics* is divided, though imperfectly[1], into two major branches:[1] ***Microeconomics*** and ***Macroeconomics***.[2] This division crystallized after the Great Depression of 1930s. Until 1936,[3] there was only one *Economics* which conformed to what is now called 'microeconomics'. In this book, we are concerned with *Microeconomics*.

In brief, ***microeconomics*** studies the economic phenomena at micro level, i.e., at the individual level, and **macroeconomics** studies them at national aggregate level. *Microeconomics* studies how consumers and producers make their choices; how their decisions and choices affect the demand and supply conditions; how consumers and producers interact to settle the prices of goods and services in the market; how prices are determined in different market settings; and how total output is distributed among those who contribute to production, i.e., between landlords, labour, capital supplier, and the entrepreneurs. For our limited purpose in this text, we will confine to the study of the *theory of consumer behaviour, theories of production and cost, theory of commodity pricing, theory of factor pricing*, and *the most efficient allocation of output and factors of production* called *welfare economics*. These theories make the main theme of *microeconomics*. We will look at the subject matter of *microeconomics* in detail in the subsequent section.

Macroeconomics, on the other hand, studies the working and performance of the economy as a whole. It analyses behaviour of the national aggregates including national income, aggregate consumption, savings, investment, total employment, the general price level and country's balance of payments. Macroeconomics analyses how these aggregate variables interact with one another, how they are determined and how they determine the aggregate national output. It also studies the impact of public revenue and public expenditure, government's economic activities and policies on the economy. An important aspect of macroeconomic studies is the consequences of international trade and other economic relations between the nations. The inclusion of these aspects of economic phenomena constitutes the major themes of *macroeconomics*.

Let us now turn to our main subject of study, the *microeconomics*.

1.2 WHAT IS MICROECONOMICS?

As mentioned above, *microeconomics* is, fundamentally, the study of how individuals and firms find solution to the problem of maximizing their gains from their limited resources. To maximize their gains, the individuals have to make a number of choices between the endless wants and alternative uses of their resources. Microeconomics studies how individuals make their choices, how their choices determine 'what to produce', 'how to produce', 'for whom to produce' and what price to charge. Microeconomics is the study of decision-making behaviour at the *micro* level. It makes a microscopic study of the various elements of an economic system, not the system as a whole. As Lerner puts it, "Microeconomics consists of looking at the economy through a microscope, as it were, to see how

1. There are many other specialized branches of economics, e.g., public economics, monetary economics, industrial economics, agricultural economics, rural economics, labour economics, international economics, environmental economics, growth or development economics, managerial economics, etc.
2. The terms 'Microeconomics', and 'Macroeconomics' were first used by a Norwegian economist, Ragnar Frisch in 1933 in his paper "Propagation Problems and Impulse Problems in Dynamic Economics", in *Economic Essays in Honour of Gustav Cassel*, (London, Frank Cass & Co., 1933). The prefixes 'micro' and 'macro' meaning 'small' and 'large', respectively, have been derived from Greek language.
3. It was in this year that John Maynard Keynes published his revolutionary book, *The General Theory of Employment, Interest and Money*. This book laid the foundation of Macroeconomics.

the millions of cells in the body economic—the individuals or households as consumers, and the individuals or firms as producers—play their part in the working of the whole economic organism".[1] From analysis point of view, decision-makers are classified broadly as consumers, producers and resource owners. Microeconomics studies economic behaviour of consumers, producers and factor owners at their individual level—individual consumer, individual producer, and individual resource owner. A consumer may be an individual or an individual household. An individual producer may be an individual entrepreneur or a corporate firm. A resource owner may be a worker and an investor (the capital owner).

A systematic study of choice-making behaviour of consumers and producers (individuals, households, firms and government), allocation of resources (land, labour and capital) between goods and services that are produced and consumed and determination of their prices make the **central theme of microeconomics.** The individuals and households as consumers make choices between various goods and services they want to consume. The study of consumer behaviour makes the ***theory of consumer behaviour, theory of consumption*** or the ***theory of demand.*** The individuals and individual firms make their choices about 'what to produce' and 'how to produce', i.e., the techniques to be used. The study of producer's behaviour constitutes the ***theory of production*** or the ***theory of supply*** including the ***cost theory. Theory of demand*** and ***theory of supply*** combined together form the ***theory of price determination*** or ***theory of price.*** The study of the behaviour of factor owners (labour and capital owners) make the ***theory of distribution*** or the ***theory of factor-price determination.*** An extension of the distribution theory is *the study of what kind of allocation of productive resources between goods* and of *consumer goods and services* make the distribution *most efficient*. This aspect is studied under ***economics of welfare.*** The study of these economic theories and their application to real life conditions, constitute the subject matter of ***modern microeconomics.***

1.3 MICROECONOMICS: A POSITIVE OR A NORMATIVE SCIENCE?

Before we answer the question whether microeconomics is a *positive* or a *normative science*, let us know what is a *positive science* and what is a *normative science*. According to J.N. Keynes, " ... a *positive science* is a body of systematized knowledge concerning *what is* [and] a *normative* or regulatory *science* is a body of systematized knowledge relating to criteria of *what ought* to be and is concerned therefore with ideal as distinguished from actual."[2] Friedman has defined 'positive science' more elaborately and clearly. In his words, "The ultimate goal of a positive science is the development of a 'theory' or 'hypothesis' that yields valid and meaningful (i.e., not truistic) predictions about phenomena not yet observed."[3] Judged against these definitions, *economics* as a social science deals with both *positive* and *normative* economic questions: 'what is' and 'what ought to be'. Thus, *microeconomics is both a positive and a normative science.* The positive and normative aspects of economic studies are described below.

Microeconomics as a Positive Science

Microeconomics as a positive science seeks to analyse and explain economic phenomena as they are. It

1. A.P. Lerner, "Microeconomic Theory" in *Perspectives in Economics—Economists Look at Their Fields of Study*, ed. by A.A. Brown, E. Neuberger and M. Palmatier, (McGraw-Hill, New York), p. 37.
2. John Neville Keynes, *The Scope and Method of Political Science*, 4th edn., (New York, Kelley and Millman, 1955), pp. 34-45 (emphasis added).
3. Milton Friedman, "Methodology of Positive Economics", in his *Essays in Positive Economics*, (Chicago, University of Chicago Press, 1953).

seeks to answer the questions 'what is', 'why it is' and 'what will be ...'. For example, what is the trend in car prices in India? Why are car prices stable despite increase in demand for cars; what will be the demand for cars if prices go up? These are questions of positive nature. Microeconomics explains the economic behaviour of individual decision-makers under given conditions; their response to change in economic conditions; and brings out the relationship between the change in economic conditions and economic decision of the people. In fact, *the main function of microeconomics is to establish cause-and-effect relationship, if there is any, between two or more economic events at micro level and to provide the basis for prediction.* Emphasizing the positive character of economics, Friedman says, "Economics as a positive science is a body of tentatively accepted generalizations about economic phenomena that can be used to predict the consequences of change in circumstances."[1] What Friedman said about economics is more true about microeconomics. One of the main tasks of microeconomics is 'to provide a system of generalizations' or microeconomic theories capable of being used to predict economic phenomena at micro level. This makes microeconomics a *positive science*. Here, the word '*positive*' does not mean that theoretical statements are *positively* true: it means that it has a great possibility to occur if conditions are fulfilled.

Microeconomics as a Normative Science

Microeconomics as a normative science deals also with the normative question 'what ought to be'. 'What is' or 'what happens in the market' may not be desirable or in the interest of the society. For example, production and sale of harmful goods like alcohol and cigarettes may be a very profitable business. But, 'Is production and sale of these goods desirable for the society?' is a normative question—a question in public interest. Microeconomics as a *social science* examines this question from the angle of social desirability of production and sale of such goods. It examines the social costs and benefits of production and sale of goods like alcohol and cigarettes and prescribes the control and regulatory measures.

Consider another microeconomic problem. Given the growth of population and supply of houses in India, house rents if not controlled, will increase and have, in fact, increased exorbitantly. 'Should house rents be allowed to increase depending on the market demand and supply conditions or be controlled and regulated to protect the interest of tenants?' is a normative question—a question in *public interest*. Microeconomics as a normative science examines the issue in the interest of both landlords and the tenants and prescribes the reasonable rate of house rents and measures to implement it.

Microeconomics, as *a normative science*, involved *value judgement* on 'what is good' and 'what is bad' for the society. The *values* are drawn from the moral, ethical, social and political aspirations of the society. Since microeconomics prescribes methods to correct undesirable economic happenings, it is also called a *prescriptive science*.

To have a comparative view of *positive* and *normative* character of microeconomics, consider the issue of foodgrain prices in India. Recall that in 2001, on one hand, there was surplus foodgrain production[2] in India, while on the other hand, large scale starvation and starvation deaths were reported from different parts of the country. This was a paradoxical situation. Yet, the Food Corporation of India (FCI), responsible for fixing the foodgrain price, did not allow foodgrain prices

1. "Methodology of Positive Economics", *op. cit.*
2. As reported by the news media, production of wheat was so high that neither the farmers nor the FCI had sufficient godown space to stock grains safely. Foodgrain bags were left in the open to rot.

to go down. This problem can be examined from both positive and normative angles. Examining 'how price of foodgrains is determined?' is a question for *positive microeconomics* and 'how should the prices of foodgrains be determined?' is a question for *normative microeconomics*. It may, thus, be ***concluded*** that *microeconomics is both a positive and normative science*. However, it is ***important*** to note that *microeconomics is, fundamentally, a positive science*. It acquires its *normative* character from the application of microeconomic theories to examine the economic phenomena from their social desirability point of view, to show the need for a public policy action and to evaluate the policy actions of the government.

1.4 METHODOLOGY OF POSITIVE ECONOMICS: MODEL BUILDING AND THEORIZATION

The economic theories that constitute the body of economic science are the result of scientific investigation of economic phenomenon. Scientific method of investigation involves *observation of economic phenomena and collection and analysis of relevant facts and making predictions. Predictive statement gives the cause-and-effect relationship between two or more economic variables*. When the relationship between the selected variables is established with a high degree of confidence, it is presented in the form of a theory or a hypothesis. This process is called ***theorization*** or *formulation of theory*.

An important element of scientific method of inquiry is ***model building***. A ***model*** is an abstraction from reality. It represents reality in a simplified form. Economic models may take the form of a logical statement, graphs or mathematical equations specifying the relationship between the economic variables. Models are used to work out the implications of a theory, to deduce the consequences of the assumptions and to make predictions. ***Economic variables*** are measurable quantities, e.g., consumer goods, output, inputs, money, income, etc. The economic variables assumed to remain constant are called *parameters*. In this section, we will discuss briefly the process of model building and theorization in economics in general. This applies to *macroeconomics* as well.

Model building and economic theorization. A scientific method of inquiry consists of the following steps:

- specifying the problem
- formulating hypothesis
- making assumptions
- collection of relevant data or facts
- deducing the testable predictions
- testing the validity of predictions

The ***first step*** in scientific method of study is to specify the *problem* or the economic phenomenon chosen for the purpose of study. For example, the problem of study may be specified as finding the effect of increase in the petrol price on the demand for cars.

The ***second step*** is to *formulate the* ***hypothesis***. A hypothesis is a statement expressing the relationship between the cause and effect. A hypothesis may be expressed in the form of a statement, e.g., 'when price of petrol increases, demand for cars decreases'. Here, increase in petrol prices is the *cause* and decrease in the demand for cars is the *effect*. It may also be stated in the form of an equation, e.g., $Q_c = C - cP_p$ (where Q_c = number of cars demanded; C = cars demanded at zero price of petrol; $-c$ = a parameter showing the effect of change in petrol price on the demand for car; and P_p = price of petrol.

The ***third step*** is to make necessary ***assumptions***. Assumptions are made to simplify the problem, to specify the components of the model, and to avoid the complexities that might arise due to the change in extraneous factors—factors operating outside the model. In economic model building, assumptions, in general, include : (i) *behavioural or motivational assumptions* pertaining to the behaviour of the decision-makers and their motivation or the objective that they set for themselves; (ii) *institutional assumptions* pertaining to the institutional set-up or market conditions under which the economic players (consumers and producers) seek to achieve their goals; (iii) *technological assumptions* relating to production technique; and (iv) *input related assumptions*—those pertaining to the supply position of the inputs.

The ***fourth step*** is to collect the relevant data and other facts related to the problem of study and their analysis according to the model.

After data is collected, assembled and analyzed, the next or the ***fifth step*** is to make the deduction(s) about the relationship between the causal factor and its effect. In our example, the deduction may be stated as 'when petrol price increases, demand for car decreases'. This deduction is the same as the hypothesis.

The ***final step*** is to test the validity of the model. The test of validity of a model is determined by its power to predict. The test of validity of the model, in case of our example, is to find whether it can be used to predict the demand for car when price of petrol increases (or decreases) by a certain percentage. If the model predicts the car demand fairly accurately, it is taken to be a valid model. Otherwise, it is an invalid model. In case a model turns out invalid, it needs to be modified by including other relevant and explanatory variables that influence the demand for car and put to test again. When the model is tested and retested and found to be valid, its outcome is stated in the form of a theory.

1.5 USES AND LIMITATIONS OF MICROECONOMIC THEORIES

Economic laws—micro and macro—have their uses and applications and also their limitations. The applicability and limitations must be borne in mind while applying economic laws to find solution to real life economic problems. The uses and limitations of economic theories in general, briefly described here, are also applicable to microeconomics.

1.5.1 Uses of Microeconomic Theories

First, microeconomics explains the economic behaviour of individual decision-makers—individual consumers, firms, industries and factor owners—and brings out the nature of relationship between the dependent and independent variables and interdependence of the diverse elements of the economic system. This contributes a great deal to the understanding of the complexity of the economic system and its working. In the words of Lerner, "Microeconomic theory facilitates the understanding of what would be a hopelessly complicated confusion of billions of facts by constructing simplified models of behaviour which are sufficiently similar to the actual phenomena, to be of help in understanding them. These models enable the economists to examine the degree to which actual phenomena depart from certain ideal constructions that would most completely achieve individual and social objective."[1] The clearer the understanding of the working of the economic system, the greater the efficiency in control and management of the economy.

Secondly, microeconomic theories establish *cause-and-effect relationship* between two or more economic events and, thereby, provide the basis for predicting the future course of economic events. Economic predictions are of great importance in planning future course of economic activities by individuals, business firms, and the government. Economic predictions may be conditional and inaccurate. For example, prediction of future price of a commodity may take the following form of a statement: if

1. A.P. Lerner, "Microeconomic Theory" in *Perspectives in Economics—Economists Look at Their Field of Study* (ed.) by A.A. Brown, E. Neuberger and M. Palmatier, (McGraw–Hill Book Company, New York), p. 36.

demand for a commodity increases, *other things remaining the same*, its price will increase. Despite the fact that a prediction of this nature is conditional, future trend of price is known more precisely than it would have been in the absence of any prediction. If one has information regarding the demand trend of a commodity and *other related factors*, one can predict the future trend in price with greater accuracy. Approximate predictions are also of great importance for the consumers to make adjustment in their expenditure pattern; for the producers to plan their production; and for the public policy-makers to formulate policy regarding price of the commodity.

Thirdly, microeconomic theories contribute a great deal in formulating economic policies and in examining the appropriateness and effectiveness of economic policies. Policy-makers may, therefore, apply relevant microeconomic theories to explain the problem at hand and analyse the implications of alternative policies and select one which seems to be most appropriate. Public economic policies which go against the economic laws may not only prove infructuous but may also create more problems than they solve. For example, if government increases the rate of tax on a commodity without analysing the nature of its demand and supply curves, the tax revenue may not increase; it may instead decrease. Besides, it may reduce both production and consumption and impose extra burden on the consumers. Microeconomic theories may be applied to examine the implications and effectiveness of the policies adopted by the government.

Fourthly, microeconomic theories, particularly price theory, can be and are, infact, profitably used in *business decision-making*. Although microeconomic theories may not offer a practical solution to a problem of the real business world, they do help business decision-makers in building analytical models, which help in specifying the nature of managerial problems and in determining appropriate policy actions.

Lastly, one of the most important uses of microeconomic theories is to provide the basis for formulating propositions that maximise social welfare. Microeconomics examines how imperfect market conditions distort the allocation of resources (money, men and material), create inefficiency and lead to reduction in production, consumption and social welfare. The normative part of microeconomics, viz., *welfare theories*, suggests conditions for achieving 'Pareto-optimality' in resource allocation with a view to maximising social welfare. It also suggests ways and means to correct inefficient allocation of resources and to eliminate inefficiency. Although theoretical welfare propositions are of little practical importance, their analytical value is not reduced by their impracticability.

1.5.2 Limitations of Microeconomic Theories

Microeconomics, like other social sciences, does not provide ready-made solution to the practical problems. It provides only tools and techniques of solving real life problems. Microeconomics has certain limitations which restrict its applicability. Most of the limitations of microeconomic theories arise from the assumptions on which they are based. Some major assumptions and the resultant limitations of microeconomic theories are as follows.

First, microeconomic theories assume a given level of national income, employment, savings and investment, supply and demand for money and the general price level. In reality, however, these factors are not constant; they are subject to change following the changes in their determinants. As such, validity of microeconomic theories is limited to their framework.

Secondly, microeconomic theories assume, in general, the existence of a free enterprise system in which the 'invisible hands' or market forces are assumed to play their roles freely. Microeconomics assumes also the absence of any government intervention in the economic activities of the society. In practice, however, government controls and regulations of economic activities are the rules of the day and are all-pervasive. Therefore, microeconomic propositions have only limited applicability—limited to the conditions assumed in the microeconomic models.

Thirdly, another limitation of microeconomics arises out of its very scope of study. It is concerned with the behaviour of individual elements of the economic organism and not with the organism as a whole. It provides only a partial analysis of economic phenomenon. Microeconomic theories, therefore, cannot be applied to study the complex economic system treated as one unit. "Description of a large and complex universe of facts like economic system is impossible in terms of individuals items"[1] and microeconomics is concerned with only 'individual items'.

These limitations of microeconomics, however, do not reduce its importance. There are many important and practical reasons for studying and making use of microeconomic theory. Emphasising the importance of 'price theory', a relatively older name of 'microeconomics', Liebhafsky has said, *".....there is a very practical reason for acquiring a knowledge of price theory: the language and concepts of price theory permeate the whole of economics, and in all fields of economic analysis they serve the practical purpose of economy of effort and constitute a generally accepted method of organising and classifying ideas about economic activities and magnitudes."*[2]

As Marshall has observed, "By the fundamental impulse of our nature, we all—high and low, learned and unlearned—are in our several degrees constantly striving to understand the course of human action, and to shape them for our purposes, whether selfish or unselfish, whether noble or ignoble."[3] Furthermore, the primary objective of economic analysis is not to formulate exact and precise economic laws but to provide a framework for logical economic thinking. In the words of Boulding, "The objective of [economic] analysis is not to provide a machine or method of blind manipulation, which will furnish an infalliable answer, but to provide ourselves with an organized and orderly method of thinking out particular problem."[4]

Apart from satisfying the human urge to understand the economic world, economic principles and laws serve many useful purposes in our practical life in so far as they: (i) provide logic and techniques for predicting the possible consequences of economic activities and thus provide the basis for rational decision making; (ii) provide rules for optimum allocation of resources and also the test for optimality; and (iii) provide guidelines for formulating appropriate public policy actions to control and regulate economic activities to achieve social goals.

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REVIEW QUESTIONS AND EXERCISES

1. The origin of economics lies in endless human wants and scarcity of resouces. Elaborate.
2. "Scarcity of resources is the mother of all economic problems." Discuss with examples.
3. Do you think your wants are unlimited at this moment? If your answer is 'yes', count your wants and you will find they are limited. Then why do you accept the proposition that 'human wants are endless'?
4. Why can't you buy anything you want? What is your main consideration in deciding what to buy and what not to?
5. Suppose time, money and labour are the only resources that you possess as a student. How do you decide how to use these resources?
6. What is microeconomics? Is microeconomics a positive or a normative science? Give arguments for your answer.
7. What is the purpose of model building in economics? What process is generally followed in model building?
8. What is scientific method of investigation? What are the steps that are generally followed in scientific study of economic problems? Use a suitable example to answer this question.
9. How will you define economic theory? What process is followed in economic theorization?
10. What kind of assumptions are made in the analysis of microeconomic problem? What behavioural assumptions are made in microeconomic theories?
11. Economic theories are not as exact and precise as the laws of natural sciences. Why are then economic theories formulated? What purpose do they serve in practical life?

2 The Economy, Its Working and Basic Problems

CHAPTER OUTLINE

2.1 What is an Economy?
2.2 How an Economy Works
2.3 Basic Problems of an Economy
2.3.1 Problems in Achieving Efficiency in Production and Distribution
2.3.2 Problems in Achieving Growth, Full Employment and Stability
2.4 How Market Mechanism Solves the Basic Economic Problems
2.5 Drawbacks of the Free Enterprise System
2.6 The Government and the Economy
2.7 Production Possibility Frontier
Further Readings
Review Questions and Exercises

In Chapter 1, we have discussed the nature, scope and methods of microeconomics. We have noted that microeconomics is the sudy of economic behaviour of human beings in their individual capacity. People do not carry out their economic activities in isolation. They are a part of a social system and their economic activities are a part of an economic system. In an economic system, economic activities of various economic agents—individuals, households, firms, etc.—are interrelated and interdependent. Therefore, economic behaviour of the people is determined and governed largely by their economic environment and the economic system in which they operate. Therefore, before we commence our study of economic theories, it will be useful to have an idea of the functioning of the economic system and its basic problems. In this chapter, we will briefly describe the functioning of a simplified economic system, the basic problems of an economy and how the problems are solved by the price mechanism. Finally, we will discuss the production possibilities of an economy.

2.1 WHAT IS AN ECONOMY?

An economy is a social organism through which people make their living. It is constituted of all the individuals, households, farms, firms, factories, banks and government who act and interact to produce and consume goods and services. Individuals and households put their resources (land, labour, capital and skill) to one or more of their alternative uses and make their living. Firms buy or hire factors of production and organise them in the process of production; produce goods and services; and sell them to their users to make profits. Traders and shopkeepers work as intermediaries between the producers and consumers to make their living. Financial institutions, e.g., commerical banks and LIC, and other financial institutions like IDBI, ICICI and mutual funds, collect savings from the households and firms and provide it to their prospective users. Transport companies transport goods from one place to another and so on. In the process, all those who contribute to these services make their living. The system often works smoothly even if nobody controls and regulates these activities. Consumers are able to get goods and services they want; producers are able to produce goods and services they can sell; factors of production are able to find employment, and so on. The system is operated in an orderly manner by what Adam Smith called, 'invisible hands,' that is, the market forces of demand and supply.

In a modern economy, economic activities of the people are interrelated and interdependent. For example, if some persons want to buy computers, there is a computer company (say, IBM) to produce and sell computers. Thus, the activities of computer users and computer producers are interrelated. Their activities are interdependent in the sense that computer company will produce only as many computers as users demand, and users can use only as many computers as producers can produce and sell. The interdependence and interrelatedness of the economic activities of the people is reflected in the form of their *interaction, cooperation* and *competition*. The economic activities of people—individuals, households and firms—affect economic interest and activities of one another, directly or indirectly, positively or negatively. Economic activities and interactions among the consumers, producers and resource owners make the *economy*. An economy works on a complex mechanism.

Government is an important element in the modern economy. It taxes people's income and hires factors of production and produces certain goods and services for the people. In addition, it intervenes with the economic activities of the people. It controls, regulates and guides their economic activities, with the purpose of achieving certain social and economic goals. The level of intervention and participation of the government in overall economic activities of the people determines whether an economy is a *capitalist* or *free enterprise economy, a socialist* or *command economy* or *a mixed economy*. In a *free enterprise economy*, government intervention in the form of control and regulation of economic activities of the people is minimum. It is total and all pervasive in a *command economy*, also known as *communist economy* and it is partial in a *mixed economy*.

2.2 HOW AN ECONOMY WORKS

Working of a modern economy is extremely complex. Millions of persons participate and contribute to its working in different ways and in different capacities—as producers, traders, workers, financiers, and consumers. Thousands of goods and services are produced and consumed and thousands of persons are engaged in production and distributions of a single commodity. All those who are involved in economic activities act and interact with different interests and motivations. The interdependence and interrelatedness of their economic activities add to the complexity of the economic system. To present a complete picture of the economic system, showing the role of each individual participant in respect of each commodity, is an extremely difficult task, rather impossible. We present below the working of a simple economy in a simplified model.

Model of a Simple Economy

In the simplified model, the economic players are classified in three categories or sectors: (i) households; (ii) business firms; and (iii) the government. The *functions* and the roles of these economic entities in the model economy are described below.

(i) The ***households*** participate in the economic system in two different capacities: (a) as suppliers of productive resources (land, labour and capital), and (b) as consumers of all goods and services produced by the business firms. (ii) ***Business firms*** include all firms, farms, factories and shops operated by individual proprietors, partnership firms, and joint stock companies engaged in production and distribution of goods and services. *Business firms* perform two functions: (a) hiring productive resources from the households and transforming them into final goods and services, and (b) selling their product to the households, the consumers, (iii) ***Government*** collects taxes from the households and firms. It uses tax revenues to buy men and material to perform its functions.

The *functions* and the mode of *interaction* among the three kinds of economic entities and working of the economic system are exhibited in Fig. 2.1. Households and firms interact in two ways: (i) as sellers and buyers of inputs, and (ii) buyers and sellers of output. The sale and purchase of inputs makes ***factor market*** where factor prices are determined, and sale and purchase of final goods and services creates ***product market*** where product prices are determined.

As Fig. 2.1 shows, factors of production (land, labour, capital, etc.) flow from the households to the ***factor market***. The interaction between households (the input suppliers) and business firms (the input demanders) determines the factor prices. Once factor prices are determined, inputs move to business firms. In return, factor payments (wages, rent and interest, etc.) flow to the households. The business firms transform the factor inputs into finished products. Finished products flow to the ***product market***. The interaction between the business firms, the suppliers, and the households, the buyers, determine the product prices. Once product prices are determined, products flow to the households. In return, the payments made by the households for their purchases flows to the firms. They use their receipts to hire inputs again and the process continues. In this process, two circular flows are generated; (i) ***real flows***, i.e., flows of inputs and final products as shown by the outer circle, and (ii) ***money flows***, shown by the inner circle. Note that real and money flows go in *opposite directions*.

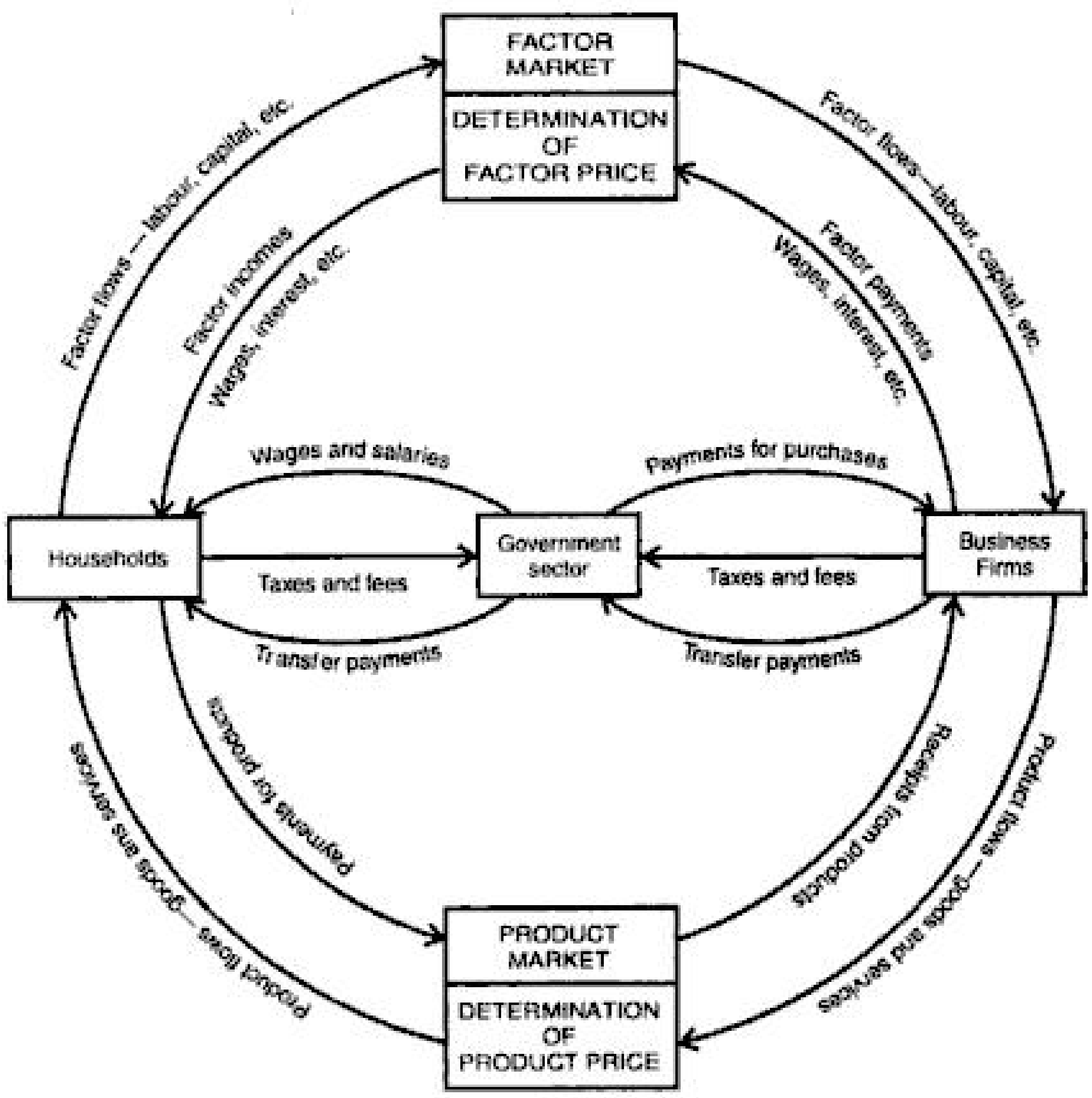

Fig. 2.1 Working of the Economy: Real and Money Flows

Government plays a significant role in the economy. It hires or buys a part of social resources to carry out its administrative and economic functions. It employs labour from households and pays wages and makes payments for the purchases it makes from the firms. In addition, it makes *transfer payments* to both households and business firms in the form of *subsidies* and *grants*.

The economic system works in an orderly manner. It meets the requirement of all those who participate in the system. Households are able to sell the services of their resources and to make their living—earn their income. The income which they earn becomes the means of buying goods and services of their need. Their purpose is well served. Similarly, this system also serves the interest of the business firms. The basic objective of the firms is to make profit for their owners. In pursuit of their objective, business firms are able to procure means of production which they transform into usable goods and services. They are able to dispose of their product in the product market and make profit. The households and business firms continue to interact with each other in pursuit of their objective and thereby make the economic system function continuously and in an orderly manner.

2.3 BASIC PROBLEMS OF AN ECONOMY

As already noted, ***human wants are endless*** whereas ***resources are scarce***. This is true of all kinds of economies—rich and poor, developed and underdeveloped. In their effort to meet the ***ever-growing needs*** of their people by using ***limited resources***, societies aim at (i) achieving *efficiency* in production and distribution of commodities; and (ii) achieving full employment, growth in output and stability in employment and growth. In their effort to achieve these goals, societies face certain problems. For pedagogic reasons, the problems faced by the economies can be grouped under two categories: (a) *problems in achieving efficiency in production and distribution of goods and services;* and (b) *problems in achieving growth, full employment and stability*. The ***nature and sources*** of the two kinds of problems are discussd below.

2.3.1 Problems in Achieving Efficiency in Production and Distribution

The need for ensuring efficiency in production of goods and services and their efficient distribution among the consumers arises due to (i) *scarcity of resources;* (ii) *ever growing human wants;* and (iii) *desire to maximize gains*. The problems that arise in ensuring efficiency in production and distribution of goods and services, often referred to as the ***basic problems***, are of three kinds:

(i) *What to produce*
(ii) *How to produce*
(iii) *For whom to produce*

Let us now discuss the *nature* and *sources* of these problems.

(i) What to produce? The problem 'what to produce' is the problem of choice between commodities. This problem arises mainly for two reasons: (i) scarcity of resources does not permit production of all the goods and services that people would like to consume; and (ii) all the goods and services are not equally valued in terms of their *utility* by the consumers. Some commodities yield higher utility than the others. Since all the goods and services cannot be produced for lack of resources, and all that is produced may not be bought by the consumers, the problem of making choice between the commodities arises. The problem 'what to produce' is essentially the problem of efficient allocation of scarce resources so that the *output is maximum* and the *output-mix is optimum*. The objective is to satisfy the maximum needs of maximum number of people.

The question 'how much to produce' is the problem of determining the quantity of each commodity and service to be produced. This problem too arises due to scarcity of resources. For, surplus production would mean wastage of scarce resources. This problem also implies an efficient allocation of resources to various goods and services to be produced.

(ii) How to produce? The problem 'how to produce' is the problem of ***choice of technique***. Here the problem is how to determine an optimum combination of inputs—labour and capital—to be used in the production of goods or services. This problem, too, arises mainly because of scarcity of resources. If labour and capital were available in unlimited quantities, any amount of labour and capital could be combined to produce a commodity. But, since resources are not available in unlimited quantity, it becomes imperative to choose a technology which uses resources most economically.

Another important factor which gives rise to this problem is that a given quantity of a commodity can be produced with a number of alternative techniques, i.e., alternative input combinations. For example, it is always technically possible to produce a given quantity of wheat with more of labour and less of capital (i.e., with a labour-intensive technology) and with more of capital and less of labour (i.e., with a capital-intensive technology). The same is true of most commodities. In case of some commodities however choices are limited. For example, production of woollen carpets and other items of handicrafts are by nature labour-intensive, while production of some other goods like machinery, aircraft, turbines etc. are by their nature capital-intensive. In case of most commodities, however, alternative technology is available. But the alternative techniques of production involve different costs. Therefore, the problem of choices of technology arises.

(iii) For whom to produce ? The problem 'for whom to produce' is the problem of matching the production pattern with the demand pattern, so that those who have the ability and willingness to pay, get the commodity and there is no surplus production. Demand pattern is determined by the pattern of choices and preferences and income distribution. Given the choice and preferences, income distribution is determined by the employment pattern and factor prices. Factor prices are determined in the factor market by the factor demand and supply conditions. Factor price multiplied by the quantity of factors employed gives the share of each factor in the national income. Those who possess a large quantity of highly priced resources, are able to claim a higher share in the national output and are able to consume a larger proportion of the national output than those who possess low-priced factors. Thus, once income distribution pattern is determined, the consumption or demand pattern is also simultaneously determined. In a free-enterprise economy, market mechanism is supposed to match production pattern with demand pattern. In general, however, production pattern is not matched by the demand pattern. The reason is all pervasive ***market imperfection***. Due to market imperfections, there is unemployment of some resources (especially labour), inefficient allocation and utilization of resources, extreme poverty, on the one hand and wasteful affluence, on the other. The societies continue to face the problems of unemployment and inequitable distribution of resources and national output.

2.3.2 Problems in Achieving Growth, Full Employment and Stability

The economic problems discussed above are of micro nature. Apart from microeconomic problems, there are certain macroeconomic problems of prime importance confronted by an economy including the problems of growth, full employment and stability. Following Lipsey, these problems may be specified as follows:

(i) How to increase production capacity of the economy? The need for increasing production capacity of the economy arises for at least two reasons. ***First***, most economies of the world have realised by experience that their population has grown at a rate much higher than their productive resources. This leads to the poverty of the nations. Poverty in itself is a cause of many social evils. Besides, it has frequently jeopardised the sovereignty and integrity of the nations. Colonisation of poor nations by the richer and powerful imperialist nations during pre-twentieth century period is evidence to this fact. Therefore, creating conditions for growth of the economy and generating resources for defence purposes has become a necessity. ***Secondly***, some economies have grown over time faster than the others while some others have remained almost stagnant. The poor nations have been subjected to exploitation and economic discrimination by economically powerful nations. This has impelled the poor nations to make their economies grow, to save themselves from exploitation and to give their people a respectable place in the international community.

(ii) How to stabilise the economy? Economic fluctuation has been an important feature of free enterprise economies. Though economic ups and downs are not unknown in the controlled economies, free enterprise economies have experienced it more frequently and more severely. Economic fluctuations cause wastage of resources, e.g., idleness of manpower or involuntary unemployment, idle capital stock, etc., particularly during the periods of depression. Economists have devoted a good deal of attention to explain this phenomenon and to suggest measures to stabilize the economy. However, economic fluctuation, though of mild magnitude, continues to remain a vexing problem.

(iii) Other problems of macro nature. In addition to the macro problems mentioned above, there are many other economic problems of this nature, which economists have studied extensively and intensively. The major problems of this category are the problems of economic growth, inflation, unemployment and foreign trade deficits. The major questions to which economists have devoted a good deal of their attention are: How is national income determined? How is the equilibrium between the product market and the money market is determined? What is the basis of trade between the nations? How are the gains from trade shared between the nations? Why do deficits and surpluses arise in trade balanced? How is an economy affected by deficits in its balance of payments.

2.4 HOW MARKET MECHANISM SOLVES THE BASIC ECONOMIC PROBLEMS

The way the basic problems of an economy are solved depends on the nature of the economy. While in a socialist economy they are solved by the government agencies like central planning authority, in a free enterprise or mixed capitalist economy this task is performed by the ***price mechanism*** or ***market mechanism***. We discuss here how price mechanism solves the basic economic problems in a free entreprise and a mixed capitalist economy. For other economic systems, a brief answer is provided in the next section.

Market mechanism is discussed in detail in the next chapter. In brief, ***market mechanism*** is a process through which market economy functions. A market economy functions through the market forces of demand and supply. The demand and supply forces interact to determine the price of goods and services. Thus, a price system is generated. Prices perform two functions in the market system. ***First***, prices serve as signals for the producers to decide 'what to produce' and for the consumers to decide 'what to consume' and 'how much to consume'. ***Secondly***, prices force the demand and supply conditions to adjust themselves to the prevailing prices. Let us now see how each of the basic problems is solved by the market mechanism or price mechanism.

(i) What to produce? The goods and services that are produced in a market economy are determined by consumer demand. The consumer is 'sovereign' in a free enterprise market economy. Each penny a consumer spends on a commodity is treated as a vote for producing that commodity. Continuing demand is a continuous process of voting. Increasing demand for a good, causes increase in its price. Rise in price makes profits go up. The profit-seeking producers will concentrate on the production of this commodity. If they produce a commodity not in demand, it will go waste and their profit motive will be defeated. This solves the problem of 'what to produce'.

(ii) How to produce? 'How to produce' is the question of choice of technology. The proportion of labour and capital used to produce a commodity is also determined by the market forces, i.e., the supply of and demand for labour and capital. Firms produce for profit and try to maximise it. It requires, among other things, minimizing cost of production. Costs can be minimized by using more of a cheap factor and less of a costly factor. If labour is cheaper than capital then more of labour and less of capital is used to produce a commodity. On the contrary, if capital is cheaper, more of capital and less of labour is used. In fact, cost minimizing firms combine labour and capital in such a proportion that minimizes the cost of production for a given output. This solves the problem of 'how to produce'.

(iii) For whom to produce? The problem 'For Whom to Produce' is also solved by the market mechanisms. The simple market rule is: produce for those who have the ability and willingness to pay. Ability to pay depends on incomes and incomes are determined by employment pattern of factors. Market mechanism determines the pattern of demand for factors of production. Given the supply of factors, market mechanism determines the price of each factors—rent, wages, interest and profits, for land, labour, capital and organisation, respectively. Once factor prices and employment pattern of factors of production (i.e., what factor is employed *in what quantity and at what price*) are determined, the distribution pattern of national income is simultaneously determined. In simple words, employment pattern determines the share of labour, property owners, investors and entrepreneurs in the national income. Once the pattern of income distribution is determined, it determines the demand pattern for the goods and services. Briefly speaking, in a free enterprise economy, goods and services are produced for those who possess the ability to pay. Production pattern so determined is however not always socially desirable.

Market System is Orderly

In a perfectly competitive market economy, the whole system is supposed to function smoothly, efficiently and in an orderly manner. Despite the fact that millions of people, often with conflicting interests and motivations, participate in working of the system at both individual and group levels, there is no chaos or anarchy. The market forces organise the whole economic system to the benefit of majority of its participants. Consumers get what they want to consume. Producers produce goods and services which maximize their profits. This social organism functions automatically—at least in theory.

Is all well with free enterprise economies? It may seem from the foregoing paragraph that all is well with the free enterprise economies. But not quite so. A genuinely efficient free enterprise system is supposed to ensure (i) that all those who are willing to work at the prevailing wage rate must get employment; (ii) that factor payments must be commensurate with their productivity; (iii) that all factors of production are optimally allocated; (iv) that, as Slitcher[1] has suggested, the goods must go to the consumers who derive the highest utility from them; and (v) that goods must be produced by the most efficient producers, i.e., by those who can produce them at the minimum possible cost.

The free enterprise system has, however, not worked as efficiently as expected at least during the post-War I period. Goods and jobs are not distributed optimally. Goods go to the persons who can pay the highest prices for them, but may not necessarily derive the highest utility too. It would be 'ridiculous to assert that ability to derive satisfaction from goods is proportionate to ability to pay for them'. Although it is difficult to quantify the satisfaction derived from a good by rich or poor persons, it cannot be denied that a woollen coat hanging idle in the wardrobe of a rich person would give more satisfaction to his/her scantily-dressed domestic servant during the winters. But the domestic servant

1. Slitcher, Sumner M., *Modern Economic Society*, Henry, Holt and Company, New York, 1928, reprinted in *Readings in Economics*, ed. by P.A. Samuelson, McGraw-Hill Company, New York, 1970.

who needs it more does not get the coat because he does not have the adequate purchasing power. Similarly, in a free enterprise system jobs too are not distributed among the people on the least-pain basis. People are prepared to work for their living irrespective of pains and sacrifices they have to make for a meagre income. Under the condition of prolonged unemployment, people would be willing to work at an extremely low wage rate whatever the cost in terms of pains. Let us now look into the shortcomings of free-enterprise system in detail.

2.5 DRAWBACKS OF THE FREE ENTERPRISE SYSTEM

The major shortcomings of free enterprise system, as experienced over time by the free enterprise economies, are described below.

First, free enterprise system assumes the existence of perfect market conditions for its efficient working. The necessary conditions for the efficient working of the market system are: free competition, increasing cost in all markets, applicability of the exclusion principle in consumption, absence of public goods, perfect knowledge and free factor mobility. But the existence of such a perfect market system in the world economy is very rare. Besides, mere existence of perfect competition is not enough to ensure the efficient working of the system. As Scitovsky[1] has remarked, perfect competition would not ensure perfect efficiency if there are differences between social and private values and in social and private marginal products. It may not be possible to quantify the difference between social and private *values* and social and private *costs*, but the existence of such differences cannot be denied.

Secondly, free-enterprise system works on the philosophy and on the assumption that each individual is the best judge of his own interest and, therefore, his choices and decisions would best serve his interest. But most choices and decisions made by individuals, particularly in regard to consumer goods, are generally influenced by "impulses, habits, prejudice, ignorance, or clever sales talks, and too little by reflection, investigation of facts and comparison of alternative opportunities".[2] If it is not so, a person would not spend more on liquor and smoking and less on milk, education or health care; a couple would not produce children whom they cannot bring up properly, people will not throw their household garbage on road; factory-owners will not cause air and environment pollution; drivers will not drive their automobiles recklessly and flout traffic rules; ministers and politicians will not indulge in corrupt political practices; and people will not vote for corrupt and criminal politicians.

Thirdly, as mentioned above, the motivating force for private enterprise is profit. The private entrepreneurs would, therefore, not like to invest their capital in the industries or sectors which have lower profitability, even if the industries are of essential nature and of strategic importance for the national economy. So is the case with regional distribution of industrial undertakings. Under free enterprise system, the industries tend to concentrate in the regions having larger industrial and infrastructural facilities. This results in lopsided development of the national economy.

Fourthly, certain services, known as 'public utilities' like medical care, education, water, electricity, sanitation, etc., are equally important for all the individuals—rich and poor. Transport and communication facilities (including roadways, railways, airways, telephones, post and telegraph, etc.) are necessary for the overall growth of the economy. Private capital normally does not flow into these sectors in adequate measures, at least for three reasons: (i) they require huge initial investment;

1. Scitovsky, Tibor, *Welfare and Competition*, Unwin University Books, 1968, p. 144.
2. Slitcher, Sumner, H., *op. cit.*, pp. 35-36.

(ii) the rate of return in these sectors is very low and remote; and (iii) most public utility services are in the nature of collective consumption to which principle of exclusion cannot be applied. Apart from this fact, the 'public utilities' and other essential services cannot be left to the private sector. For, the pricing system of free enterprise system is such that only rich can afford these services, and hence there will be inequitable distribution of essential services.

Fifthly, free enteprise system works efficiently only when there is perfect competition. Perfect competition requires equality between the competitors. But two firms are hardly equal in efficiency. The competition, therefore, becomes imperfect, which leads to the growth of monopolies and unequal distribution of income. This is one of the greatest drawbacks of the free enterprise system.

Finally, free-market mechanism does not function efficiently where the *exclusion principle* is not applicable, specially where *externalities* are involved. Application of exclusion principle requires that those who do not pay for a good are excluded from the benefit from that good, and those who do not derive any benefit from a good are excluded from bearing the cost of that good. In a modern complex society, there are numerous activities, which impose disadvantage on those who do not benefit from them and there are those who benefit even if they do not pay for such goods and services. For instance, smoke-emitting factories, air polluting automobiles plying in the cities cause environment pollution and people using loudspeakers on marriage ceremonies and playing their radio loudly harm their neighbours by causing atmosphere and noise pollution. Such costs borne by the people are known as 'spill-over costs'. Similarly, planting trees on roadsides, creation of parks and gardens, spread of education etc., benefit the society by providing a beautiful landscape, spread of knowledge etc. Such benefits are known as 'spill-over benefits'. Spill-over costs and spill-over benefits are jointly called ***externalities***. The free enterprise system working on market principles does not compensate those who suffer and charge those who benefit from externalities. This makes market system inefficient and leads to sub-optimal allocation of resources.

Because of these drawbacks of the market mechanism, free enterprise system has failed in achieving optimum distribution on goods and services, optimum allocation of resources, maximum efficiency and maximum social welfare. Failures apart, the free enterprise system is alleged to have caused the growth of monopolies, unequal income distribution, unemployment, and poverty. Besides, though free enterprise system is capable of bringing economic growth, it does not ensure a stable, sustained and balanced growth. It becomes therefore inevitable for the government to intervene with the market mechanism through tax and subsidy measures to reduce market distortions, provide conditions for fair competition, and help the economy in achieving efficiency, stability, growth and economic justice.

It may, however, be noted that market mechanism works more efficiently than the government managed system.

2.6 THE GOVERNMENT AND THE ECONOMY

We have noted that the interference of the government with the market mechanism becomes inevitable because of failures of the system. Now, the question arises as to what should be the appropriate role of the government in economic management of the country and what should be the form, nature and extent of government interference with market mechanism. These questions have been discussed and debated for long but no precise answer has been provided by the economists. Nevertheless, the economic role of the government can be broadly categorised on the basis of the three economic systems which presently prevail in the world, viz., capitalist system or free enterprise system, socialist system, and the mixed-economy system.

(i) Capitalist society. A capitalist society works on the principles of free enterprise system or what is also called a *laissez faire* system. In this system, the primary roles of the government are: (i) to preserve and promote free market mechanism wherever it is possible to ensure a workable competition; (ii) to remove all unnecessary restrictions on free working of a competitive market; and (iii) to provide a level playground and rules of the market game through necessary interventions of controls so that free competition can work effectively.[1] Besides, government intervention and its economic activities should deliver what free market mechanism cannot. Meade[2] has recommended eight kinds of activities for the State to perform for this purpose:

(i) control of inflation and deflation mainly through indirect measures, like fiscal and monetary regulations;

(ii) control and regulation of monopolistic powers of large corporate concerns with a view to avoiding unemployment and wastage of resources;

(iii) creation and ownership of state monopoly of essential goods and services, e.g., railway transport, generation and distribution of electricity and such like services on the ground of efficiency and economies of large scale;

(iv) promoting equality of opportunity by providing equal access to educational opportunities restricting the restrictive activities of trade unions, etc.;

(v) administration of justice and maintenance of law and order, and ensuring freedom of activities;

(vi) aiding private planning for the uncertainties of the future by some measure of government indicative planning;

(vii) making central planning for large structural changes in the economy; and

(viii) tackling the problems of environmental controls, of the use of exhaustible resources, and of population growth.

It may be inferred from the above that the government's role in a capitalist society is supposed to be limited to (a) restoration and promotion of necessary conditions for efficient working of free market mechanism; and (b) to enter those areas of production and distribution in which private entrepreneurship is lacking or is inefficient. Any planning by the government should be indicative and supplement to the private plans for future uncertainties.

(ii) Socialist economy. In contrast with the capitalist system, the role of government in a **socialist economy** is all pervasive. While in the former, the government is supposed to play a limited role in the economic sphere, in the latter, it exercises comprehensive control on almost all economic activities. In the socialist system, not only there is a complete disregard for free enterprise and market mechanism but also these systems are abolished by law. The private ownership of factors of production is replaced by the state ownership. All economic activities are centrally planned, controlled and regulated by the state. All decisions regarding production, resources allocation, employment, pricing etc., are centralised in the hands of government or the Central Planning Authority. The individual freedom of choice and decision-making in regard to economic activities is drastically curtailed. This, however, should not mean that there is no scope for individual decisions. Individuals are provided freedom to make their own choices, but within the policy framework of the socialist economy. The Soviet

1. Meade, J.E., *The Intelligent Radical's Guide to Economic Policy*, (George Allen & Unwin Ltd., London), 1795, pp. 13-14.
2. *Ibid.*, pp. 14-16.

economic system was till 1990 the most prominent example of socialist system of economic management. Other countries which had adopted socialist economic system were China, Poland, Slovakia and Yugoslavia. These economies are, however, liberalizing their economic system rapidly.

The social aims of the socialist economic system are the same as in free enterprise system, viz., efficiency, growth, social justice, and maximisation of social welfare. But, while the motivating force in a capitalist economy is ***private profit***, in the socialist economy, it is maximisation of ***social welfare***. Socialist way of management of the economy eliminates many evils of capitalist system, e.g., exploitation of labour by capitalists, elimination of forces generating economic fluctuations, prevention of unemployment, and providing social, political and economic equality.

(iii) Mixed economy. A **mixed economy** is an economic system which combines the features of both free enterprise and socialist (or centrally planned) economic systems. In this system, the economy is divided into two sectors, viz., (i) private sector, and (ii) public sector. **Private sector** is allowed to function on the principles of free enterprise system or free market mechanism within a broad political and economic policy framework. The other part of the economy, the **public sector**, is organised, owned and managed along the socialist pattern. The public sector is created by reserving certain industries, trade, services, and activities for the government control and management. The government prevents by law the entry of private capital into the industries reserved for the public sector. Another way of creating or expanding the public sector is *nationalisation* of private industries. The promotion, control and management of the public sector industries is the sole responsibility of the state.

Apart from controlling and managing the public sector industries the government controls and regulates the private sector through its industrial, monetary and fiscal policies. If necessary, direct controls are also imposed.

It is noteworthy that most free enterprise economies are conceptually mixed economies, since in all such economies there co-exist private and public sectors. A mixed economy is essentially a variant of the capitalist economy. The mixed economies of free enterprise system can however be distinguished from the mixed economies of 'socialist pattern' on the basis of the rationale of public sector in the two systems. The public sector in a free-enterprise system is a matter of pure economic necessity and is subservient to the free market mechanism. It functions on the principles and with the objective of aiding, supplementing and strengthening the free enterprise system. On the other hand, the creation of public sector in a 'socialist pattern of society' like India, is a matter of ideological and social choice. Its functioning is oriented towards the creation of a socialist pattern of society. In this system, social justice and equal opportunity are intended to be achieved through state policy measures rather than through market mechanism. Another point of distinction is that the public sector of the socialist pattern of society has a comprehensive *economic planning* whereas in a free enterprise system such plans are only indicative. Indian economy has since 1991 been oriented towards market mechanism by relaxing the government control on the economy by putting end to quota and 'licence raj'.

In the *mixed economy of a socialist pattern of society*, the roles and responsibilities of the government are much wider than free enterprise system, and much less than in the socialist society. The government, in this system, undertakes to perform all the functions that state performs in a free enterprise economy. In addition, it assumes the responsibility of making and implementing the plans for economic development of the country. The government has also to perform the task of coordinating private sector activities with the public sector, and controlling and regulating the former to bring it in tune with the public sector policies.

2.7 PRODUCTION POSSIBILITY FRONTIER

As noted above, societies cannot have all that they want because resources are scarce and technology is given. In reality, however, both human and non-human resources available to a country, keep increasing over time and technology becoming more and more productive. Availability of human resources increases due to a natural process of increase in population, and non-human resources (especially capital goods and raw materials) increase due to creative nature of human beings. Non-human resources have been increasing due to human efforts to create more and better of capital goods, to discover new kinds and sources of raw materials, and to create a new and more efficient technique of production. Such factors change ***production possibilities*** and ***production possibility frontier*** of an economy.

In this section, we will describe the *production possibility frontier* and introduce the concept of ***opportunity cost***. To begin with, we will assume a **static model** with the following **assumptions:** (i) a country's resources consists of only labour and capital; (ii) availability of labour and capital is given; (iii) the country produces only two goods—food and clothing; and (iv) production technology for the goods is given.

The production possibility frontier. *Production possibilities refer to the alternative combinations of goods and services that a society is capable of producing with its given resources and state of technology.* With reference to our model specified above, *production possibilities are the alternative combinations of maximum food and clothing that the country can produce by making full use of its labour and capital, given the technology.* For example, let us suppose that, given the availability of labour, capital, and technology, the alternative production possibilities open to the country are given in Table 2.1. The production possibilities given in Table 2.1, can be presented in the form of a diagram as shown in Fig. 2.2. In this diagram, vertical axis measures food production and horizontal axis measures production of clothing. By graphing the alternative production possibilities given in Table 2.1, we locate points *A*, *B*, *C*, *D*, *E*, and *F* as shown in Fig. 2.2. A number of intermediate points can be located between any two of these points. By joining these points, we get a curve *AF*. This curve is called ***production possibility frontier (PPF)***. *The production possibility frontier, AF, shows all possible alternative combinations of the two goods (food and clothing) that can be produced by making full use of all the available resources (labour and capital), given the state of technology.* Each point on the *PPF* shows a different combination of two goods. For example, *production possibility frontier AF* shows that if the country choose point *A*, it can produce 7 thousand tons of food and no clothing.

Table 2.1 Alternative Production Possibilities

Alternative	Food (thousand tons)	Clothing (million meters)
A	7	0
B	6	33
C	5	48
D	4	60
E	3	68
F	0	80

Similarly, point *F* shows that the country can produce 80 million meters of clothing but no food. A large number of other alternative combinations of food and clothing can be located on the

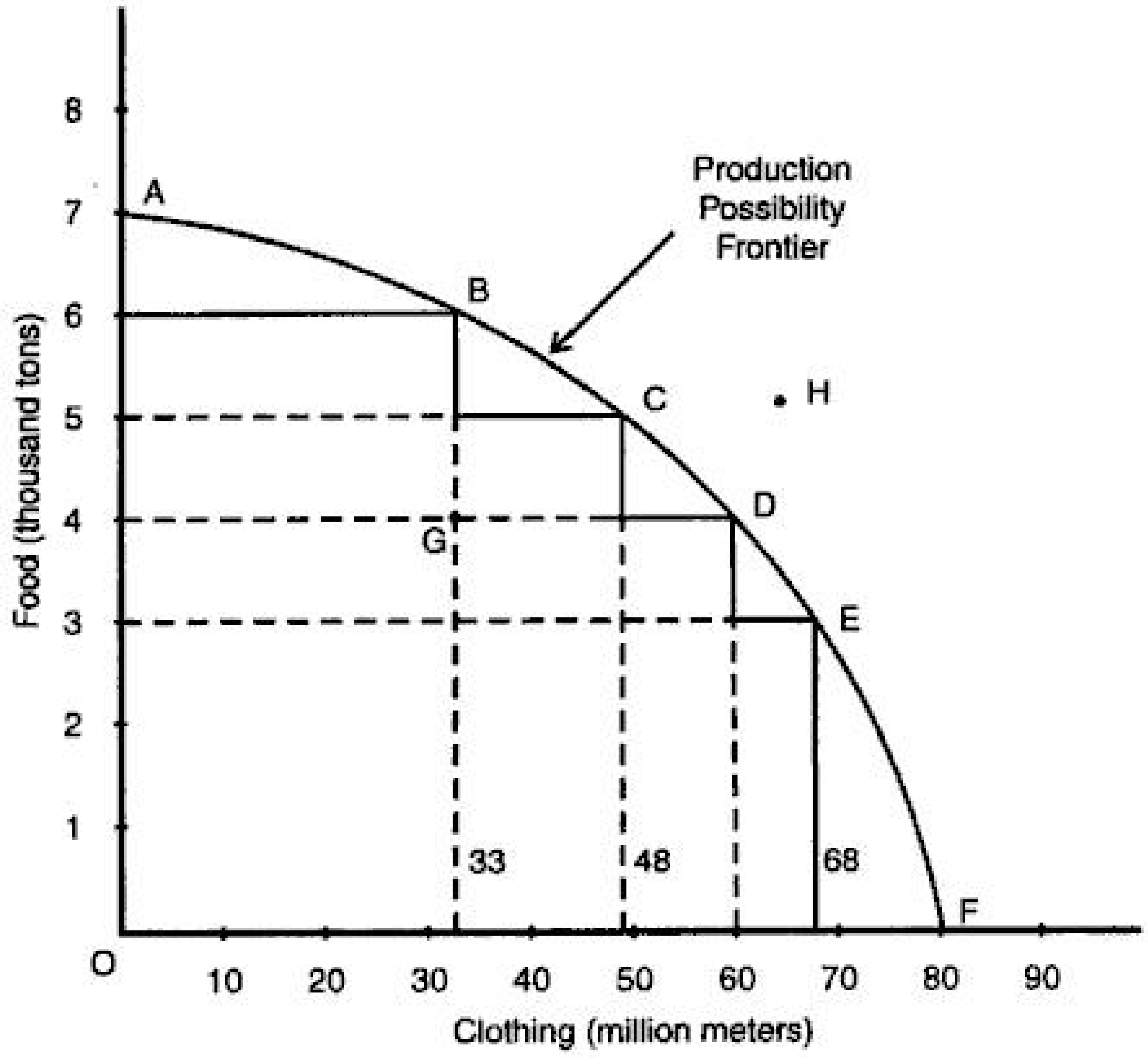

Fig. 2.2 The Production Possibility Frontier

curve *AF* that the country can produce by making full use of its resources, given the technology. For example, point *B* shows a combination of 6 thousand tons of food and 33 million meters of clothing and point C shows a combination of 5 thousand tons of food and 48 million meters of clothing, and so on. The combination of food and clothing that a society chooses to produce on the *PPF* depends on the demand for food and clothing.

Implications of points away from PPF. The *production possibility frontier* shows the alternative combinations of the two goods under the conditions that all the resources (labour and capital) are fully employed. Any point below the *PPF*, e.g., point G, implies underutilization or unemployment of resources. If resources are fully employed, an additional 2 thousand tons of food or 15 million meters of clothing or more of both the goods can be produced. Any point that falls beyond the *PPF*, e.g., point *H*, is unattainable for lack of resources. The scarcity of resources does not permit production of any combination of food and clothing indicated by a point outside the *PPF*.

The opportunity cost. Apart from showing the possible alternative combinations of two goods, *production possibilities frontier* indicates also the *opportunity cost* of one commodity in terms of the the other. Conceptually, *opportunity cost* is the benefit that is foregone to avail the benefit of another opportunity. In the present context, "The opportunity cost of an increase in the output of some product is the value of the other goods and services that must be foregone when inputs (resources) are taken away from production in order to increase the output of the product in question."[1] In our example, opportunity cost of food production is the quantity of clothing foregone to produce a certain quantity of food, and *vice versa*. The concept of 'opportunity cost' can be exemplified with

1. Baumol, William J. and Blinder, Alan S., *Economics: Principles and Policies*, 4th Edn., (Harcourt, Jovanovich, London, 1988), p. 632.

the help of alternative options given by the *PPF*. As can be seen in Fig. 2.2, the movement along the *production possibilities frontier, AF*, shows decrease in the output of one commodity at the cost of the output of the other. For example, movement from point *A* to point *B* shows decrease in food production from 7 thousand tons to 6 thousand tons and increase in the production of clothing from 0 million meters to 33 million meters. It implies that 1 thousand tons of food can be produced only by sacrificing 33 million meters of clothing. It means that *opportunity cost* of the 1 thousand tons of food is 33 million meters of clothing. Likewise, movement from point *B* to point *A* implies that ***opportunity cost*** of 33 million meters of clothing is one thousand tons of food.

Increasing opportunity cost and concavity of PPF. The *production possibilities frontier* reveals ***another important fact*** that *opportunity cost* changes along the *PPF*. In Fig. 2.2, movement from point *A* downwards to points *B, C, D, E* and *F* shows increasing opportunity cost of clothing in terms of lost output of food. For example, movement from points *A* and *B*, means transferring resources (labour and capital) from food production to clothing production. As a result, food production is lost by 1 thousand tons for 33 million meters of clothing. It means that the opportunity cost of 33 million meters of clothing is 1 thousand tons of food. A further movement from point *B* to *C* means that the opportunity cost of only 15 million meters of clothing, a much lower quantity, is the same one thousand tons of food. It means that opportunity cost of clothing increases as we move downwards along the *PPF*. It increases further between points *C* and *D*. Similarly, movement from point *F* towards point *A*, shows increasing opportunity cost of food production in terms of clothing.

Why is PPF concave? It can be seen in Fig. 2.2 that *PPF* takes the form of a ***concave curve***. The *PPF* derives its concavity from the fact that opportunity cost increases along the *PPF*. Opportunity cost increases due to an economic law, i.e., the *law of diminishing returns to scale*. The law of diminishing returns states that when more and more units of two inputs are used to produce a commodity, the return on the marginal units of inputs goes on diminishing. The movement from one point on the *PPF* to another means transfer of resources from the production of one commodity to that of the other. For example, movement from point *A* towards point *F* implies transfer of resources from food production to production of clothing. As more and more resources are employed to produce clothing, marginal productivity of resources in terms of clothing goes on diminishing. The result is increase in the opportunity cost.

Shift in Production Possibility Frontier

The *production possibilities frontier* for a country is not fixed for all times to come. In general, it keeps shifting upwards for two reasons: (i) *expansion of resources*, i.e., increase in the availability of resources (labour and capital); and (ii) *technological improvements*. The effects of resource expansion and technological improvements on the *PPF* is explained and illustrated below.

(i) Resource expansion and production possibility frontier. Increase in human and non-human resources of a country, technology remaining the same, causes a parallel shift in its *PPF*. In general, resources of a country increase over time with increase in labour supply due to increase in population and increase in the supply of capital. The upward shift in the *PPF* due to increase in country's resources (labour and capital) is illustrated in Fig. 2.3 assuming a given technology. Suppose that given the resources and technology of a country, its *PPF* is shown by the curve *AB* in Fig. 2.3.

Now, let the resources (labour and capital) of the country increase so that a larger quantity of labour and capital is available to produce food and clothing. With the increase in resources, the country can increase its food production by *AC* or, alternatively, production of clothing by *BD*, or a larger combination of both the goods. By joining the possible points, we get a higher *PPF* as shown by the curve *CD* in Fig. 2.3. This shows an upward shift in the *PPF* from *AB* to *CD* due to increase in

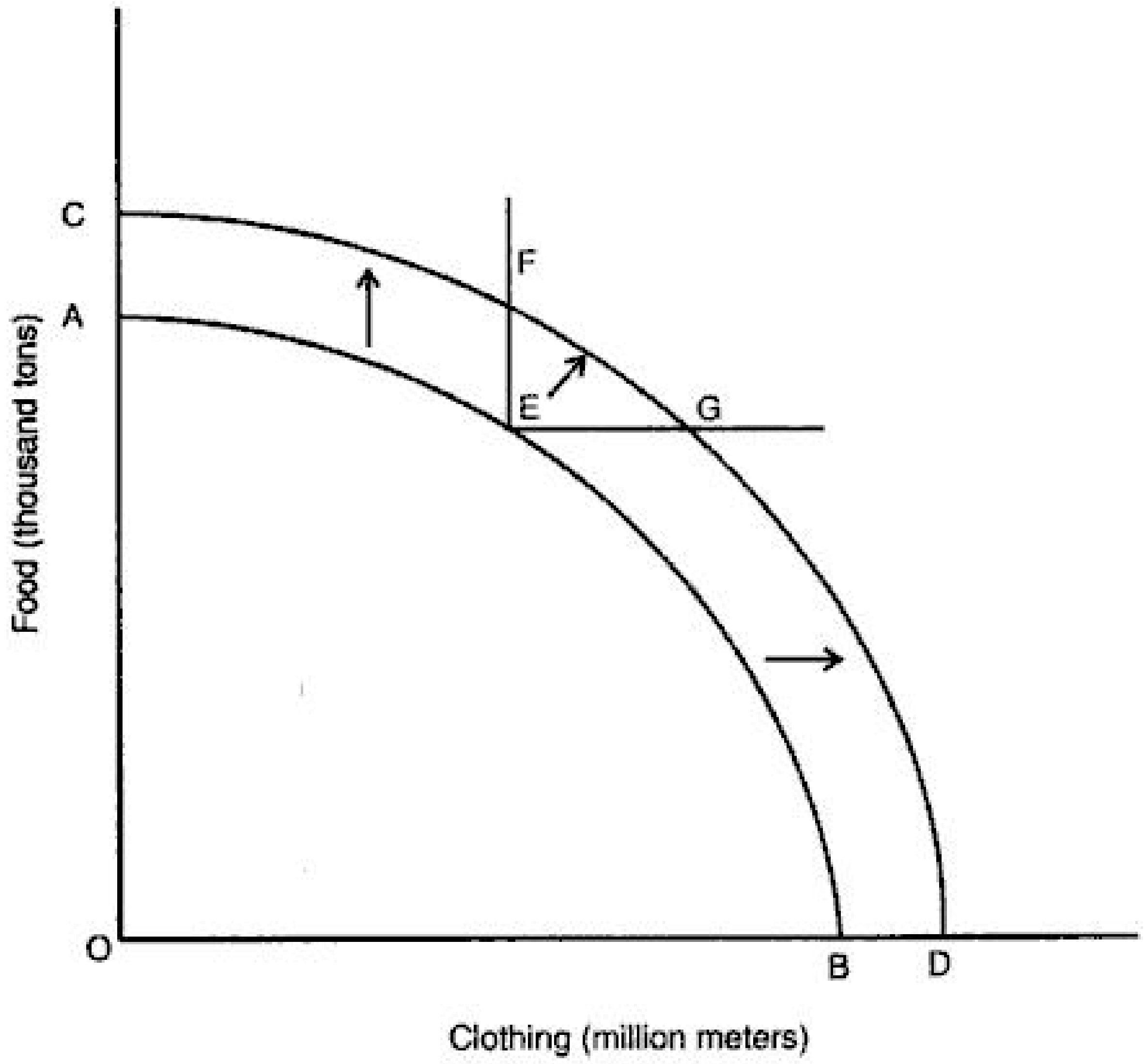

Fig. 2.3 Shift in Production Possibility Frontier

resources. Each point on the *production possibilities frontier CD* shows a larger combination of food and clothing. For example, suppose given its resources, the country was at point *E* on the *PPF* shown by *AB*. When its resources increase, its *PPF* shifts upward to *CD*. The country can then increase its production of food by *EF* or of clothing by *EG* or an addition quantity of both the goods indicated by points between *F* and *G*. This kind of production possibilities show ***economic growth*** of the country.

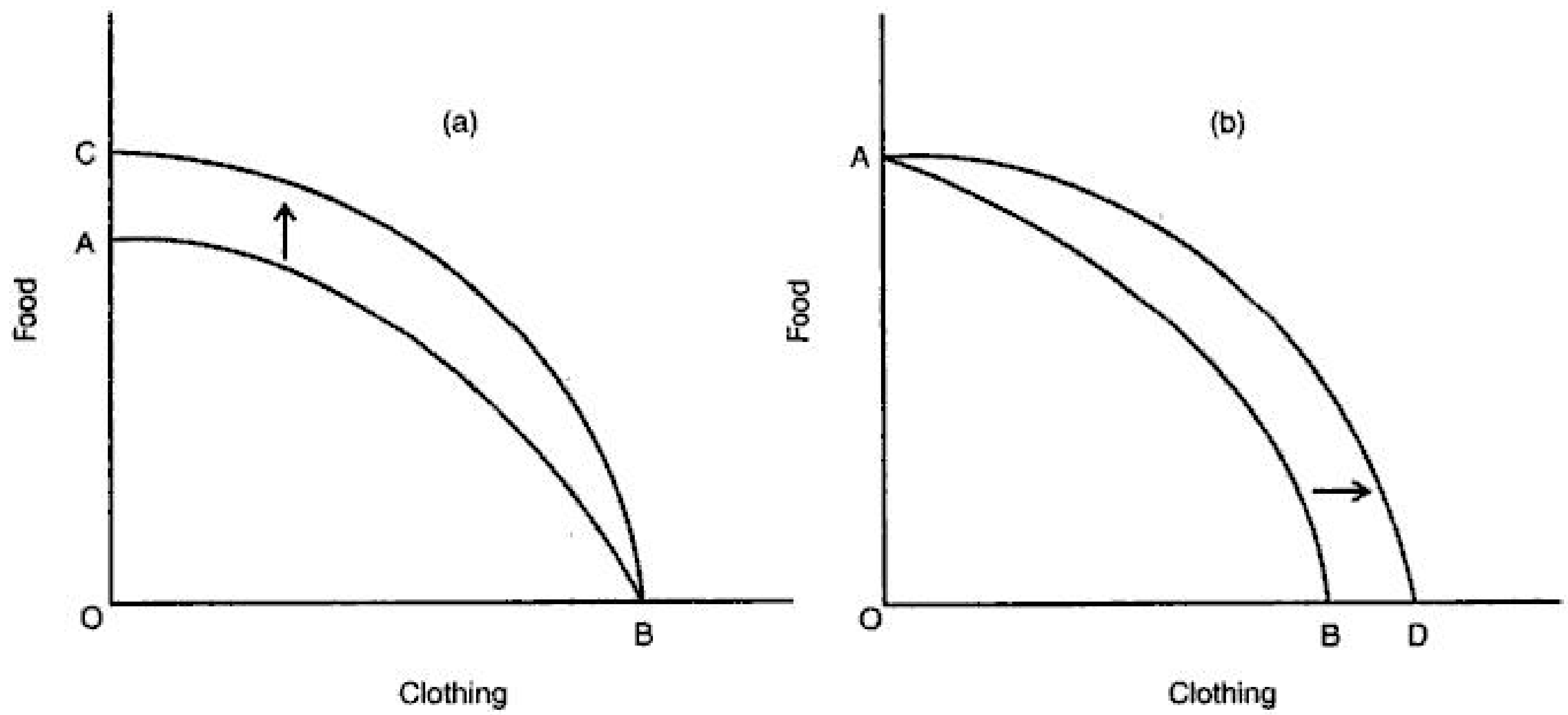

Fig. 2.4. Technological Improvement and Shift in *PPF*

(ii) Technological improvement and production possibility frontier. Technological improvement refers to change in production technique so that more of goods can be produced per unit of time by using a given quantity of resources. That is, technological improvement increases the productivity of resources, both labour and capital. Technological improvement may be commodity-specific and at different points of time in different industries. In India, for example, technological break-through in food production was made during the 1970s whereas technological improvement in clothing industry had started much earlier. The *PPF* shift due to industry-wise technological improvement is illustrated parts (a) and (b) of Fig. 2.4. Part (a) illustrated shift in the *PPF* due to technological improvement in food production, assuming no improvement clothing technology, and part (b) illustrates shift in the *PPF* due to technical improvement in clothing industry, assuming no change in food technology.

In can be seen in part (a) of Fig. 2.4 that technological improvement in food production makes an upward shit in the *PPF* from *AB* to *CB*. The shift in *PPF* indicates (i) that total food production can be increased with no change in clothing production, (ii) that more of both the goods can be poduced. Similarly, part (b) shows the shift in the *PPF* when there is technological improvement in clothing industry and no such change in food industry. Due to technological improvement, total production of clothing can be increased by *DB* or more of both the goods can be produced.

(iii) What if Changes in Resources in Technology are Simultaneous? If *technological improvements* take place along the *resource expansion* and if technological improvements take place in both the industries simultaneously, then the shift in *PPF* is similar to that caused by resource expansion, though the shift may not be parallel.

FURTHER READINGS

Lipsey, Richard, G., *An Introduction to Positive Economics,* (ELBS, London), 6th Edn., 1983, Chapters 4 and 5.

Samuelson, Paul A. and Nordhaus, W., *Economics,* 15th Edn., (McGraw-Hill, Inc., New York, 1995), Chapter 1

Slitcher, Sumner H., *Modern Economic Society,* (Henry, Hold and Co., New York., 1928), reprinted in *Readings in Modern Economics,* ed. by P. A. Samuelson, (McGraw-Hill, New York, 1970).

REVIEW QUESTIONS AND EXERCISES

1. How will you define an economic system? What are the various constituents of the economic system? How do they act and react?
2. Explain the working of a simple economy with the help of an appropriate diagram using a simple model. How will the total real output be affected when households set aside a part of their income?
3. Illustrate the circular flows of product and money in a simple economy. Why are the two kinds of flows always equal in value terms? What will happen if one of the flows is reduced for some reason?

4. What are the basic problems of an economy? Why do these problems arise? Do all kinds of economies — rich and poor, developed and underdeveloped — face the same basic problems?
5. Scarcity is the mother of all kinds of economic problems. Do you agree with this statement? Give reasons for your answer.
6. What is 'market mechanism'? How does market mechanism work to sovle the basic problems in a free market economy? Under what market conditions does the market mechanism work efficiently to solve the economic problems?
7. An efficient solution to the basic problems of an economy lies in that commodities go to those who derive the highest utility from them and factors of production flow to the activities in which their productivity is maximum. Does market mechanism provide solution to basic problems 'what to produce', 'how to produce' in the manner that the above condition is satisfied?
8. Discuss the major drawbacks and failures of the free market economy? What are the reasons for failures of the market system in providing an efficient solution to the basic problems?
9. Why does intervention of the government in free market economy become often inevitable? What roles does the government play in a free market economy? How is government role different in free market economies from that in controlled economies?
10. What is meant by 'production possibility frontier'? What factors determine the production possibility frontier of an economy? How are the points below and above the production possibility frontier different from the points on the frontier curve?
11. Define opportunity cost. Why does opportunity cost increase along the production possibility frontier? Explain with an appropriate example. Suppose a country produced only two goods — cars and computers. When some of the resources are transferred from car production to computer production, car output decreases by 1000 units and computer output increases by 50,000 units. Find the per unit opportunity cost of car production.
12. What are the factors that make production possibility frontier upwards? Illustrate and explain an upward shift in the production possibility frontier caused by (a) increase in the supply of resources, technology remaining the same; (b) technological improvements, resources remaining the same; and (c) simultaneously change in resources and technology.
13. Which of the following statements is NOT correct?
    (a) Scarcity is the cause of all economic problems;
    (b) Market mechanism can solve all economic problems;
    (c) Consumer is sovereign in a socialist economy;
    (d) Opportunity cost equals cost of production;
14. Do you agree with the following statements? Give reason for your answer.
    (i) Government is an important element of modern economies
    (ii) Production possibilities frontier shows the combination of two goods, which cannot be produced.
    (iii) Production possibilities frontiers can shift upwards without increase in resources.
    (iv) The basic economic problems what to produce and how to produce is the problem of only poor countries.

PART II

DEMAND AND SUPPLY

3 The Laws of Demand and Supply

CHAPTER OUTLINE

3.1 The Concept of Market
3.2 The Demand Side of the Market
  3.2.1 The Meaning of Demand
  3.2.2 The Law of Demand
  3.2.3 The Demand Schedule
  3.2.4 The Demand Curve
  3.2.5 Why Demand Curve Slopes Downward to the Right
  3.2.6 Exceptions to the Law of Demand
  3.2.7 The Concept of Market Demand
  3.2.8 Other Determinants of Market Demand
  3.2.9 Demand Function
  3.2.10 Shift in Demand Curve
3.3 The Supply Side of the Market
  3.3.1 The Law of Supply
  3.3.2 The Supply Schedule
  3.3.3 The Supply Curve
  3.3.4 Shift in the Supply Curves
  3.3.5 Supply Function
3.4 The Market Equilibrium: Equilibrium of Demand and Supply
3.5 Shift in Demand and Supply Curves and Market Equilibrium
  3.5.1 Shift in Demand Curve
  3.5.2 Shift in Supply Curve
  3.5.3 Simultaneous Shift in Demand and Supply Curves
3.6 Stability of Market Equilibrium
  3.6.1 Static and Dynamic Equilibrium
  3.6.2 Equilibrium under Static Conditions
  3.6.3 Equilibrium under Dynamic Conditions
  Further Readings
  Review Questions and Exercises

We have noted in Chapter 2 that **market mechanism** plays a crucial role in solving the basic economic problems in a free market economy and that the entire market system functions in an orderly manner, though some aspects of it may not be desirable. The market system works in an orderly manner because it is governed by certain **Fundamental Laws of Market** known as the **Laws of Demand and Supply**. The forces of demand and supply interact to determine the price of goods and services brought to the market. The laws of demand and supply are all pervasive in economic analysis. That is why (perhaps) Thomas Carlyle, the famous 19th century historian remarked, "It is easy to train an economist; teach a parrot to say Demand and Supply."[1] In fact, the most important function of microeconomics is to explain the laws of demand and supply, market mechanism and working of the price system. In this chapter, we explain the concept and the laws of demand and supply, price determination, and equilibrium of the commodity market.

3.1 THE CONCEPT OF MARKET

The word 'market' generally means a place or area where goods and services are bought and sold, e.g., Chandani Chowk, Karol Bagh, Connaught Place, Delhi Stock Exchange, Bombay Stock Exchange, Sabzi Mandi, etc. In economics, the word 'market' is used in a rather abstract sense. The market means a system by which sellers and buyers of a commodity interact to settle its price and the quantity to be bought and sold. According to Samuelson and Nordhaus[2], "A **market** is a mechanism by which buyers and sellers interact to determine the price and quantity of a good or service". Market for a commodity consists of the buyers and sellers who interact to settle its price and quantity to be transacted. The sellers and buyers may be individuals, firms, factories, dealers and agents.

Some important points in the market concept are :

(i) A market need not be situated in a particular place or locality. The geographical area of a market depends on how scattered are the buyers and sellers. It may be as small as a fish market in a corner of a city or as large as the entire world, e.g., the global markets for arms, cars, electronic goods, aeroplanes, computers, oil, medicines, etc.

(ii) Buyers and sellers need not come in personal contact with each other. The transactions can be effected through postal services, telephone, fax, agents, or e-mail, etc. People do buy many goods and services directly from the producers without having ever seen them.

(iii) The word 'market' may refer to a commodity or service (e.g., fruit market, car market, share market, money market, paper market, labour market, etc.) or to a geographical area, Bombay market, Indian market, Asian market, etc.

(iv) The economists distinguish between markets also on the basis of (a) nature of goods and services, e.g., factor market and commodity market or input market and output market; (b) number of firms and degree of competition, e.g., competitive market (large number of firms with homogenous products), monopolistic market (many firms with differentiated products); oligopolistic market and so on.

3.2 THE DEMAND SIDE OF THE MARKET

3.2.1 Meaning of Demand

Conceptually, demand can be defined as the desire for a good for whose fulfilment a person has sufficient purchasing power and willingness to pay for the good. In simple words, *demand is a desire for a good, backed by ability and willingness to pay*. A desire without sufficient resources (money income) is merely a wish. A desire with resources but without willingness to spend is only a potential demand.

1. Samuelson attributes this statement to "anonymous" in his *Economics*, 13th Edn., p. 55.
2. Samuelson, P. A and Nordhaus, W., *Economies*, 15th Edn., (McGraw-Hill, Inc., New York, 1995), p. 23.

A desire accompanied by ability and willingness to pay makes a real or **effective demand.**

Individual and market demand. *Individual demand* can be defined as the quantity of a commodity that a person is willing to buy at a given price over a specified period of time, say per day, per week, per month, etc. ***Market demand*** refers to the total quantity that all the users of a commodity are willing to buy at a given price over a specific period of time. In fact, market demand is the sum of individual demands. Individual and market demand curves are illustrated ahead in section 3.2.7.

3.2.2 The Law of Demand

The law of demand states the relationship between the quantity demanded and price of a commodity. Although quantity demanded of a commodity depends also on many other factors, e.g., consumer's income, price of the related goods, consumer's taste and preferences, advertisement, etc., price is the most important and the only determinant of demand in the short run.

The law of demand can be stated as, ***all other things remaining constant, the quantity demanded of a commodity increases when its price decreases and decreases when its price increases.*** This law implies that demand and price are inversely related. Marshall states the law of demand as "the amount demanded increases with a fall in price and diminishes with a rise in price". This law holds under *ceteris paribus* assumption, that is, *all other things remain unchanged*. The law of demand can be illustrated through a ***demand schedule*** and a ***demand curve.***

3.2.3 The Demand Schedule

A ***demand schedule*** is a tabular presentation of different prices of a commodity and its corresponding quantity demanded per unit of time. A hypothetical market demand schedule is given in Table 3.1. This table presents price of shirts (P_s) and the corresponding number of shirts demanded (Q_s) per month.

Table 3.1 Demand Schedule for Shirts

P_s (price in Rs)	Q_s (Shirts in '000)
800	8
600	15
400	30
300	40
200	55
100	80

Table 3.1 illustrates the law of demand. As data given in the table shows, the demand for shirts (Q_s) increases as its price (P_s) decreases. For instance, at price Rs 800 per shirt, only 10 thousand shirts are demanded per month. When price decreases to Rs 400, the demand for shirts increases to 30 thousand and when price falls further to Rs 100, demand rises to 80 thousand. This relationship between price and quantity demanded gives the law of demand.

3.2.4 The Demand Curve

A ***demand curve*** is a graphical presentation of the demand schedule. A demand curve is obtained by plotting a demand schedule. For example, when the data given in the demand schedule (Table 3.1) is presented graphically as in Fig. 3.1, the resulting curve *DD′* is the **demand curve.** The curve *DD′* in Fig. 3.1 depicts the law of demand. It slopes downward to the right. It has a negative slope. The negative slope of the demand curve *DD′* shows the *inverse relationship* between the price of shirt and its quantity demanded. It shows that demand for shirts increases with the decrease in its price and decreases with rise in its price. As can be seen in Fig. 3.1, downward movement on the demand curve *DD′* from point *D* towards *D′* shows fall in price and rise in demand. Similarly, an upward movement from point *D′* towards *D* reads rise in price and fall in demand.

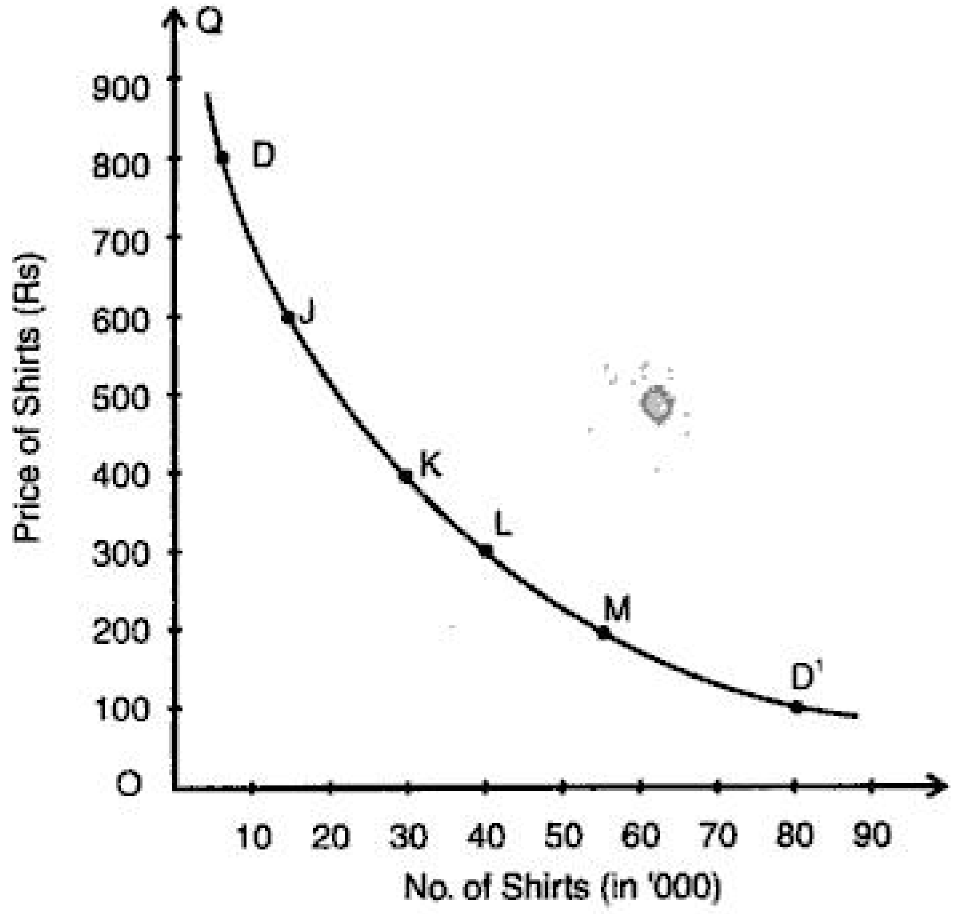

Fig. 3.1 The Demand Curve

The law of demand is based on an empirical fact. For example, when prices of cell phones and personal computers (PCs), specially of the latter, were astronomically high, only few rich persons and big firms could afford them. Now with the revolution in computer cell phone technology and the consequent fall in their prices, demand for these goods has shot up in India.

3.2.5 Why Demand Curve Slopes Downward to the Right

Figure 3.1 shows that *demand curve slopes downward to the right*. Why does it happen? The **reasons behind the law of demand** are following:

(i) Income effect. When price of a commodity falls, real income of its consumers increases in terms of this commodity. In other words, their purchasing power increases since they are required to pay less for the same quantity. According to another economic law, increase in real income (or purchasing power) increases demand for goods and services in general and for the goods with reduced price in particular. The increase in demand on account of increase in real income is called ***income effect***.

It should however be noted that the *income effect* is negative in case of *inferior goods*. In case price of an ***inferior good*** accounting for a considerable proportion of the total consumption expenditure falls substantially, consumers' real income increases. Consequently, they substitute superior goods for inferior ones. Therefore, *income effect* on the demand for inferior goods becomes *negative*.

(ii) Substitution effect. When price of a commodity falls, it becomes cheaper compared to its substitutes, their prices remaining constant. In other words, when price of a commodity falls, price of its substitutes remaining the same, its substitute becomes relatively costlier. Consequently, rational consumers tend to substitute cheaper goods for costlier ones within the range of normal goods—goods whose demand increases with increase in consumer's income—other things remaining the same. Therefore, demand for the relatively cheaper commodity increases. The increase in demand on account of this factor is known as ***substitution effect***.

(iii) Diminishing marginal utility. Marginal utility is the utility derived from the marginal unit consumed of a commodity. Diminishing marginal utility is also responsible for increase in demand for a commodity when its price falls. When a person buys a commodity, he exchanges his money income with the commodity in order to maximise his satisfaction. He continues to buy goods and services so long as marginal utility of his money (MU_m) is less than the marginal utility of the commodity (MU_c). Given the price (P_c) of a commodity, the consumer adjusts his purchases so that $MU_c = MU_m$. This proposition holds under both constant MU_m and diminishing MU_m.

If MU_m is assumed to be constant, then $MU_m = P_c$. Under this condition, utility maximising consumer makes his purchases in such quantities that

$$MU_m = P_c = MU_c$$

When price falls, $(MU_m = P_c) < MU_c$. The only way to regain his equilibrium is to reduce MU_c. So the consumer purchases more of the commodity. When the stock of a commodity increases, MU_c decreases. As a result, demand for a commodity increases when its price decreases.

This conclusion holds also under diminishing MU_m. When price of a commodity falls and consumer buys only as many units as before the fall in price, he saves some money on this commodity. As a result, his stock of money increases and his MU_m decreases, whereas MU_c remains unchanged because his stock of commodity remains unchanged. Since MU_m is less than MU_c, the utility maximizing consumer exchanges money with commodity to equate MU_m with MU_c, with a view to maximising his satisfaction. Consequently, demand for a commodity increases when its price falls.

3.2.6 Exceptions to the Law of Demand

The law of demand is one of the fundamental laws of economics. The law of demand, however, does not apply to the following cases:

(i) Expectations regarding future prices. When consumers expect a continuous increase in the price of a durable commodity, they buy more of it despite increase in its price, to avoid the pinch of 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 further, rather than buy the commodity when its price initially falls. Such decisions of the consumers are contrary to the law of demand.

(ii) 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,[1] precious stones, rare paintings and antiques, etc. Rich people buy such goods mainly because their prices are high.

(iii) Giffen goods. An exception of this law, is also the classic case of Giffen goods named after a British economist Sir Robert Giffen, (1837–1910). A Giffen good does not mean any specific commodity. It may be any essential commodity much cheaper than its substitutes, consumed mostly by the poor households and claiming a large part of their income. If price of such goods 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 is 30 kgs

1. Goods of this category are also accumulated to store value.

including 20 kgs of *bajra* (an inferior good) and 10 kgs of wheat (a superior good). Suppose also that *bajra* sells at Rs 5 a kg and wheat Rs 10 a kg. At these prices, the household spends Rs 200 per month on food grains. That is the maximum it can afford. Now, if price of *bajra* increases to Rs 6 per kg, the household will be forced to reduce its consumption of wheat by 5 kgs[1] and increase that of *bajra* by the same quantity in order to meet its minimum monthly consumption requirement within Rs 200 per month. Obviously, household's demand for *bajra* increases from 20 to 25 kgs per month despite increase in its price and that of wheat falls to 5 kgs.

3.2.7 The Concept of Market Demand

Market demand for a commodity is the sum of all individual demands for the commodity at a given price, per unit of time. Suppose, there are only three consumers (A, B and C) of Pepsi and their weekly individual demand for Pepsi at its different prices is given as in Table 3.2. The last column of the table shows the market demand, i. e., the aggregate of individual demands for Pepsi.

Table 3.2 Individual and Market Demand for the Pepsi Cans

Price	No. of Pepsi Cans demanded by			Market demand
(Rs)	A	B	C	$= A + B + C$
12	0	0	0	0
10	0	0	4	4
8	0	4	8	12
6	3	8	12	23
4	5	12	16	33
2	8	16	20	44
0	11	20	24	55

The last column of Table 3.2 shows weekly market demand for Pepsi. The *market demand curve* can be obtained by plotting the data in the last column of the table.

Graphical Derivation. Alternatively, market demand curve can be derived graphically by horizontal summation of the individual demand curves at each price of Pepsi. Graphical derivation of the market demand curve is illustrated in Fig. 3.2. The individual demand curves of buyers A, B and C are shown by the demand curves D_A, D_B and D_C, respectively. Horizontal summation of these demand curves produces weekly *market demand curve* for Pepsi as shown by the curve D_M. Thus, a *market curve is horizontal summation of individual demand curves at different prices.*

It is ***important*** to note here that there is a significant difference between the individual demand curves and the market demand curve. The individual demand curves may not slope downward in case of many consumer goods, e.g., a book by an author, umbrella, cinema ticket for a show, or a passenger ticket, etc. But market demand for all such goods, slopes downward following the decrease in their prices, due to increase in the number of consumers.

1. The increase in demand for *bajra* by 5 kgs can be worked out as follows. Suppose the household maintains its food consumption at its minimum level of 30 kgs. For this, it will be required to substitute x kgs of *bajra* for the same quantity of wheat (x kgs). Its food consumption basket may be expressed as $(20 + x)$ kgs of bajra + $(10 - x)$ kgs of wheat = 30 kgs. Since household can afford only Rs 200 per month, its budget equation can be written as $6(20 + x) + 10(10 - x) =$ Rs 200. Solving this equation for x, we get $x = 5$ kgs.

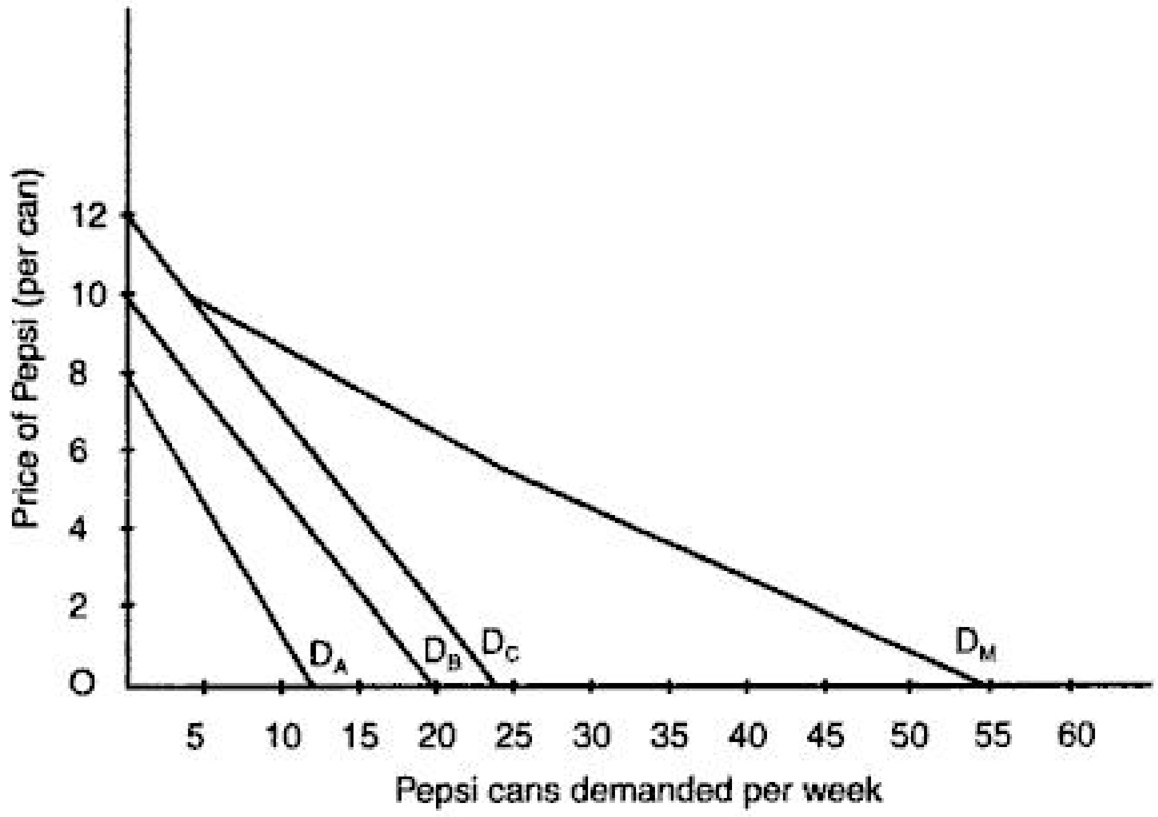

Fig. 3.2 Derivation of Market Demand Curve

3.2.8 Other Determinants of Market Demand

In the short run, price of a commodity is the main determinant of its market demand. In the long run, however, market demand for a product is determined by the number of other factors. We will discuss here, some other important quantifiable and non-quantifiable determinants of demand for a product.

(i) Price of substitutes and complementary goods. The demand for a commodity depends also on the prices of its substitutes and complementary goods. Two commodities are deemed to be ***substitutes*** for one another, if change in price of one affects the demand for the other in the same direction. For instance, commodities *X* and *Y* are, in economic sense, substitutes for one another if a rise in the price of *X* increases the demand for *Y*, and *vice versa*. Tea and coffee, hamburger and hot-dog, wheat and rice, alcohol and drugs are some common examples of common substitutes. By definition, the relation between demand for a product and price of its substitute is of **positive** nature. When price of a product (say, tea) falls (or increases), then demand for its substitute (coffee) falls (or increases). The relationship of this nature is given in Fig. 3.3 (a).

A commodity is deemed to be a ***complement*** of another when it complements the use of the other. For example, petrol is a complement to motor vehicles; butter and jam are complements to bread; milk and sugar are complement to tea and coffee and so on. Conceptually, two goods are complements for one another, if an increase in the price of one causes a decrease in the demand for another. By definition, *there is an inverse relationship between the demand for a good and the price of its complement.* For instance, an increase (or a decrease) in the price of petrol causes a decrease (or an increase) in the demand for car, other things remaining the same. The nature of relationship between the demand for a product and the price of its complement is given in Fig. 3.3 (b).

(ii) Consumers' income and Engel curves. Consumer's income is the basic determinant of the quantity demanded of a product. It is a common knowledge that the people with higher disposable income spend a larger amount on goods and services than those with lower income. Income-demand relationship is of a more varied nature than that between demand and its other determinants.

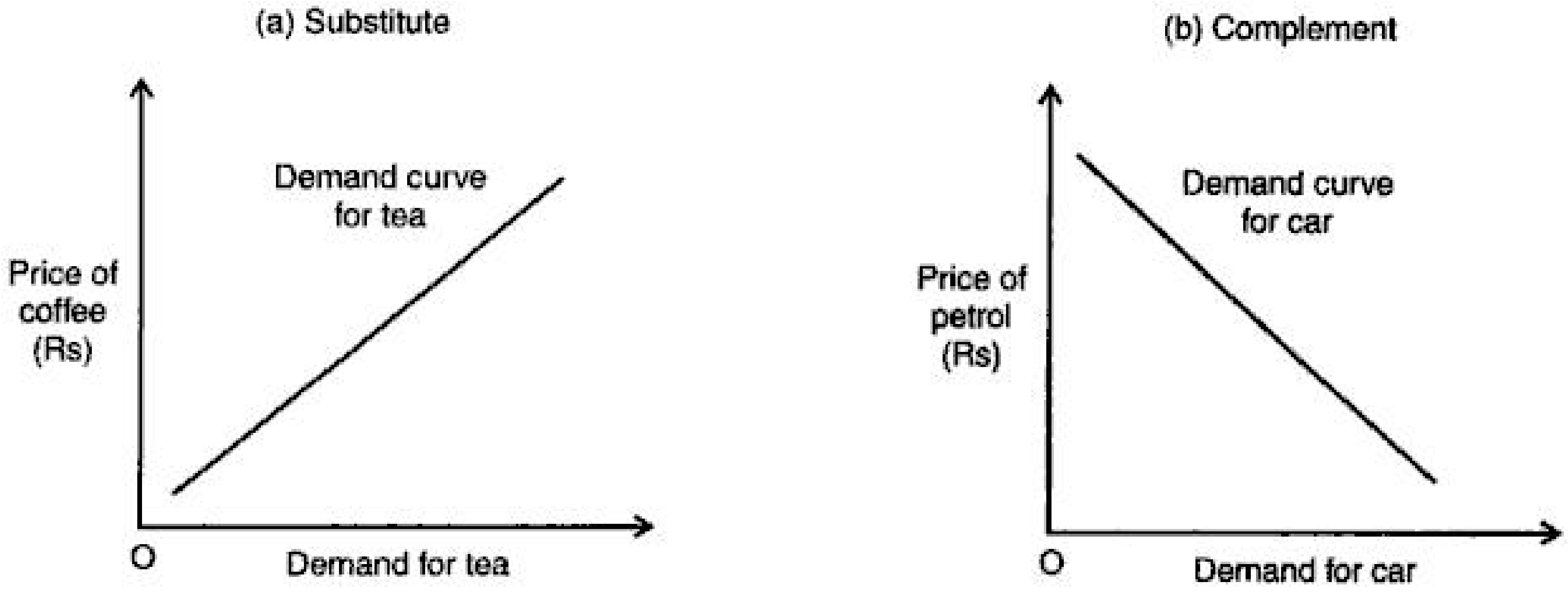

Fig. 3.3 Demand for Substitute and Complement

For the purpose of income-demand analysis, goods and services may be grouped under four broad categories, viz. (a) essential consumer goods; (b) inferior goods; (c) normal goods; and (d) prestige or luxury goods. The relationship between income and the different kinds of goods is presented through the **Engel Curves.***

(a) Essential consumer goods (ECG). The goods and services which fall in this category are essentially consumed by almost all persons of a society, e.g., food grains, clothes, vegetable oils, sugar, matches, cooking fuel and housing, etc. The quantity demanded of such goods increases with increase in consumer's income only upto a certain limit, other factors remaining the same. The relation between goods and services of this category and consumer's income is shown by curve *ECG* in Fig. 3.4. As the curve shows, consumer's demand for essential goods increases until his income rises to OY_2 and beyond this level of income, it does not.

(b) Inferior goods. Inferior and superior goods are generally known to both consumers and sellers. For instance, every consumer knows that *bajra* is inferior to wheat and rice; *bidi* (an indigenous cigarette) is inferior to cigarette, coarse textiles are inferior to refined ones, kerosene stove is inferior to gas-stove; travelling by bus is inferior to travelling by taxi, and so on. In economic terminology, however, *a commodity is deemed to be inferior if its demand decreases with the increase in consumers'* income. The relation between income and demand for an inferior good is shown by curve *IG* in Fig. 3.4 assuming that other determinants of demand remain the same. Demand for such goods may initially increase with increase in income (say upto Y_1) but it decreases when income increases beyond this level.

(c) Normal goods. In economic sense, normal goods are those which are demanded in increasing quantities as consumers' income rises. Clothing is the most important example of this category of goods. Household furniture, electricity, telephones, household gadgets, etc. are other examples of this category of goods. The nature of relation between income and demand for normal goods is shown by the curve *NG* in Fig. 3.4. As the curve shows, demand for such goods increases with increase in income of the consumer, but at different rates at different levels of income. Demand for normal goods initially increases rapidly with the increase in income and later, at a lower rate.

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* Engel Curve has been named after a German Statistician, Christian Lorenz Ernst Engel (1821–1986), who was one of the first to study systematically the relation between quantity demanded of a good and the consumer's income. According to Engel's law, proportion of expenditure on essential goods decreases as income increases.

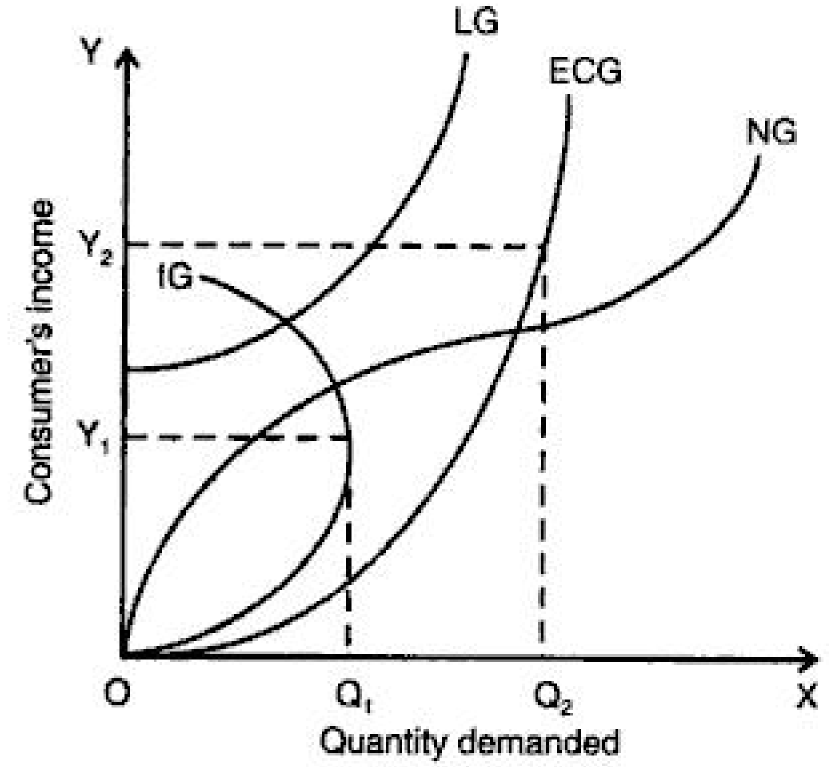

Fig. 3.4. Income-Demand Curves

It may be noted from Fig. 3.4 that upto a certain level of income (Y_1) the relation between income and demand for all types of goods is similar. The difference is of degree only. The relation between income and different kind of goods becomes distinctly different only beyond a certain level of income.

(d) Prestige or luxury goods. Prestige goods are those which are consumed mostly by the rich section of the society, e.g., precious stones, studded jewellery, costly cosmetics, luxury cars, airconditioners, costly decoration items (e.g., antiques), etc. Demand for such goods arises only beyond a certain level of consumer's income. The income-demand relationship of this category of goods is shown by the curve *LG* in Fig. 3.4.

(iii) Consumer's taste and preference. Consumer's taste and preferences play an important role in determining the demand for a product. Taste and preferences depend, generally, on the social customs, religious values attached to a commodity, habits of the people, the general life-style of the society and also the age and sex of the consumers. Change in these factors changes consumers' taste and preferences. When there is a change in consumers' liking, tastes and preferences for certain goods and services following the change in fashion, people switch their consumption pattern from cheaper and old fashioned goods over to costlier 'mod' goods, so long as price differentials commensurate with their preference. For example, preference for 'junk food' in the younger generation has increased as compared to normal home-made nutritious food. Consumers are prepared to pay higher prices for 'mod' goods even if their virtual utility is the same as that of old-fashioned goods. This fact reveals that tastes and preferences also influence demand for goods and services.

(iv) Expected utility at equilibrium. Most consumers have limited income to satisfy unlimited wants. They spend their income on various goods they consume in such a manner that the total satisfaction derived out of their limited income is maximum. A consumer maximises his total satisfaction or his total utility when marginal utility, per unit of expenditure, derived from each commodity is the same. For example, let us suppose that a consumer has to spend his limited income on bread (*B*), shirts (*S*), and cinema shows (*C*). Given their respective prices as P_b, P_s, P_c, he would spend his income on these items according to the law of equi-marginal utility* so that marginal

* This law is discussed in detail in Chapter 6.

utility (*MU*) per unit of expenditure from each of these goods is the same, i.e.,

$$\frac{MU_b}{P_b} = \frac{MU_s}{P_s} = \frac{MU_c}{P_c}$$

where MU_b, MU_s and MU_c denote the *MU* of bread, shirts and cinema shows, respectively.

This is a necessary condition of consumer's equilibrium. Since *MU* schedule for each of these goods would be different, the consumer would buy different quantities of these goods with a view to equalising their *MU* per unit of expenditure. The equilibrium condition itself determines the quantity of each good (given their *MU* schedule) which a utility maximising consumer would like to buy. Although, in practice, a consumer may not be able to achieve the theoretical precision of his equilibrium, his pattern of expenditure and the quantity of each commodity that he would buy would approximate to the equilibrium condition stated above.

(v) Consumers' expectations. Consumers' expectations regarding the future course of economic events, particularly regarding changes in prices, income, and supply position of goods, play an important role in determining the demand for goods and services in the short run. If consumers expect a rise in the price of a commodity, they would buy more of it at its current price, with a view to avoiding the pinch of price-rise in future. On the contrary, if consumers expect prices of certain goods to fall, they postpone their purchases of such goods with a view to taking advantage of lower prices in future, mainly in case of non-essential goods. This behaviour of consumers reduces (or increases) the current demand for the goods whose prices are expected to decrease (or increase) in future. Similarly, an expected increase in income on account of the announcement of revision of pay-scales, dearness allowance, bonus, etc., induces increase in curent purchase, and *vice versa*.

(vi) Demonstration effect. When new commodities or new models of existing ones appear in the market, rich people buy them first. Some people buy new goods or new model of goods because they have genuine need for them while others buy because they want to exhibit their affluence. But once new commodities come in vogue, many households buy them, not because they have a genuine need for them but because others or neighbours have bought these goods. The purchase by the latter category of buyers are made out of such feelings as jealousy, competition, equality in the peer group, social inferiority and the desire to raise social status. Purchases made on account of these factors are the result of ***'Demonstration Effect'*** or the ***'Bandwagon Effect'***. These effects have a positive effect on the demand. On the contrary, when a commodity becomes the thing of common use, some people, mostly rich, decrease or give up the consumptions of such goods. This is known as **'Snob Effect'**. It has a negative effect on the demand for the related goods.

(vii) Consumer-credit facility. Availability of credit to the consumers from the sellers, banks, relations and friends or from any other source encourages the consumers to buy more than what they would buy in the absence of credit facility. That is why the consumers who can borrow more consume more than those who can borrow less or cannot borrow at all. Credit facility affects mostly the demand for consumer durables, particularly those which require bulk payment at the time of purchase.

(viii) Population of the country. The total domestic demand for a product depends also on the size of population. Given the price, per capita income, taste and preferences etc., the larger the population, the larger the demand for a product of common use. With an increase (or decrease) in the size of population, employment percentage remaining the same, demand for the product increases (or decreases). The relation between market demand for a product (normal) and the size of population is similar to the income–demand relationship.

(ix) Distribution of national income. The distribution pattern of national income also affects the demand for a commodity. If national income is evenly distributed, market demand for ***normal goods*** will be the largest. If national income is unevenly distributed, i.e., if majority of population belongs to the lower income groups, market demand for essential goods will be the largest whereas the same for other kinds of goods will be relatively low.

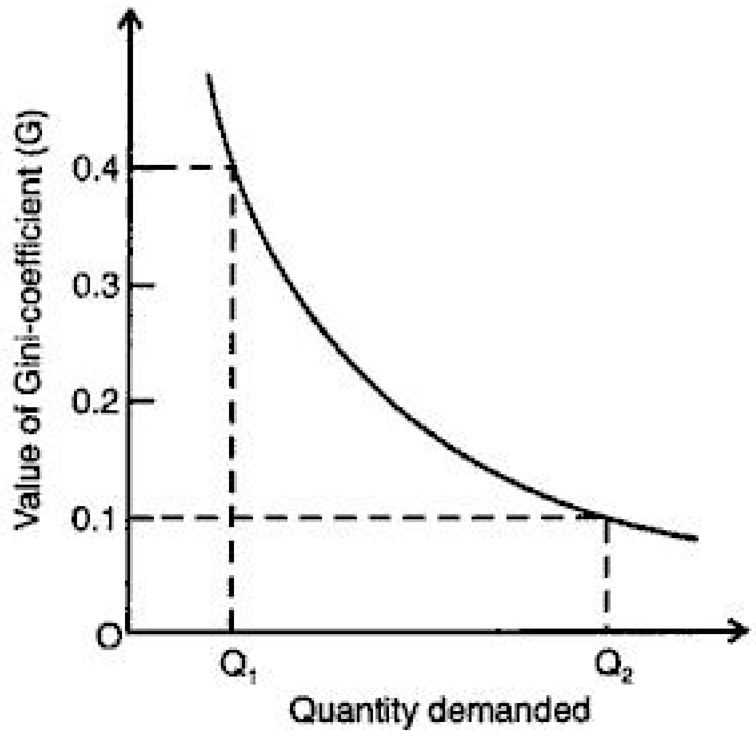

Fig. 3.5 Gini-coefficient and Demand

The relationship beteween market demand for a normal good and national income distribution is illustrated in Fig. 3.5. In the figure, vertical axis measures the Gini efficient[1] (a measure of national income distribution—G) and the horizontal axis measures the quantity demanded of a normal good. As Fig. 3.5 shows, at high value of $G = 0.4$, quantity demand of a normal good is small equal to Q_1. As G decreases from 0.4 to 0.1 (i.e., income distribution becomes more and more even) quantity of a normal goods demanded increases from Q_1 towards Q_2.

3.2.9 Demand Function

In mathematical language, a function is a symbolic statement of relationship between a dependent and independent variables. Demand function states the relationship between demand for a product (the dependent variable) and its determinants (the independent variables). Let us consider the most common form of a demand function, i.e., the short-run demand function, which consists of quantity demand (Q) and price (P). Assume that the quantity demanded of a commodity (D_x) depends only on its price, other factors remaining constant. The demand function will then read as 'demand for a commodity (D_x) depends on its price (P_x)'. The same statement may be written in its functional form as

$$D_x = f(P_x) \tag{3.1}$$

where D_x is demand for commodity X, the dependent variable, and P_x is price of X, the independent variable.

1. Gini-coefficient is a standard measure of national income distribution through Phillips curve. Gini-coefficient (G) having numerical value equal to zero indicates equal distribution of national income. $G > O$ indicates inequality. The higher the value of G, the greater the inequality in the distribution of national income.

From the demand function, one can easily derive a corresponding ***price function***. For example, given the demand function (3.2), the price function may be written as

$$P_x = \frac{a - D_x}{b} \tag{3.4}$$

or
$$P_x = \frac{a}{b} - \frac{1}{b} D_x$$

Denoting a/b by a' and $1/b$ by b', Eq. (3.4.) may be written as

$$P_x = a' - b'D_x$$

Given the demand function (3.3), price function can be derived as follows.

If
$$D_x = 100 - 5P_x,$$
then
$$P_x = 20 - 0.20\ D_x$$

(ii) Non-linear demand function. A demand function is said to be non linear or curvilinear when the slope of a demand curve ($\Delta P/\Delta Q$) changes all along the demand curve. Non-linear demand function yields a demand curve instead of a *demand line*, as shown in Fig. 3.7. A non-linear demand function, generally, takes the form of a power function as

$$D_x = aP_x^{-b} \tag{3.5}$$

or of a rectangular hyperbola of the form

$$D_x = \frac{a}{P_x + c} b \quad \text{where } a, b, c > 0. \tag{3.6}$$

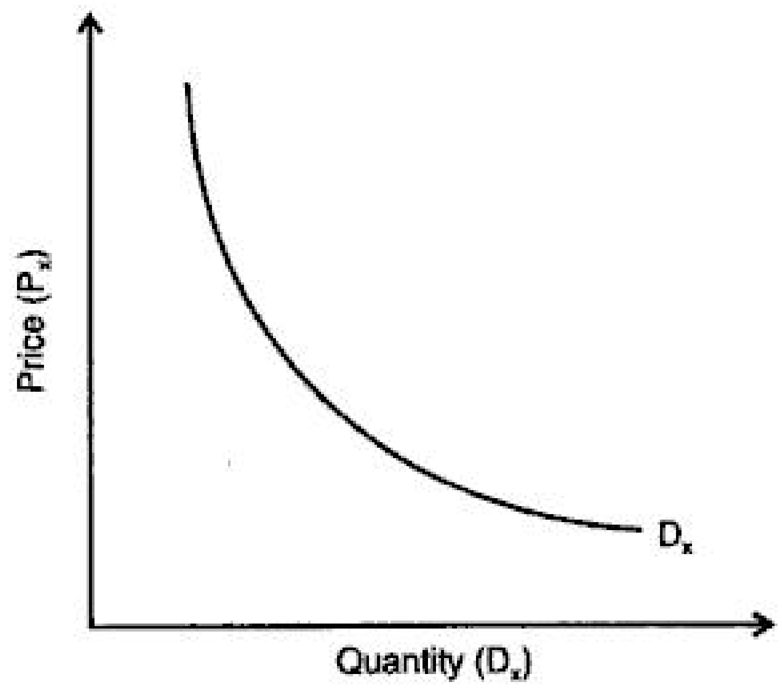

Fig. 3.7 Nonlinear Demand Function

Note that the exponent ($-b$) of the price variable in a non-linear demand function (3.5) is the coefficient of price elasticity of demand, which is constant.

(iii) Dynamic demand function. The demand function with price as a single independent variable, as described above, may be termed as ***short-term demand function***. A short-run demand function assumes all other factors than price to be given. In the long-run, however, the market demand for a product depends on the composite impact of all the determinants operating simultaneously. Therefore, in a ***long-run*** or ***dynamic demand function***, all the relevant determinants of demand for a product are included in the demand function. For instance, if individual demand (D_x) for a commodity X, depends

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3.3.4 Shift in the Supply Curve

We have shown above that a change in the price of a commodity causes a change in its quantity supplied along a given supply curve. Although price of a commodity is the most important determinant of its supply, it is not the only determinant. Many other factors influence the supply of a commodity. Given the supply curve of a commodity, when there is change in its other determinants, the supply curve shifts rightward or leftward depending on the effect of such changes. Let us now explain how other determinants of supply cause shift in the supply curve.

(i) Change in input prices. When input prices decrease, the use of inputs increases. As a result, product supply increases and the supply curve *SS* shifts to the right to *SS*", as shown in Fig. 3.10. Similarly, when input prices increase, product supply curve shifts leftward from *SS* to *SS*'.

(ii) Technological progress. Technological changes that reduce cost of production or increase efficiency cause increase in product supply. For instance, introduction of high yielding variety of paddy and new techniques of cultivation increased per acre yield of rice in India in the 1970s. Such changes make the supply curve shift to the right.

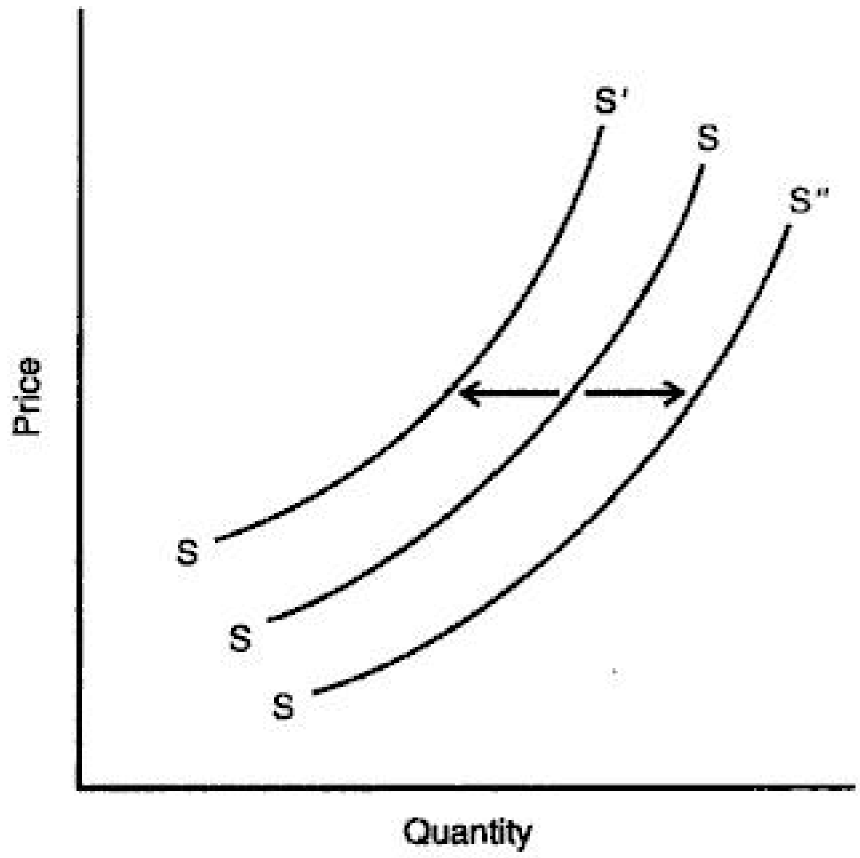

Fig. 3.10 Shift in the Supply Curve

(iii) Price of product substitutes. In production of many commodities, it is possible to produce some other goods which require a similar technology. For example, a refrigerator company can also produce ACs; Tatas famous for truck production can also produce cars; Maruti Udyog can produce trucks, and so on. Fall in the price of one of the product substitutes may lead to the rise in the supply of other due to capacity utilization for profit maximisation.

(iv) Nature and size of the industry. The supply of a commodity depends also on whether an industry is monopolized or competitive. Under monopoly, supply is fixed. When a monopolized industry is made competitive, the total supply increases. Besides, if size of an industry increases due to new firms joining the industry, the total supply increases and supply curve shifts rightward.

(v) Government policy. When government imposes restrictions on production, e.g., import quota on inputs, rationing of or quota imposed on input supply, etc., production tends to fall. Such restrictions make supply curve to shift leftward.

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By substituting supply and demand functions, we get

$$10\,P_x = 150 - 5\,P_x$$
$$P_x = 10$$

At equilibrium price $P_x = 10$, the quantity supplied and demanded are in equilibrium.

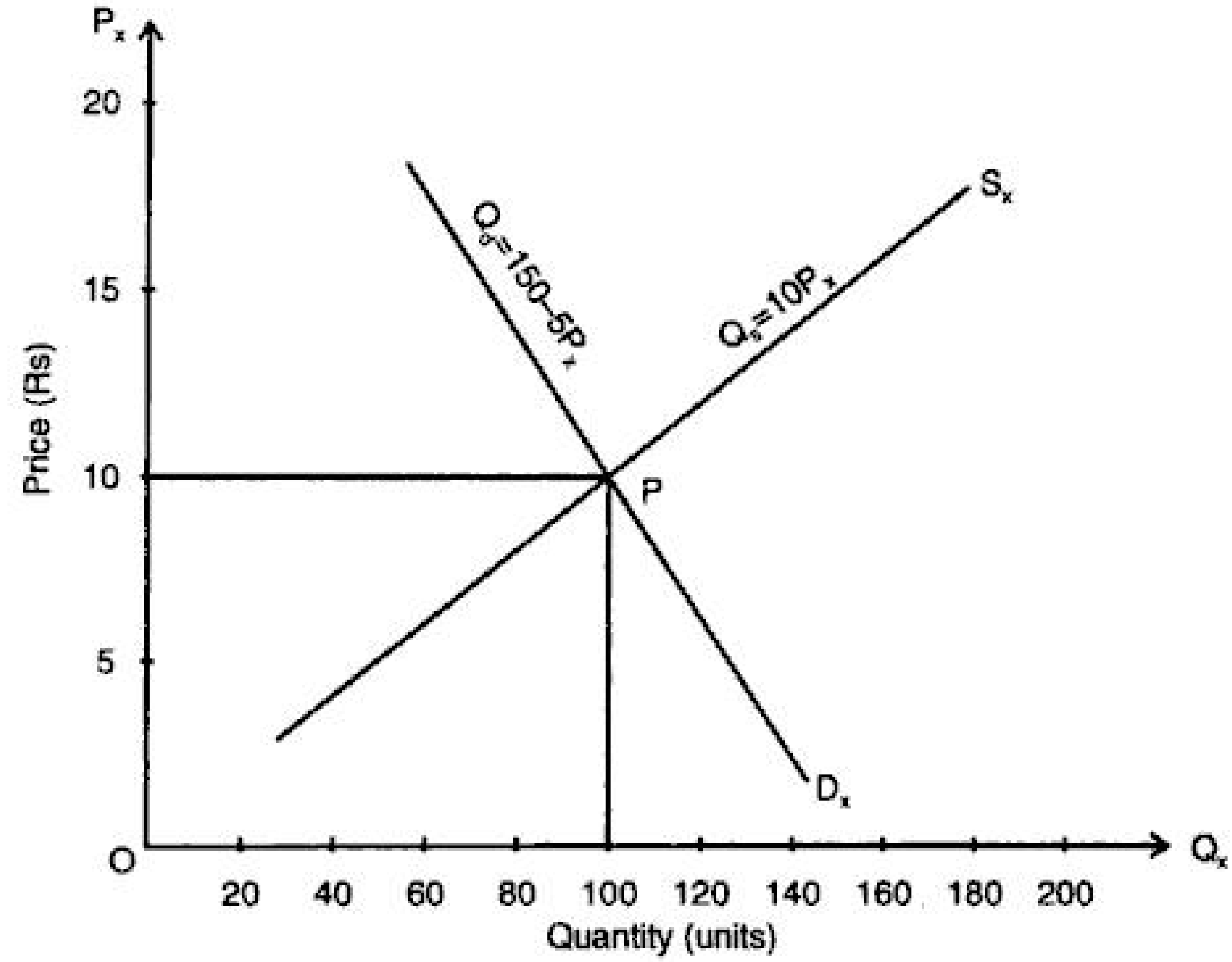

Fig. 3.12 Determination of Equilibrium Price and Quantity

The algebraic determination of equilibrium price and quantity is illustrated graphically in Fig. 3.12. The demand curve *DD'* has been drawn by using the demand function $Q_d = 150 - 5\,P_x$ and the supply curve *SS'* by using the supply function $Q_s = 10\,P_x$. As the figure shows, demand and supply curves intersect at point *P*. A perpendicular drawn from point *P* to the quantity axis determines the equilibrium quantity at 100 units and a line drawn from point *P* to the price axis determines the equilibrium price at Rs 10. At this price, the quantity demanded equals the quantity supplied and hence the shirt market is in equilibrium.

3.5 SHIFT IN DEMAND AND SUPPLY CURVES AND MARKET EQUILIBRIUM

3.5.1 Shift in Demand Curve

Whenever there is a shift in the demand and/or supply curve, there is also a shift in the equilibrium point. The effect of shift in the demand curve on the equilibrium is shown in Figure 3.13. Suppose that the initial demand curve is given by the curve *DD'* and supply curve by *SS'*. The demand and supply curves intersect each other at point *P*. The equilibrium price is determined at *PQ* and equilibrium quantity at *OQ*. Let the demand curve now shift from its position *DD'* to *DD"*, supply curve remaining the same. The demand curve *DD"* intersects the supply curve *SS'* at point *M*. Thus, shift in the demand curve causes a shift in the equilibrium from point *P* to point *M*. At the equilibrium, quantity demand and supplied increases from *OQ* to *ON* and price increases from *PQ* to *MN*. Note that, the supply curve remaining the same, a rightward shift in the demand curve results in a higher

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Going by the ***Walrasian approach***, let the price rise from OP_2 to OP_3 (see Fig. 3.16). As a result, demand decreases to OQ_1 and supply increases to OQ_3. Since supply exceeds demand by Q_1Q_3, price will fall till equilibrium point P is reached. Similarly, if price falls to OP_1 demand will exceed supply pushing the price upward to the equilibrium point. The equilibrium position at P is therefore stable. This is called *Walrasian stable equilibrium*. It should be borne in mind that change in price, demand and supply are simultaneous and instantaneous. Otherwise, equilibrium may not remain stable, particularly in case of an initial fall in price under the demand and supply conditions as given in Fig. 3.16.

To look at the ***Marshallian approach***, suppose quantity supplied increases from OQ_2 to OQ_3. At OQ_3, supply price is OP_3. At this price, demand falls to OQ_1. There is thus an excess supply of Q_1Q_3. Excess supply pushes price down to OP_2 at which demand equals supply. Similarly, if quantity falls to OQ_1, it means short supply, given the demand. Shortage of supply pushes price up to OP_2. At this price supply equals demand and equilibrium is stable. This is called *Marshallian stable equilibrium*.

(ii) Unstable equilibrium under static conditions. Let us now look at the conditions of ***unstable equilibrium under static conditions***. The cases of unstable equilibrium under static conditions, are extremely rare and temporary ones. Besides, the issue is not finally settled. Let us, however, describe here the famous Marshallian and Walrasian view on this issue. To begin with, consider a downward sloping demand curve and a *backward sloping* supply curve, as shown in Fig. 3.17. Note that the slope of supply curve is greater than that of the demand curve.

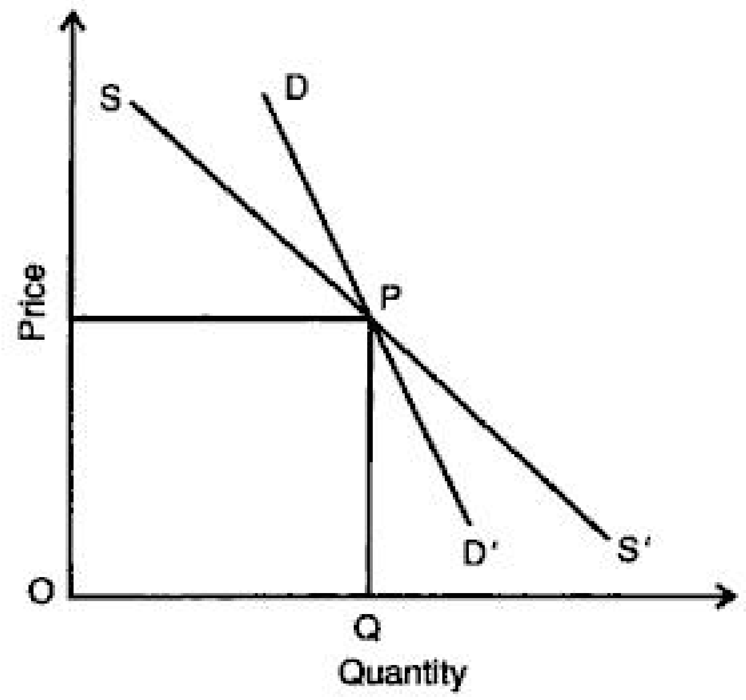

Fig. 3.17. Unstable Equilibrium: Negative Slope of Supply Curve

The negative slope of a supply curve indicates a peculiar behaviour of sellers in response to price change, that is, sellers sell less when price increases and sell more when price decreases. Such a behaviour of sellers may be attributed to ***distress selling*** by them. For example, suppose that a subsistence farmer capable of growing only one crop, sells only a part of his produce just sufficient to meet his non-food requirements. Given these conditions, he sells less when price is high and sells more when price is low so that supply curve has a negative slope. A similar supply curve may exist in the case of a labourer, who prefers leisure to income and works only as many hours per day as necessary to earn a minimum income sufficient to meet his basic requirements. Yet **another example** of negatively sloping supply curve is in case of an organised competitive market in a market period. If sellers in this market period try desperately to accumulate certain amount of cash, having no alternative to selling the existing stock of goods, they would have to sell more at lower price and less at higher price. In this case also, supply curve would have a negative slope. But such a case is temporary and very rare.

(i) Stable equilibrium under dynamic conditions. As mentioned above, an equilibrium position is said to be stable if displacement of equilibrium itself sets forces into action that restore the initial equilibrium position. The simplest way to illustrate the stability and instability of equilibrium position under dynamic conditions is provided by **'Cobweb Theorem'**.

The name, 'Cobweb' Theorem, has been derived from the appearance of the diagram it produces. The Cobweb Theorem can be stated in the form of three theorems.

a) ***Theorem I:*** If slope of demand curve ($\Delta P/\Delta Q$) is less than that of supply curve ($\Delta P/\Delta S$), the equilibrium is stable: the system is *convergent*.

b) ***Theorem II:*** If $\Delta P/\Delta D > \Delta P/\Delta S$, equilibrium is unstable. The adjustment process is *divergent* or *oscillatory*.

c) ***Theorem III:*** If $\Delta P/\Delta D = \Delta P/\Delta S$, equilibrium is nondamped oscillating: it keeps circulating around the original equilibrium with a constant change in price and quantity.

Figure 3.21 illustrates the ***stable equilibrium***, the theorem I. As the figure shows, demand and supply[1] curves intersect each other at point P determining equilibrium price at OP_3 and equilibrium output at OQ_4. If price rises for some reason in, say period t, to OP_5, equilibrium will be disturbed. For, at the new price, demand falls to OQ_1 which is much less than the expected supply OQ_6 at this price. In period $t + 1$, supply rises to OQ_6 exceeding demand by Q_1Q_6. Consequently, price falls to OP_1 causing a rise in demand to OQ_6. But in response to fall in price, supply decreases in period $t + 2$ to OQ_2. The demand now exceeds supply by Q_2Q_6. Therefore, price rises to OP_4, causing an increase in supply by Q_2Q_5 in period $t + 2$. It is now the turn of price to adjust itself to the existing demand and supply conditions. This whole process is repeated period after period. Note that each time the process of adjustment is repeated, the magnitude of change in supply, price and demand goes on decreasing. For example, in period $t + 1$, supply increases by Q_1Q_6 in period $t + 2$ it decreases by Q_2Q_6, and in period $t + 3$ it increases by Q_2Q_5 that $Q_1Q_6 > Q_2Q_5 > Q_3Q_4$. So is the case with price and demand. As a result of decreasing magnitude in changes, the system in Figure 3.21 converges to

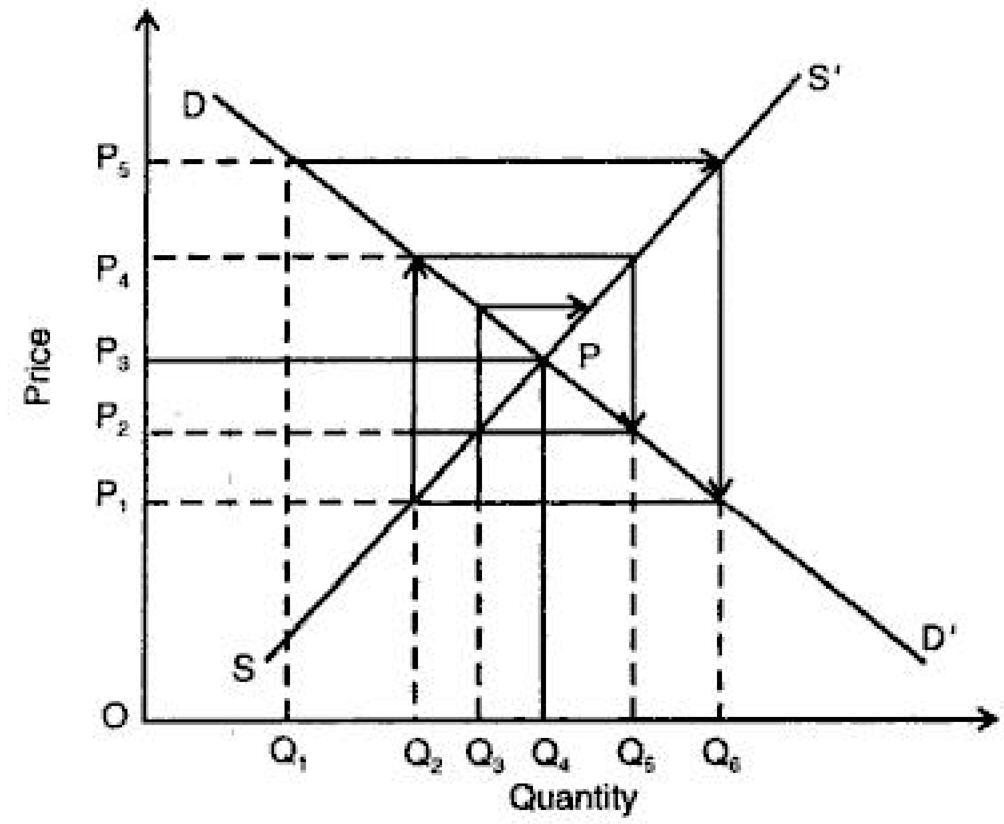

Fig. 3.21 Stable Equilibrium

1. Note that the slope of demand curve ($\Delta P/\Delta D$) is smaller than that of supply curve, ($\Delta P/\Delta S$), i.e., $\Delta P/\Delta D < \Delta P/\Delta S$.

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12. From a demand function $Q_d = 2000 - 30\,P$ and a supply function $Q_s = 20\,P$, find out (a) equilibrium price, (b) equilibrium quantity, and (c) gap between demand and supply at P = Rs 20 and P = Rs 50.

13. From a demand function given as $P = (Q_d - 20)/3$ and a supply function as $P = Q_s/2$, find out (i) whether there is excess demand or excess supply at prices Rs 2 and Rs 5, and (ii) the quantity of excess demand or excess supply at these prices.

14. Which of the following statements are True or False?
    (a) The demand for a commodity is inversely related to the price of its substitutes.
    (b) When income increases, the demand for essential goods increases more than proportionately.
    (c) Decrease in input prices causes a leftward shift in the supply curve.
    (d) There cannot be a market without a place.
    (e) The desire for a commodity backed by ability and willingness to pay is demand.
    (f) The law of demand states the relationship between the quantity demanded and price of a commodity, consumers income, price of the related goods and advertisement.
    (g) An individual demand curve marks the upper limits of his/her intentions to buy a commodity at different prices.
    (h) A market demand curve represents the maximum quantity that an individual would be willing to buy at different prices.
    (i) The income-effect on demand for an inferior good is negative.
    (j) Demand for car and price of petrol are inversely related.
    (k) Most demand functions are of the form $D = a + b\,P$.
    (l) A straight line supply function is of the form $P = Q/b$.

[(**Ans.** True: (e), (g), (h), (i), (l) False: (a), (b), (c), (d), (f), (j), (k)]

15. Which of the following conditions makes an approximate definition of 'market'?
    (a) Market is a meeting place for buyers and sellers.
    (b) The buyers and sellers meet to transact business.
    (c) The buyers and sellers must transact business by or without meeting in a place.

16. Suppose characteristics of three persons—*A*, *B* and *C* are given as follows:
    (a) *A* wants to buy a book on microeconomics but has no money to pay for it.
    (b) *B* has sufficient money to buy the book but prefers to borrow books from the library.
    (c) *C* has money and is willing to spend his money on a book on microeconomics.
    Who creates demand for books on microeconomics?

17. An individual demand curve slopes downward to the right because of :
    (a) income effect of fall in prices;
    (b) substitution effect of decrease in price;
    (c) diminishing marginal utility;
    (d) conditions (a), (b) and (c) hold; or
    (e) none of the above.

18. A Giffen good is one whose demand increases, other thing remaining the same, when:
    (a) its price increases;
    (b) consumer's income increases; or
    (c) price of its superior substitutes decreases;
    Give the correct answer.

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4.1.1 Arc and Point Elasticity

When price–elasticity of demand is measured between any two finite points on a demand curve, it is called ***arc elasticity*** and elasticity measured at a point on the demand curve is called ***point elasticity***. As noted above, the elasticity of demand measures the percentage change in quantity demanded due to a certain percentage change in price. The percentage change in price may be considerably high (e.g., 10 per cent, 20 per cent or even higher) or it may be very small—so small that it is not significantly different from zero. When change in price is significantly high, it shows a movement from one point on the demand curve to another point, making an *arc*. Therefore, price elasticity measured for a considerably high change in price, is called ***arc elasticity of demand***. And, when price elasicity is measured for very small changes in price—not significantly different from zero—it is called ***point elasticity***.

4.1.2 Measuring Arc Elasticity

The elasticity co-efficient between any two finite points on a demand curve, i.e., *arc elasticity*, can be measured by using the formula given in Eq. (4.1). For example, the measure of elasticity between points *J* and *K* on the demand curve *PM* in Fig. 4.1 is the measure of arc elasticity. The movement from point *J* to *K* on the straight line demand curve *PM* shows a fall in price of commodity *X* from Rs 25 to Rs 15 and the consequent increase in demand from 30 units to 50 units. Here, $\Delta P = 25 - 15 = 10$ and $\Delta Q = 30 - 50 = -20$. The arc elasticity between points *J* and *K* (moving from *J* to *K*) can be calculated as given below:

$$e_p = -\frac{\Delta Q}{\Delta P}.\frac{P_0}{Q_0}$$

$$e_p = -\frac{-20}{10}.\frac{25}{30} = 1.66 \tag{4.2}$$

Interpretation: Elasticity coefficient is interpreted as percentage change in demand due to one percent change in price. For example, in Eq. (4.2), *elasticity coefficient is 1.66*. The *elasticity coefficient (1.66)* will be *interpreted as a 1 per cent decrease in price of commodity X results in a 1.66 per cent increase in demand for it*.

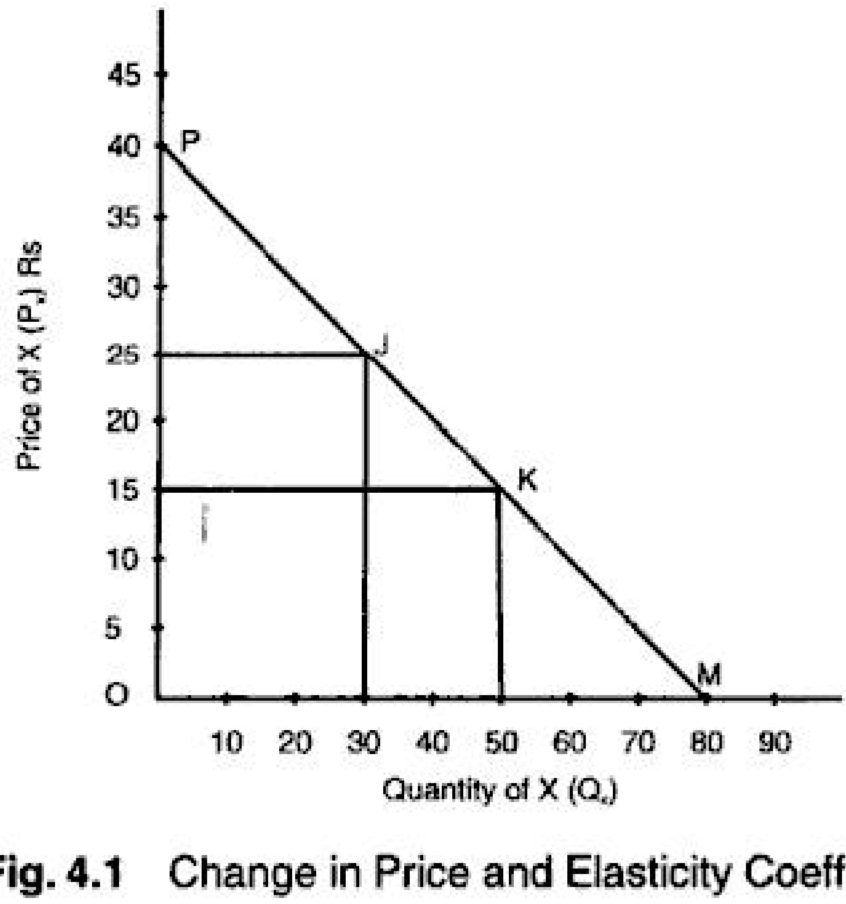

Fig. 4.1 Change in Price and Elasticity Coefficient

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$$e_p = \frac{\partial Q}{\partial P} \cdot \frac{P}{Q}$$

By substitution,

$$e_p = \frac{QN}{PQ} \cdot \frac{PQ}{OQ} = \frac{QN}{OQ}$$

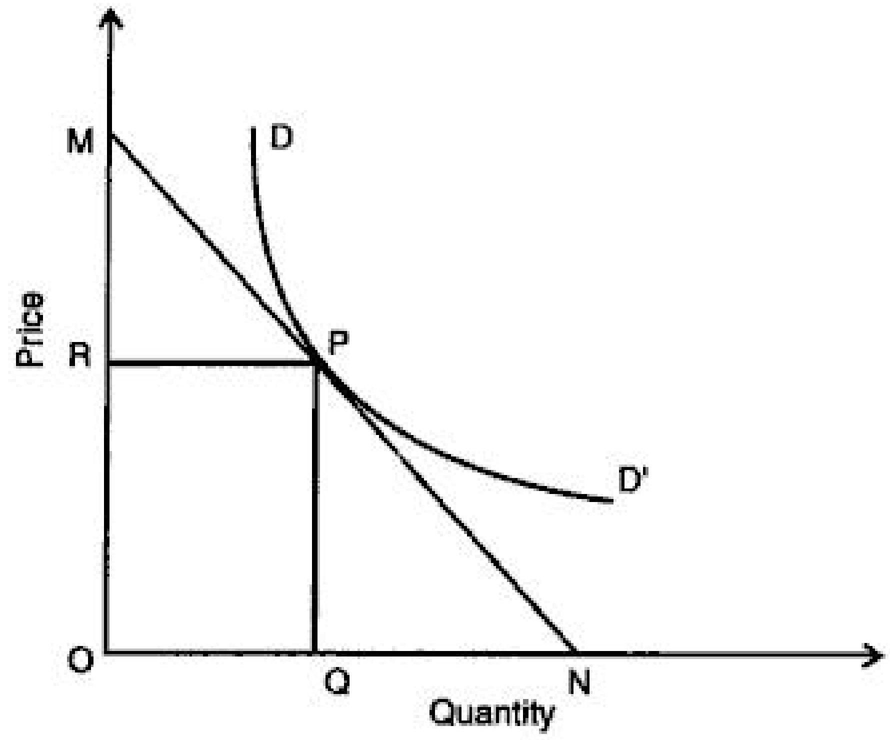

Fig. 4.3 Point Elasticity on a Non Linear Demand Curve

Geometrically, $QN/OQ = PN/PM = e$. (For Proof, see the preceding section).

4.1.4 Price Elasticity Along the Demand Curve

The price elasticity of demand varies all along a demand curve. Consider a linear demand curve MN in Fig. 4.4. At one and only one point, $e_p = 1$. At all other points (except terminal points), $e_p < 1$ or $e_p > 1$. At terminal point N, $e_p = 0$ and at terminal point M, elasticity is ***undefined***. This point is explained below.

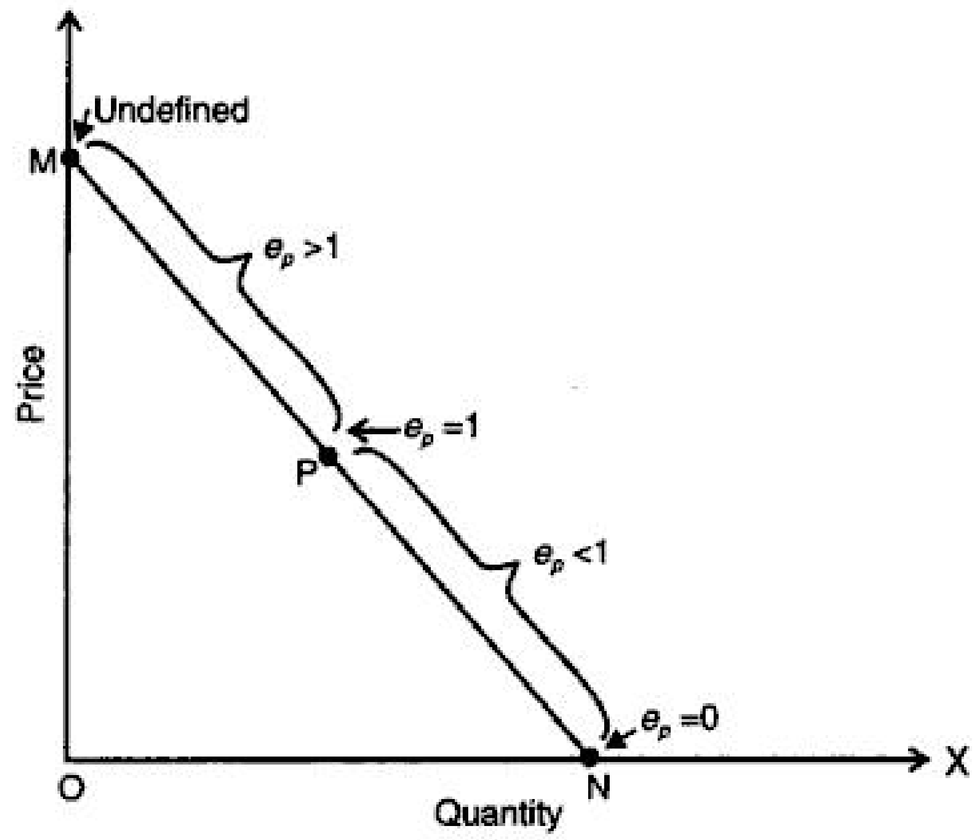

Fig. 4.4 Point Elasticities of Demand

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Following the logic of the preceding section, we can prove that

$$\frac{RK}{RJ} = \frac{PO}{PJ}$$

and

$$\frac{QM}{QL} = \frac{PO}{PL}$$

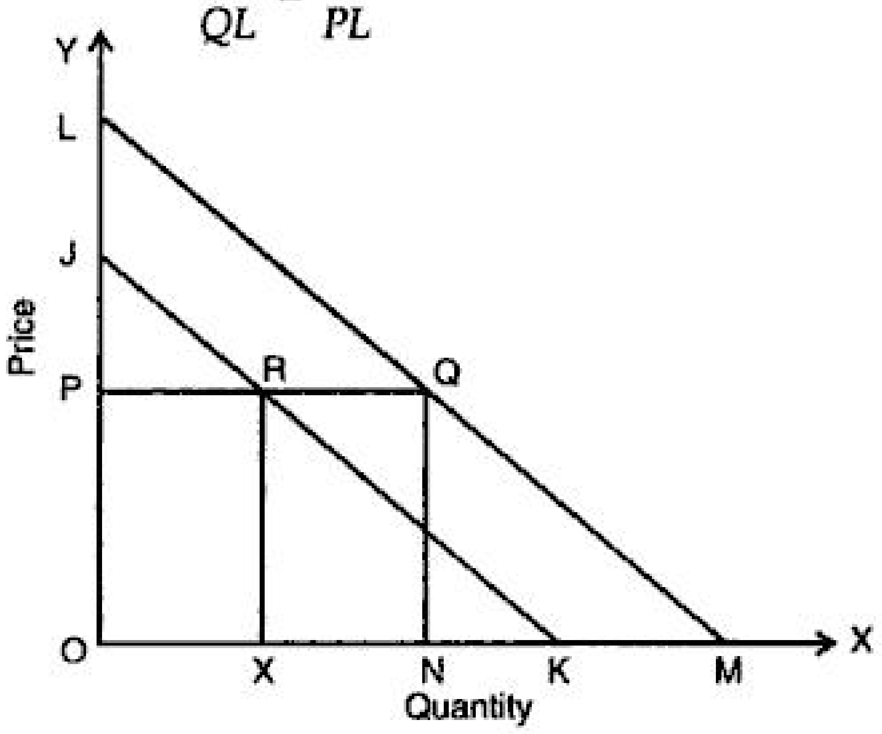

Fig. 4.7 Different Elasticities of Parallel Demand Curves

It can be seen from Fig. 4.7 that $PJ < PL$. Therefore,

$$\frac{PO}{PJ} > \frac{PO}{PL}$$

It is thus proved that

$$\frac{RK}{RJ} > \frac{QM}{QL}$$

It may be concluded from the above conclusions that demand curves having the same slope may have different elasticities, and demand curves having different slopes may have the same elasticities, both at a given price.

4.3 MEASURING PRICE ELASTICITY FROM A DEMAND FUNCTION

Price elasticity of demand can be measured directly from a demand function. In this section, we will describe the method of measuring price elasticities from a given demand function—linear and nonlinear.

(i) Measuring elasticity from a linear demand function. Suppose a linear demand function is given as follows.

$$Q = a - b\,P$$

At a given price, say, P_1, this demand function reads as

$$Q_1 = a - b\,P_1$$

When price changes from P_1 to P_2, then

$$Q_2 = a - b\,P_2$$

To measure the arc elasticity, we need two ratios: $\Delta Q/\Delta P$ and P/Q. Given the two demand functions, ratio $\Delta Q/\Delta P$ can be obtained as follows.

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$$MR = AR\left(1 - \frac{1}{e}\right)$$

and
$$AR = \frac{MR}{\left(1 - \frac{1}{e}\right)}$$

or
$$AR = MR\left(\frac{e}{e-1}\right) \tag{4.16}$$

Eq. (4.16) gives the relationship between AR and price elasticity.

Graphical Proof. Eq. (4.16) gives the relationship between AR and MR and between AR and price elasticity. The relationship beteween MR and AR can also be derived geometrically. Suppose AR curve is given by the curve AR in Fig. 4.8. Then MR curve is given by the curve AM.

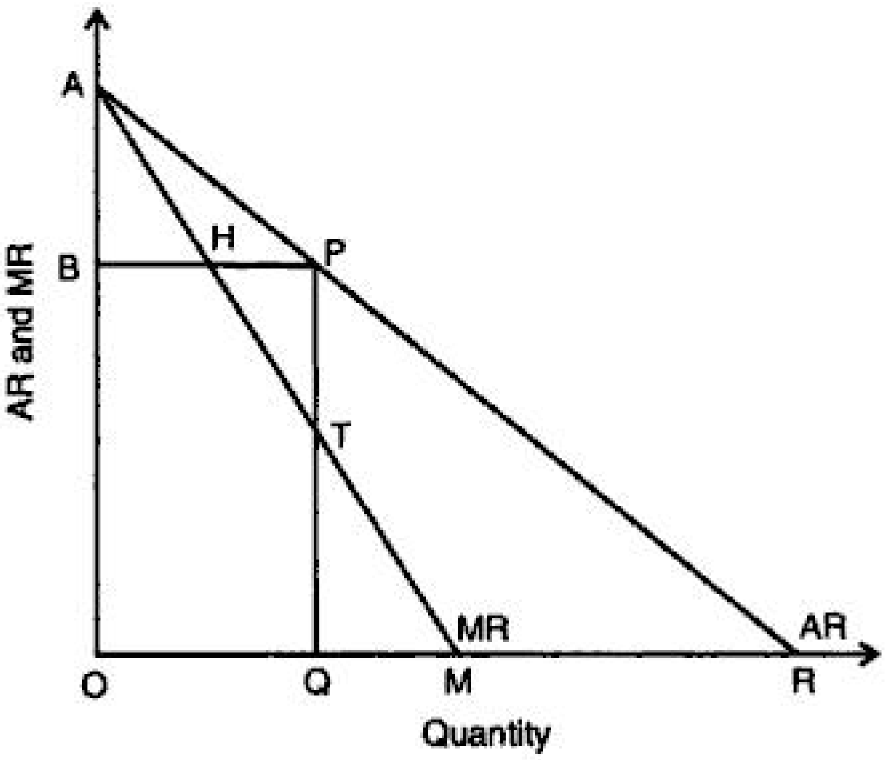

Fig. 4.8 Relationship between *AR* and *MR*

Let us suppose that price is given at PQ (= BO). As has been proved above, price elasticity at point P on the AR curve (which is the same as demand curve) can be expressed as

$$e = \frac{QR}{OQ} = \frac{PR}{AP} = \frac{OB}{AB}$$

Considering the last term, i.e., $e = OB/AB$, since $OB = PQ$,

$$\therefore \qquad e = \frac{PQ}{AB} \tag{4.17}$$

In Fig. 4.8, $AB = PT$.[1] By substituting PT for AB in Eq. (4.17), we get

1. **Proof.** At price PQ, total revenue = $PQ \times OQ$, which equals the area $OBPQ$. Considering from MR angle, the total revenue at price PQ is given by the area $OATQ$. Therefore, $OBPQ = OATQ$. It can be observed from Fig. 4.8 that area $OBHTQ$ is common to the areas $OBPQ$ and $OATQ$. Therefore, area of ΔABH = area of ΔTPH. Note that $\angle ABH$ and $\angle TPH$ are right angles. Therefore, $\Delta ABH = \Delta TPH$. The properties of right angle triangles of equal size tell that their corresponding sides are equal. Therefore, $BH = HP$, $AH = HT$, and $AB = PT$.

It may be inferred from Eq. (4.25) that whether the total expenditure increases, decreases or remains constant as a result of change in price depends on whether

$$Q_x(1-e_p) \gtreqless Q_x$$

Whether $Q_x\,(1-e_p)$ is greater than, equal to or less than Q_x depends on whether $e_p \gtreqless 1$.

The relationship between, total consumer expenditure and price elasticity of demand has been summarised up in Table 4.2.

Table 4.2 Elasticity and Consumption Expenditure

Elasticity (e_p)	Price change	Marginal expenditure	Total expenditure
$e_p > 1$	Rise Fall	$ME < 0$ $ME > 0$	Decreases Increases
$e_p = 1$	Rise Fall	$ME = 0$ $ME = 0$	Constant Constant
$e_p < 1$	Rise Fall	$ME > 0$ $ME < 0$	Increases Decreases

As shown in the above table, when $e_p > 1$, i.e., demand is *elastic*, an increase in price causes more than proportionate decrease in quantity demanded. Hence, total expenditure decreases. And, if price decreases, quantity demanded increases more than proportionately. As a result, total expenditure increases.

When $e_p = 1$, a rise (or fall) in price causes a proportionate decrease (or increase) in quantity demanded leaving total expenditure unchanged.

When $e_p < 1$, i.e., when demand is *inelastic*, a rise in price causes increase in the total expenditure because demand decreases less than proportionately, and a fall in price reduces it as quantity demanded increases less than proportionately.

4.7 OTHER ELASTICITIES OF DEMAND

In this section, we will discuss elasticities of demand with respect to some of its other determinants often used in economic analysis.

4.7.1 Cross-Elasticity of Demand

Cross-elasticity is the measure of responsiveness of demand for a commodity to the changes in the price of its substitutes and complementary goods. For instance, cross-elasticity of demand for tea (T) is the percentage change in its quantity demanded due to a change in the price of its substitute, coffee (C). Formula for measuring cross-elasticity of demand for tea ($e_{t,c}$) with respect to price of coffee (P_c) is

$$e_{t,c} = \frac{\text{Proportionate change in demand for tea } (Q_t)}{\text{Proportionate change in price of coffee } (P_c)}$$

4.9 PRICE ELASTICITY OF SUPPLY

Price-elasticity of supply is the measure of responsiveness of the quantity supplied of a good to the change in its market price. The coefficient of price-elasticity of supply (e_p) is the measure of percentage change in the quantity supplied of a good due to a given percentage change in its price. The formula of supply elasticity is given as

$$e_p = \frac{\text{\% change in quantity supplied } (Q)}{\text{\% change in price } (P)}$$

$$= \frac{\Delta Q/Q}{\Delta P/P} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

Note that the formula for measuring the price-elasticity of supply is the same as for the price-elasticity of demand, (without a minus sign). Given the formula, price-elasticity of supply can be easily measured.

Example. Suppose that the supply curve for a commodity is given as SS' in Fig. 4.10 and we want to measure the price-elasticity of the supply between points J and P for rise in price. In that case,

$$\Delta Q = 60 - 100 = -40$$

$$\Delta P = 5 - 7.5 = -2.5$$

$$P = 5 \text{ and}$$

$$Q = 60$$

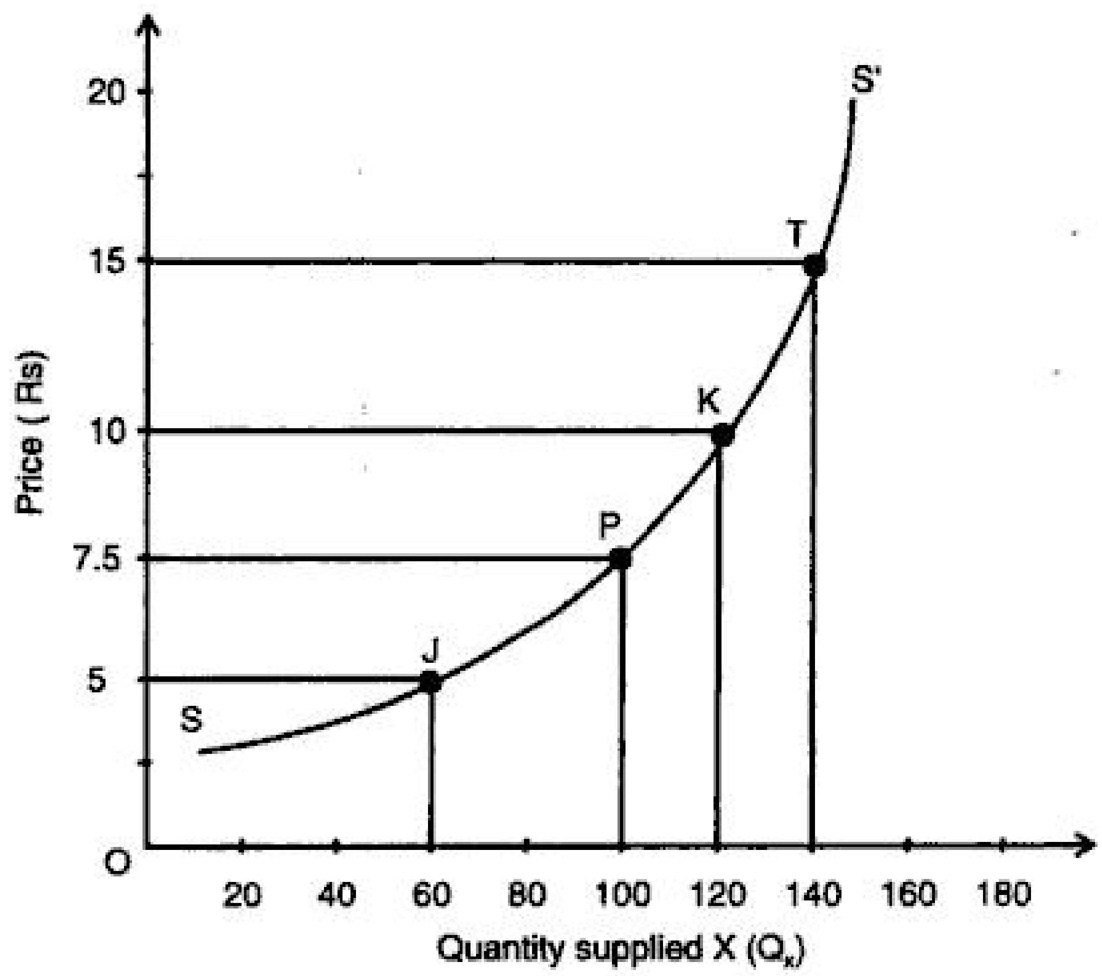

Fig. 4.10 Price Elasticity of Supply

18. A less than zero income elasticity indicates that with an increase in income, consumption of a product
   (a) turns negative (b) increases
   (c) decreases (d) remains constant?

19. Given the demand function:
   $Q_d = 12 - P$
   (a) find demand and marginal revenue schedules,
   (b) plot *AR* and *MR* schedules,
   (c) find marginal revenue when $P = 10$, 6 and 2
   (d) estimate elasticity coefficient of the demand curve, when total revenue is at maximum.

20. Define *elasticity of price expectation* (E_e). In the context of an environment of business recession, state briefly the implication of:
   (i) $E_e > 1$ (ii) $E_e = 1$ (iii) $0 < E_e > 1$ (iv) $E_e = 0$ and (v) $E_e < 0$.

21. A publishing company plans to publish a book. From the sales data of other publishers of similar books, it works out the demand function for the book as $Q = 5000 - 5P$. Find out:
   (a) demand schedule and demand curve,
   (b) number of books sold at P = Rs 25,
   (c) price for selling 2500 copies,
   (d) price for zero sales,
   (e) point-elasticity of demand at price Rs 20, and
   (f) arc elasticity for a fall in price from Rs 25 to Rs 20 .

22. Suppose demand function for a product is given as $Q = 500 - 5P$. Find out:
   (a) quantity demanded at price Rs 15, (b) price to sell 200 units,
   (c) price for zero demand, and (d) quantity demanded at zero price.

23. Which of the following statements is true?
   (a) if price elasticity = 1, $MR = 0$
   (b) if price elasticity > 1, $MR > 0$
   (c) the price elasticity < 1, $MR < 0$ [Ans. All Three]

24. Suppose individual demand schedules for *A*, *B* and *C* are given as follows:

Price (Rs)	A's demand	B's demand	C's demand
5	80	40	20
10	40	20	10
15	20	10	5
20	10	5	0
25	0	0	0

Find:
   (a) market demand schedule,
   (b) market demand curve,
   (c) elasticity when price falls form Rs 15 to Rs 10,
   (d) elasticity when price rises from Rs 10 to Rs 15.

[Ans. 13 (c), 14 (a), 15 (b), 16 (b), 17 (b), 18 (c)]

How elasticities determine tax burden. In part (a) of Fig. 5.2, demand curve has a steeper slope and hence it has a lower elasticity than the supply curve, at a given price. Since demand curve (DD') has a lower elasticity than the supply curve (SS_1), tax burden on the buyers is *larger* than that on the sellers. Buyers bear tax burden equal to $AB = P_2P_3$ and sellers bear the rest of the tax burden $BC = P_1P_2$. It is obvious from the figure that $AB > BC$ or $P_2P_3 > P_1P_2$.

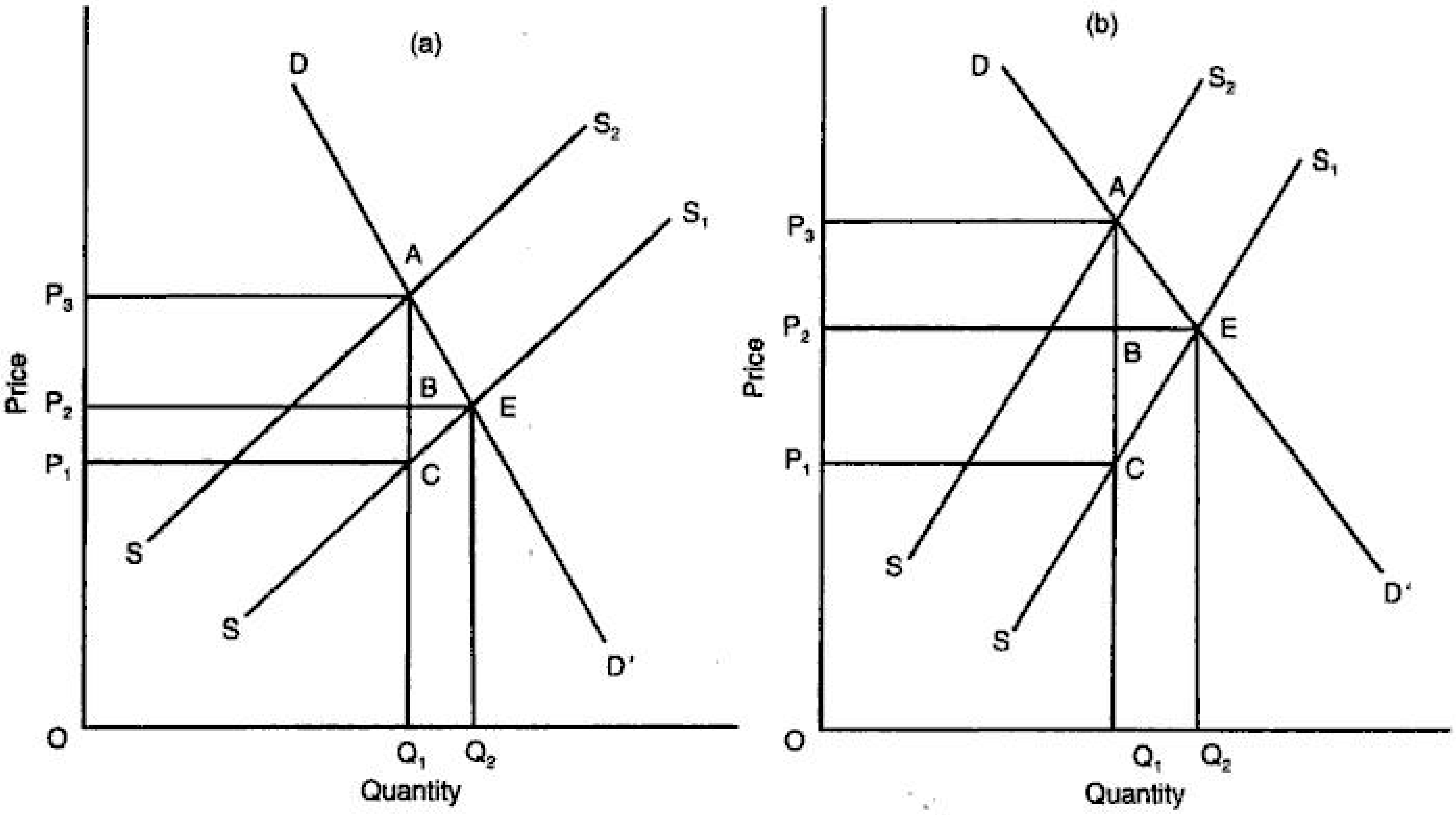

Fig. 5.2 Elasticities of Demand and Supply and Tax Burden

Part (b) of Fig. 5.2 presents a reverse case, supply curve having a greater elasticity than the demand curve. As the figure shows, supply curves SS_1 and SS_2 are less elastic[1] than the demand curve (DD'). Therefore, tax burden on the sellers is larger than that on the buyers. As the figure shows, the tax burden that falls on the sellers equals to BC and the tax burden that falls on the buyers equals AB. Since $BC > AB$, sellers bear a higher tax burden.

The formula for measuring tax incidence. Economists have devised the following formula[2] for measuring the tax incidence on the buyers and sellers. The formula for measuring the ***tax incidence on the buyer*** is given as follows:

$$\Delta T_b = \frac{e_s}{e_s - e_d}\Delta T$$

(where ΔT_b = buyer's share in tax; e_s = elasticity of supply; e_d = elasticity of demand; and ΔT = change in amount of tax)

For example, suppose elasticity of demand for computers is – 0.6, elasticity of computer supply

1. It can be judged by the slopes of demand and supply curves. As Fig. 5.2 (b) shows, demand curve has a lower slope than the supply curves.
2. For the derivation of the formula, see Jeffrey M. Perloff, *Microeconomics*, 2nd Edn., Addison Wesley, Boston, 2001, Appendix 3A.

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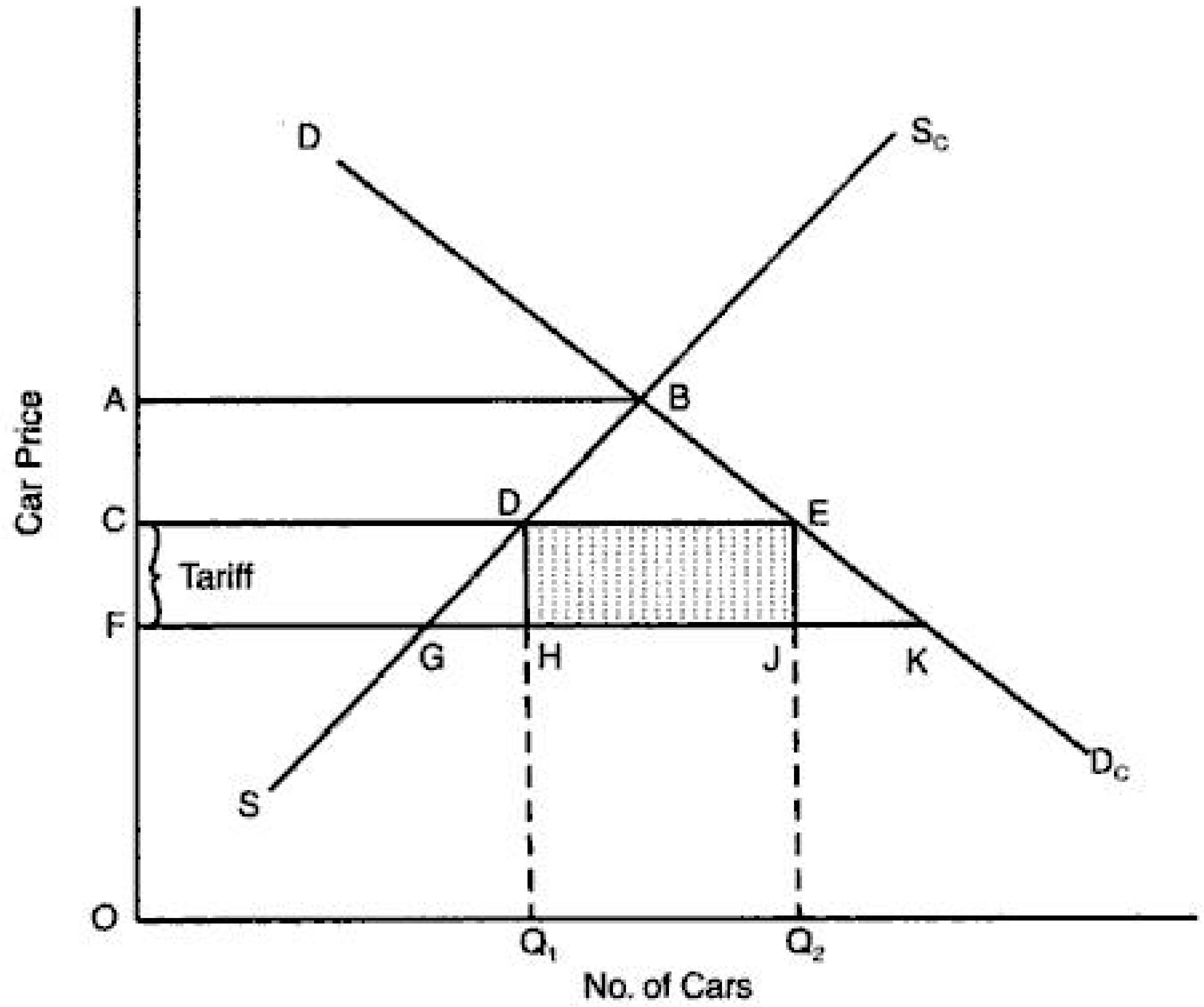

Fig. 5.5 Effects of Import Tariff

Fig. 5.5. In the absence of car import, car market equilibrium is determined at point B and the country produces and consumes AB number of cars at price OA.

Let the country now open trade in cars and allow import of unlimited number of cars. Suppose price of foreign cars is given at OF in Fig. 5.5. With trade opened, car price in the country falls from OA to OF. At car price OF, total demand for car increases from AB to FK. Of the total demand, FK, domestic car companies supply only FG and rest of the demand is met with imports. Total import of cars equals $FK - FG = GK$.

Let the government impose a specific tariff of CF on imported cars. As a result, car price increases in the domestic market from OF to $OC = OF + CF$. Due to increase in car price, domestic demand for car decreases from FK to CE of which CD is supplied domestically and DE is imported.

Look at the ***effects of import tariff***. Two obvious effects of import tariff are: (i) domestic production of car increases from FG to CD, and hence increases domestic employment, and (ii) government makes a revenue from import duty equal to $DE \times CF$. Since import tariff $CF = DH$, total revenue from import duty equals $DH \times DE = DEJH$ as shown by the shaded rectangle.

5.4.2 Export Subsidy

Export subsidy is similar to production subsidy. The objective of export subsidy is to increase exports with a view to increasing employment and export earning. The effect of export subsidy is illustrated in Fig. 5.6. The curve DD_C is the domestic demand curve and SS_C is the domestic supply curve for motor cars. In the absence of export of cars, the market equilibrium is given at point B which shows total production at OQ_2 at market clearing price $OA = BQ_2$.

Let us assume that car price in foreign market is OC. Therefore, cars will be exported at a price higher than the domestic price (OA). As a result, car price increases in the domestic market from OA to OC. At this price, total production increases from AB to CF. Of the total production (CF), CE is consumed domestically and EF is exported.

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6 Theory of Consumer Behaviour: Cardinal Utility Approach

CHAPTER OUTLINE

6.1 Introduction
6.2 The Concept of Cardinal Utility and Its Measurement
6.3 Total and Marginal Utility
6.4 The Law of Diminishing Marginal Utility
6.5 Consumer Equilibrium: Cardinal Utility Approach
  6.5.1 Assumptions
  6.5.2 Consumer Equilibrium: One Commodity Case
  6.5.3 Consumer Equilibrium: The General Case
6.6 Derivation of Demand Curve
6.7 Drawbacks of Cardinal Utility Approach
Further Readings
Review Questions and Exercises

6.1 INTRODUCTION

In Chapter 3, we have discussed the theory of demand. Recall that the term 'demand' is defined as the quantity of a commodity that a consumer is willing to buy at a given price per unit of time. In this Part of the book, we are concerned with the questions: (i) *How does a consumer decide how much of a commodity to buy at a given price?* and (ii) *How does the consumer respond to change in price of the commodity,* given *his income, and prices of the related goods?* These questions take us to the ***theory of consumer behaviour***. The theory of consumer behaviour is based on an ***axiom*** that ***a consumer is a utility maximizing entity***. But the economists hold different views on whether utility is measurable in absolute terms. The classical[1] and neo-classical[2] economists held the view that *utility is cardinally or quantitatively measurable*: it can be measured in cardinal numbers like weight, height, length, temperature, air pressure, etc. Modern economists, on the other hand, hold the view that *utility is*

1. Most prominently, Jeremy Bentham, in his book *An Introduction to the Principles of Morals* (1789). For details, see Samuelson, P.A., *Economics*, 13th Edn., Ch. 19, and Hirshleifer, J., *Price Theory and Applications*, 3rd edn., (Prentice-Hall of India, New Delhi, 1987), pp. 61-64.

2. Including Gossen (1854) of Germany, William Stanley Jevons (1871) of England, Leon Walras (1874) of France, Karl Menger of Austria and Alfred Marshall (1890) of England (the numerals in parentheses are the years in which their view was published). Marshall made significant refinements in the 'neo-classical utility theory' which earned the name "Marshallian Utility Analysis".

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Assumptions. The law of diminishing marginal utility holds only under certain given conditions. These conditions are often referred to as the *assumptions* of the law.

First, the unit of the consumer goods must be standard, e.g., a cup of tea, a bottle of cold drink, a pair of shoes or trousers etc. If the units are excessively small or large, the law may not apply.

Second, consumer's taste and preference remain unchanged during the period of consumption.

Third, there must be continuity in consumption and where break in continuity is necessary, it must be appropriately short.

Fourth, the mental condition of the consumer remains normal during the period of consumption. For, if a person is eating and also drinking (alcohol) the utility pattern will not be certain.

Given these conditions, the law of diminishing marginal utility holds universally. In some cases, e.g., accumulation of money, collection of hobby items like stamps, old coins, rare paintings and books, and melodious songs, marginal utility may initially increase rather than decrease, but it does decrease eventually. That is, the law of marginal utility generally operates universally.

6.5 CONSUMERS'S EQUILIBRIUM : CARDINAL UTILITY APPROACH

A consumer reaches equilibrium position when he maximises his total utility given his income and prices of commodities he consumes. Analysing consumer's equilibrium requires answering the question 'how does a consumer allocate his money income among the various goods and services he consumes to arrive at his equilibrium'?

The cardinal utility approach or what is called also as the Marshallian approach to consumer's equilibrium is based on the following assumptions.

6.5.1 Assumptions

1. Rationality. It is assumed that the consumer is a rational being in the sense that he satisfies his wants in order of their merit. It means that he buys first a commodity which yields the highest utility and he buys last a commodity which gives the least utility.

2. Limited money income. The consumer has a limited money income to spend on the goods and services he chooses to consume.

3. Maximisation of satisfaction. Every rational consumer intends to maximise his satisfaction from his given money income.

4. Utility is cardinally measurable. The cardinalists assume that utility is cardinally measurable, i.e., it can be measured in absolute terms and in cardinal numbers.

5. Diminishing marginal utility. The cardinalist assumed that the utility gained from successive units of a commodity consumed decreases as a consumer consumes more and more units of it.

6. Constant utility of money. The marginal utility of money remains constant whatever the level of consumer's income and each unit of money has utility equal to 1.

7. Utility is additive. Cardinalists maintain that utility is not only cardinally measuable but also it is additive. The additivity of the utility can be expressed through a utility function. Suppose that the basket of goods and services consumed by a consumer contains n items, and their quantities may be expressed as $x_1, x_2, x_3, \ldots, x_n$. The utility function of the consumer may be expressed as

$$U = f(x_1, x_2, x_3, \ldots, x_n)$$

Given the utility function, the total utility obtained from n items may be expressed as

$$U_n = U_1(x_1) + U_2(x_2) + U_3(x_3) \ldots + U_n(x_n)$$

Suppose that the consumer is in equilibrium at point E_1, where given the price of X at P_3, $MU_x = P_3(MU_m)$. Here equilibrium quantity is OQ_1. Now, if price of the commodity falls to P_2, the equilibrium condition will be disturbed making $MU_x > P_3(MU_m)$. Since MU_m is constant, the only way to attain the equilibrium again is to reduce MU_x. This can be done only by buying more of commodity X. Thus, by consuming Q_1Q_2 additional units of X he reduces his MU_x to E_2Q_2 and, thereby, restores equilibrium condition, i.e., $MU_m = P_2(MU_m)$. Similarly, if price falls further he buys and consumes more to maximise his satisfaction.

Figure 6.3(a) reveals that when price is P_3, equilibrium quantity is OQ_1. When price decreases to P_2, equilibrium point shifts downward to point E_2 where equilibrium quantity is OQ_2. Similarly, when price decreases further to P_1 and $P(MU_m)$ line shifts downward, equilibrium point shift to E_3 where equilibrium quantity is OQ_3. It may be inferred from these facts that as price decreases, the quantity demanded increases. This price and equilibrium quantity relationship is presented in part (b) of Fig. 6.3. The price-quantity combination corresponding to equilibrium point E_3 is shown at point J. Similarly, the price quantity combinations corresponding to equilibrium points, E_2 and E_1 have been shown to point K and L, respectively. By joining the point J, K and L we get the demand curve for commodity X. The demand curve, D_x, is the usual downward sloping Marshallian demand curve.

Before we close the discussion on the cardinal utility theory, let us point out the major drawbacks of the cardinal utility approach.

6.7 DRAWBACKS OF CARDINAL UTILITY APPROACH

The following are the basic drawbacks of the cardinal utility theory, as pointed out by the economists.

First, the very first assumption of cardinal approach that utility is cardinally (or objectively) measurable is untenable. Utility is a subjective concept which cannot be measured objectively.

Second, cardinal utility approach assumes that marginal utility of money remains constant and serves as a measure of utility. This assumption is unrealistic because marginal utility of money, like that of all other goods, is subject to change. And, therefore, it cannot serve as a measure of utility derived from goods and services.

Third, the psychological law of diminishing marginal utility has been established from introspection. This law is accepted as an axiom without empirical verification.

Fourth, cardinal utility approach and derivation of demand curve on the basis of this approach, are based on the *ceteris paribus* assumption which is unrealistic. It is for this reason that this theory ignores the ***substitution*** and ***income effects*** which might operate simultaneously.

Finally, cardinal approach considers that the effect of price changes on demand curve is exclusively price effect. This assumption is also unrealistic because price effect may include income and substitution effects.

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7.12 Goods, Bads, Neuters
7.13 Comparison of Cardinal and Ordinal Utility Approach
7.13.1 Similarity between the Two Approaches
7.13.2 Superiority of Indifference Curve Approach
7.13.3 Critique of Indifference Curve Approach
Further Readings
Review Questions and Exercises

7.1 INTRODUCTION

We have explained the cardinal utility theory of consumer behaviour in the preceding chapter. This chapter presents ordinal utility analysis of consumer behaviour. Ordinal utility approach uses indifference curve to analyse consumer behaviour. The indifference curve was invented and used by Francis Y. Edgeworth[1] (1881) to show the possibility of commodity exchange between two individuals. About a decade later, Irving Fisher[2] used indifference curve in 1892 to explain consumer's equilibrium. Both Edgeworth and Fisher believed only in cardinal measurability of utility. It was Vilfred Pareto[3] who introduced, in 1906, the ordinal utility hypothesis to the indifference curve analysis. In the subsequent decades, many significant contributions were made by Eugene E. Slutsky[4], W.E. Johnson[5] and A. L. Bowley[6]. Yet, indifference curve technique could not gain much ground in the analysis of consumer behaviour till the early 1930s. It was in 1934 that John R. Hicks and R.G.D. Allen[7] developed the ordinal utility theory as a powerful analytical tool of consumer analysis. Later, Hicks provided a complete exposition of indifference curve technique in his *Value and Capital*, though in his later work, *A Revision of Demand Theory*, he dropped some of his earlier assumptions. Indifference analysis is regarded at present as the most powerful tool of consumer analysis. We begin our discussion on the ordinal utility approach with a brief description of the ordinal utility concept and indifference curve.

7.2 THE CONCEPT OF ORDINAL UTILITY

Ordinal utility is not a quantity or a numerical value. It is only an expression of the consumer's preference for one commodity over another or for one basket of goods over another. The concept of ***Ordinal utility*** is based on the following axioms.

(i) It may not be possible for a consumer to express his utility in quantitative terms. But it is always possible for him to tell which of any two goods he prefers. For example, an individual may not be able to specify ***how much*** utility he derives by eating a chocolate. But he can always tell what he prefers between chocolate and ice-cream, between a pair of shoes and a fancy hat, and so on.

(ii) A consumer can list all the commodities he consumes in the order of his preference.

---

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4. Eugene E. Slutsky, "On the Theory of the Budget of the Consumer," reprinted in *Readings in Price Theory*, (eds) K.E. Boulding and G.I. Stigler, 1953.
5. W.E. Johnson, "The Pure Theory of Utility Curve," *Economic Journal*, December 1913.
6. A.L. Bowely, *Mathematical Groundwork*, 1924.
7. John R. Hicks and R.G.D. Allen, in their paper, "A Reconsideration of the Theory of Value, *Economica*, February–May 1934.

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Rearranging the terms in Eq. 7.2, we get,

$$-\frac{\Delta Y}{\Delta X} = \frac{MU_x}{MU_y}$$

Here, $\Delta Y/\Delta X$ is simply the slope of the indifference curve, which gives the $MRS_{y,x}$ when X is substituted for Y. Similarly, $\Delta X/\Delta Y$ gives $MRS_{x,y}$ when Y is substituted for X. Symbolically,

$$\left.\begin{aligned} MRS_{x,y} &= -\frac{\Delta X}{\Delta Y} = \frac{MU_y}{MU_x} \\ \text{and} \quad MRS_{y,x} &= -\frac{\Delta Y}{\Delta X} = \frac{MU_x}{MU_y} \end{aligned}\right\} = \text{Slope of indifference curve} \qquad (7.3)$$

7.3.3 The Postulate of Diminishing Marginal Rate of Substitution

Diminishing marginal rate of substitution is one of the basic postulates of indifference curve analysis. The axiomatic assumption of ordinal utility theory is analogous to the assumption of 'Diminishing Marginal Utility' in cardinal utility theory. The postulate of diminishing marginal rate of substitution states an observed behavioural rule that when a consumer substitutes one commodity (say X) for another (say Y), the ***'marginal rate of substitution'*** (MRS) decreases as the stock of X increases and that of Y decreases. The diminishing $MRS_{x,y}$ computed from Table 7.1 is presented in Table. 7.2.

Table 7.2 The Diminishing *MRS* Between Commodities X and Y

Movements on IC	*Change in Y* $(-\Delta Y)$	*Change in X* (ΔX)	$MRS_{y,x} = (\Delta Y/\Delta X)$
From point *a* to *b*	− 10	2	− 5.0
From point *b* to *c*	− 5	5	− 1.0
From point *c* to *d*	− 4	8	− 0.5
From point *d* to *e*	− 2	10	− 0.2

As Table 7.2 shows, when the consumer moves from point *a* to *b* on the indifference curve (Fig. 7.1), he gives up 10 units of commodity Y and takes 2 units of commodity X. It gives

$$MRS_{y,x} = -\frac{-\Delta Y}{\Delta X} = -\frac{-10}{2} = 5$$

As he moves down from point *b* to *c*, he loses 5 units of Y and gains 5 units of X, giving

$$MRS_{y,x} = -\frac{-\Delta Y}{\Delta X} = -\frac{-5}{5} = 1$$

The $MRS_{y,x}$ goes on decreasing as the consumer moves further down along the indifference curve, from point *c* through *d* and *e*. The diminishing marginal rate of substitution causes the indifference curves to be *convex to the origin*.

The diminishing marginal rate of substitution can also be illustrated graphically as shown in Figure 7.3. The $MRS_{y,x}$ is given by the slope of the indifference curve.

larger quantity of one or both the goods than the lower one. And, a larger quantity of a commodity is supposed to yield a greater satisfaction than the smaller quantity of it, provided $MU > 0$.

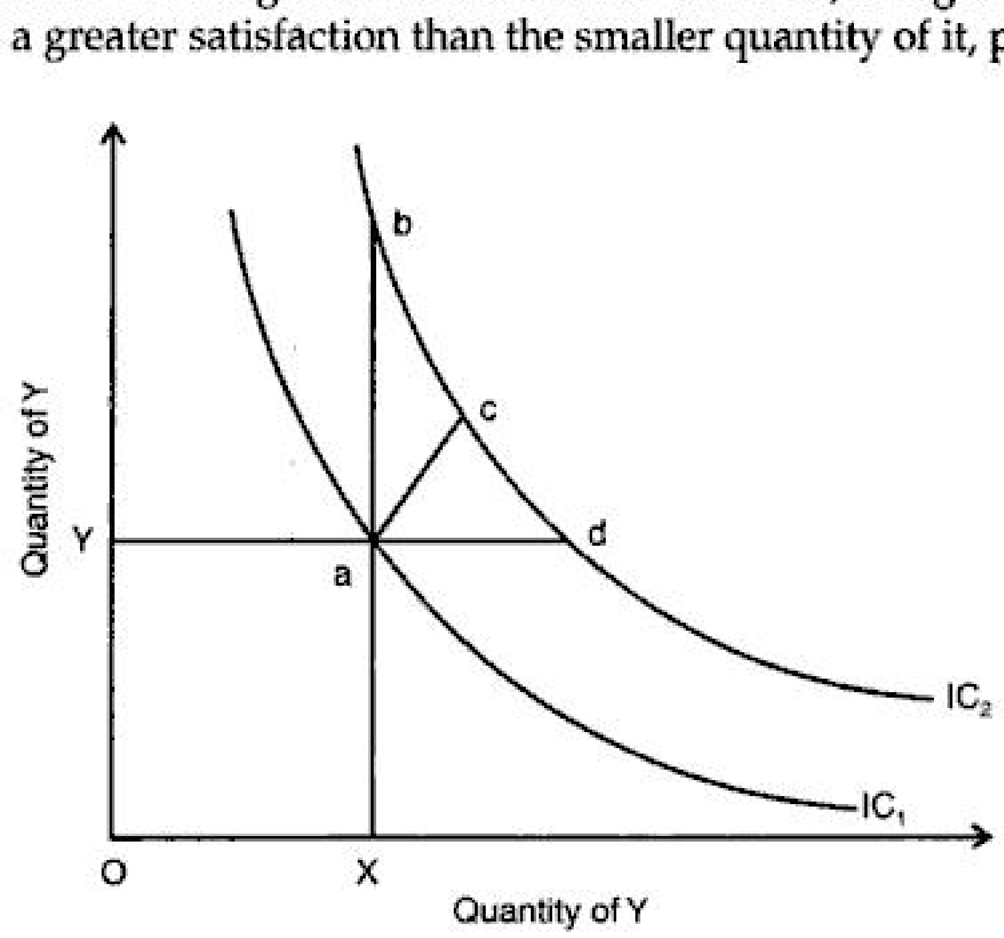

Fig. 7.6 Comparison of Lower and Upper Indifference Curves

For example, consider the indifference curves IC_1 and IC_2 in Fig. 7.6. The vertical movement from point *a* on the lower indifference curve, IC_1, to point *b* on the upper indifference curve, IC_2, means increase in quantity of *Y* by *ab*, the quantity of *X* remaining the same (*OX*). Similarly, a horizontal movement from point *a* to *c* means a greater quantity of commodity *X*, quantity of *Y* remaining the same. A diagonal movement from point *a* to *c* means larger quantities of both *X* and *Y*. Unless the utility of additional quantities of *X* and *Y* are equal to zero, these additional quantities will yield additional utility. Therefore, the level of satisfaction indicated by the upper indifference curve (IC_2) would always be greater than that indicated by the lower indifference curve (IC_1).

7.5 THE BUDGETARY CONSTRAINT AND THE BUDGET LINE

A utility maximising consumer would like to reach the highest possible indifference curve on his indifference map. But the consumer is assumed to have a limited income. The limitedness of income acts as a constraint on the utility maximising behaviour of the consumer. This is known as ***budgetary constraint***. The budgetary constraint, assuming a two-commodity model, may be expressed as :

$$P_x \cdot Q_x + P_y \cdot Q_y = M \tag{7.4}$$

where P_x and P_y are prices of *X* and *Y*, respectively, and Q_x and Q_y are their respective quantities, and *M* is consumer's money income.

Equation (7.4) states that a consumer, given his income and market prices of *X* and *Y*, can buy only a limited quantity of the two goods (i.e., Q_x and Q_y). From Eq. (7.4), Q_x and Q_y can be worked out as follows.

$$Q_x = \frac{M}{P_x} - \frac{P_y}{P_x} Q_y \tag{7.5}$$

$$Q_y = \frac{M}{P_y} - \frac{P_x}{P_y} Q_x \tag{7.6}$$

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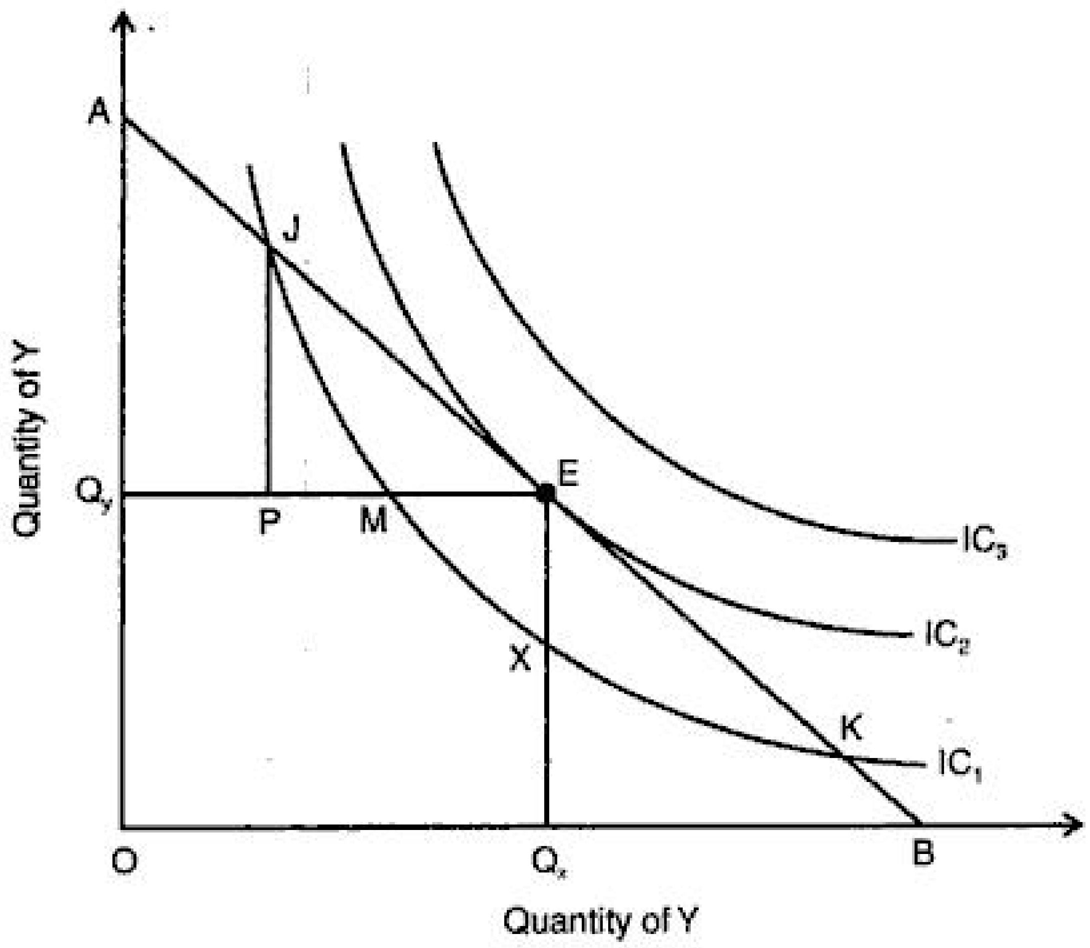

Fig. 7.10 Equilibrium of the Consumer

From the information contained in Fig. 7.10, it can be proved that the level of satisfaction at point *E* is greater than that on any point on IC_1. Suppose that the consumer is at point *J*. If he moves to point *M*, he will be equally well-off because points *J* and *M* are on the same indifference curve. If he moves from point *J* to *M*, he will have to sacrifice *JP* of *Y* and take *PM* of *X*. But in the market, he can exchange *JP* of *Y* for *PE* of *X*. That is, he gets extra *ME* (= *PE* – *PM*) of *X*. Since *ME* gives him extra utility, point *E* yields a utility higher than that at point *M* or *J*. Therefore, point *E* is preferable to points *M* and *J*. The consumer will therefore, have a tendency to move to point *E* from any point on IC_1, in order to reach the highest possible indifference curve, all other things (taste, preference, and prices of goods) remaining the same.

7.6.1 The Corner Solution : The Extreme Choice

Sometimes some consumers make extreme choices between a set of two substitute goods. For example, some consumers prefer to spend total money on clothing and no money on making trips to hill stations, even though they have the option of making a choice between various combinations of these goods. Some consumers behave just on the contrary. Similarly, some people prefer buying books to spending on movies and some people prefer travelling to leisure, and so on. In such cases, ***the necessary equilibrium conditions, i.e.,*** $MRS = P_x/P_y$, ***does not apply.*** In this section, we use indifference curve analysis to show the choice-making behaviour of such consumers.

Figure 7.11 illustrates the case of such extreme preference of a consumer. Let us suppose that a consumer has to make choice between clothing and tours and is faced with budget line *CT*. His indifference map is given by indifference curves IC_1, IC_2 and IC_3. Given his budget line and indifference map, the consumer is shown to be in equilibrium at point *C*, ***the corner point***. This kind of solution is known as ***corner solution***. As Fig.7.11 shows, consumer's indifference curve, IC_1, intersects the budget line. Since IC_1 is a lower one, the consumer cannot maximize his utility on IC_1. However, his indifference curve IC_2 meets the budget line at corner point *C*. This is the point of consumer's equilibrium, the point of his maximum satisfaction. Note that in case of ***corner solution*** or ***corner***

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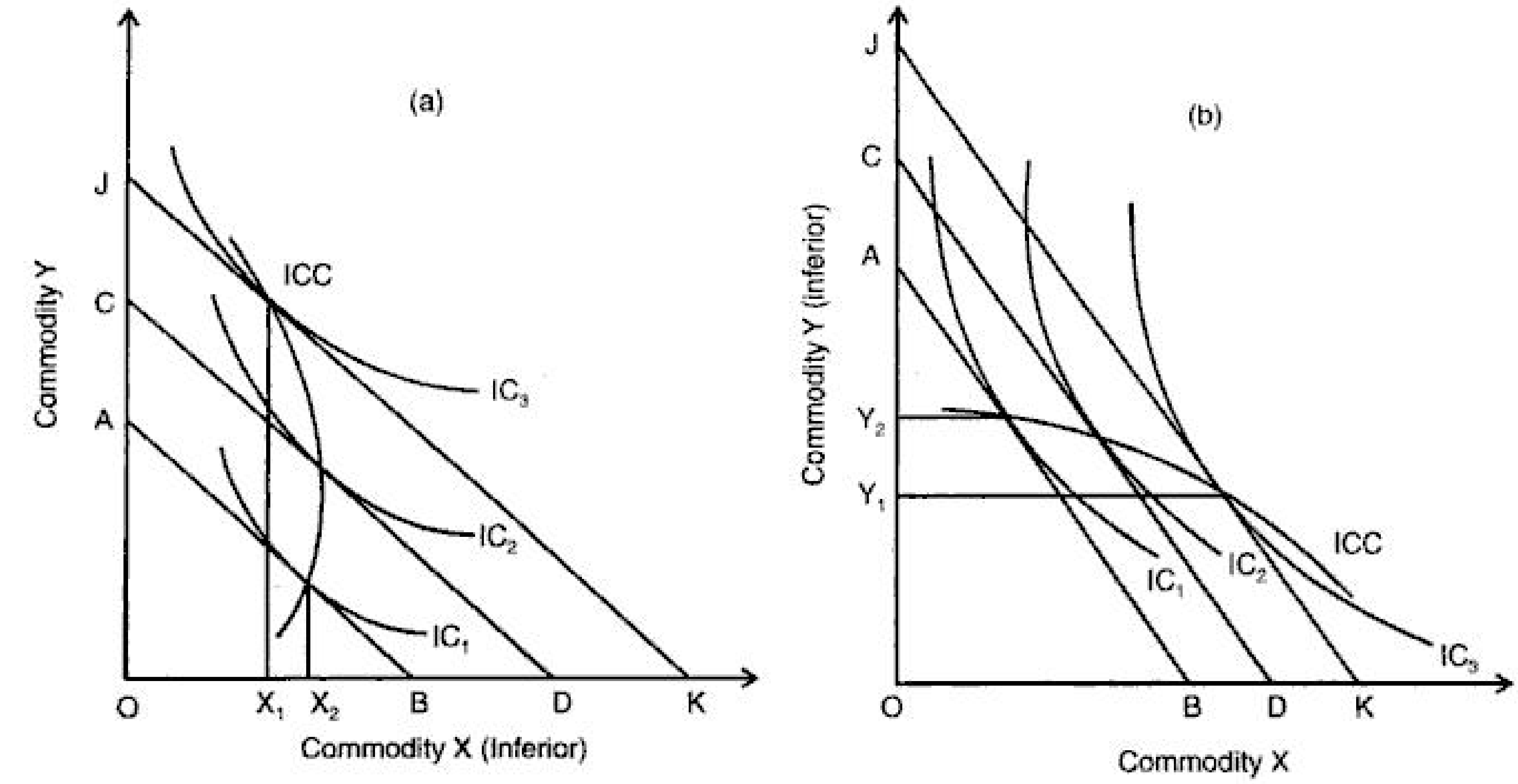

Fig. 7.14 Income Consumption Curves of Inferior Goods

7.7.3 The Engel Curve[1] and Its Derivation

Engel curve *is the graphical presentation of the relationship between equilibrium quantity purcahsed of a commodity and the consumer's income.* It should be borne in mind that *income-consumption curve (ICC) and Engel curve are not the same.* While income-consumption-curve (*ICC*) shows the relationship between consumer's income and *quantity* consumed of a commodity, Engel curve shows the relationship between money income and *money expenditure* on a particular good. However, income-consumption-curve does provide the necessary information required to draw the Engel curve. The derivation of Engel curve from the income-consumption-curve is illustrated in Fig. 7.15 (a) and (b). The income-consumption-curve in Fig. 7.15 (a) shows that consumption of commodity X increases from OX_1 to OX_2 to OX_3 and then to OX_4 as income increases from M_1 to M_2 to M_3 and to M_4 and the consumer moves from equilibrium E_1 to E_2 to E_3 to E_4. In Fig. 7.15(a), income levels have been shown on the vertical axis. The quantities demanded of X plotted in relation to the corresponding levels of income represents Engel curve, as shown in Fig. 7.15(b).

1. The 'Engel Curves' are named after a 19th-century German Statistician, Christian Lorenz Ernst Engel (1821-1896). He made a pioneering study of relationship between consumer's income and the quantity purcahsed of a commodity.

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detail the effect of price change on consumer's behaviour.

The consumer's response to change in the price of X and the resulting change in combination of the two goods are illustrated in Fig. 7.18.

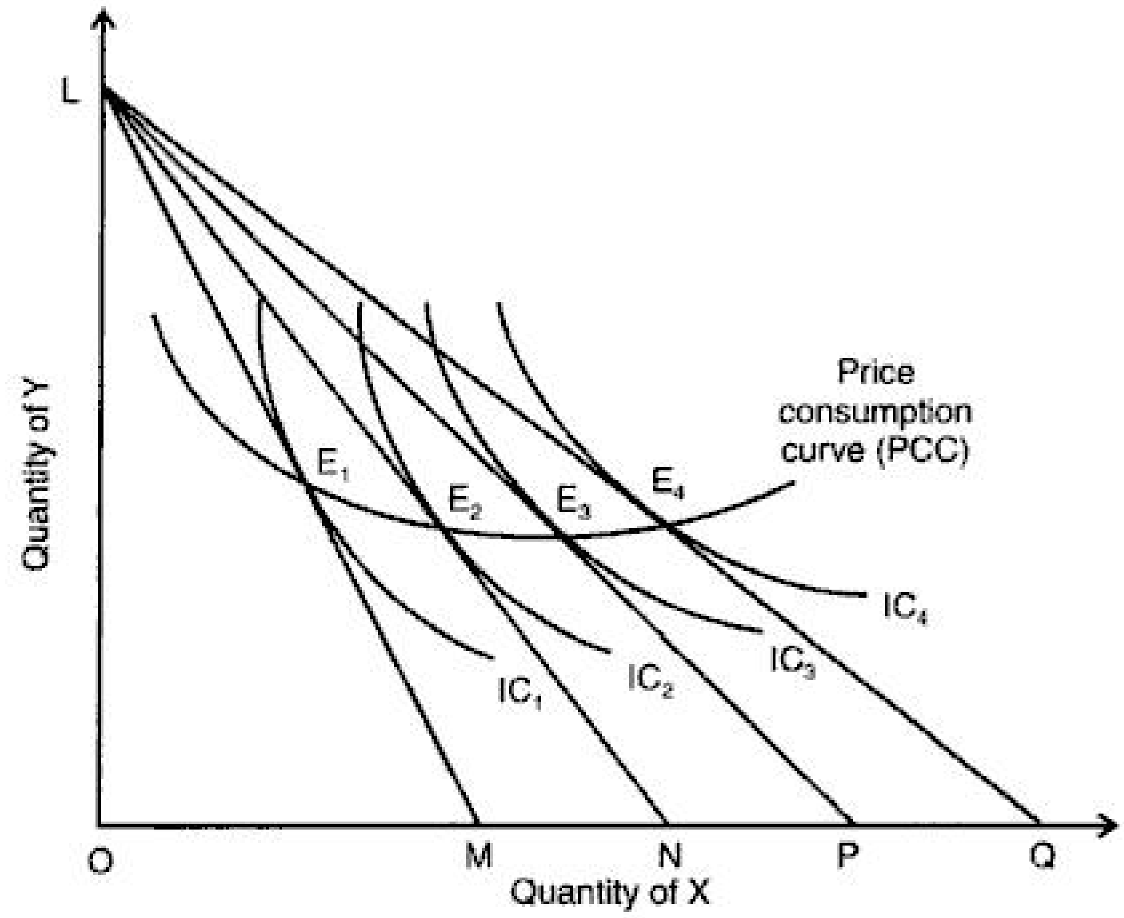

Fig. 7.18 Price Consumption Curve

Suppose that the consumer is initially in equilibrium at point E_1. Now let the price of X fall, *ceteris paribus*, so that consumer's budget line shifts from its initial position LM to the position of LN. This shift takes place due to increase in consumer's purcahsing power in term of X. With increased purcahsing power, the consumer can buy more of X (or more of both the goods). As a result, the consumer reaches a higher indifference curve IC_2 and his new equilibrium at E_2 occurs to the right of his original equilibrium, provided X is a 'normal good'. As shown in Fig. 7.18, with successive fall in the price of X, consumer's equilibrium shifts from E_2 to E_3 to E_4. The shift in equilibrium shows the change in equilibrium quantities of X and Y. By joining the points of equilibrium E_1, E_2, E_3 and E_4, we get a curve called ***price-consumption curve*** **(PCC)**. Price-consumption-curve is a locus of points of equilibrium on indifference curves, resulting from the change in price of commodity X all other things remaining the same. It shows the change in consumption basket due to change in the price of commodity X. In other words, *PCC* show consumer's response to change in price of X.

7.8.2 Derivation of Consumer's Demand Curve

Consumer's demand curve for a commodity, say, commodity X, can be derived by using the indifference curve technique. We have illustrated the derivation of *price consumption curve (PCC)* in Figure 7.18. The *PCC* curve provides the necessary data required for drawing the demand curve. To draw individual demand curve for a commodity X, we need data on different prices of commodity X and the corresponding quantity demanded of X. This information is provided by the *PCC*. Derivation of demand curve for commodity X is illustrated in Fig. 7.19.

Figure 7.19(a) shows the derivation of *PCC*. Given his income, prices of goods X and Y and his indifference map, the consumer is shown to be initially in equilibrium at point E_1 where he consumes OX_1 of X. When price of X decreases he moves to equilibrium point E_2 where he consumes OX_2 and

Hicksian method of measuring income effect is to reduce consumer's income (by way of taxation) so that he returns to his original indifference curve, IC_1, in accordance with the new price ratio. Hicks calls it 'income compensation approach'. This has been done by drawing an imaginary budget line ($M'N'$) parallel to MN'' and tangent to indifference curve IC_1. It means that when consumer's income is taxed away to the extent of real income-effect, his budget line MN'' shifts downward to $M'N'$. The budget line $M'N'$ is tangent to indifference curve IC_1 at point R. Point R represents the equilibrium of the consumer at new price ratio of X and Y, after the elimination of the real income-effect. It means that, after income adjustment, the consumer will move from point Q to R. The consumer's movement from point Q to R means decrease in quantity demanded of X by X_2X_3. This change in quantity demanded of X results from decrease in consumer's real income due to taxation. Therefore, X_2X_3 is the ***income effect***.

Once income effect is measured, it is easy to find the substitution effect. It can be obtained by subtracting income effect (*IE*) from the price effect (*PE*). Thus, subtracting income-effect, X_2X_3, from the price effect, X_1X_3, we get the ***substitution effect*** as follows.

$$\text{Substitution effect} = PE - IE = SE$$

$$= X_1X_3 - X_2X_3 = X_1X_2$$

In Fig. 7.20, the substitution effect (X_1X_2) occurs when the consumer moves from point P to R. In other words, consumer's movement from P to R and the corresponding change in quantity demanded (X_1X_2) is the substitution effect caused by the fall in price of X.

Income and substitution effects of price rise. Fig.7.21 illustrates the decomposition of *price effect* into *income* and *subtitution* effects of a price rise. Suppose that the consumer's initial budget

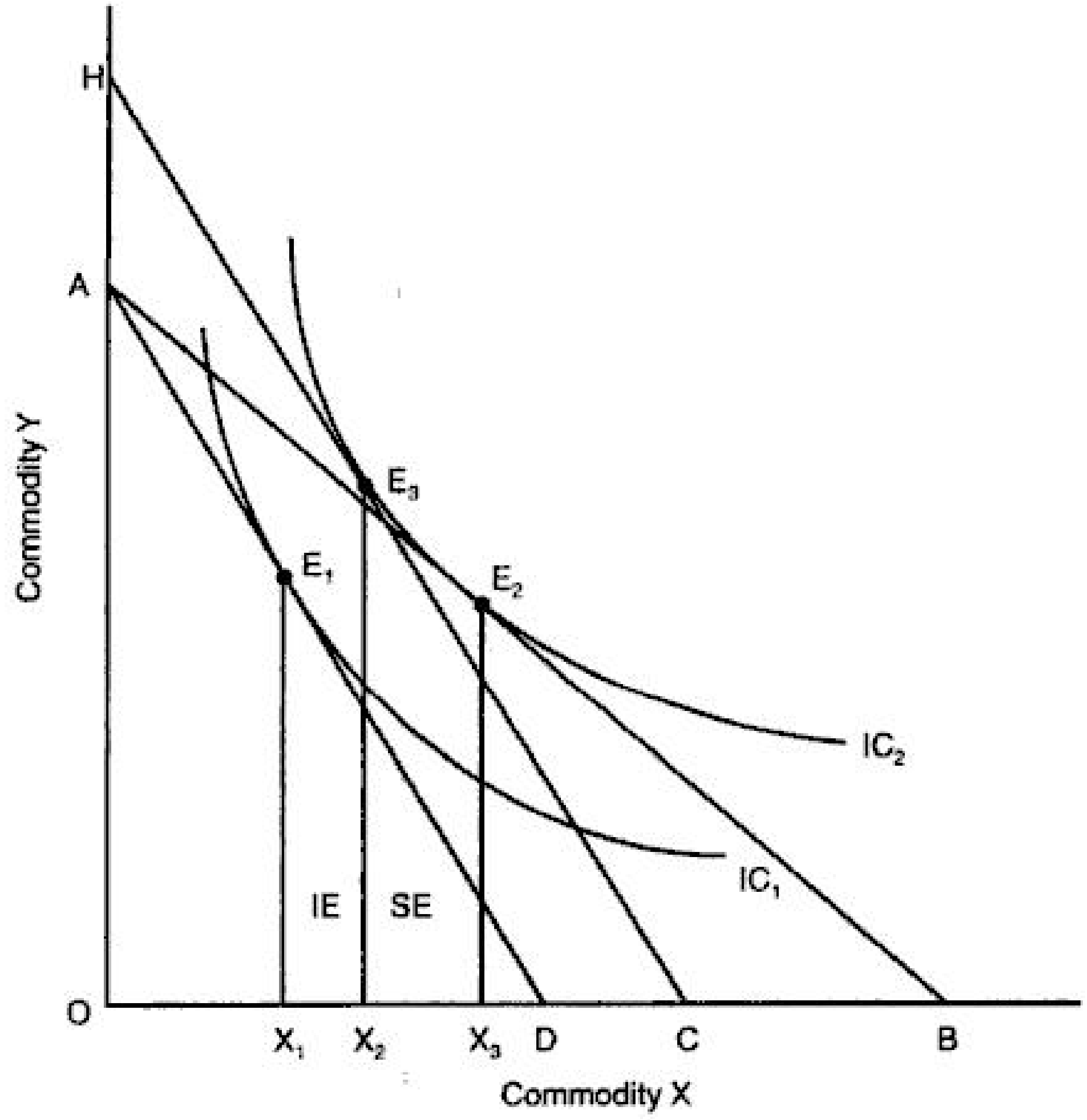

Fig. 7.21 Income and Substitution Effects of Price Rise

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7.9.4 Need for Splitting Income and Substitution Effects

We have described above the Hicksian and Slutsky's methods of decomposing income and substitution effects of the price effect. Let us now look into the need for separating income effect and the substitution effect. As Hicks[1] has pointed out, "substitution effect is absolutely certain; it must always work in favour of an increase in demand for a commodity when the price of that commodity falls." Thus, the behaviour of substitution effect is predictable: it follows directly from the principle of diminishing marginal rate of substitution. On the contrary, 'income effect is not so reliable'[2] and its behaviour is *unpredictable* in general. In fact whether income effect is positive or negative depends on whether a commodity is treated by the consumer as a 'superior' or 'inferior' good. Since the subjective valuation of a commodity may vary from person to person, the response of the consumer in general to the change in real income becomes *uncertain and unpredictable*. It is quite likely that while in some cases, substitution effect works in a positive direction, income effect works in negative direction. In such cases, a systematic analysis of price-demand relationships becomes an extremely difficult task. It becomes therefore necessary to eliminate the unpredictable income effect so that "the systematic and predictable behaviour of the substitution effect can be revealed."[3] That is why the attempts to measure and split away the income effect from the price effect.

7.10 INCOME AND SUBSTITUTION EFFECTS : INFERIOR GOODS

In the foregoing section we have examined, income and substitution effects of a change in price on the consumption of 'normal' and 'superior' goods. Let us now see how these effects of rise in income and change in price work on the consumption of an inferior good.

As mentioned earlier, an 'inferior good' is one whose consumption decreases with increase in consumer's income. In other words, an ***'inferior good' is one for which income-effect is negative***. The reason for the income-effect for an 'inferior good' being negative is the natural tendency of a consumer to reduce his consumption of 'inferior goods' and increase the consumption of 'superior' or 'normal' goods when his income increases. Income of the consumer may increase either due to increase in his money income, prices remaining the same, or due to increase in his real income due to fall in prices, money income remaining constant, or due to both. Let us first look at the effect of rise in money income on the consumption of an inferior good.

7.10.1 Effect of Rise in Money Income

The income effect of rise in income on the consumption of an 'inferior good' (say, X) is illustrated in Figure 7.24. In the figure, the vertical axis measures money income and the horizontal axis measures an inferior goods, X. Let us suppose that the consumer is initially in equilibrium at point E_1, where he consumes OX_3 unit of X. As his income increases from OM_1 to OM_2, price of X remaining consant, his budget line shifts to M_2N_2 and he reaches an upper indifference curve IC_2. His new equilibrium point is E_2 where he consumes only OX_2 units of X. Note that $OX_2 < OX_3$. That is, his consumption of X decreases. It decreases further to OX_1 as his income increases to OM_3. The curve joining equilibrium points E_1, E_2 and E_3 is ICC for the *inferior* commodity (X). It has a negative slope beyond a point showing the *negative income effect*.

1. *Value and Capital*. p.32.
2. *Ibid.*, p.32.
3. W.J. Baumol, *op. cit.*, P.212.

7.11 PERFECT SUBSTITUTES AND COMPLEMENTARY GOODS

We have seen above that indifference curves for two substitute goods are convex to origin. The convexity of indifference curve is based on the postulate of diminishing marginal rate of substitution between the two substiute goods. The shape of the indifference curve however depends on whether the two related goods are perfect or imperfect substitutes or complementary goods. In this section, we look at the shape of indifference curves for perfect substitutes and complementary goods.

Let us first define the ***perfect substitutes*** and ***complements.*** Generally speaking, two goods are considered as ***perfect substitutes*** for one another when utility derived from either goods is the same. For example, wheat and rice, tea and coffee, electricity and cooking gas and whisky and rum are perfect substitutes for some, if not all, consumers. In case of two goods (X and Y) being perfect substitutes for one another, the marginal rate of substitution between them (i.e., $\Delta X/\Delta Y$) remains *constant* and the indifference curve is a straight line, as shown by the line MN, in Fig. 7.27 (a).

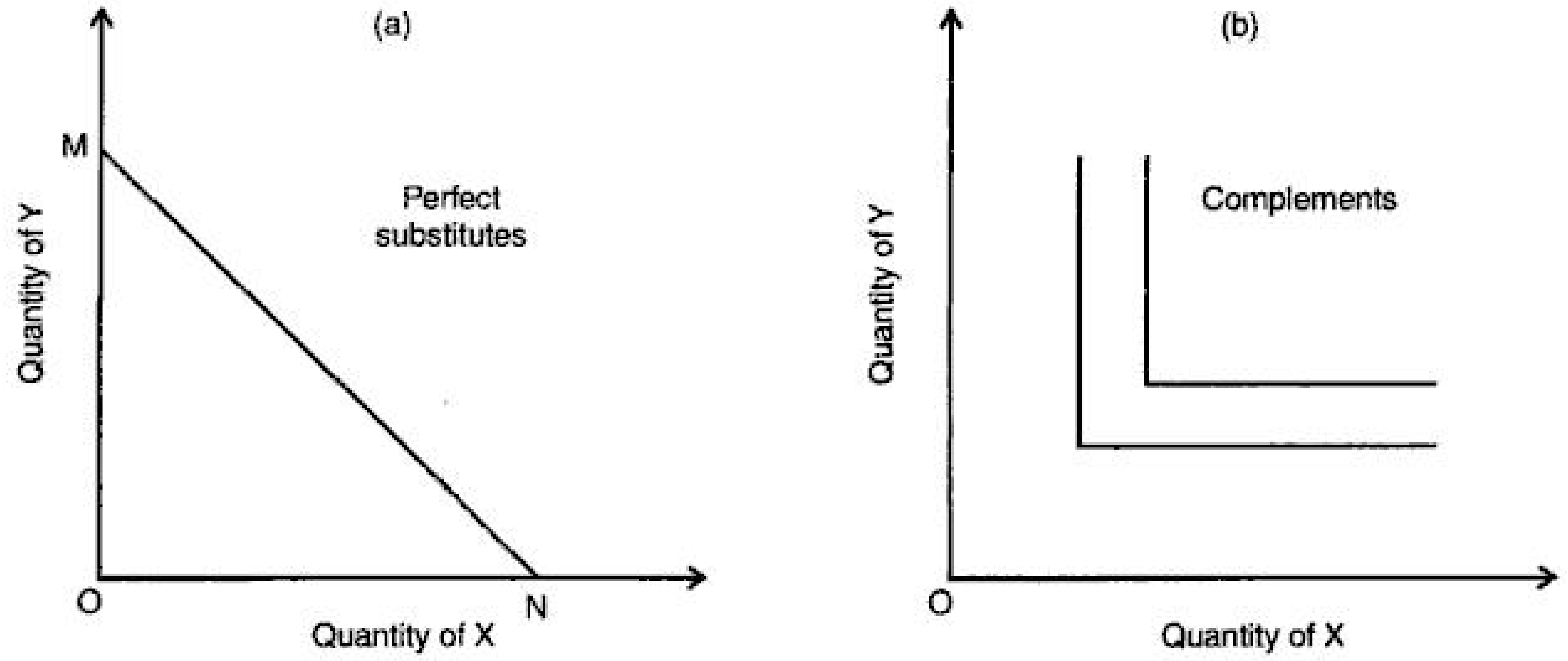

Fig. 7.27 Indifference Curves : (a) Perfect Substitutes; (b) Complementary goods

As regards the ***complementary goods,*** any two goods (X and Y) are considered as ***complements*** if an increase (decrease) in the consumption of one good (X) causes an increase (decrease) in the consumption of the other goods (Y). A number of pairs of complementary goods may be cited: tables and chairs, shirts and trousers, tea and sugar, bread and butter, tyres and tubes, car and petrol, and so on. The indifference curve for the complementary goods is L-shaped as shown in Figure 7.27(b). The indifference curve has a sharp convexity only at one point, giving it a rectangular shape. The rectangular shape of the indifference curve implies that an increase in the quantity of X without an increase in the quantity of Y, (or increase in the quantity Y without any addition to the quantity of X), leaves the consumer at the same level of satisfaction. It means, an additional quantity of one without increase in the quantity of the other does not yield additional satisfaction.

7.12 GOODS, BADS AND NEUTERS

We have seen, in the preceding sections, how a consumer makes his choices between any two **goods.** The ***goods*** are defined as the goods and services which yield pleasure or satisfaction. ***Goods*** yield positive utility, e.g., food, clothes, house, furniture, car, pen, paper, etc. The goods add to the welfare of the consumer. In other words, ***things that do good to the consumers are called goods.*** It must however be noted that some goods may not necessarily do good to the consumer in real sense. For example, cigarettes and drugs do not do any good to the smokers and drug-users. But these are

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7.13 COMPARISON OF CARDINAL AND ORDINAL UTILITY APPROACHES

Having outlined the indifference curve technique, let us now compare the cardinal and ordinal utility approaches to consumer's analysis and look into their relative merits.

7.13.1 Similarity Between the Two Approaches

Similar Assumptions. Most of the assumptions made under the two approaches are the same. For example, both cardinal and ordinal approaches assume consumer's rationality, transitivity of choices, limited income, perfect kknowledge and utility maximization. The *diminishing marginal utility* assumption of the cardinal utility approach is implicit in the *diminishing marginal rate of substitution* assumption of the ordinal utility approach.

Equilibrium Conditions are Identical. Both cardinal and ordinal utility approaches use identical equilibrium condition. The necessary equilibrium condition of cardinal utility approach is given as

$$\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$$

and the first order equilibrium condition under ordinal utility approach is given as

$$MRS_{x,y} = \frac{P_x}{P_y}$$

Since $MRS_{x,y}$ equals MU_x/MU_y, the first order equilibrium condition under the two approaches is the same.

The second order equilibrium condition of cardinal utility approach is that the total expenditure must not exceed consumer's total income. Ordinal utility approach makes a similar assumption in the form of budgetary constraint. That is, if a consumer having money income M, consumes only two goods, X and Y, given their prices as P_x and P_y, then

$$Q_x \cdot P_x + Q_y \cdot P_y = M$$

Thus, inspite of the fact that cardinal and ordinal approaches are based on different assumption regarding the measurability of utility, both arrive at the same conclusion.

7.13.2 Superiority of Indifference Curve Approach

In spite of their similarity in assumptions and equilibrium conditions, Hicksian indifference curve analysis is in many respects superior to the Marshallian caridnal utility approach. The indifference curve analysis has made major advances in the theory of consumer behaviour at least in the following respects.

First, the assumptions of indifference curve approach are less stringent or restrictive than those of cardinal utility approach. While cardinal utility approach assumes cardinal measurability of utility, ordinal utility approach assumes realistically only ordinal measure of utility. Besides, unlike cardinal utility approach, the ordinal utility approach does not assume constancy of utility of money. Marshallian assumption of constancy of marginal utility of money is incompatible with demand functions involving more than one good.

Secondly, indifference curve approach provides a better criterion for the classification of goods into substitutes and complements. This is considered as one of the most important contributions of

1. The cross-elasticity between two goods, X and Y is given by $(\Delta Q_y/\Delta P_x) \cdot (P_x/Q_y)$

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8. What is meant by consumer's equilibrium? Show that consumer's equilibrium condition under ordinal utility approach is the same as that under the cardinal utility.
9. What are the conditions for consumer's equilibrium in ordinal utility approach? Why does a consumer choose a combination of two goods where marginal rate of substitution equals the commodity price ratio?
10. Suppose a domestic servant spends her total income on only two goods, food and clothing. What will be the effect of increase in her income on her consumption of food and clothing? Illustrate the derivation of her income consumption curve.
11. What is Engel curve? Illustrate graphically the derivation of Engel curve. When does it tend to bend backwards?
12. What is price consumption curve (*PCC*)? Can you prepare a demand schedule on the basis of data provided by the *PCC*? Illustrate the derivation of demand curve for a normal good and a Giffen good.
13. Define income and substitution effects of a price change. Using Hicksian method illustrate graphically the decomposition of substitution and income effects of change in price of a commodity.
14. Illustrate the difference between the Hicksian and Slutsky methods of separating income and substitution effects of price change of a normal good. Which method gives, in your opinion, a better measure of the two effects and why?
15. Suppose Rajat likes chocolates more than ice-creams. How do his indifference curves look like? In what way are they different from the usual indifference curves? Show graphically Rajat's equilibrium combination of chocolates and ice-creams?
16. Suppose a consumer consumes two goods *X* and *Y*. Draw indifference curves assuming (a) *X* and *Y* are normal goods, and (b) *X* is an inferior good and *Y* is a superior good. Are the indifference curves different in the two cases? If not, how are they different?
17. 'All Giffen goods are inferior goods but all inferior goods are not Giffen goods'. Explain this statement showing graphically the difference between the substitution and the income effects of a price change on the demand for the two kinds of goods.
18. What is meant by 'composite goods convention'? In what way are the slopes of budget line and indifference curves in composite goods case different from those in case of two normal goods? How does a consumer achieve his equilibrium point in composite goods case?
19. Write the correct answer.
    (a) Indifference curve was invented by (i) Edgeworth, (ii) J. R. Hicks, (iii) Marshall, or (iv) Slutsky?
    (b) Each point on an indifference curve shows (i) different combinations of goods and different levels of utility, (ii) the same combinations and the same utility, (iii) different combinations and the same utility, or (iv) none of the options?
    (c) Along the indifference curve, the marginal rate of substitution between two goods (i) decreases, (ii) increases,or (iii) remains constant?
    (d) The marginal rate of substitution between two normal goods is always positive or always negative?
    (e) The marginal rate of substitution is (i) equal to, (ii) greater than, or (iii) less than the slope of the indifference curve?
    (f) The indifference curves for two normal goods are always (i) convex to origin, (ii) concave to origin, or (iii) neither convex nor concave?

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prices unchanged, its effect on the consumer would be similar to that of income tax.

Secondly, while income tax affects all those who have a taxable income, excise tax affects only those who consume the taxed commodity. For example, an excise tax on wine does not impose any burden on the teetotallers whereas an income tax does. It all depends, however, on the nature and spread of taxation.

Thirdly, the above analysis which is in the tradition of partial equilibrium analysis would not be valid if applied to the community as a whole.[1] But, the question here is not whether the conclusion drawn from Fig. 8.1 is or is not valid in general equilibrium analysis. Rather, the question is whether the indifference curve technique can be profitably applied to the problems of the above nature. Obviously, it can be.

8.2 MEASURING EFFECTS OF EXCISE AND INCOME SUBSIDIES

Indifference curve analysis has also been used to analyse and compare the effects of *excise* and *income subsidies* as policy measures. Let us suppose that the government is planning to raise the levels of living of the poor families and has to make a choice between (a) income subsidy in the form of lump-sum money grant, and (b) excise subsidy or subsidy in the form of food subsidy, rent subsidy or loan subsidy. The relevant questions that arise in this regard are: (i) which of these measures ***costs less*** to the government, and (ii) which of these measures would be preferable to the people who are intended to benefit from these policy measures? These questions can be answered with the aid of indifference curve analysis. Let us analyse a simple case of choice between excise subsidy on a commodity (say, X) and a lump-sum income subsidy, granted to a single consumer.

8.2.1 The Cost of Excise Subsidy

In Fig. 8.2, the vertical axis measures income and the horizontal axis measures quantity of commodity X. Consumer's budget line is shown by MN_1 which represents consumer's budgetary options in the absence of excise or income subsidy. The consumer is shown to be initially in equilibrium at point E_1 on indifference curve IC_1 where he consumes OX_1 units of X for which he pays MP of his income and retains OP for other goods.

Let us now suppose that the government subsidises commodity X by 50 per cent of its price so that price consumers pay is reducd to a half. As a result, budget line shifts from MN_1 to MN_3 and the consumer moves on to equilibrium point E_3. Here he consumes OX_3 units of X for which he pays DM of his income (at subsidised price). In the absence of excise subsidy, the consumer would have paid MB of his income for OX_3. Thus, $MB - MD = DB$ is the cost of subsidy which the government would pay to the producers of commodity X.

8.2.2 Cost of Lump-Sum Income Subsidy

Let us now consider what will happen if the government replaces excise subsidy by income subsidy or a supplementary income measure. The effect of income subsidy is also illustrated in Fig. 8.2.

Suppose that the government supplements consumer's income by an amount that makes the consumer to move from IC_1 to his indifference curve IC_2 which he had reached after subsidisation of commodity X. That is, income subsidy is just sufficient to maintain the level of consumer's utility with the price subsidy. The effect of income subsidy can be obtained by drawing a budget line

1. For details see Milton Friedman, *Price Theory: A Provisional Taxt*, pp. 59-61.

8.4 DERIVATION OF LABOUR SUPPLY CURVE

Like commodity supply curve shows the relationship between the price of the commodity and it's quantity supplied by the firms, the labour supply curve shows the relationship between supply of labour and wage rate. Labour supply curve is ***a backward bending curve.*** The labour supply curve is the result of labour's choice between income and leisure. We will show below the use of indifference curve in the analysis of labour's choice between income and leisure and in deriving the supply curve of labour.

8.4.1 Income-Leisure Choice

Let us assume that utility function of an individual worker is given as

$$U = f(M, L)$$

(where M = money income from work, and L = leisure).

Assume also that an individual divides his daily time into work and leisure so as to maximise his utiliy function. Given the number of hours at his disposal, if he increases his hours of work, his income increases but his hours of leisure decrease and *vice versa*. His working-hours yield income. It implies that the individual divides his time between income and leisure. The income-leisure choice of the worker is illustrated in Fig. 8.4. in which X-axis measure the hours available to the worker and Y-axis his money income. Let us assume that the total hours available to the individual are OH and that hourly wage rate is $\overline{W}$. If he works for OH hours and enjoys no leisure, his total income will be $OM = OH.\overline{W}$. If the individual enjoys his whole time (OH) as leisure, he will be at point H with zero income. And, if he enjoys no leisure, i.e., he works for OH hours, he will be at point M. By joining the points M and H by a line, we get his ***income-leisure curve,*** MH. This curve shows income-leisure combinations at a given wage rate, $\overline{W}$. Another significant point to be noted is that the slope of the income-leisure curve, $OM/OH = \overline{W}$.

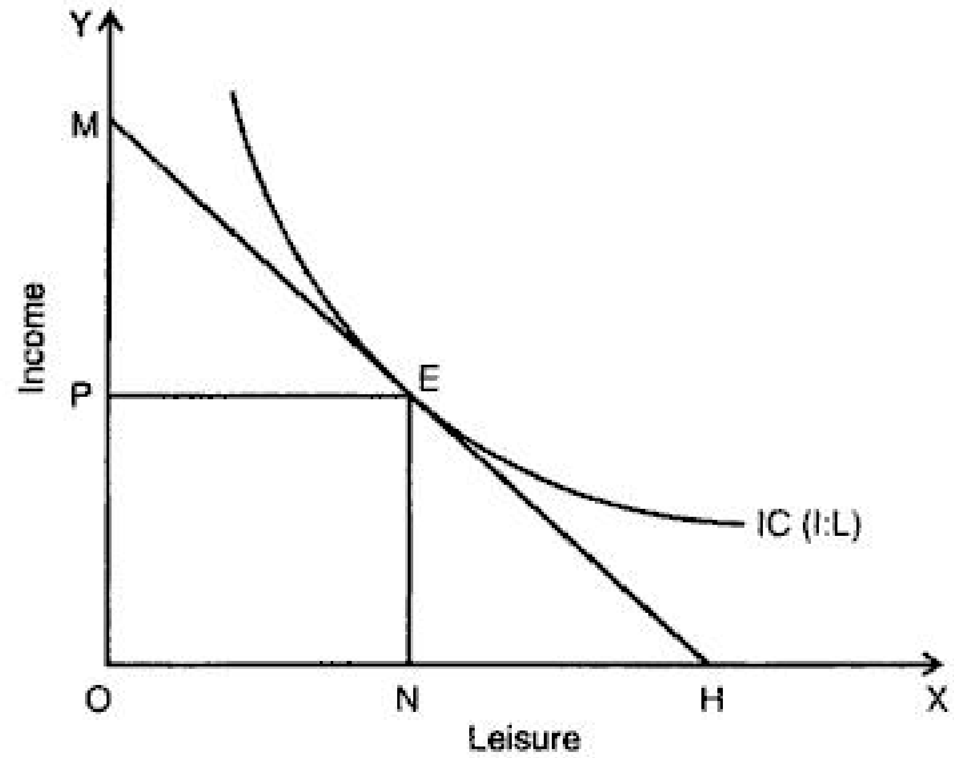

Fig. 8.4 Equilibrium of Individual Worker

Let us now assume that individual's indifference curve for income and leisure (I:L) is given by the curve IC in Fig. 8.4. This curve is known as ***income-leisure trade-off curve.*** Its slope indicates the MRS_{LM} between income and leisure, i.e., $\Delta M/\Delta L$. The individual's equilibrium is determined at

(ii) Effective rationing. Fig. 8.8 presents the case of fully *effective rationing*. The budget line MN and area under it represent the 'market opportunity set' available to the consumers. In the absence of rationing, the consumers would be in equilibrium at point U on indifference curve IC_2. After the imposition of rationing at OR, consumers move to a constrained equilibrium at point C on a lower indifference curve, IC_1. Their consumption of X falls from OQ to OR. Rationing is, therefore, ***completely effective***. It is doubly effective if rationing aims at reducing consumption of X and increasing that of Y. This kind of rationing has a serious welfare implication. However, it cannot be judged from Fig. 8.8 whether loss of consumers' welfare is matched with gains of rationing.

8.5.2 Rationing of More Commodities

(i) Precautionary rationing. The government imposes rationing generally on more than one commodity. We will illustrate rationing on two commodities. In case two goods, e.g., X and Y, are subjected to rationing, its effectiveness depends again on the limits of permissible consumption. If permissible consumption limits of both the goods are in excess of what consumers consume in the absence of rationing, then rationing would be ineffective in the sense that it does not displace consumers' equilibrium. This situation is illustrated in Fig. 8.9. Given the budget line MN, the consumers would be in equilibrium at point U. If the government imposes rationing at OM_y for Y and at OR_x for X, it would be ineffective. For, consumers are in equilibrium at point U which is well within their 'market opportunity set' and rationing limits. They will consume only OX_0 of X and OY_0 of Y, both being less than their respective rationing limits. This kind of rationing may, however, be used as a precaution against expected increase in consumption of X and Y or expected accumulative demand for these goods in anticipation of deterioration in supply position.

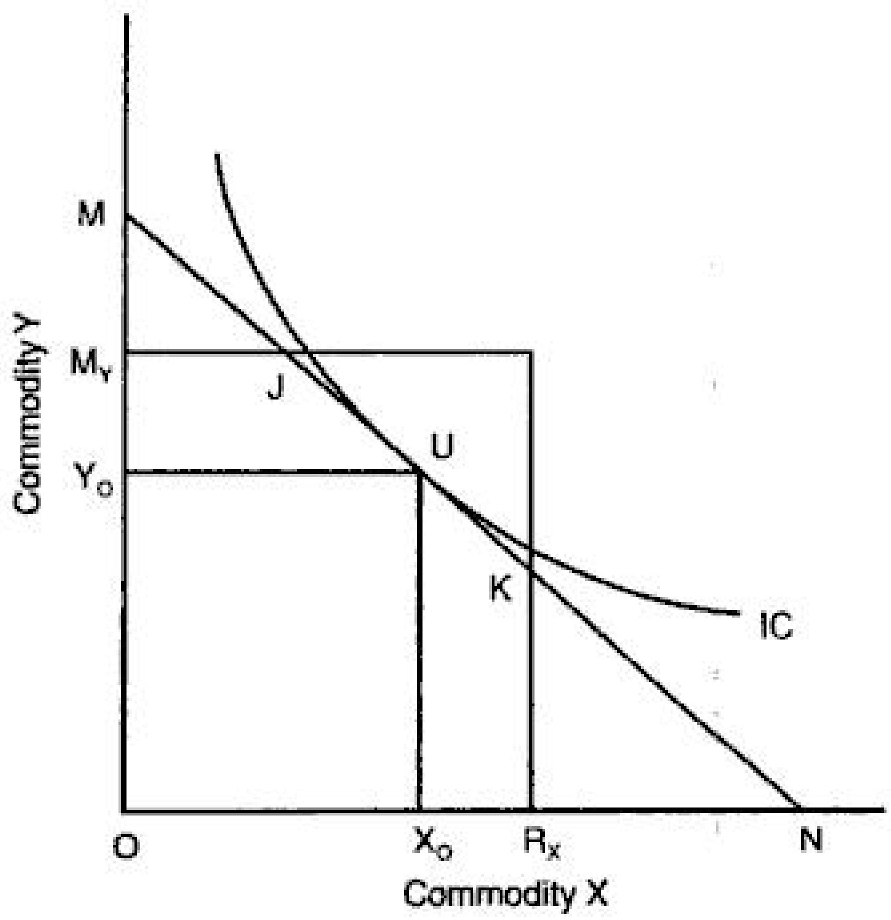

Fig. 8.9 Preventive Rationing X and Y

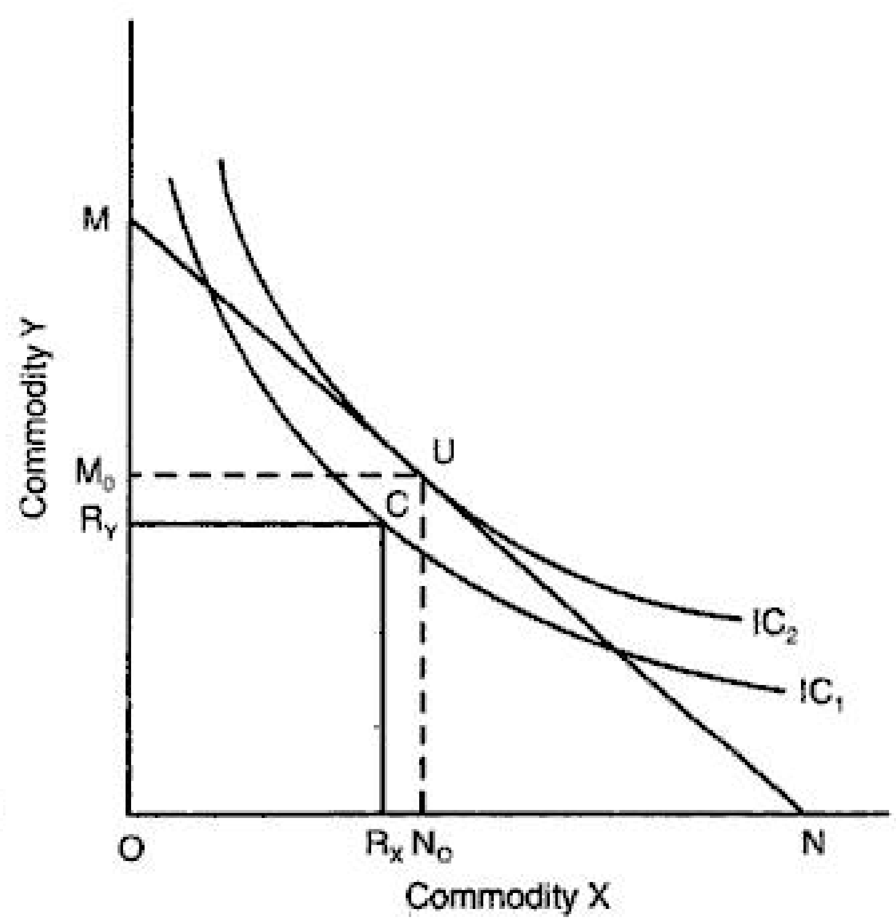

Fig. 8.10 Effective Rationing of X and Y

(ii) Effective rationing. Figure 8.10 presents the case of effective rationing of both the goods, X and Y. In the absence of rationing, consumers would be in equilibrium at point U consuming ON_0 of X and OM_0 of Y. With rationing imposed at OR_x for X and OR_y for Y, the consumers will be forced to move to point C on a lower indifference curve. At point C, their consumption is limited to

to incorporate the **'external effects'** on the personal utility, such as **'bandwagon effect'**[1] **'snob effect'**[2], and **'Veblen effect'**[1] into the 'current theory of demand'. Because of some of these developments, perhaps, Hicks felt it necessary to revise his 'theory of demand' which he had developed in his *Value and Capital*. In mid-sixties, Kelvin Lancaster added another dimension to the theory of demand by exploring what he calls *technology of consumption*, a technique similar to indifference curve. Given the target readership of this book, however, we present in this chapter a brief description of only one of these developments, i.e., Samuelson's 'Revealed Preference Theory' of consumer behaviour.

9.2 REVEALED PREFERENCE: ASSUMPTIONS AND AXIOMS

In succession of Hicks-Allen ordinal utility approach, Samuelson[2] proposed in 1947, another theory, called the 'Revealed Preference Theory' of consumer behaviour. The main merit of the revealed preference theory is that 'law of demand' can be directly derived from the ***revealed preference axioms*** without using indifference curve and most of its restrictive assumptions. What is needed is simply to record consumer's observed behaviour in the market, i.e., the basket of goods a consumer buys at different prices. Besides, the revealed preference theory is also capable of establishing the existence of indifference curves and their convexity. For its merits, revealed preference theory is treated as 'the third root of the logical theory of demand'. The revealed preference theory is discussed here briefly.

Assumptions

Revealed preference theory is based on the following assumptions:

1. **Rationality** — The consumer is a rational being: he prefers a larger basket of goods to the smaller ones.
2. **Transitivity** — Consumer's preferences are transitive. That is, given the alternative baskets of goods, A, B and C, if he considers $A > B$ and $B > C$, then he considers $A > C$.
3. **Consistency** — Consumer's taste remains constant and consistent. Consistency implies that, it a consumer, given his circumstances, prefers A to B, he will not prefer B to A under the same conditions.
4. **Price Inducements** — Given the collection of goods, the consumer can be induced to buy a particular collection by providing him sufficient price incentives.

Revealed Preference Axiom

The revealed preference can be stated as follows. ***Given the budgetary constraint and alternative baskets of goods having the same price, if a consumer chooses a particular basket, he reveals his preference.*** For example, suppose that a consumer has a given income which he spends on two commodities, X and Y. Suppose also that there are two alternative baskets A and B of the two goods, X and Y, and that both the baskets are equally expensive. ***Given these conditions, if the consumer chooses basket A rather than basket B, he reveals his preference for basket A.*** This is the basic axiom of the revealed preference theory.

1. 'Veblen effect' means decrease in consumption of a commodity because it has become cheaper. It implies a positive relationship between price and quantity consumed.
2. Samuelson, P.A., *Foundation of Economic Analysis*, (Cambridge, Mass., Harvard University Press, 1947), Chapters 5 and 6; and "Consumption Theory in Terms of Revealed Preference." *Economica*, November 1948, pp. 243-53. Samuelson had however conceived the idea much earlier in his paper "A Note on the Pure Theory of Consumer's Behaviour," *Economica*, February and August 1938.

any point on this segment is inferior to *B*. Since the consumer chooses point *B*, as *revealed preference axiom* suggests, any other point on or below *PT* is inferior to *B*. Therefore, any combination in the area *NBT* is *revealed inferior* to *B*. Thus, the triangle *NBT* which is a part of the *ignorance zone, KAN*, is clipped off because consumer's ranking of this area is now known.

This procedure can be repeated for as many points as one wishes and the area of *ignorance zone* can be reduced bit by bit. For example, we may select a point C on the *BT* segment of *PT* and draw a probable price line *QR*. Following the same procedure, we may show that points in the area marked by the triangle *TCR* are revealed inferior to *A* and chop off the area from the *ignorance zone*. Moving up along the budget line *MN*, we may choose point *D* and hack away triangle *UDM*.

The same procedure may be adopted to whittle away the 'upper ignorance zone' marked by triangle *JAM* and to find points in relation to *A*. The procedure is illustrated in Fig. 9.5. The consumer is assumed to be initially at point *A* on the budget line *MN*. Let us now suppose that P_x increases and P_y decreases and the new budget line, *PT*, passes through the point *A* and that the consumer chooses point *L* on the budget line *PT*. At new prices, bundle *A* is as much expensive as bundle *L*. We know from the revealed preference theory that point *L* is preferable to point *A* and any point in the area *ALD* is revealed preferred to *L*. Therefore, any point in zone *SLD* is preferable to point *A*. This ranking of area *SLDJ* reduces the area of 'upper ignorance zone'. This procedure may be repeated by drawing other price lines through point *A* and the 'upper ignorance zone' can be reduced bit by bit.

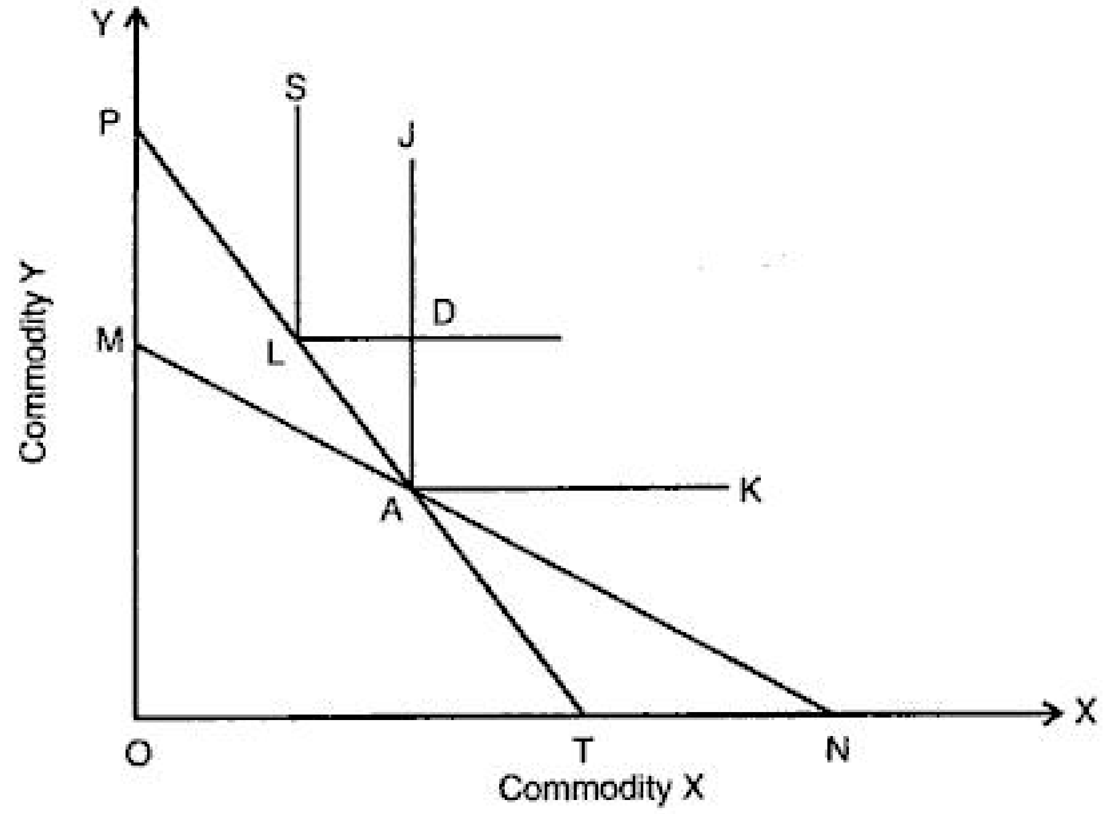

Fig. 9.5 Derivation of Indifference Curve through Revealed Preference Theory

If we join all the points—*A*, *B* and *C* in Fig. 9.4 and *A* and *L* in Fig. 9.5—which have been located on the various budget lines, we get a curve which Samuelson called ***offer curve*** as shown by the curve *FF'* in Fig. 9.6. The position of the offer curve is the probable position of ***indifference curve.***

This probability of the existence of an indifference curve can be established by the following inferences which can be drawn from the foregoing discussion.

First, the indifference curve cannot be a straight line like *MN* because choice of point *A* shows that all other points on *MN* are revealed inferior to *A*, and therefore, the consumer cannot be indifference between point *A* and any other point on the budget line.

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10.2 MARSHALLIAN CONCEPT OF CONSUMER SURPLUS

Although the concept of consumer surplus was originated by Dupuit as early as 1844, it remained an immeasurable concept until Marshall suggested, as late as 1920, a method of measuring consumer's surplus in money terms. Marshall defined consumer's surplus as **"the excess of the price which [a consumer] would be willing to pay rather than go without the thing, over that which he actually does pay."** According to Marshallian theory of demand, what a consumer is willing to pay for one unit of a commodity measures the money value of his expected utility and what he actually pays measures the monetary cost of the expected utility. The difference between the two values is called *'consumer surplus'*. For example, suppose you are prepared to pay Rs 500 for a ticket to a cricket match but you pay only Rs 200, the actual price of the ticket, you have a consumer surplus of Rs 300.

The concept of consumer's surplus can be expressed also in terms of utility (or satisfaction). Since Marshall assumed marginal utility (*MU*) of money, what a consumer is willing to pay indicates his expected utility and what he actually pays measures the loss of utility (of money). The difference between the utility gained and the utility lost in acquiring the commodity is consumer's 'surplus satisfaction' which Marshall called **'consumer's surplus'**.

The Marshallian concept of consumer's surplus and its measurement are graphically illustrated in Fig. 10.1. The consumer's willingness to pay is shown by his straight line demand curve *MN*. The curve *MN* also indicates the utility derived from each successive unit of a commodity. The market price, i.e., the price which a consumer actually pays, is given by *OP*. At price *OP*, the consumer buys *OQ* units. The total utility derived by the consumer from *OQ* units is shown by the area *OMBQ*, for which the consumer pays $OPBQ = OQ.OP$. Thus, in Marshallian sense, total consumer surplus equals $PMB = OMBQ - OPBQ$. That is, the shaded area *PMB* represents the consumer's surplus in Marshallian sense when consumer buys *OQ* units of a commodity *X*.

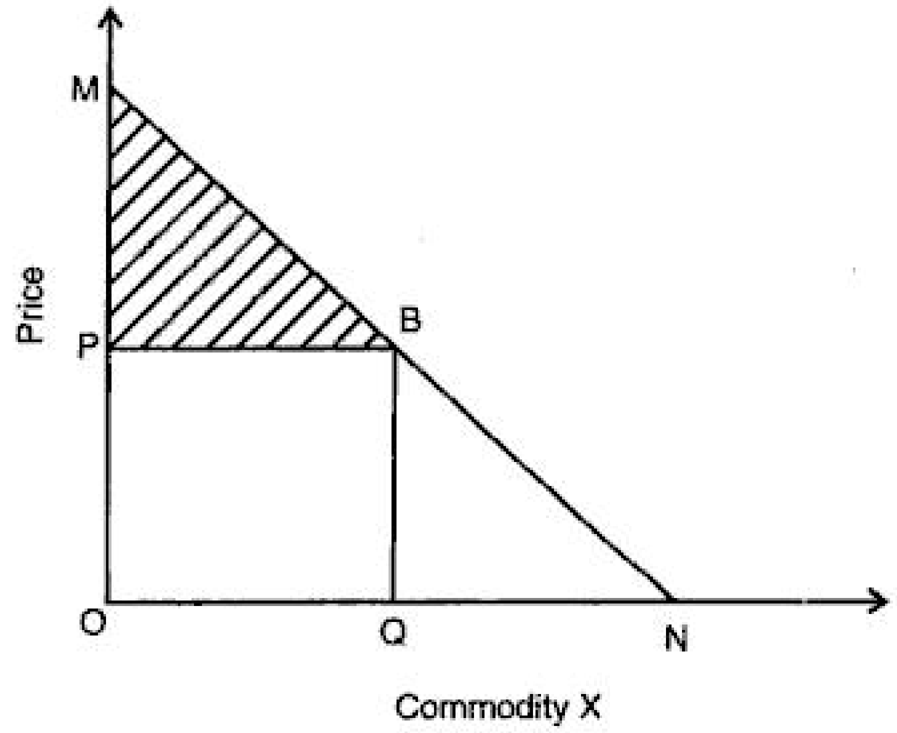

Fig. 10.1 Consumer's Surplus

Assumptions

The above analysis of consumer's surplus is based on the following assumptions.

First, it is assumed that the market price is given so that neither the sellers nor the buyers can affect

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(iii) limited substitution of one factor for the other, i.e., labour and capital are imperfect substitutes;
(iv) a given technology; and
(v) inelastic supply of fixed factors in the short-run.

If there is a change in these assumptions, the production function will have to be modified accordingly. The two most important production functions used in economic literature to analyse input-ouput relationships are Cobb-Douglas production function and 'Constant Elasticity of Substitution' (*CES*) production function. These production functions will be discussed in the next chapter. We will explain now the *laws of production* through a simple hypothetical production function with one variable input.

11.4 PRODUCTION WITH ONE VARIABLE INPUT: THE SHORT-RUN LAWS OF PRODUCTION

The traditional theory of production analyses the marginal input-output relationships under (i) short run, and (ii) long run conditions. In the short run, input-output relations are studied with one variable input (labour), the other input (capital) held constant. The laws of production under these conditions are called **'The laws of Variable Proportions'**, the **'Laws of Returns to a Variable Input'** and the **'Law of Diminishing Marginal Returns'**. In the long run, input-output relations are studied assuming all the input to be variable. The long run input-output relations studied under 'Laws of Returns to Scale'. In the following section, we will explain the 'laws of return to a variable input'. The laws of 'returns to scale' or what is also called 'long-run laws of production', will be discussed in the following chapter.

11.4.1 The Law of Diminishing Marginal Returns

The law of diminishing returns states that ***when more and more units of a variable input are applied to a given quantity of fixed inputs, the total output may initially increase at an increasing rate and then at a constant rate but it will eventually increase at diminishing rates***. The ultimate law is, the marginal increase in total output eventually decreases when additional units of variable factors are applied to a given quantity of fixed factors. In the words of Hirshleifer, "If one factor (or group of factors) is increased while another factor (or group of factors) is held fixed, output or Total Product q will at first tend to rise. But, eventually at least, a point will be reached where the rate of increase, the *Marginal Product* [$MP_l = \Delta Q/\Delta L$] associated with increments of the variable factor, begins to fall; this is the point of diminishing marginal returns."[1] Baumol states the law of diminishing returns in similar terms: "As more and more of some input, i, is employed, all other input quantities being held constant, eventually a point will be reached where additional quantities of input i will yield diminishing marginal contributions to total output."[2]

Assumptions

The law of diminishing returns is based on the following assumptions: (i) the state of technology is given, (ii) labour is homogenous, and (iii) input prices are given.

To illustrate the law of diminishing returns with the help of our coal mining example, let us assume (i) that the coal-mining firm has a set of mining machinery as its capital (K), fixed in the short run, and (ii) that it can employ more of mine-workers to increase its coal production. Thus, the

1. Hirshleifer, J., *Price Theory and Applications*, 3rd Ed., p.316 (emphasis added).
2. Baumol, W.J., *Economic Theory and Operations Analysis*, 4th Edn., p.270.

assumptions is shown by the curve TP_L in Fig. 11.2. By definition, marginal product is the addition to the total production (TP_L) due to a marginal increase in the variable input, labour (L). Given a continuous production function, *marginal product of labour* (MP_L) can be defind as

$$MP_L = \frac{\delta TP_L}{\delta L}$$

Graphically, MP_L is given by the slope of the TP_L curve (see Fig. 11.2). Given the definition of MP_L, the MP_L curve may be derived from the TP_L curve, as shown in Fig. 11.2

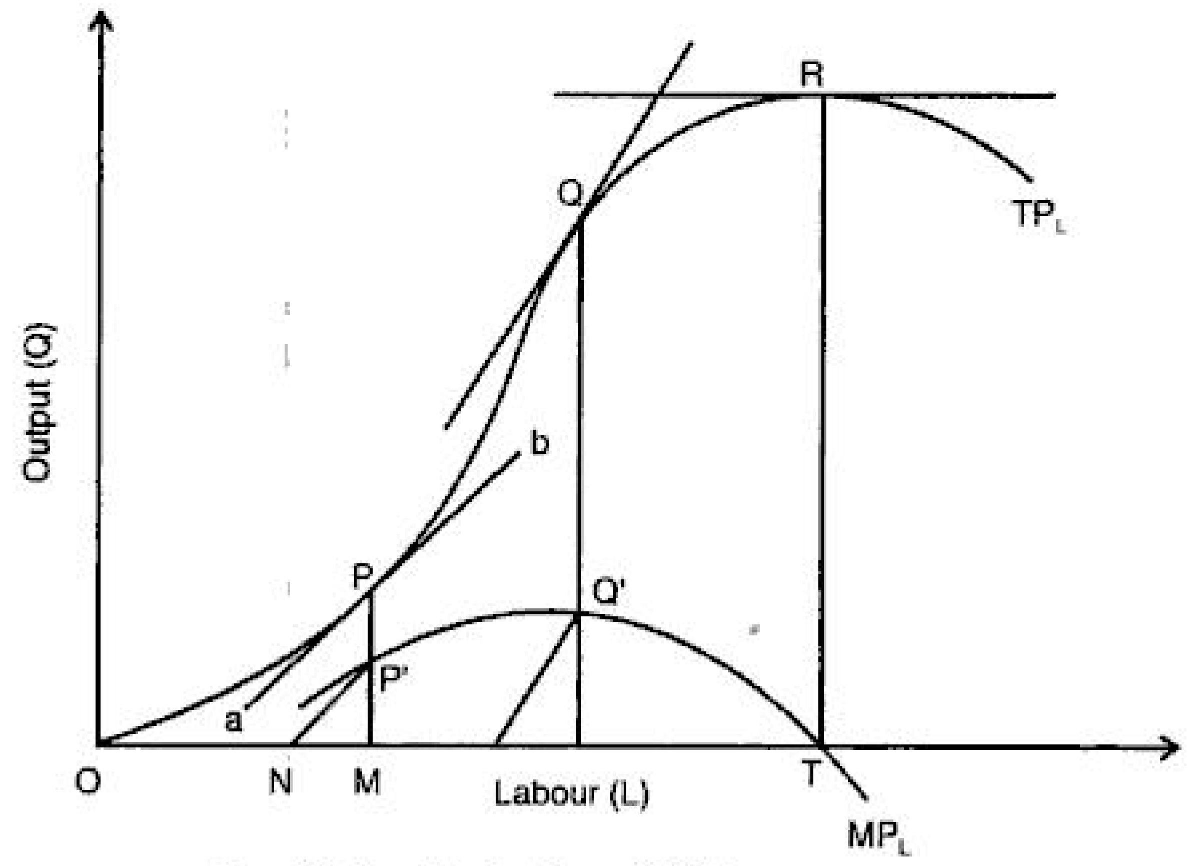

Fig. 11.2 Derivation of MP_L curve

The MP_L curve can be derived by measuring the slope of TP_L at its various points and by plotting the measures. For example, if we choose point P on TP_L curve and draw a tangent ab through this point, the slopes of the TP_L and of the tangent ab at point P are the same. An odinate PM drawn from point P measures the output resulting from OM labour. The contribution of the marginal addition of the labour, say NM amount of labour, can be obtained by drawing a line parallel to the tangent ab from point N through PM. Note that the parallel line meets PM at point P'. Thus, $P'M$ is the marginal product of NM labour. This process may be repeated for several other points chosen on the TP_L curve and MP of labour obtained. By joining the resultant points (say, P', Q' and T), we get the MP_L curve as shown in Fig. 11.2.

11.5.2 Derivation of Average Product Curve

In our example, *average product of labour* (AP_L) can be defined as

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

The AP_L curve can also be derived from the TP_L curve. The TP_L curve derived in Fig. 11.3 is similar to one derived in Fig. 11.2. Suppose that we want to measure AP_L at point P on the TP_L in Fig. 11.3. At point P, output is $PN = OM$ and the total labour employed is $ON = MP$. If we draw a line from point P to origin O, we get a line OP. The line OP represents the TP_L with constant returns to labour. The slope of line OP gives, therefore, the ***constant returns*** to marginal labour. When MP_L is

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REVIEW QUESTIONS AND EXERCISES

1. Distinguish between (a) variable input and fixed input, and (b) short run and long run. How do these concepts matter in the formulation of the laws of production?
2. What is a production function? How does a production function serve a useful purpose in production analysis?
3. Define average and marginal products of the variable input. When marginal product begins to decline, what happens to the average product?
4. Does there exist any relationship between marginal and average products? If there is one, what is the basis of this relationship?
5. State the law of diminishing marginal returns. What are the conditions for this to apply? Does this law apply to all kinds of industries?
6. Discuss the law of variable proportions using an appropriate production function. Why is this law so called? Explain with example.
7. What are the three stages of returns in the law of diminishing returns? Why does production increase at increasing rate in the initial stage of the law of diminishing marginal returns?
8. Show graphical derivation of *TP*, *MP* and *AP* curves. Show also the three stages of production. What economic purpose do the stages of production serve?
9. Suppose a production function is given as follows.

   $Q = 10L + 5L - L^3$

   Find the following

   (a) *TP*, *MP* and *AP* schedules;
   (b) *TP* where $MP = AP$;
   (c) Labour (L) required to maximize output.
10. Draw *TP*, *MP* and *AP* curves using the schedules obtained in question 7 and illustrate the three stages of production.
11. The law of diminishing returns is an empirical law. But this law does not apply to all kinds of industries in the same manner. Comment.
12. Suppose a production schedule is given as follows. Complete the table.

Labour	Total production	Marginal product	Average product
1	5		
2	11		
3	18		
4	26		
5	35		
6	45		
7	55		
8	64		
9	70		
10	75		
11	72		
12	60		

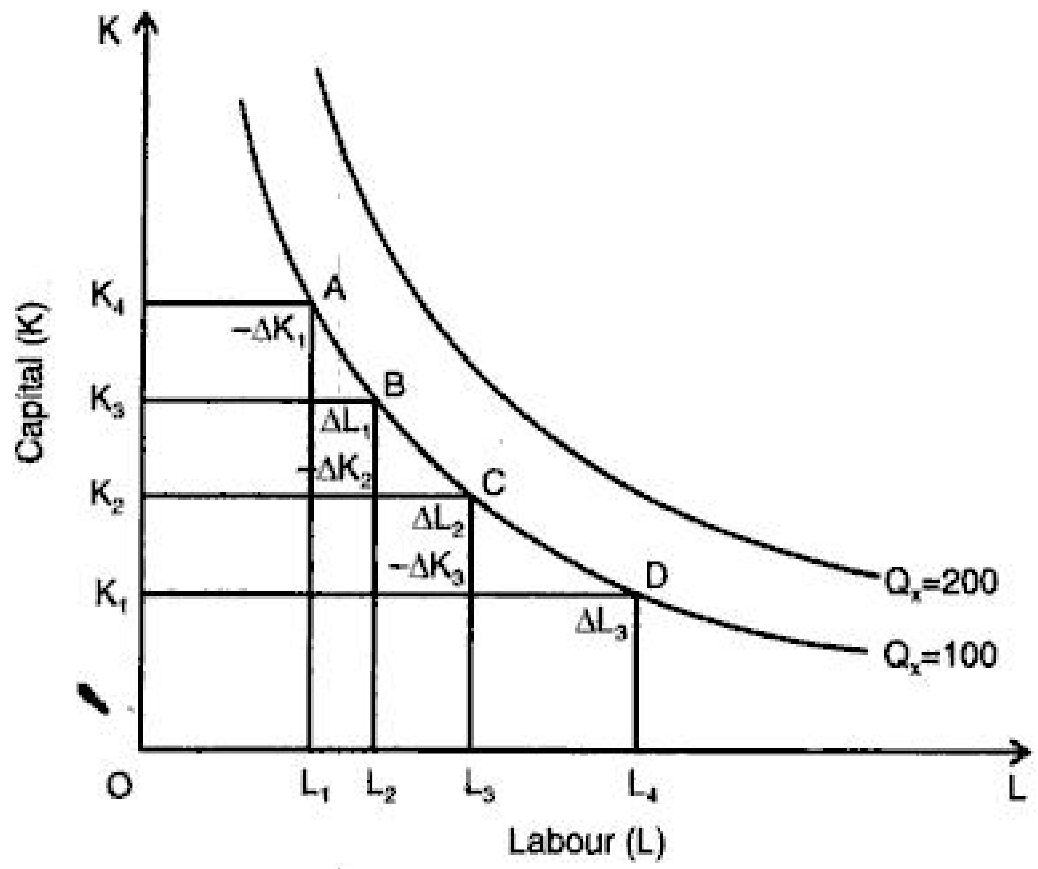

Fig. 12.1 Isoquant Curves

Table 12.1 Capital Labour Combinations and Output

Points	*Input Combinations*			*Output*
	K	+	*L*	
A	OK_4	+	OL_1	= 100
B	OK_3	+	OL_2	= 100
C	OK_2	+	OL_3	= 100
D	OK_1	+	OL_4	= 100

12.3 PROPERTIES OF ISOQUANT CURVES

Isoquants have the same *properties* as *indifference curves.* They are explained below in terms of inputs and output, under the condition that two inputs are not perfect substitutes.

(a) Isoquants have a negative slope. An isoquant has a negative slope in the *economic region*[1] or in the relevant range. The economic region is the region on the isoquant plane in which substitution between inputs is technically efficient. It is also known as the *product maximizing region.* The negative slope of the isoqant implies substitutability between the inputs. It means that if one of the inputs is reduced, the other input has to be so increased that the total output remains unaffected. For example, movement from A to B on Q_X (Fig. 12.1) means that if K_4K_3 units of capital are removed from the production process, L_1L_2 units of labour have to be brought in to maintain the same level of output.

(b) Isoquants are convex to the origin. Convexity of isoquants implies not only the substitution between the inputs but also diminishing *marginal rate of technical substitution*[2] *(MRTS)* between the inputs in the economic region. The *MRTS* is defined as

$$MRTS = \frac{-\Delta K}{\Delta L} = \text{slope of the isoquant}$$

1. The concept of 'economic region' is discussed below in detail.
2. The concept of marginal rate of technical substitution is discussed in detail in the forthcoming section.

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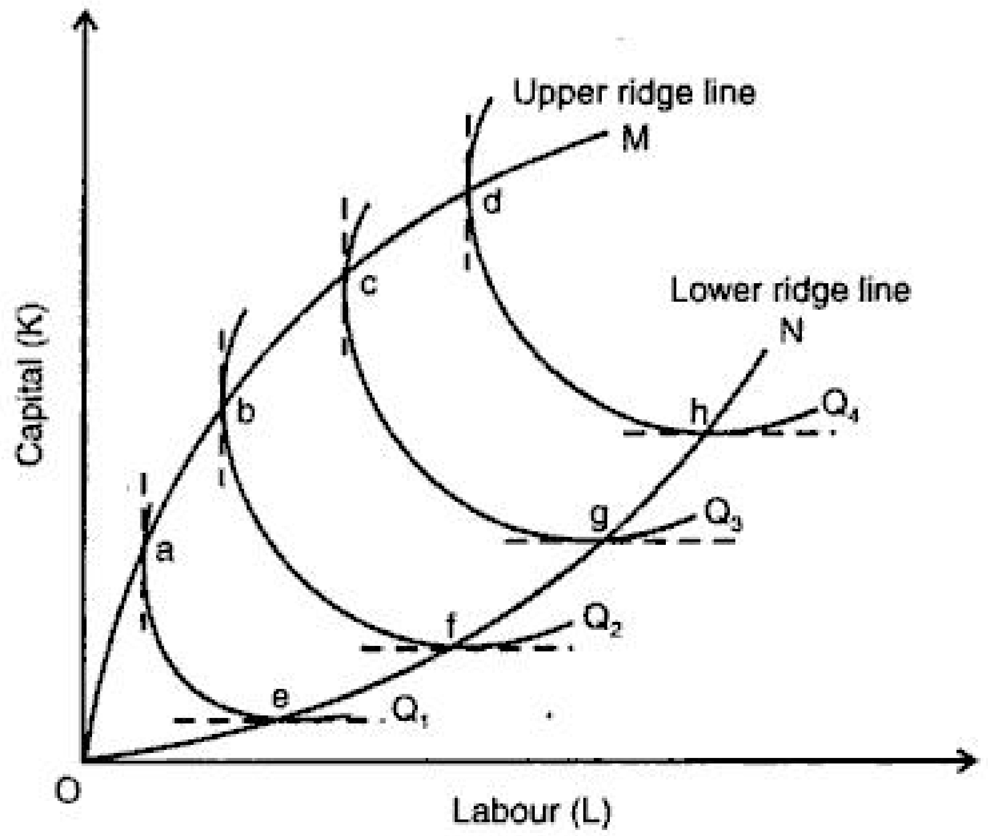

Fig. 12.4 Isoquant Map and Economic Region

Since upper isoquants indicate a larger input-combination than the lower ones, each successive upper isoquant indicates a higher level of output than the lower ones. For example, if isoquant Q_1 represents an output equal to 100 units, isoquant Q_2 represents an output greater than 100 units. As one of the properties of isoquants, no two isoquants can intersect or be tangent to one another.

12.5.2 Economic Region of Production

It is noteworthy that the whole isoquant map or production plane is not technically efficient, nor is every point on an isoquant technically efficient. The reason is that, on a convex isoquant, the *MRTS* decreases along the isoquant and zero is the limit to which the *MRTS* can decrease. The point at which *MRTS* equals zero marks the limit to which one input can substitute another. It also determines the minimum quantity of an input which must be used to produce a given output. Beyond this point, an additional employment of one input will necessitate employing additional units of the other input. Such a point on an isoquant may be obtained by drawing a tangent to the isoquant and parallel to the vertical and horizontal axes, as shown by dashed lines in Fig. 12.4. By joining the resulting points *a*, *b*, *c* and *d*, we get a line called the ***upper ridge line***, *OM*. Similarly, by joining the points *e*, *f*, *g* and *h*, we get the ***lower ridge line***, *ON*. The ridge lines are locus of points on the isoquants where the marginal products of the inputs are equal to zero. The upper ridge line implies that marginal productivity of capital is zero along the line, *OM*. The lower ridge line implies that marginal productivity of labour is zero along the line, *ON*.

The area between the two ridge lines, *OM* and *ON*, is called ***'economic region'*** or ***'technically efficient region'*** of production. Any production technique, i.e., capital-labour combination, within the economic region is technically efficient to produce a given output. And, any production technique outside this region is technically inefficient since it requires more of both inputs to produce the same quantity.

For example, suppose that the quantity represented by isoquant Q_2 is to be produced. We have two points, *b* and *f*, on the isoquant Q_2, which fall on the ridge lines. Consider first piont *b*, i.e., the point of intersection between the isoquant Q_2 and the upper ridge line. Point *b* indicates minimum of labour and maximum of capital required to produce Q_2. A smaller amount of capital, given the labour input at point *b*, would be insufficient to produce Q_2. Beyond point *b*, producing Q_2 would require more of capital and labour, which is technically inefficient. It would mean producing the same quantity with

Three Laws of Returns to Scale

When all the inputs are increased *proportionately* (i.e., by some multiple of the existing scale), there are technically three possible ways in which total output may increase:

(i) it may increase more than proportionately,
(ii) it may increase proportionately, and
(iii) it may increase less than proportionately.

For example, if both the inputs (labour and capital) are doubled, the resulting output may be more than double, equal to double or less than double. This kind of inputs-output relationship gives three laws of returns to scale:

(i) **the law of increasing returns to scale,**
(ii) **the law of constant returns to scale, and**
(iii) **the law of decreasing returns to scale**

These three laws of return to scale are illustrated and explained below first graphically with the help of isoquants and then through the ***production function***.

12.8.1 Increasing Returns to Scale

As stated above, the law of increasing returns to scale implies that output increases more than proportionately to the increase in input and the rate of increase in output goes on increasing with each subsequent increase in input. For example, suppose inputs are increased by 50% and output increases by more than 50%, say by 75%, and when inputs are again increased again by 50% and output increases by 100% and so on. This kind of input-output relationship shows that the law of increasing returns to scale is in operation. This kind of returns to change in scale is illustrated in Fig. 12.9. The three isoquants—Q_1, Q_2 and Q_3— represent three different levels of production—10 units, 25 units and 50 units, respectively. Product lines *OA* and *OB* show the relationship between inputs and output. For instance, movement from point *a* to *b* denotes doubling the inputs, labour and capital. As Fig. 12.9 shows, input combination increases from $1K + 1L$ to $2K + 2L$. The movement from *a* and *b* also indicates increase in output from 10 units to 25 units. This means that when inputs are doubled, output is more than doubled.

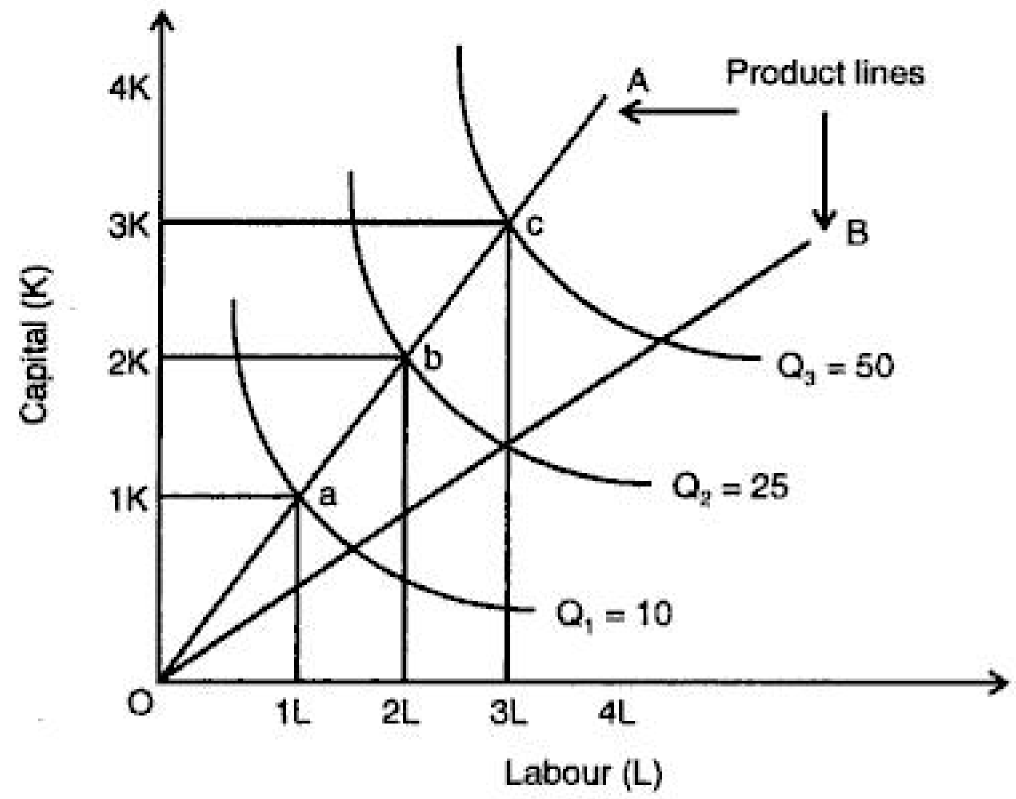

Fig. 12.9 Increasing Returns to Scale

In Eq. (12.6), the proportion h may be greater than, equal to or less than k. Accordingly, it shows the three laws of returns to scale.

(i) If $h = k$, the production function reveals ***consant returns*** to scale.
(ii) If $h > k$, the production function reveals ***increasing returns*** to scale.
(iii) If $h < k$, production function reveals ***decreasing returns*** to scale.

12.9.1 Cobb-Douglas Production Function[1] and Returns to Scale

We have used above a simple Cobb-Douglas type of *linear homogenous production function* to illustrate the laws of returns to scale. We will now use Cobb-Douglas production function to illustrate the laws of returns to scale. The Cobb-Douglas production function is given as

$$Q = A\,K^{\alpha}\,L^{\beta} \qquad (12.7)$$

(where A, α and β are positive constants and $\beta = 1 - \alpha$).

It is *important* to note here that exponent α gives the *elasticity of output with respect to capital* (i.e., change in output for one percent change in capital) and also the *relative share* of capital in the output. Similarly, exponent β gives the *elasticity of output with respect to labour* (i.e., change in output for one percent change in labour) and also its *relative share* in output.

Let us, now, illustrate the application of Cobb-Douglas production function for deriving the laws of returns to scale. Given the production function in Eq. (12.7), if inputs, K and L, are multiplied by a factor k, then Eq. (12.7) can be written as

$$hQ = A\,(k\,K)^{\alpha}\,(k\,L)^{\beta}$$

By factoring out k, as common factor, we get

$$\begin{aligned} hQ &= A\,k^{\alpha}\,k^{\beta}\,(K^{\alpha}\,L^{\beta}) \\ &= Ak^{\alpha+\beta}\,(K^{\alpha}\,L^{\beta}) \end{aligned}$$

or $$hQ = k^{\alpha+\beta}\,(A\,K^{\alpha}\,L^{\beta}) \qquad (12.8)$$

Eq. (12.8) gives the rules for the laws of returns to scale. Sine $Q = A\,K^{\alpha}\,L^{\beta}$, factor $h = k^{\alpha+\beta}$. From this relationship, one can derive the rules for the laws of returns to scale as follows.

(i) If $\alpha + \beta > 1$, $h > k$, the production function gives ***increasing returns to scale.***
(ii) If $\alpha + \beta = 1$, $h = k$, the production function gives ***Constant returns to scale.***
(iii) If $\alpha + \beta < 1$, $h < k$, the production function gives ***decreasing returns to scale***

For example, in a Cobb-Douglas production function of the form $Q = A\,K^{0.40}\,L^{0.75}$, the exponent $\alpha = 0.40$ and $\beta = 0.75$. The sum of exponents $(\alpha + \beta) = 0.40 + 0.75 = 1.15$. Since $(\alpha + \beta) > 1$, this production function shows ***increasing returns to scale.*** Likewise, in a production function $Q = A\,K^{0.25}\,L^{0.50}$, the sum of exponents $(\alpha + \beta) = 0.25 + 0.50 = 0.75$. Therefore, this production function shows ***decreasing returns to scale.***

It is important to note here that Douglas[2] found in his empirical study of the US manufacturing industries that, in most cases, $\alpha + \beta = 1$. However, the possibility that $\alpha + \beta = 1$ may not hold in all

---

1. The production function widely known as Cobb-Douglas production function was first developed by Paul A. Douglas in his book *The Theory of Wages* (Macmillan, NY, 1924). It was improved further by Charles W. Cobb and Paul H. Douglas in their paper "A Theory of Production", *Am. Eco. Rev.*, March 1928(Suppl.) and was used by Paul H. Douglas, 20 years later, in his paper "Are There Laws of Production", *Am. Eco. Rev.*, March 1948.

2. In his "*Are There Laws of Production?*" (*op. cit.*) Cobb-Douglas production function for US manufacturing in 1948, based on both time-series and cross-section data and estimated labour-elasticity (β) of output at 0.73 and capital-elasticity of output at 0.25. This makes $\beta + \alpha \cong 1$.

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$$MRTS = \frac{MP_L}{MP_K} = \frac{(MP_L)P}{(MP_K)P} = \frac{MRP_L}{MRP_K} \tag{13.5}$$

where MRP = marginal revenue productivity of the factor, and P = product price.

Thus, the least-cost criterion given in Eq. (13.3) can be put in terms of input and output price as

$$\frac{P_L}{P_K} = \frac{MRP_L}{MRP_K}$$

or

$$\frac{MRP_L}{P_L} = \frac{MRP_K}{P_K} \tag{13.6}$$

It may be inferred from Eq. (13.6) that ***the least-cost* or *optimal input combination* requires that the *MRP* ratios of inputs must be equal to their price ratios.**

13.4 MAXIMISATION OF OUTPUT WITH A GIVEN COST

In an alternative situation, a firm may be faced with a resource constraint and may seek to maximise the output. Like least-cost combination of inputs, there are ***first oder*** and ***second order conditions*** for maximising output under resource constraints.

The ***first order condition*** that must be fulfilled for maximising output is that the slope of the isocost must be equal to the slope of the isoquant. That is,

$$\frac{P_L}{P_K} = \frac{MP_L}{MP_K}$$

The ***second order condition*** that must be fulfilled is that the isoquant must be tangent to the isocost.

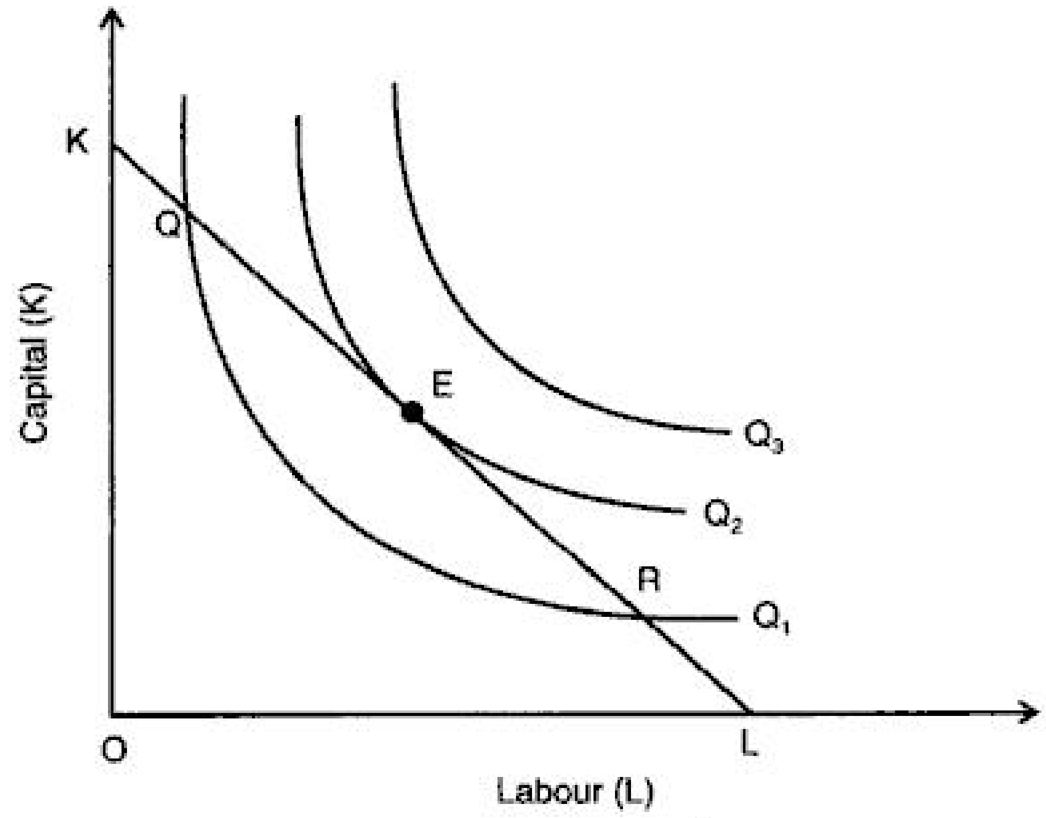

Fig. 13.4 Output Maximisation for a Given Cost

The output maximisation conditions are illustrated in Fig. 13.4. Both the first and the second order conditions are fulfilled at point E on the isoquant Q_2. Thus, Q_2 is the maximum output attainable under the given cost condition. Although the first order condition is fulfilled also at point Q and R

13.7 SUBSTITUTION AND RESOURCE EFFECTS OF CHANGE IN INPUT PRICES

In the preceding section, we have discussed the price effect of change in the relative price of inputs. There are, however, two effects of change in relative prices of inputs, viz., ***resource effect*** or ***budget effect*** and substitution effect. In this section, we illustrate the substitution and resource effects of a fall in the price of one input on a firm's choice of input combination.

In order to explain the effect of change in factor prices on the input combination, we assume

(i) P_K and P_L are given or, in other words, r and w are constant;
(ii) the total resources are indicated by isocosts KL (see Fig. 13.8); and
(iii) the firm's initial input combination is OK_2 of K and OL_1 of L, at point E on isoquant Q_1.

Given the initial conditions, let P_L decrease, while P_K remains constant, so that the relevant isocost is KW. The isocost KW is tangent to isoquant Q_2 at point N. At this point, the firm's new least-cost combination of inputs is $OK_1 + OL_3$. Thus, as a result of decrease in P_L, the firm reduces its K by K_1K_2 and increases L by L_1L_3. This change in input combination is the result of ***price effect***. The price effect is indicated by movement from point E to N. Note that when P_L decreases, the firm reduces its K by $K_1K_2 = EP$ and adds $L_1L_3 = PN$ to its labour input. Note that PN of L is much greater than EP of K is required to substitute output remaining the same. It means that total $PN(= L_1L_3)$ is greater than the substitution effect. The difference is ***budget effect***.

To find the budget **effect**, let us find out how muh additional labour will the firm employ, if its resources increase so that the firm reaches the isoquant Q_2, *inputs prices remaining the same*. This can be done by drawing an isocost parallel to KL and tangent to Q_2, as shown by isocost $K'L'$. The isocost $K'L'$ is tangent to isoquant Q_2 at point M. It means that if P_K and P_L remain constant and firm's resources increase, it will settle at point M where its input combination will be OK_3 of K and OL_2 of L. The change in labour employment, L_1L_2 is called ***budget effect*** or **resource effect**. If we deduct the budget effect on labour employment from the price effect, we get the substitution effect, as given below.

Substitution effect = Price effect – Budget effect
Since price effect = L_1L_3, and budget effect = L_1L_2
Substitution effect = $L_1L_3 - L_1L_2 = L_2L_3$.

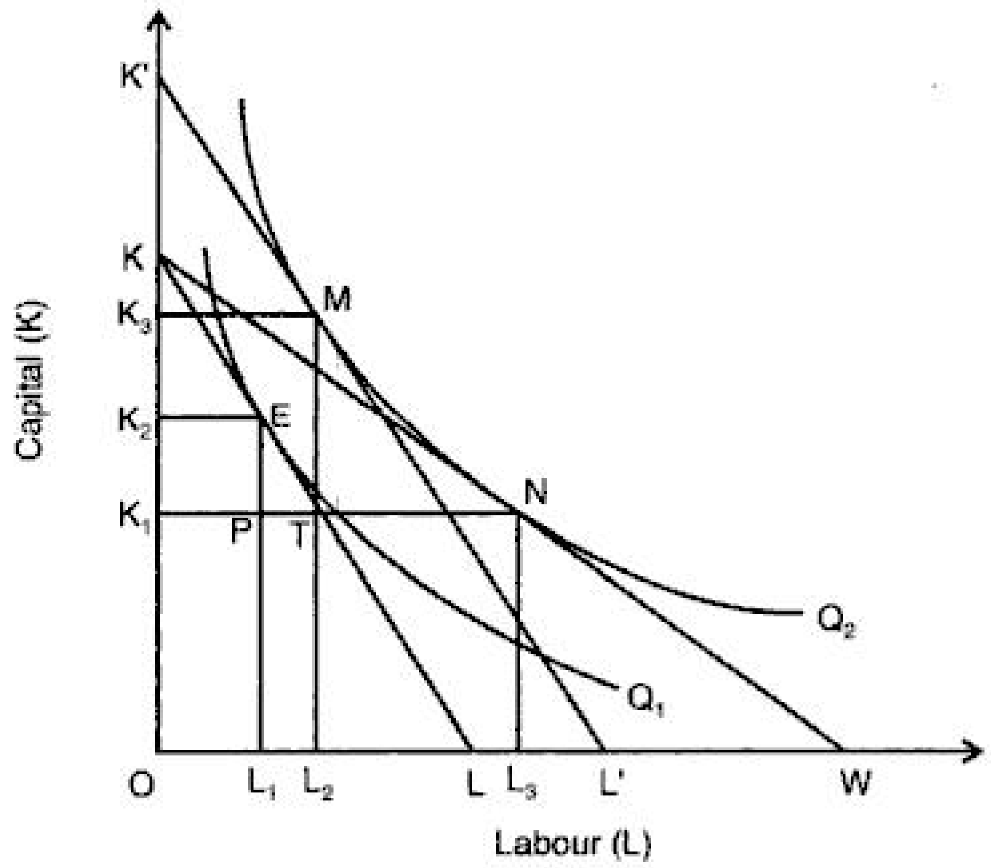

Fig. 13.8 Substitution Effect and Input Combination

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charged in the current business. ***Normal profit is a necessary minimum earning, in addition to alternative cost, which a firm must get to remain in its present occupation.***

3. Explicit and Implicit Costs

Explicit cost are those which fall under the actual or business costs entered in the books of accounts. The payments on account of wages, salaries, utility expenses, interest, rent, purchase of materials, licence fee, insurance premium and depreciation charges are the examples of explicit costs. These costs involve cash payments and are clearly reflected by the usual accounting practices. In contrast with these costs, there are certain other costs which do not take the form of cash outlays, nor do they appear in the accounting system. Such costs are known as ***implicit or imputed costs.*** Implicit costs is similar to opportunity cost. For example, suppose an entrepreneur does not utilise his services in his own business and works as a manager in some other firm on a salary basis. If he starts his own business, he foregoes his salary as manager. This loss of salary is an implicit cost of his own business. It is implicit because the income foregone by the entrepreneur is not charged as the explicit cost of his own business. The implicit cost includes implicit wages, implicit rent, implicit interest etc. Although implicit costs are not taken into account while calculating the loss or gain of the business, these costs do figure in business decisions.

4. Total, Average, and Marginal Costs

Total cost (TC) represents the value of the total resouces used in the production of goods and services. If refers to the total outlays of money expenditure, both explicit and implicit, on the resources used to produce a given output. The total cost for a given output is obtained from the cost function.

Average cost (AC) is of statistical nature, rather than being an actual cost. It is obtained simply by dividing the total cost (TC) by the total output (Q), i.e., TC/Q = average cost.

Marginal cost (MC) is the addition to the total cost on account of producing one additional unit of product. Or, marginal cost is the cost of marginal unit produced.

Total, average and marginal cost concepts, used in the economic analysis of the firm's productive activities, are discussed in detail in the following section.

5. Fixed and Variable Costs

Fixed costs are those which are fixed in volume for a certain given output. Fixed cost does not vary with the variation in the output betwen zero and a certain level of output. The costs that do not vary over a certain level of output are known as *fixed costs*. Fixed cost includes cost of (i) managerial and administrative staff; (ii) depreciation of machinery, building and other fixed assets; and (iii) maintenance of land. The concept of fixed cost is associated with short-run.

Variable costs are those which vary with the variation in the total output. Variable costs are functions of the output. Variable costs include direct labour cost, cost of raw materials, running cost of fixed capital, such as fuel, ordinary repairs, routine maintenance expenditure, and the costs of all other inputs that vary with output.

6. Short-run and Long-run Costs

Two other important cost concepts associated with variable and fixed cost concepts that often figure in economic analysis are short-run and long-run costs. ***Short-run costs*** may be defined as the costs which vary with the variation in output, the size of the firm remaining the same. In other words, short-run costs are the same as variable cost. ***Long-run costs***, on the other hand, may be defined as the costs

vertical upward shift of the *TVC* by *TFC*. The relationship between *STC* and output gives the ***basic principle of short-run cost theory***, i.e., ***given the fixed cost, STC increases initially at decreasing rates but it increases ultimately at increasing rates***. The factor behind this law will be discussed later.

14.4.2 Derivation of *AFC, AVC* and *AC* Curves

From cost analysis point of view, the relationship between output and *average costs* (viz., *AFC, AVC* and *AC*) is more important than the relationship between output and *total costs* (viz., *TFC, TVC* and *TC*). In this section, we will explain the method of deriving *AFC, AVC* and *AC*.

(i) Derivation of AFC curve. Fig. 14.2 illustrates the derivation of *AFC*. *AFC* is obtained by dividing *TFC* by *Q*. That is, $AFC = TFC/Q$. Since *TFC* remains constant, *AFC* decreases continuously as output (*Q*) increases. *AFC* decreases initially sharply and its rate of decrease goes on diminishing. This trend in *AFC* is shown by the *AFC* curve in Fig. 14.2. The *AFC* decreases with increase in output: it tends to be very low as output increases but it is never zero. Graphically, *AFC* is a *rectangular hyperbola*. It implies that $AFC \times Q = TFC$, at all the levels of output.

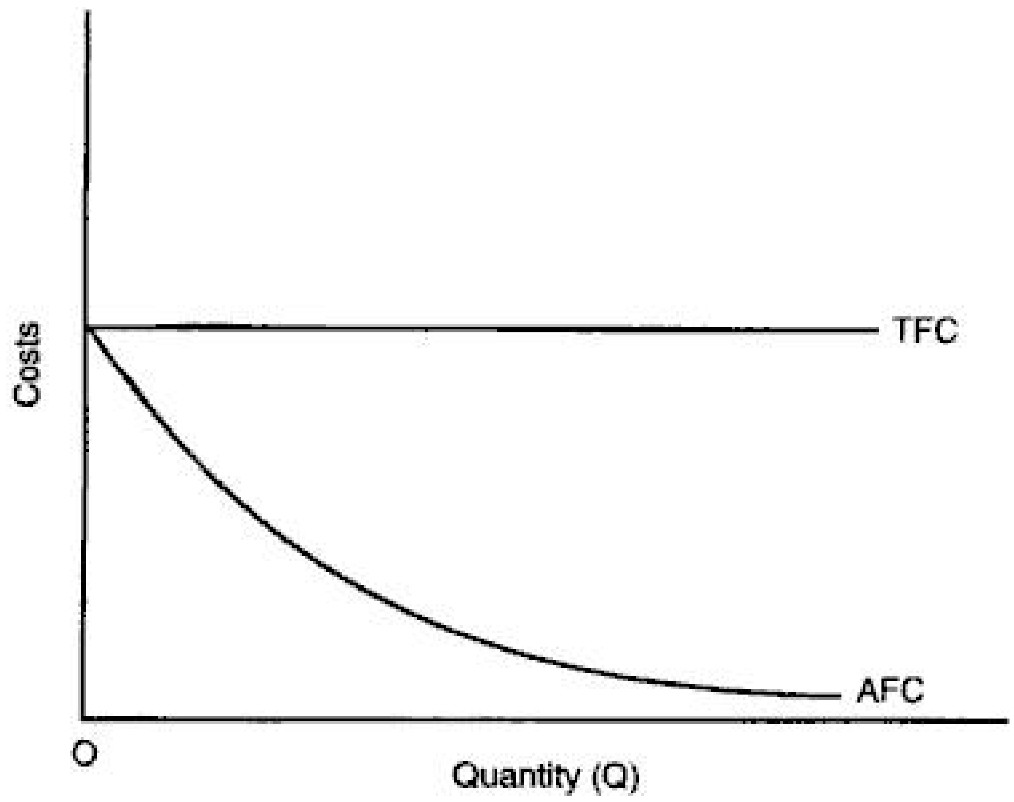

Fig. 14.2 Total Fixed and Average Fixed Costs

(ii) Derivation of AVC Curve. The average variable cost (*AVC*) curve can be derived graphically directly from the *TVC* curve as shown in Fig. 14.3. Note that the *TVC* curve in part (a) of Fig. 14.3 is the same as the *TVC* curve in Fig. 14.1. Graphically, *AVC* at any level of output, can be obtained by finding the *slope* of the line drawn from the chosen point on the *TVC* curve to the point of origin (*O*). For example, suppose we want to find *AVC* at output OQ_2. An ordinate drawn from point Q_2 meets the curve *TVC* at point *B*. If a line is drawn from point *B* to the point of origin (*O*), it gives the line *OB*. The slope of the line *OB* (a diagonal) give the *AVC* for output OQ_2. The slope of the diagonal *OB* is given by BQ_2/OQ_2. Since slope of the line *OB* equals *AVC*, we have

$$AVC = \frac{BQ_2}{OQ_2}$$

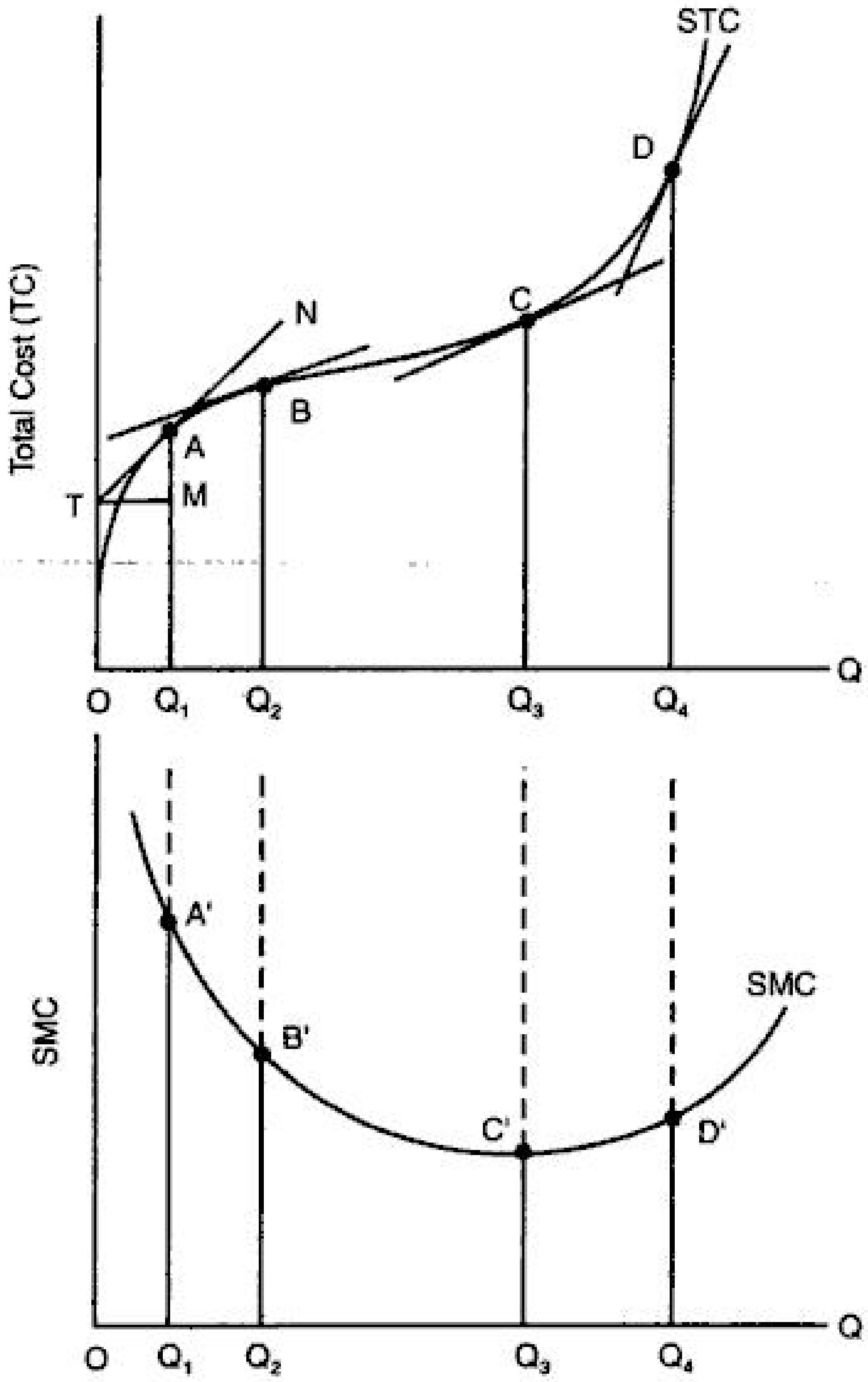

Fig. 14.5 Derivation of the SMC Curve

14.4.3 Relative Position of AFC, SAVC, SAC and SMC Curves

In the preceding sections, we have discussed and illustrated the derivation of short-run average cost curves (*AFC, SAVC* and *SAC*) and short-run marginal cost curve (*SMC*) in isolation of one another. What is more important in economic analysis is their relative position and behaviour. The *AFC, SAVC, SAC* and *SMC* curves are presented together in Fig. 14.6, showing their relative position and their behaviour in relation to one another. Of great importance is the relationship between (a) *SAC* and *SAVC*, and (b) *SAC* and *SMC*. In this section we put these cost curves together to show their relative position and behaviour.

(a) Relationship between SAC and SAVC. In can be seen in Fig. 14.6 that both these cost curves are U-shaped implying that these costs decrease in the initial stage of production and begin to increase in the later stage of production. This behaviour patern of the *SAVC* and *SAC* is attributed to the *law of diminishing returns*. There is, however, a difference in their behaviour. As Fig. 14.6 shows, the *SAVC* reaches its minimum at a lower level of output OQ_1 while *SAC* continues to decrease till output OQ_2. The reason is, the behaviour of *SAVC* is governed directly by the law of diminishing returns, whereas behaviour of the *SAC* is governed partly by the behaviour of *AFC* and partly by that of the *SAVC*. This

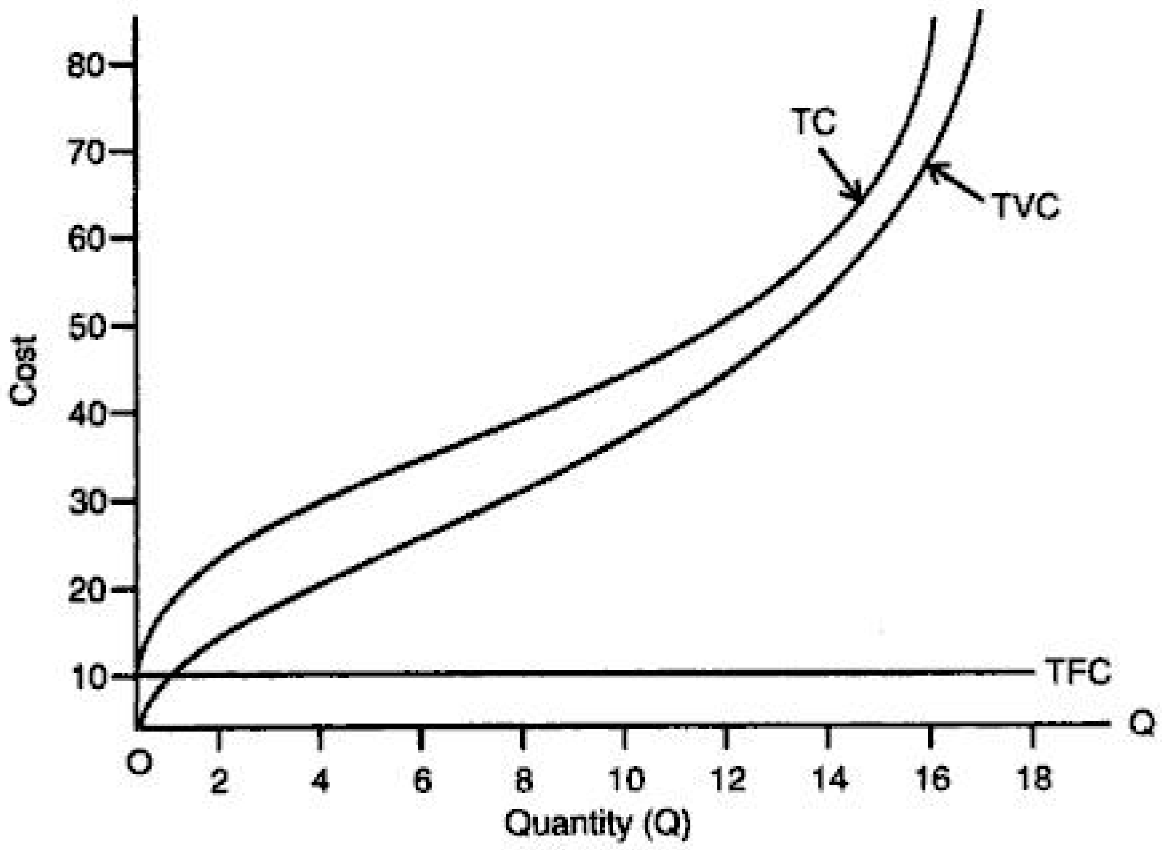

Fig. 14.7 TC, TFC and TVC Curves

(ii) Average variable cost (AVC). Given the *TVC* function (Eq. 14.3), *AVC* can be expressed as follows.

$$AVC = \frac{6Q - 0.9Q^2 + 0.05Q^3}{Q}$$

$$= 6 - 0.9Q + 0.05Q^2 \qquad (14.8)$$

Having derived the *AVC* function in Eq. (14.8), we may easily obtain the behaviour of *AVC* in response to change in Q. The behaviour of *AVC* for $Q = 1$ to 16 is given in Table 14.1 (col. 6), and graphically presented in Fig. 14.8 by the *AVC* curve.

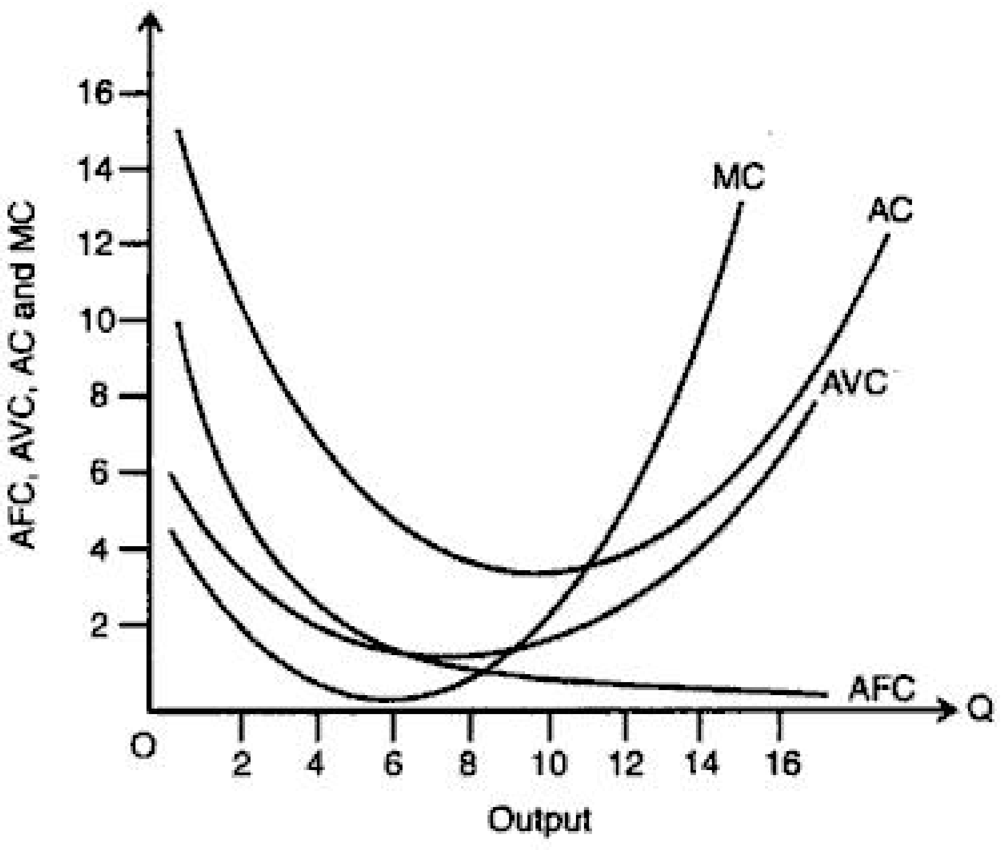

Fig. 14.8 Short-Run Cost Curves

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14.6.2 Derivation of Long-Run Average Cost (LAC) Curve

The derivation of the *LAC* is illustrated in panel (b) of Fig. 14.9. There are three *SAC*s corresponding to three *STC*s is panel (a). SAC_1 corresponding to STC_1 is given in panel (b) of the figure. The firm has its minimum SAC_1 equal to C_1Q_1 at output OQ_1. SAC_2 is related to STC_2. Note that *AC* of the second plant is lower than that of the second plant, as shown by the curve SAC_2 in panel (b) due to economies of scale (discussed in Section 14.7 of this chapter) when the second plant is added. One reason is that with the addition of the second plant, availability of capital per worker increases and productivity of labour increases, including workers employed in the first plant. Consequently, unit cost of output decreases, given the input prices. However, when the third plant is added, this kind of advantage is reduced. Therefore, SAC_3 does fall but less than SAC_2, and *SAC* begins to rise and it rises to C_3Q_3 after the inclusion of the third plant.

***The long-run average cost curve* (*LAC*)** can now be drawn by drawing a curve tangent to SAC_1, SAC_2, and SAC_3, as shown in Fig. 14.9 (b). The *LAC* curve is also called as **'Envelope Curve'**. It is also called as **'Planning Curve,'** as it serves as a guide to the entrepreneur in his planning to expand the production in future. A more general process of deriving 'Envelope Curve' is illustrated in Fig. 14.10.

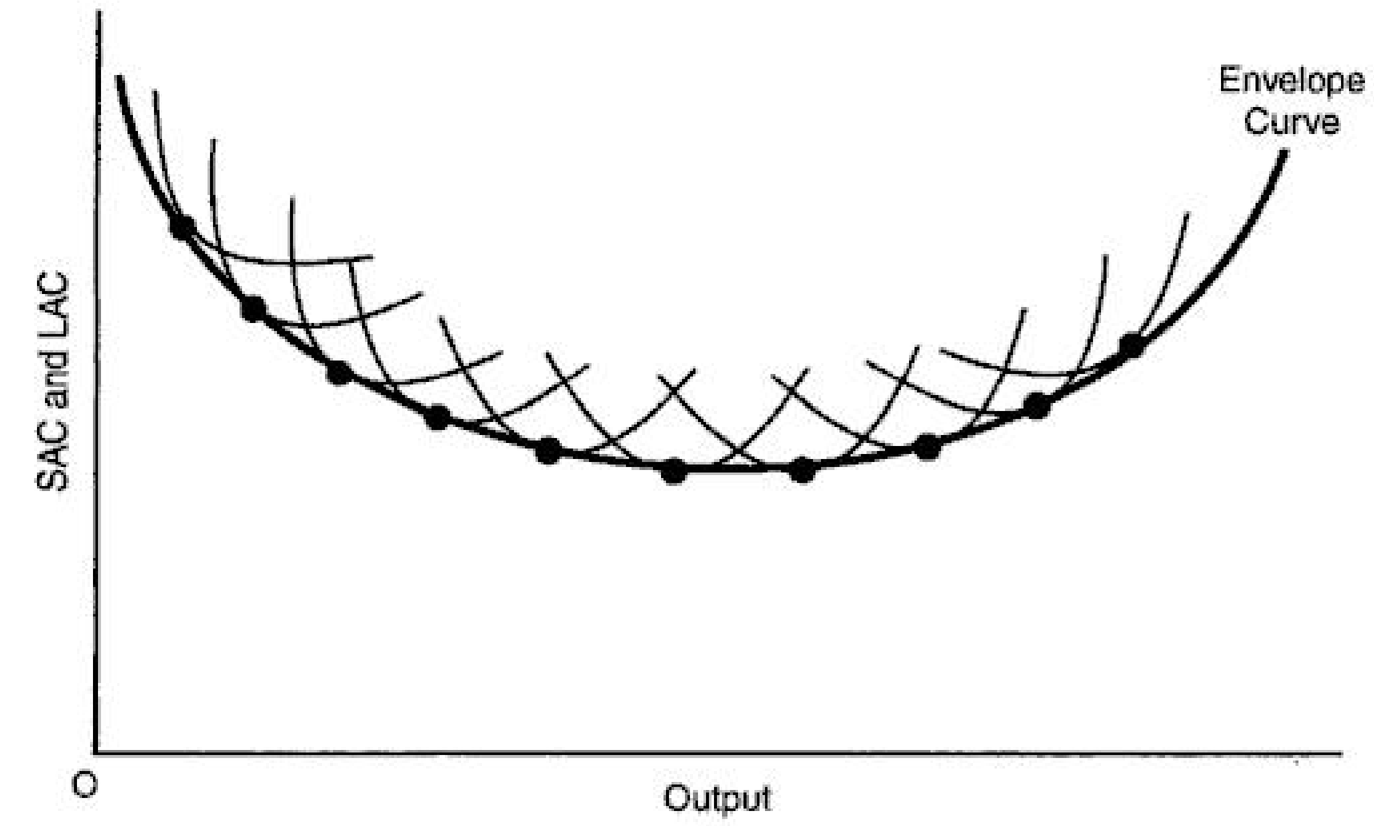

Fig.14.10 Derivation of Envelope Curve

The relationship between *LTC* and output and between *LAC* and output can now be easily inferred. As is obvious from the *LTC* Fig. 14.9(a), the long-run cost-output relationship is similar to the short-run cost-output relation. With the subsequent increase in the output, the *LTC* first increases at a decreasing rate, and then, at an increasing rate. As a result, *LAC* initially decreases until the optimum utilisation of the second plant. The addition of the third plant makes the *LAC* move upward because SAC_3 lies above the level of SAC_2. This trend in *LAC* implies that when the scale of the firm expands, per unit cost first decrease, but it increases ultimately as shown in Fig. 14.9(b). The decrease in per unit cost is the result of the internal and external economies and the eventual increase in cost, is caused by the internal and external diseconomies (discussed in Section 14.7 of this Chapter).

14.6.3 Derivation of Long-Run Marginal Cost (LMC) Curve

The long-run marginal cost curve (*LMC*) is derived from the short-run marginal cost curve (SMC_S). The derivation of *LMC* is illustrated in Fig. 14.11 in which *SAC*s and *LAC* are the same as in Fig.

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(iv) Economies in Transportation and Storage Cost

Economies in transportation and storage costs arise from fuller utilisation of transport and storage facilities. Transportation cost are incurred both on production and sales sides. Similarly, storage costs are incurred on both raw materials and finished products. The large-size firms may acquire their own means of transportation and they can thereby reduce the unit cost of transportation compared to the market rate, at least to the extent of profit margin of the transport companies. Besides, own transport facility prevents the delays in transporting goods. Some large-scale firms have their own railway tracks from the nearest railway point to the factory, and thereby they reduce the cost of transporting goods in and out. For example, Bombay Port Trust has its own railway tracks and oil companies have their own fleet of tankers. Similarly, large-scale firms can build their own godowns in the various centres of product distribution and can save on cost of storage.

B. External Economies

External economies are also called 'pecuriary economies'. External or pecuriary economies accrue to the expanding firms from the advantages due to conditions changing outside the firm. Pecuniary economies accrue to the large-size firms in the form of discounts and concessions on (i) large scale purchase of raw material, (ii) large scale acquisition of external finance, particularly from the commercial bank; (iii) massive advertisement campaigns; (iv) large scale hiring of means of transport and warehouses; etc. These benefits are available to all the firms of an industry—they are not specific to any one particular firm.

Besides, expansion of an industry invites and encourages the ***growth of ancillary industries*** which supply inputs and complementary parts. In the initital stages, such industries also enjoy the increasing returns to scale. In a competitive market, therefore, input prices go down. This benefit accrues to the expanding firms in addition to discounts and concessions. For example, growth of automobile industry helps the development of tyre industry and other motor parts. If Maruti Udyog Limited starts producing tyres for its cars and ancillaries, cost of Maruti cars may go up. Consider another example, growth of fishing industry encourages growth of firms that manufacture and supply fishing nets and boats. Competition between such firms and laws of increasing returns in the initial stages, reduce cost of inputs. This is an important aspect of external economies.

14.7.2 Diseconomies of Scale: Why LAC Increases

Diseconomies of scale are disadvantages that arise due to the expansion of production scale and lead to rise in the cost of production. Like economies, diseconomies may be internal and external. **Internal and external diseconomies** are those which are exclusive and internal to a firm—they arise within the firm. Internal diseconomies arise outside the firms, mainly in the input markets. Let us describe the nature of internal and external diseconomies in some details.

A. Internal Diseconomies

Like every thing else, economies of scale have a limit too. This limit is reached when the advantages of division of labour and potentials of managerial staff are fully exploited; excess capacity of plant, warehouses, transport and communication system, etc. is fully used; and economy in advertisement cost tapers off. Although some economies may still exist, diseconomies begin to overweigh them and costs begin to rise.

Managerial Inefficiency. Diseconomies begin to appear first at the management level. Managerial inefficiencies arise, among other things, from expansion of scale itself. With fast expansion of the production scale, personal contacts and communication between (i) owners and managers, and (ii) managers and labour, get rapidly reduced. Close control and supervision is replaced by remote

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traditional theory, there is no such built-in reserve capacity and therefore *SAVC* begins to rise once the technically efficient level of output is reached.

The SAVC and SMC curves

A more important aspect of the modern theory of cost is the nature of and relationship between the *SAVC* and the *SMC* curves. The derivation of *SAVC* and the *short-run marginal cost (SMC)* curves is illustrated in Fig. 14.14. The *SAVC* curve is the same as in Fig. 14.13. The *SMC* curve follows the pattern of the traditional theory. The *SMC* decreases with increase in output upto a certain level.

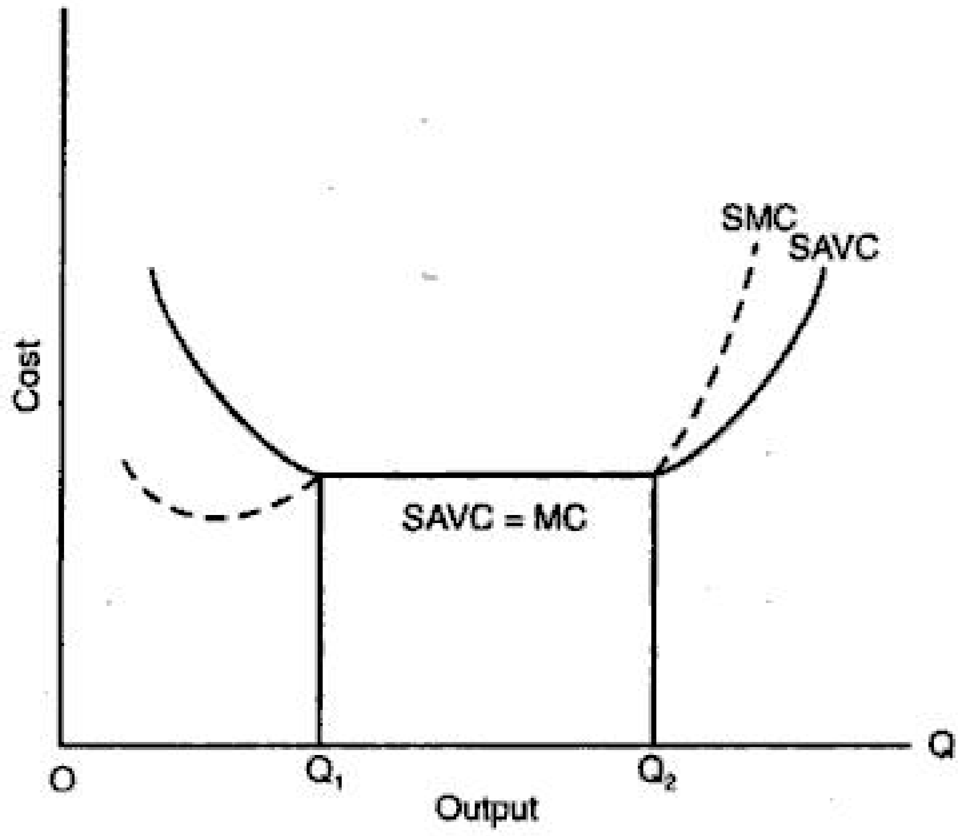

Fig. 14.14 Modern SAVC and SMC Curves

This behaviour of *SMC* curve is shown in Fig. 14.15 till the output OQ_1. However, in the range of output, between OQ_1 and OQ_2, the *SAVC* is constant. It is therefore equal to *SMC*. We know that when *SMC* begins to rise, it rises faster than *SAVC*. This behaviour of *SMC* is shown at output OQ_2 and beyond. Beyond output OQ_2, the *SMC* begins to rise and it rises faster than the *SAVC* as is the case in the traditional theory.

The Short-run Average Cost (SAC) Curves

As in traditional theory, in modern theory of cost, *SAC* = *AFC* + *SAVC*. The *AFC* includes *normal profit*. Derivation of the *SAC* curve in the modern theory is illustrated in Fig. 14.15. The *SAVC* curve (and also the *SMC* curve) is similar to one given in Fig. 14.14. For the derivation of the *SAC* curve, the *AFC* curve is added to Fig. 14.15. The *SAC* curve is the vertical summation of the *SAVC* and *AFC* curves.

As Fig. 14.15 shows, *AFC* falls continuously whereas *SAVC* decreases till output OQ_1 and remains constant between output OQ_1 and OQ_2. Therefore, a vertical summation of *AFC* and *SAVC* curves gives the *SAC* curve which declines continuously till output OQ_2. Thus, in modern theory of cost, *SAC* decreases until the *built-in reserve capacity* is fully exhausted. The *reserve capacity* is exhausted at output OQ_2. Beyond output OQ_2, therefore, *SAC* begins to increase and goes on increasing following the increase in *SAVC* while decreasing *AFC* loses its significance.

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REVIEW QUESTIONS AND EXERCISES

1. Distinguish between the following cost concpets.
   (a) Opportunity cost and actual cost;
   (b) Explicit cost and implicit costs;
   (c) Private and social cost; and
   (d) Short-run and long-run cost.
2. Suppose Mr. Dolittle carries out his own business and makes an annual average income of Rs. 12 lacs. For some market reasons, he expects his business income to go down to Rs. 10 lacs per annum with no hope to increase in future. Therefore, he decides to take up a manager's job in a multinational company which offered him a salary of Rs 90,000 per month. Find Mr. Dolittle's opportunity cost of his job as a manager.
3. Explain the meaning of and distinguish between the *AFC, AVC, AC* and *MC*. Illustrate graphially the relationship between these cost concepts. Why does *AFC* take the form of a hyperbola?
4. Illustrate graphically the derivation of *SAVC*curve from the *TVC* curve assuming a cubic cost function. At what point of the *TVC* curve is the *SAVC* minimum?
5. Illustrate graphically the derivation of *SAC* curve from the *TC* curve assuming a cubic cost function. At what point of the *TC* curve is the *SVC* minimum?
6. Define marginal cost. Show that $MC = \Delta TVC$. (Hint. $\Delta TFC = 0$).

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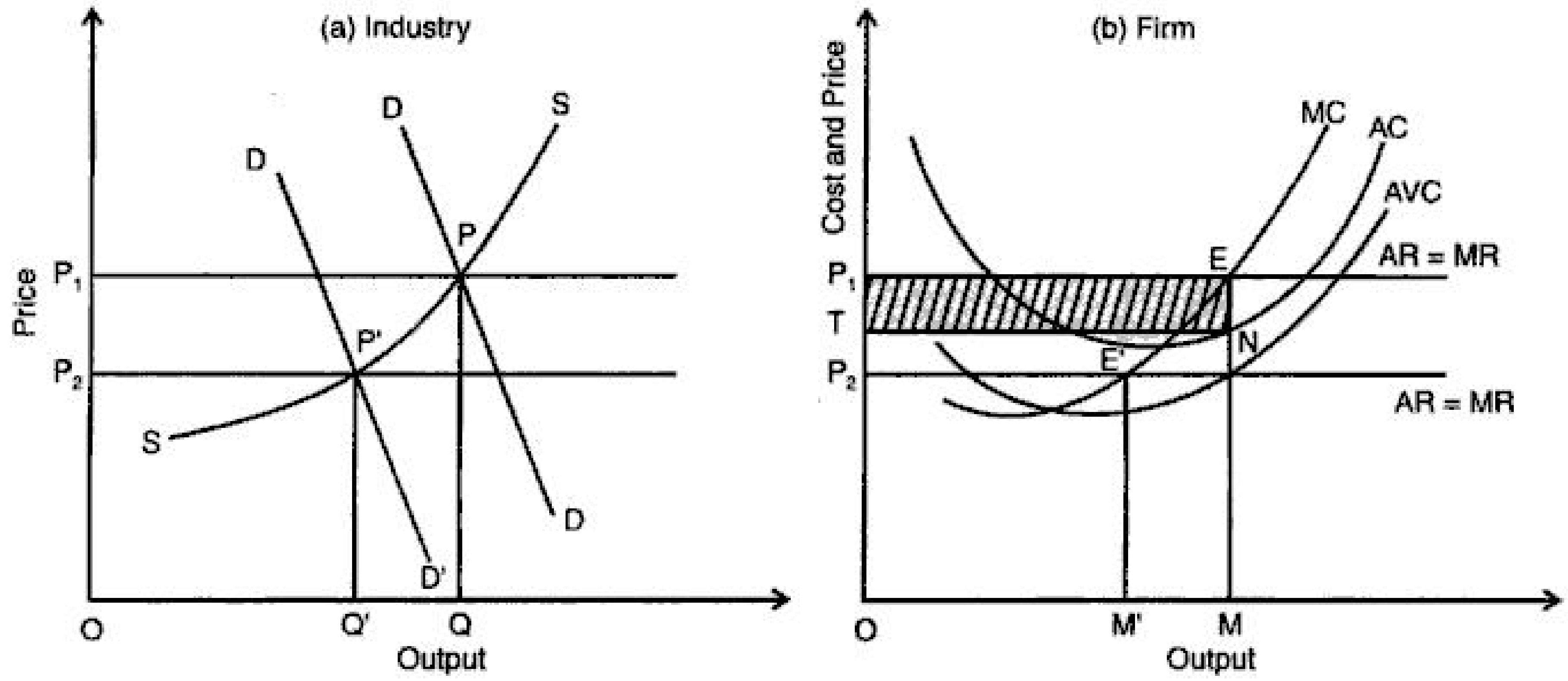

Fig. 16.8 Industry's Vs Firm's Equilibrium in the Short Run

16.6 LONG-RUN EQUILIBRIUM OF THE FIRM AND INDUSTRY

The short run is, by definition, a period in which (i) firm's cost and revenue curves are given, (ii) firms cannot change their size—their capital is fixed, (iii) existing firms do not have the opportunity to leave the industry, and (iv) new firms do not have the opportunity to enter the industry. In contrast, ***long-run*** is a period in which these constraints disappear. Long-run permits change in technology and employment of both, labour and capital, i.e., firms can change their size. Some of the existing firms may leave and new firms may enter the industry. In the long-run, supply curve not only shifts rightward but also becomes more elastic.

In this section, we will analyse the equilibrium of the firm and industry in the long-run. It should be noted at the outset, that the process through which firms and industry reach their respective long-run equilibrium, is a continuous process of adjustment and readjustment of price and output with the changing conditions in the long-run. The process of equilibrium of the firm and industry is presented in the panels (a) and (b) of Fig. 16.9.

16.6.1 Equilibrium of Firm in the Long-Run

To show the long-run equilibrium, let us begin with a short-run situation. Suppose (i) that short-run price is given at OP_1, in panel (a) of Fig. 16.9, and (ii) that firms' short-run cost curves are identical and are given by SAC_1 and SMC_1, as shown in panel (b). Given the price OP_1, firms are in equilibrium at point E_1. It can be seen in part (b) of Fig. 16.9 that the firms are making an abnormal profit of $E_1M = E_1Q_1 - MQ_1$ per unit of output. Abnormal profit brings about two major changes in the industry.

One, existing firms get incentive to increase the scale of their production. Their average and marginal costs go down caused by the economies of scale. This phenomenon is shown by SAC_2 and SMC_2. When we draw the *LAC* and *LMC* curves, these curves show decreasing costs in the long-run.

Two, attracted by the abnormal profit, new firms enter the industry increasing the total supply.

For these reasons, the industry supply curve, SS_1, shifts rightward to SS_2 [Fig. 16.9(a)]. The shift in supply curve brings down the market price to OP_2 which is the long-run equilibrium price. Thus, equilibrium price is once again determined for the industry.

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are *price takers*. In contrast, in a monopoly market, there is a single seller who has an absolute power to determine the price of its product: a monopoly is a ***price maker***. In this chapter, we will discuss:

(a) meaning and sources of monopoly power,
(b) price and output determination in the short and long runs,
(c) price discrimination by a monopoly firm,
(d) comparison of price and output under monopoly and perfect competition,
(e) government control of monopolies, and
(f) measures of monopoly power.

17.1 MONOPOLY AND SOURCES OF MONOPOLY POWER

17.1.1 Definition and Features

The word monopoly has been derived from Greek word *monos*, meaning 'alone' and *polein* meaning 'seller'. By definition, *monopoly is market situation in which there is a single seller of a commodity of 'lasting distinction' without close substitutes.*[1] A monopoly firm enjoys an absolute power to produce and sell a commodity. This, however, does not mean that a monopoly firm is absolutely free from any kind of competition. Monopoly firms too, have to face *indirect competition*, especially in regard to setting the price of the product. There are at least ***two potential sources of indirect competition***.

One potential source of indirect competition is the rivalry between monopoly good and other goods produced by other monopolies and competitive firms, for claiming a considerable share in consumers' budget. Therefore, a monopolist cannot charge any price for its product. For example, Delhi Vidyut Board (DVB), a public sector electricity producing and supplying company is at present a monopolist in Delhi. When it is privatized (which it is likely to be), it will have to take into account in its pricing policy, not only its cost of production and distribution, but also what people can afford after meeting such essential needs as food, clothing, shelter, education and medicine.

The ***second*** source of potential indirect competition comes from the availability and price of *inferior substitutes*. For example, consider again the case of DVB. In its pricing policy, DVB will have to take into account the availability and price of other sources of energy for lighting, cooking and cooling, e.g., diesel operated generator sets, cooking gas, etc. These substitutes are not close substitutes but their availability at a relatively lower price is in all probability likely to influence the pricing strategy of the DVB. Similarly, the Mahanager Telephone Nigam Limited (Delhi) still a monopolist in telecommunications, is facing competition from the cellphone companies: its monopoly power is considerably eroded. So is the case with Delhi Transport Corporation with increasing number of private operators of charted buses.

Given these problems confronting the monopolies, one can hardly find many cases of a ***pure*** or ***absolute monopolies***. However, notwithstanding these problems in defining an absolute monopoly firm, the discussion on price and output determination under monopoly confines, in general, to the case of a ***pure monopoly***, i.e., a monopoly firm enjoying absolute power in determining the price and output of its product.

Finally, an ***important feature*** of a pure monopoly is that a monopolized industry is a single-firm industry, i.e., there is no distinction between the firm and the industry. Therefore, there is no distinction between market demand curve and monopoly firm's own demand curve, i.e., the demand curve for the monopoly firm's product is same as the market demand curve.

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1. A close substitute is one whose cross-elasticity is positive and close to 1 or even greater than 1.

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17.3.3 Algebra of Profit Maximization: A Numerical Illustration

Price and output determination by monopoly in the short-run has been discussed above theoretically by *TR-TC* and *MR-MC* approaches and illustrated graphically. Now we illustrate the determination of equilibrium price and output by a monopoly firm through a numerical example assuming hypothetical demand and cost functions.

Let us suppose that demand and total cost functions of a monopoly firm are given as follows.

Demand function : $Q = 100 - 0.2\,P$ (17.4)

Cost function : $TC = 50 + 20Q + Q^2$ (17.5)

The problem before the monopoly firm is to find the profit maximising output and price. The problem can be solved as follows.

We know that profit is maximum at an output which equalizes *MR* and *MC*. So the first step is to find *MR* and *MC* functions from the demand and cost functions, respectively. We have noted earlier that *MR* and *MC* are the first derivation of *TR* and *TC* functions, respectively. *TC* function is given, but *TR* function is not. So, let us find *TR* function first.

$$TR = P\,.\,Q$$

Since *TC* - function is expressed in terms of *Q*, *TR* - function too needs to be expressed in terms of *Q* for the purpose of convenience in solution. This can be done by converting demand function in Eq. (17.4) into a price function as given below. Given the demand function (17.4), price function can be derived (See Section 17.3.1) and written as

$$P = 500 - 5Q \tag{17.6}$$

Since $P = 500 - 5Q$, by substitution, we get

$$TR = (500 - 5Q)Q$$

$$TR = 500Q - 5Q^2 \tag{17.7}$$

Now *MR* function can be obtained by differentiating the *TR*-function given in Eq. (17.7).

$$MR = \frac{\partial TR}{\partial Q} = 500 - 10Q$$

Likewise, *MC* function can be obtained by differentiating the *TC* function given in Eq. (17.6).

$$MC = \frac{\partial TC}{\partial Q} = 20 + 2Q$$

Now that *MR* and *MC* functions are known, profit maximising output can be easily obtained. The profit maximising output can be obtained by equating the *MR* and *MC* functions given above and finding the solution as shown below.

$$MR = MC$$

$$500 - 10Q = 20 + 2Q$$

$$480 = 12Q$$

$$Q = 40$$

The output $Q = 40$ is the profit maximising output.

Now profit maximising price can be obtained by substituting 40 for *Q* in the price function.

Thus, $P = 500 - 5\,(40)$

$= 300$

Profit maximising price is Rs 300.

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Pindyck, R.S. and Rubinfeld, D.L., *Microeconomics*, 5th Edn. (Prentice Hall International, London, 2001), Chapters 10 and 11.

Robinson, Joan, *The Economics of Imperfect Competition* (London, Macmillan, 1933), Chapters 2, 3, 15 and 16.

REVIEW QUESTIONS AND EXERCISES

1. What is monopoly? How does existence of a close substitute affect the monopoly power? What are the sources of monopoly?
2. How are the revenue and cost curves under monopoly different from those under perfect comeptition? How are *AR* and *MR* curves related to one another?
3. Write a note on the relationship between average revenue and marginal revenue under (i) perfect competition, and (ii) monopoly.
4. How is pricing under monopoly different from that under perfect competition? Can a monopoly firm fix any price for its product?
5. Explain the equilibrium of a monopoly firm in the short-run. Why is monopoly price always higher than the competitive price?
6. For a profit maximising monopoly, price is greater than marginal cost and it remains so over a large range of output. Why does then a monopolist not produce more than an output at which its $MC = MR$?
7. A monopoly firm may earn normal or abnormal profits or may even incur losses in the short-run. Do you agree with this statement? Give reasons for your answer.
8. Will a monopolist remain in business in the short-run if it is just covering its average variable costs? Explain with the help of a diagram.
9. When $MC = 0$, where does a monopoly firm set the price for its product? Why does it not fix its price where $e < 1$?
10. Would the monopolist ever operate on the inelastic portion of his demand curve? Explain your answer.
11. Suppose price charged by a monopolist at equilibrium is twice as high as its *MC*. What is the price-elasticity of demand?
12. "There is no supply curve of a monopoly firm". Do you agree with this statement? Give reasons.
13. Compare monopoly and perfect competition with regard to the following: (i) price, (ii) output, (iii) welfare cost, and (iv) relationship between *MC* and price.
14. Show the difference between the long-run equilibrium of a competitive firm and the long run equilibrium of a monopoly firm with regard to the following: (i) price, (ii) profits, (iii) use of capacity.
15. What is meant by "dead weight loss"? How is 'dead weight loss' measured? Why does it arise only under monopoly and not under perfect competition?
16. What is price discrimination? Explain and distinguish between the first, second and the third degrees of price discrimination. Which one makes a general case for price discrimination and why?

[**Hint:** $MR = P(1 - 1/e)$ and at equilibrium $MR = MC$]

[**Ans.** 35 (b), 36 (b), 37 (c), 38 (c), 40 (d) — supply curve does not exist), 15 (b)]

41. Suppose a monopoly firm sells it product in two different markets with their respective demand functions given as follows.

$$Q_1 = 500 - P_1,$$
$$Q_2 = 300 - P_2$$

Firm's total cost function is given as

$$TC = 50000 + 100Q$$

Find:

(a) profit maximising output,
(b) profit maximising price,
(c) prices for the two markets, and
(d) total profit at equilibrium.

42. Suppose demand function and total cost function (TC) for a monopoly firm are given as follows.

Demand function	:	$Q = 101.25 - 0.25P$, and
TC function	:	$TC = 40 + 5Q + Q^2$

Find:

(a) profit maximising output,
(b) profit maximising price,
(c) total revenue function, and
(d) average revenue function.

18 Price and Output Determination Under Monopolistic Competition

CHAPTER OUTLINE

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18.2 Monopolistic Competition: Definition and Characteristics
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 18.2.2 Characteristics of Monopolistic Competition
18.3 Basic Elements of Chamberlin's Theory of Monopolistic Competition
 18.3.1 Product Differentiation and Firm's Demand Curve
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 18.3.3 Concept of Industry and Product Groups
18.4 Firm's Equilibrium under Monopolistic Competition
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18.1 INTRODUCTION

In two preceding chapters, we have discussed the theory of price and output determination under perfect or pure competition and monopoly. The "theories of perfect competition and monopoly constituted the 'classical' microeconomic theory from Marshall to Knight"[1] and dominated the theory of value till the early 1920s. In the late 1920s and the early 1930s, however, economists expressed their dissatisfaction with perfect competition and pure monopoly models, as these models did not

1. C.E. Ferguson, *Micreconomic Theory*, 2nd Ed. (Richard D. Irwin, Illinois), p. 317.

represent the real world business behaviour. In reality, there were very few monopolies because there were very few commodities for which there were no close substitutes, and there were very few perfectly competitive markets because there were a very few homogeneous products. In today's business world, perfect competition and monopoly represent only two extreme and uncommon market structures. Such as it is, theories of perfect competition and monopoly could be applied to only two small segments of the markets at two opposite extremes.

Piero Shraffa[1] was one of the first to point out the limitations of perfect competition and pure monopoly models. He was followed by Hotelling[2] and Zeuthen[3] who claimed (i) that neither perfect competition nor monopoly represent the real business world, and (ii) that most common markets fall between the perfect competition and the monopoly. It was in this background that Edward H. Chamberlin[4] of Harvard University made a path-breaking contribution to the theory of value in 1933. Another important contribution to the theory value, as an alternative to Chamberlin's theory, was made by Joan Robinson[5] of the Cambridge University—six months later the same year. It is said that Chamberlin spent a lot of time and labour in pointing out the difference between his own and Joan Robinson's work.[6] Chamberlin's theory is, however, considered to be superior for its, at least, two significant contributions: (i) he introduced firms' practice of 'product differentiation' and its effect on the demand curve and the theory of pricing, and (ii) he included selling cost in his analysis as an element of competition and its effect on firm's cost curves and equilibrium.

In this chapter, we will explain the basic elements of the theory of price and output determination as expounded by Chamberlin.

18.2 MONOPOLISTIC COMPETITION : DEFINITION AND CHARACTERISTICS

18.2.1 Definition of Monopolistic Competition

By definition, ***monoplistic competition refers to a market structure in which a large number of sellers sell differentiated products which are close substitutes for one another.*** Incidentally, a *close substitute* is one whose cross-elasticity is close to unity or greater. *Monopolistic competition* combines the basic elements of both perfect competition and monopoly.

The ***element of monopoly*** in monopolistic competition arises from the fact that each firm has an absolute right to produce and sell a branded or patented product. Other firms are prevented by laws from producing and selling a branded product of other firms. This gives a firm *monopoly power* over production, pricing and sale of its own banded product. For example, consider toilet soap industry. There are a number of brand names available in the market — Lux, Liril, Hamam, Palmolive, Fairglow, Pears, Fa, Rexona, Lifebouy, Carmel, Godrej, Cinthol, Ponds, OK, Dettol, etc. Each of these branded toilet soaps is produced and sold by a company having monopoly power over the product. Similarly, Maruti Udyog Ltd has monopoly power for producing and selling cars under

1. Piero Shraffa, "The Laws of Returns under Competitive Conditions", *Eco., Jl.*, 1929, pp. 41-57.
2. Harold Hotelling, "Stability and Competition", *Economic Journal*, 1929, pp. 41-57.
3. Zeuthen, A., *Problems of Monopoly and Economic Welfare*, Routledge, London, 1930).
4. Edward Hasting. Chamberlin, *The Theory of Monopolistics Contribution: A Re-Orientation of the Theory of Value* (Harvard University Press, Mass., 1933).
5. Joan Robinson, *The Economics of Perfect Competition* (Macmillan, London, 1933).
6. Joan Robinson is said to have expressed her regret, "I'm sorry I ruined his life" (quoted in Maddala, G.S. and E. Miller, *Microeconomics: Theory and Applications*, (McGraw-Hill, NY, 1989, p. 375 fn).

the brand name Maruti. No other car manufacturing company can produce and sell cars under this brand name.

The ***element of competition*** comes from the fact that each branded product is a close substitute for another and firms selling branded products of the same generic category have to compete for the market share. Considering again our example of tiolet soaps. All the companies producing and selling these branded toilet soaps are in intensive competition for capturing the largest possible market share. One index of the competition between them is the amount that they spend on advertising their product. These features of the toilet soap industry make it monopolistically competitive. Toothpaste industry with a number of branded product names (Binaca, Colegate, Close-up, Pepsodent, Forhans, Cibaca, Neem, Meswak, Signal, Promise, Prestige, etc.) is another example of monopolistic competition. So is the case with major industrial products in India, e.g., electrical tubes and bulbs, TV sets, refrigerators, air-conditioners, personal computers, textile goods, tea, coffee, cigarettes soft drinks, cold creams, shampoos, detergents, shaving blades, shaving cream, hair oils, hair dyes, shoes, wrist wa 'ches, steel, cement, mobile phones, and so on.

Some of the industries looking monopolistically competitive may be oligopolistic in which there are only a few sellers. The question as to what makes a market monopolistically competitive or oligopolistic will be taken up later in the next chapter which deals with *oligopoly markets*. Let us now know look at the general characteristics of monopolistic competitions.

18.2.2 Characteristics of Monopolistic Competition

As mentioned above, monopolistic competition combines the elements of both perfect competition and monopoly power. Therefore, the main characteristics of monopolistic competition are the blend of perfect competition and monopoly. The main features of monopolistic competition vis-s-vis perfect competition and monopoly are described below.

1. Product differentiation. Product differentiation is the basis of and the main distinctive characteristic of monopolistic competition that distinguishes it from monopoloy and perfect competition. In case of monopoly, there is only one product and only one seller, and under perfect competition, a large number of sellers sell *homogeneous product*. Under monopolistic competition, the firms differentiate their products from one another in respect of their shape, size, colour, design, minor qualitative differences, efficiency is use, some extra facility, packaging, after-sale-service, guarantee and warrantee, etc. Product differentiation may be real or fanciful and spurious.[1] The basic purpose of product differentiation is to make the consumers believe that a product is different from others and, thereby, to create brand loyalty of the consumers. Product differentiation affects firm's demand curve in a significant way, as discussed in section 18.2.3.

2. Large number of sellers. Under monopolistic competition, the number of sellers is *large*. How large? It is difficult to specify number of firms: it may be anywhere 10-20 *plus* depending on the size of the market. However, the question 'how large' can be answered in conceptual terms with reference to perfect competition. Under perfect competition, the number of sellers is so large that a firm becomes a *price taker*. In contrast, under monopolistic competition, the number of firms is only so large that a firm retains its power to be a *price maker*. The monopolistically competitive firms have the power to set the price of their product depending on the objective of the firm.

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[1] For example, toothpaste companies make high claims of removing bad breath, strenghtening gums, making teeth sparkle and so on whereas dentists claim that brushing teeth with plain water is as good as brushing with any toothpaste. Similarly, in spite of high claims of anti-dandruff shampoos, no body is known to have got rid of dandruff even after using the costliest ones year after year.

3. Free entry and free exist. As in case of perfect competition, there is no barrier on the entry of new firms and exit of old ones from the industry. New firms are free to enter the monopolistically competitive industry and to quit at will. Entry of new firms reduces the market share of the existing ones and exit of firms does the opposite. These consequences of free entry and free exit lead to intensive competition among the firms for both retaining and increasing their market share.

4. Selling costs. Unlike firms under perfect competition and monopolies, firms under monopolistic competition make heavy expenditure on advertisement and other sales promotion schemes for their product. This is an important feature that distinguishes monopolistic competition from perfect competition and monopoly. *Selling costs* include all the expenditure on advertisement, sales promotion schemes, and salaries of sales personnel. Selling costs and their effect of firm's equilibrium will be discussed below in detail.

5. Downwad sloping demand curve. As in case of monopoly, a monopolistically competitive firms faces a downward sloping demand curve. The reason is that a monopolistically competitive firm can, by exercising its monopoly power, increase its price and still retain some buyers with brand loyalty and can increase the demand for its product by decreasing the price because of a relatively higher cross-elasticity of the competitive product.

18.3 BASIC ELEMENTS OF CHAMBERLIN'S THEORY OF MONOPOLISTIC COMPETITION

In the rest of this chapter, we will be concerned with Chamberlin's theory of monopolistic competition. For a better comprehension of his theory, it is essential to understand the implications of the following three basic elements of monopolistic competition as defined by Chamberlin.

(i) Product differentiation and firm's demand curve;
(ii) Selling costs and firm's cost structure, and
(iii) Product differentiation and the concept of industry

These aspects of monopolistic competition are briefly discussed below.

18.3.1 Product Differentiation and Firm's Demand Curve

Product differentiation is the basis of competition among the monopolistically competitive firms. Chamberlin has defined ***product differentiation*** in the following words. "A general class of product is differentiated if any significant basis exists for distinguishing the goods (or services) of one seller from those of others. Such a basis may be real or fancied, so long as it is of any importance whatever to buyers, and leads to a preference for one variety of product over another. Differentiation may be based upon certain characteristics of the product itself, such as exclusive patented features, trade marks, trade names, peculiarities of the package or container, if any, of singularity in quality, design, colour or style. It may also exist with respect to the conditions surrounding its sales. In retail trade, these conditions include such factors as the convenience of the seller's location, the general tone or character of his establishment, his way of doing business, his reputation for fair dealing, courtesy, efficiency, and all the personal links, which attach his customers either to himself or to those employed by him."[1]

Thus, the basic purpose of product differentiation is to make customers distinguish the product of a firm from those of the others in the industry and to develop a preference or band loyalty. Once brand loyalty is developed, it alters the course of the demand curve for the product. In the ultimate

1. Chamberlin, E.D., *Theory of Monopolistic Competition: A Re-Orientation of the Theory of Value (OUP)*, 7th Edn., 1956, p. 56.

analysis, ***product differentiation aims at changing the slope and position of the demand curve for the product and from converting it from a horizontal demand line (as under perfect competition) to a downward sloping demand curve.*** The downward sloping demand curve gives the firm power to use his discretion in changing the price of his product.

What is more important in regard to inter-firm competition, with product differentiation, each firm perceives that the demand curve for its own product is more elastic than that of the rival firms. This aspect is illustrated in Fig. 18.1. Suppose industry's demand curve (i.e., market demand curve) is given by the curve D_M. If industry demand is proportionately divided between the firms, each firm is supposed to have a demand curve shown by D_F.

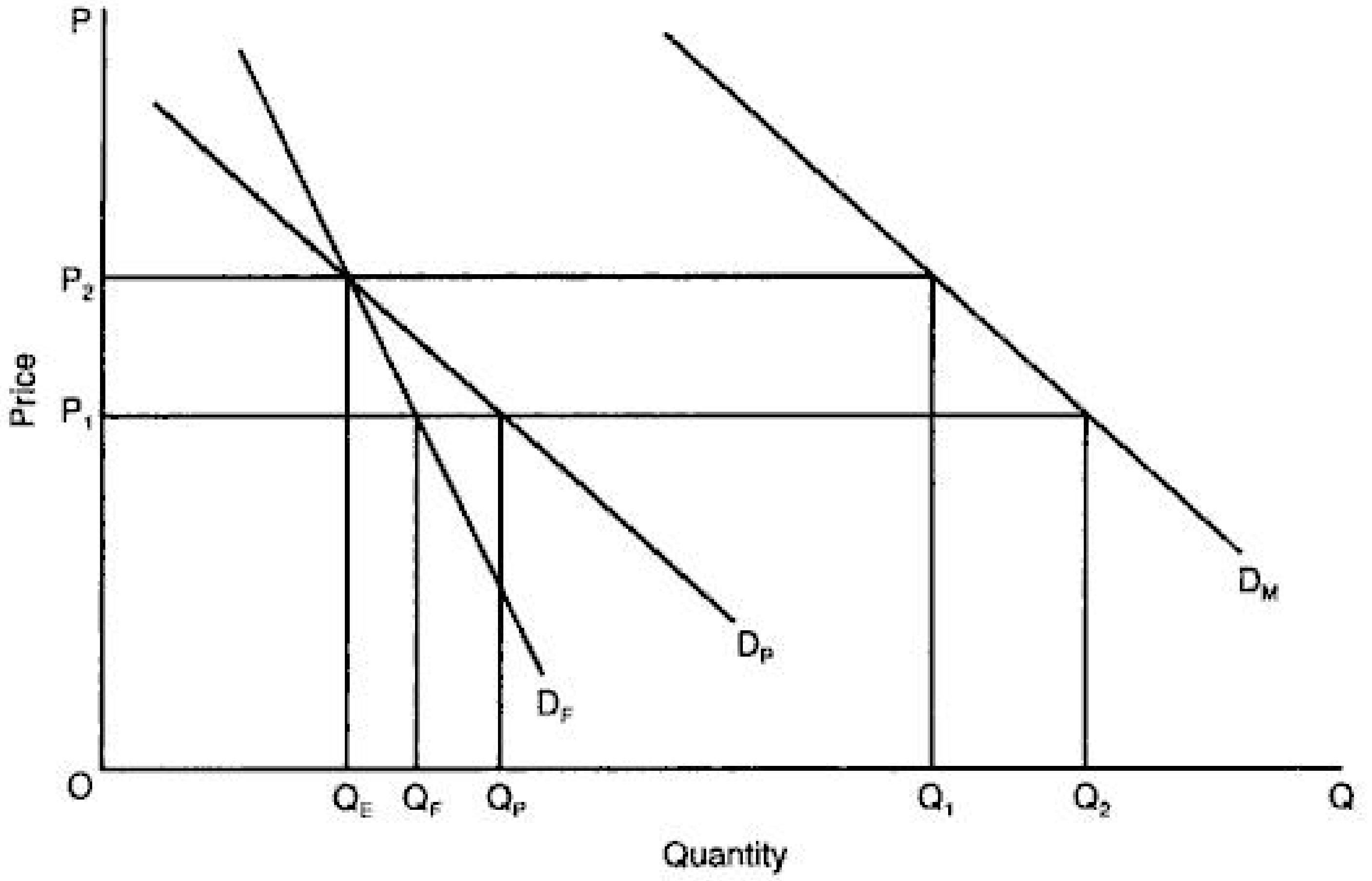

Fig. 18.1 Demand Curves for the Industry and the Firms

However, firms under monopolistic competition do not take it to be the demand curve for their individual product. Each firm perceives that the demand curve for its own product is *more elastic* than that of the other firms. Its *perceived demand curve* is shown by the demand curve D_P. Note that the *perceived demand curve*, D_P, is more elastic than the demand curve D_F. The basis of the perceived demand curve is the firm's belief that if it changes the price of its own product, it will go unnoticed by the other firms and they will not react to change the price of their products. The reason for this assumption is the firm's belief that the number of firms is so large that price changes made by a single firm is very much likely to go unnoticed by the rival firms.

The concept of the *perceived demand curve* can be explained as follows. Given the industry demand curve D_M in Fig. 18.1, if price for the industry (the "product group") is given at OP_2, the demand for the industry as a whole will be OQ_1, each firm selling an equal quantity OQ_E. Given this price-quantity combination, an individual firm perceives that if it cuts down the price of its own product to OP_1, the other firms will not change their price, then the demand for its product will increase by Q_EQ_P, not by Q_EQ_F. The additional increase in the demand for its product is the result of cross elasticity, i.e., when one firm decreases its price and other firms do not, its product becomes relatively cheaper. Since products of all the firms are close substitutes for one another, some customers switch over from the constant-price products to the product which has a lower price. Similarly, if only one firm increases its price, it looses its customers to other firms. As a result, demand for its poduct decreases more than indicated by the demand curve D_F. This holds for all price changes and gives rise to a perceived demand curve D_P. The perceived demand curve plays a significant role in price and output determination in Chamberlin's theory of monopolistic competition with price competition. This aspect is discussed furthur in a following section.

18.3.2 Selling Costs and Firm's Cost Structure

Introduction of selling costs in the theory of price and output determination under monopolistic competition is another innovative contribution made by Chamberlin. He defines 'selling costs' as "costs incurred in order to alter the position or the slope of the demand curve for a product."[1] Chamberlin's concept of selling costs is not exactly the same as advertisement cost[2]: it is advertisement cost plus. By Chamberlin's definition, selling costs include:

(i) cost of advertisement,
(ii) expenditure on sales promotion schemes (including gifts and discounts to buyers),
(iii) salary and commission paid to sales personnel,
(iv) allowance to retailers for displays, and
(v) cost of after-sale-services.

Also, Chamberlin distinguishes *selling costs* and *production cost* on the basis of their basic purpose and functions. According to Chamberlin, costs that are incurred to create a product or service of utility and making it available to the consumers are *production costs*. In Chamberlin's perception, production cost includes also the cost of transportation. The basic function of the production cost is to create a commodity and to make it available to the consumers. The selling costs, on the other hand, perform the following functions:

(i) informing potential buyers about the availability of the product,
(ii) increasing demand for the product by attracting customers of the rival products, and
(iii) to make the demand curve shift upward.

What is more important in price and output determination is the effect of selling costs on the total cost that figure in pricing decisions. In his model of monopolistic competition, Chamberlin assumes the traditional U-shaped cost curves—*AC*, *AVC* and *MC*—and also a U-shaped *average selling cost (ASC)* curve. *ASC* is defined as *SC/S* (where *SC* = *selling costs* and *S* = *sales*). The U-shaped *ASC* curve is illustrated in Fig. 18.2.

As the figure shows, the *ASC* first decreases until it reaches its minimum and then begins to increase. In the beginning, it is very high because a little selling cost (or advertisement cost) is a waste. With increase in selling costs, sales increase at a rate higher than the rate of increase in selling costs. As a result, *ASC* decreases. The decrease in *ASC* is attributed to 'increasing returns' to advertising and *economies of scale* in advertisement cost.[1] It must, however, be noted that returns to selling cost is determined by the following factors:

(i) *price of the product* — a high price makes selling cost less effective;
(ii) *price of the substitute* — a lower price of the substitutes makes selling cost less productive;
(iii) *buyers' income* — advertising a costly product in low-income society has no pay-off; and
(iv) *buyers' loyalty to rival brands* — the stronger the loyalty, the lower the cross-elasticity and the less effective the selling cost.

1. Chamberlin, E.D., *op. cit.*, p. 56.
2. However, in Chapter VII of this book, he has used "advertising" often as 'synonymous with selling cost' (see p. 130, f.1).
3. Chamberlin, E.D. pp. 132-33.

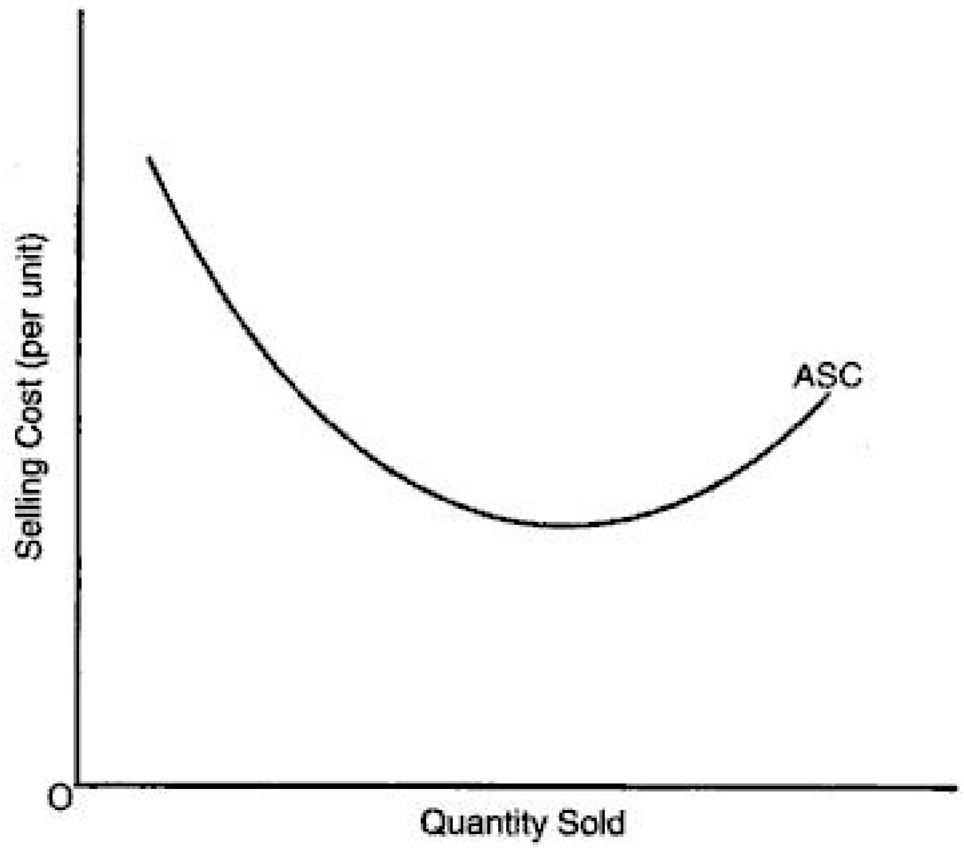

Fig. 18.2 The Average Selling Cost Curve

However, even if all these factors are favourable, a stage is finally reached when returns to selling costs, especially to advertisement cost, tends to become constant. This is the stage of saturation. The stage of saturation may be marked by the size of the market and/or competitive advertisement by the rival firms. Increasing selling costs or advertisement cost at the stage of saturation tends to become less and less effective in attracting more buyers. Therefore, sales increase at a much lower rate than the increase in the selling costs. Consequently, *ASC* begins to increase and goes on increasing. This is how *ASC* gets its U-shape. The *ASC* curve is added to the *AC* curve in determining the profit maximising level of output and price. This aspect is discussed in the next section.

What is the Optimum Level of Advertising Cost?

Given the nature of the *ASC* curve (in Fig. 18.2), a question arises: What is the optimum level of advertising cost? The optimum level of advertising cost is determined by the objective of the firm — whether it is profit maximisation, retaining market share or countervailing the advertisement by the rival firms. Optimisation of advertising expenditure is illustrated in Fig. 18.3 under the following assumptions.

(i) objective of the firm is to maximise its profit;
(ii) price of the product is given[1];
(iii) average production cost (*APC*) and *MPC* curves are given; and
(iv) average selling cost (*ASC*) is also known.

Under these conditions, the optimum level of selling cost is determined where the firm's overall marginal cost (*MC*) including 'marginal cost of production' (*MCP*) and marginal cost of advertising equals the price. Since price is given by assumptions, *price* = *MR*.

The price of the product is given at *OM* and firm's *APC* is shown by the curve *APC*. The firm's *APC* curve added vertically with *ASC* curve (not given in the figure) is shown by the curve labelled

1. This assumption is made to avoid complications arising out of change in price due to price competition (see Chamberlin, pp. 130-31).

APC + *ASC*. The vertical distance between the *APC* and *APC* + *ASC* measures the *average selling cost (ASC)*. Finally, firm's overall *MC* (associated with *APC* + *ASC*) is shown by the *MC* curve.

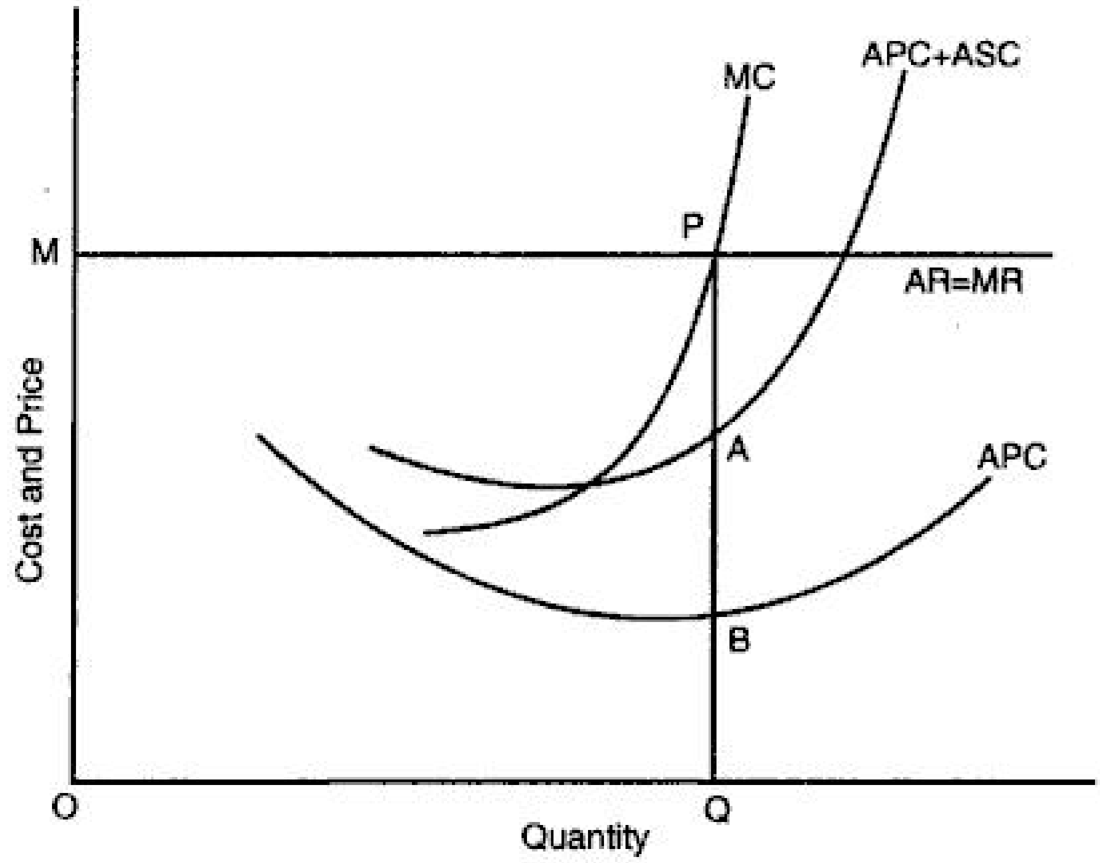

Fig. 18.3 Optimization of Selling Cost

As Fig 18.3 shows, price line, *AR* = *MR*, and *MC* curve intersect at point *P*. An ordinate drawn from point *P* to the quantity axis determines the profit maximizing output at *OQ*. Once profit-maximizing output is determined, the optimum level of all costs (given the cost curves) is automatically determined. It can be seen in Fig. 18.3 that at profit maximizing output *OQ*, price equals $PQ = BQ + AB + AP$. Note that at output *OQ*, average selling cost (*ASC*) equals *AB*. That is, at the profit maximizing level of output, average advertising cost equals *AB*. Therefore, *AB* is the *optimum average selling cost (ASC)*. The total optimum selling cost or advertisement expenditure can be obtained by multiplying *ASC* with output *OQ*. That is, *total optimum advertisement expenditure* = $OQ \times AB$.

18.3.3 Concept of Industry and Product Groups

An industry under perfectly competitive conditions is defined as a group of firms producing a homogeneous product. But, this concept of industry cannot be applied to the cases where products are differentiated. Where products are differentiated—slightly or substantially—each firm is, in a sense, an industry in itself, exactly as a monopoly firm is an industry in itself. The heterogeneity of the products, therefore, causes a problem in analytical treatment of the industry. Problem arises because ***industry demand curve under monopolistic competition is not the same as under perfect competition***. Since under perfect competition, product is homogeneous, demand curve for an industry can be obtained by adding individual demand curve of individuals firms. But, under monopolistic competition, product is made heterogoneous through product differentiation techniques and in case of heterogeneous products, the demand for individual products cannot be added to obtain market demand and supply curves.

For the reason given above, Chamberlin defines the monopolistically competitive industry as a 'group' of firms producing a 'closely related' commodity, called ***product group***. The products of the 'group' must be *close, technological and economic substitutes*. The two products are ***technological substitutes*** for each other if they technically satisfy the same want, e.g., soaps, cigarettes, toothpastes, automobiles, TV sets, etc. The two products are considered as ***economic substitutes*** for each other when they satisfy the same want and have *more* or *less* the same price. For example, all black-and-white TV sets of different brands are economic substitutes for one another. But black-and-white TV sets are not economic substitutes for colour TV sets since their prices are widely different but they are technological substitutes.

Operationally, the product group may be defined as the group of firms whose products have between themselves high *price elasticity* and high *cross-elasticities*. This definition, although theoretically plausible, involves the problems of measuring cross-elasticities and of determining its degree that can make a commodity admissible to the group. Determining the product group, therefore, involve subjective judgement.

18.4 FIRM'S EQUILIBRIUM UNDER MONOPOLISTIC COMPETITION

In this section, we will discuss Chamberlin's theory of equilibrium price and output determination under monopolistic competition and how firms in monopolistic competition find their equilibrium. He prefaces his theory with a comparison of price and output choices under pure competition and monopoly and under monopolistic competition. He points out that under pure competition, firms selling homogeneous products are given a price at which they can sell any quantity they desire. Advertising by the individual firm is of no consequence: it is rather a waste. A monopoly facing a downward sloping demand curve has the power of discretion in respect of price and quantity to be sold. However, given the demand curve, it can choose either price or output, not both. Advertising by a pure monopoly is of little consequence. Under monopolistic competition, however, a firm can alter its sales prospects by the following *three methods:*

(i) by changing the price of its product;
(ii) by changing 'the nature of the product'; and
(iii) by incurring the advertisement outlays.

As to changing price, since a firm under monopolistic competition faces a downward sloping demand curve with elasticity less than infinity, it has the option to change the price. In regard to changing the nature of the product, a firm can do it by changing the quality of its product by making technical changes, introducing a new design, use of superior material, by a new style of packaging, by establishing a close link with buyers, and so on. Besides, a firm can increase its sales by prompt and courteous service, credit facilities, and by enhancing expenditure on advertisement. While making changes in price and output is a short-run phenomenon, changing the quality of the product and attracting larger number of buyers are long-run phenomena. Therefore, Chamberlin's theory of price and output determination is discussed under ***short-run*** and ***long-run*** conditions.

Assumptions

Chamberlin has made the following ***explicit*** and ***implicit*** assumptions to develop his theory of monopolistic competition.

(i) There is a large number of firms selling slightly differentiated products which are close substitutes for one another.
(ii) The number of firms in a product group is so large that their activities, especially, manoeuvring of price and output, go unnoticed by the rival firms.
(iii) Demand and cost curves for all the products and for all the firms of the group are uniform.[1] i.e., firms face identical demand (including *perceived* one) and cost curves.

1. Chamberlin (1956), *op. cit.*, p. 82.

(iv) Consumer's preferences are evenly distributed among the different products and difference in products are not such that they make a difference in cost.[1]

The last two assumptions are called rather "heroic" in the sense that these are unrealistic. However, it can be assumed, for theoretical convenience, that the differences, wherever they are, are not significant enough to influence the price and output decisions of the rival firms. Given the assumptions, let us discuss first the ***short-run equilibrium of the firm***. Firm's ***long-run equilibrium*** will be discussed in the next section.

18.4.1 Short-Run Equilibrium of the Firm

The ***short-run equilibrium*** of the firm under monopolistic competition is illustrated in Figs. 18.4 and 18.5. Figure 18.4 illustrates how firms in the state of disequilibrium adjust their price and output to move to the state of equilibrium. Figure 18.5 presents the final position of the firm's equilibrium and also the determination of equilibrium perice and output.

In Fig. 18.4, the firm's perceived and proportional demand curves are given by the curves D_P and D_P, respectively. The *MR* curve shows their *marginal revenue* curve corresponding to their perceived demnd curve (D_P) and their *marginal cost curve* is shown by the curve *MC*. Now suppose that in the short run market price is given at OP_3 determined by the firms themselves or by 'custom',[2] and all the firms are at point *A* selling output OQ_1 which equals D_M/n (where D_M is the total market demand for the industry as a whole and *n* is the number of firms.

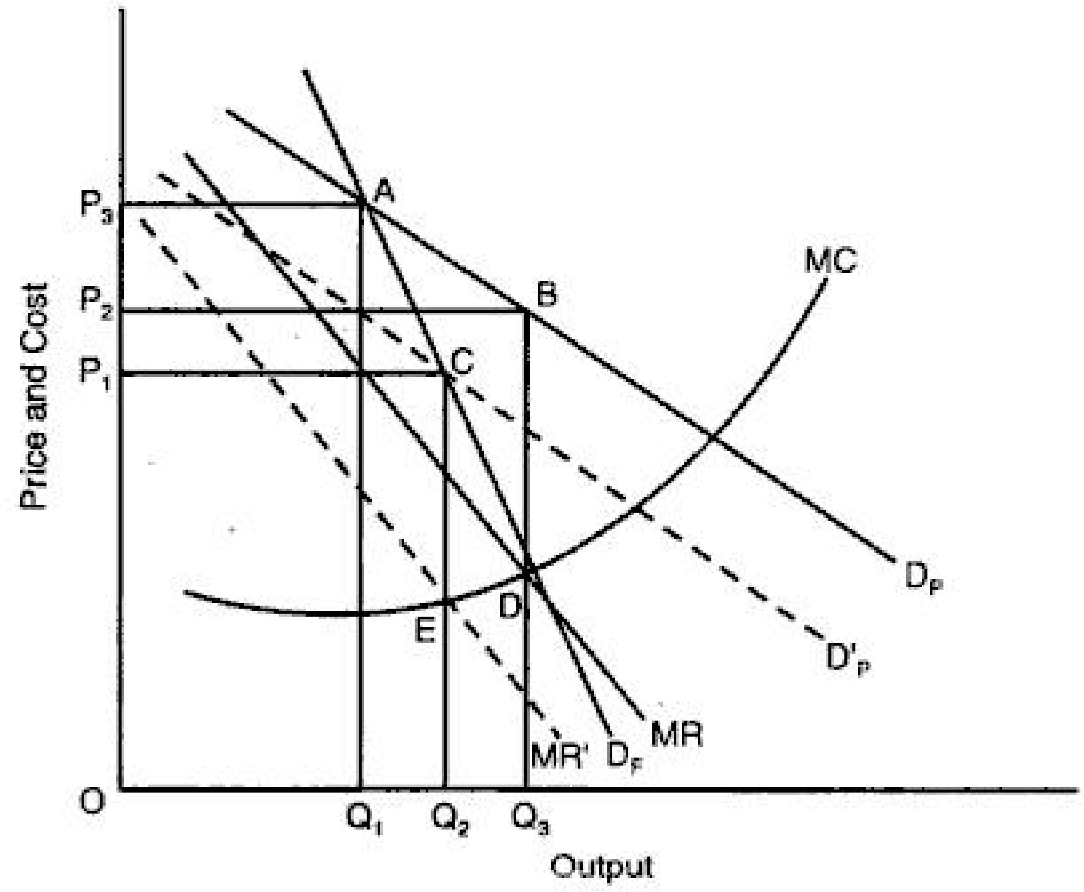

Fig. 18.4 Price and Output Adjustments in the Short-Run

Under monopolist competition, however, this position is *not* stable because each firm, given its perceived demand curve (D_P), expects to sell more by cutting down the price of its product. How much more can they sell and at what price? The answer lies in the quantity and the price that

1. Chamberlin (1956), p. 83.
2. Assumed by Chamberlin (1956), p. 140.

enter the industry, (ii) firms indulge in price competition, (iii) changes (i) and (ii) take place simultaneously, and (iv) firms advertise their product more vigorously. Chamberlin has used a sequence of *four models* to analyze the long-run equilibrium with these changes. The four models present, in fact, the four different stages of analysis. Following the general practice[1], however, we present here only the final form of his model of long-run equilibrium in monopolistic competition. A detailed analysis of Chamberlin's four models are given in *Appendix* to this chapter.

The long-run equilibrium of the firms under monopolistic competition is illustrated in Fig. 18.6. The revenue and cost curves in Fig. 18.6 are similar to those given in Fig. 18.5. To analyse the process of adjustment, let us have a re-look at Fig. 18.5. As Fig. 18.5 shows, each firm makes a pure or supernormal profit of *PC* per unit of output, i.e., to the extent of the difference between the price and *SAC*. Supernormal profit attracts new firms to the industry as there is no barrier to entry. With the entry of new firms, the existing firms loose a part of their markets to the new entrants. As a result, the proportional demand curve (D_F) of the firms shifts leftward and perceived demand curve (D_P) shifts downward. This shift continues until pure profit disappears. This status of firms is shown by point *P* in Fig. 18.6. At point *P*, demand curve D_P is tangent to *LAC* curve and demand curve D_F intersects with them. Since price equals *LAC* at point *P*, no firm is making pure profit. There is, therefore, no incentive for new firms to enter the industry nor for the existing ones to quit the industry. The firms are, therefore, in the state of their long-run equilibrium at point *P*. It is important to note that point *P* is not coincidental. It is determined by the intersection of the *MR* and *MC* curve determining profit maximising output at OQ_A and price at PQ_A. In equilibrium, firms produce and sell quantity OQ_A at price $PQ_A = OP_E$. This is how, according to Chamberlin, monopolistically competitive firm reach their equilibrium in the long-run. An important outcome of this analysis is that, in the long-run all firms in monopolistic competition make only normal profit.

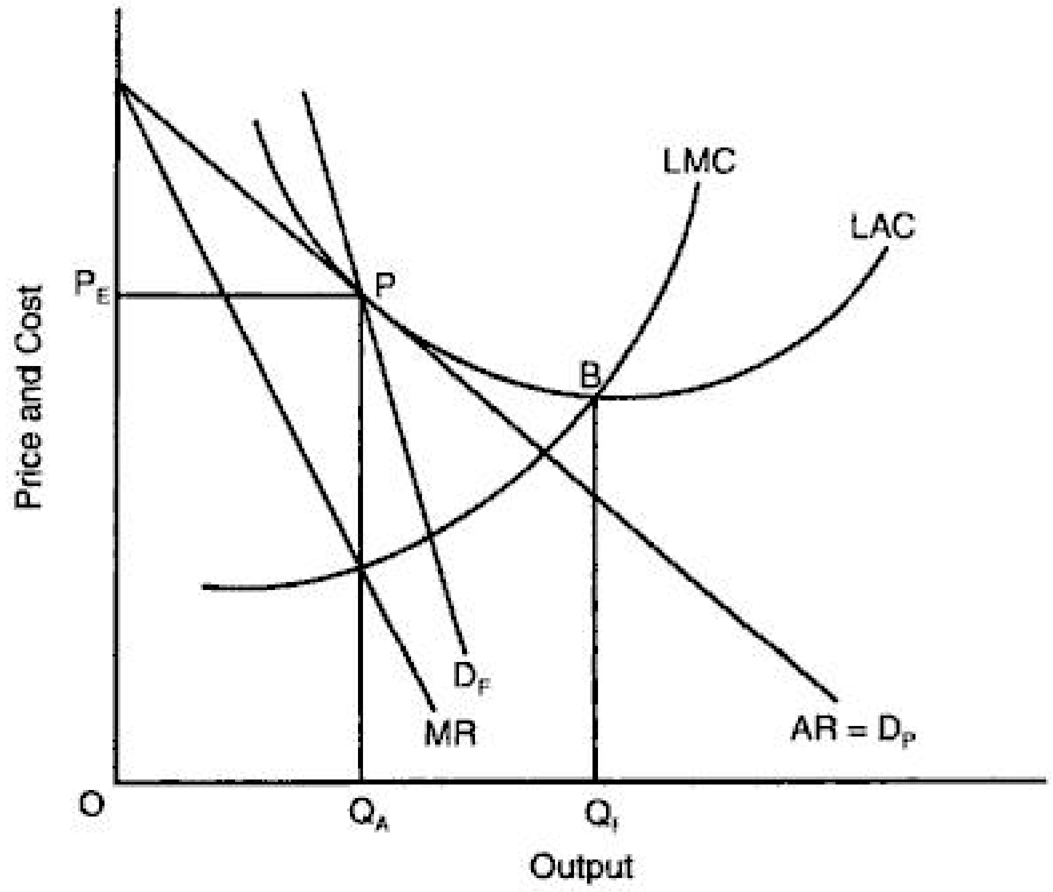

Fig. 18.6 Long-run Equilibrium of Firms in Monopolistic Competition

1. And also in view of the study requirements of the graduate students.

18.5 EXCESS CAPACITY UNDER MONOPOLISTIC COMPETITION

As in case of monopoly, the existence of excess capacity is an important feature of monopolistic competition. The excess capacity or unutilized capacity is a social waste which has atrracted economist' attention. In this section, we will discuss (a) concept and measure of "ideal output", and (b) non-price competition and excess capacity.

18.5.1 Ideal Output and Excess Capacity

"The excess capacity" of a firm is defined as the difference between the "ideal output" and the "actual output" attained in the long-run. What is "ideal output"? The economists[1] from Marshall to later ones including Kahn[2], Harrod,[3] and Cassels[4] defined *ideal output* as the output that can be produced at the minimum *long-run average cost (LAC)*. This concept of "ideal output" is linked to social optimality of production. *Excess capacity* is also called as "idle capacity" and "unused capacity".

The existence of excess capacity under monopolistic competition can be seen in Fig. 18.6. The firm is in equilibrium at point *P*. Its *actual output* at equilibrium is OQ_A. As regards the "ideal output", note that *LMC* intersects *LAC* at point *B* which marks, as a matter of rule, the minimum point at the *LAC* curve. Point *B* determines the "ideal output" at OQ_I. Thus "actual output" is OQ_A and "ideal output" is OQ_I. The difference between the actual output OQ_A and the ideal output OQ_I equals Q_AQ_I. Thus, Q_AQ_I is the "excess capacity" under monopolistic competition.

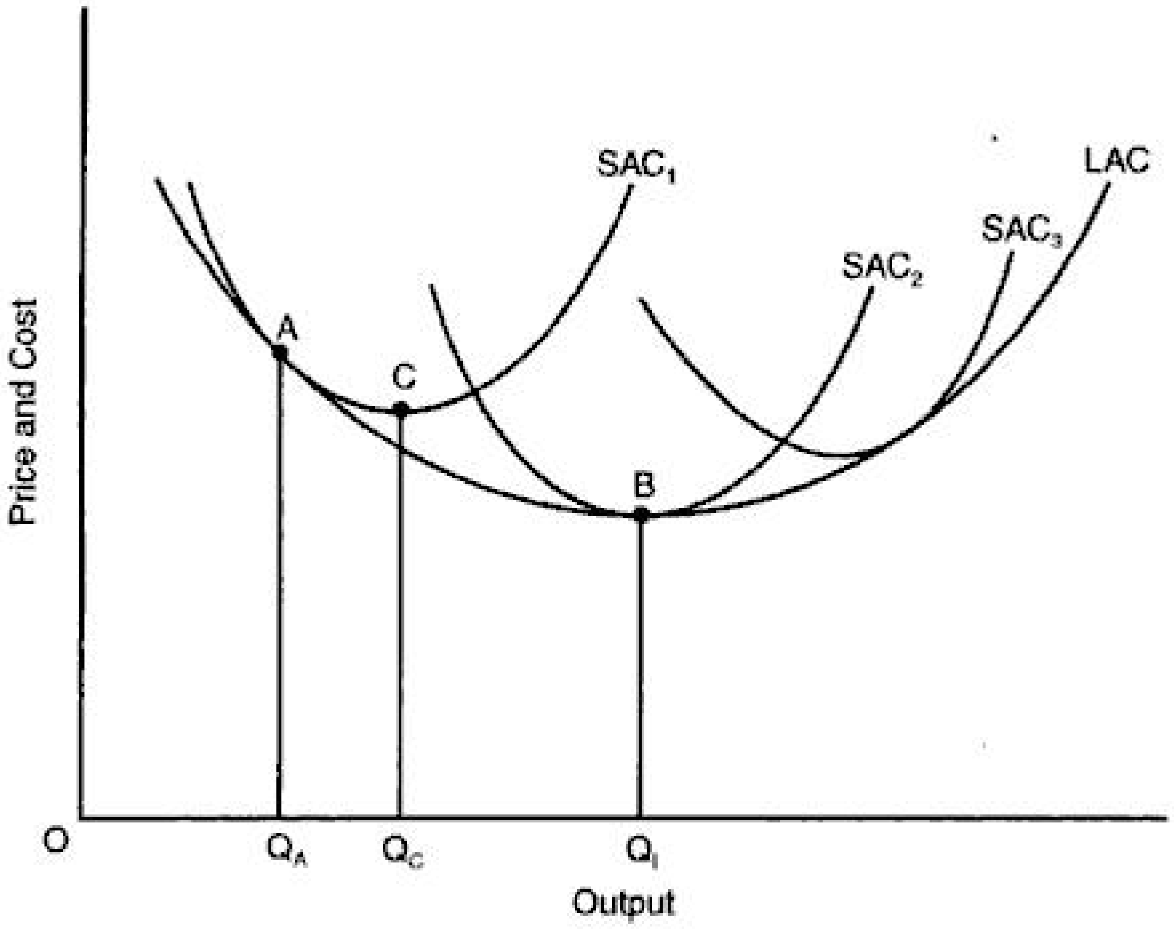

Fig. 18.7 Ideal Output and Excess Capacity

Cassels[5] has divided excess capacity in two parts on the basis of what is optimum from individual

1. Quoted in John P. Gould, Jr. and Edward P. Lazear, *Microeconomic Theory* (Richard D. Irwin, Homewood, Illinois), 6th Edn., 1933, p. 359.
2. R.F. Kahn, "Some Notes on Ideal Output", *Economic Journal*, 45 (1934).
3. R. Harrod, "Doctrines of Imperfect Competition", *Qly, Jl., of Eco.*, 49 (1934-35).
4. J.M. Cassels, "Excess Capacity and Monopolistic Competition", *Qly. Jl. of Eco*, 51, May 1937.
5. *Op. cit.*

18.6.1 Individual Equilibrium

Chamberlin has enunciated equilibrium of an individual firm under the following three conditions: (a) determination of the optimum selling costs with price given; (b) determination of equilibrium price with a given amount of selling cost, and (c) determination of price and selling costs simultaneously. Case (a) is already illustrated in Fig. 18.3. Given our limited purpose here, we will confine to case (c) in which a firm facing a downward sloping demand curve and a U-shaped *ASC* curve has to find equilibrium price and selling costs. The equilibrium of the firm under these conditions is explained below under the following assumptions:

(i) the firm seeks to maximise its profit;
(ii) it is free to adjust its price, output, and selling cost to this end;
(iii) "price, products, and selling policies of all competition" are given; and
(iv) their is no interdependence betweeen the firms.

The equilibrium.of the individual firm is illustrated in Fig. 18.9. Firm's downward sloping demand curve is given by the curve *D* (= *AR*) and its marginal revenue curve by the curve *MR*. Its average production cost curve is given by the curve *APC* and its overall cost is shown by the curve

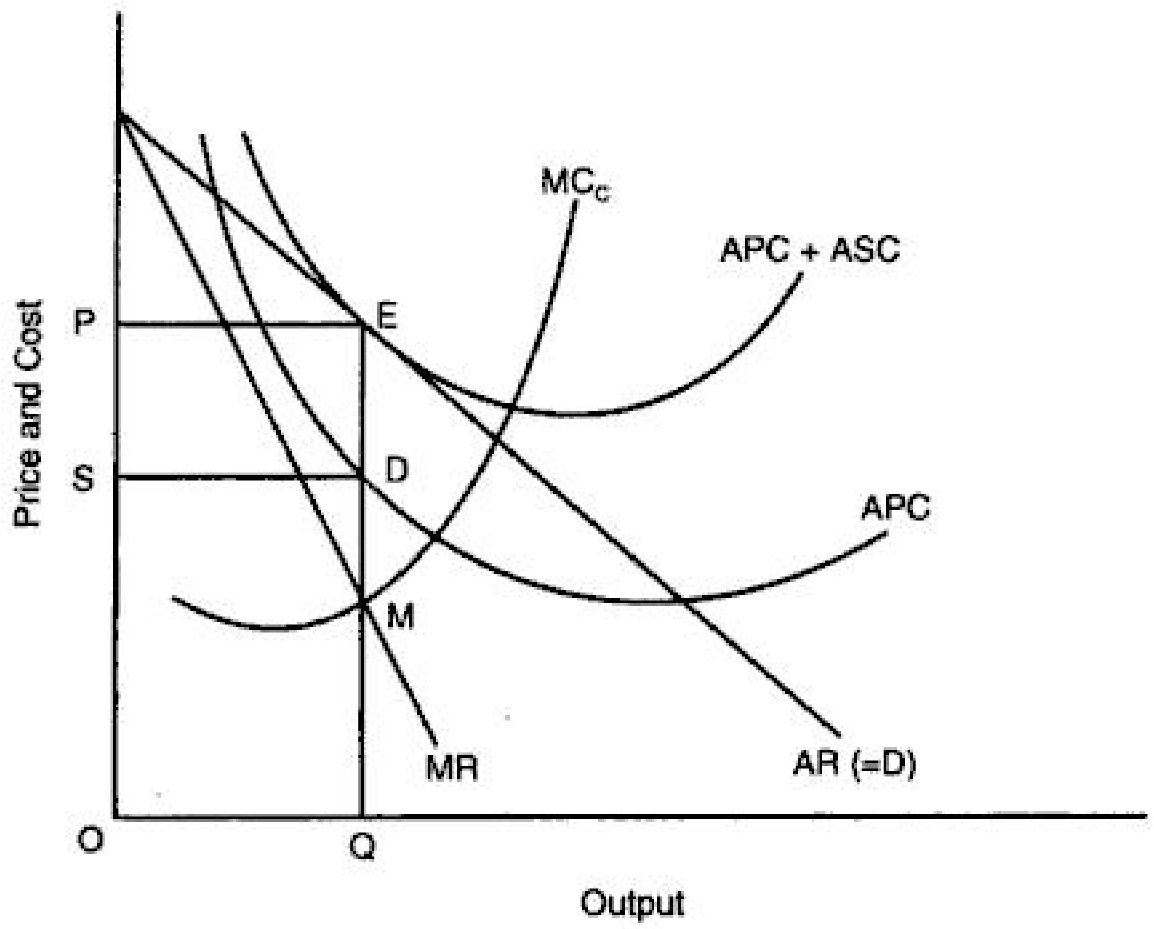

Fig. 18.9 Firm's Equilibrium with Variable Price and Selling Costs

labelled *APC* + *ASC* and its *combined marginal cost* by the curve MC_C. Firm's *MR* and MC_C curve intersect at point *M* determining the equilibrium output at *OQ*. Given the demand curve, equilibrium price is determined at *OP* = *EQ*. That is, firm's profit maximizing output is *OQ* and price is *OP*. At the equilibrium level of output, its average selling cost *(ASC)* equals *ED* and its total selling cost equals *ED* × *OQ*. Since *OQ* = *SD*, firm's total selling cost equals *ED* × *SD* = *SDEP*. This is *optimum selling cost*. The total revenue of the firm equals output × price = *OQ* × *OP* = *OPEQ*. Since firm's demand curve and overall avergae cost curves are tangent to one another at point *E*, selling price equals the overall average cost, i.e., *APC* + *ASC*. The firm is therefore making only normal profit. This is the general case of firm's individual equilibrium in isolation. However, if firm's demand curve lies above the *APC* + *ASC* curve, the firm will make pure profit, but only in the short-run.

18.6.2 Group Equilibrium

Chamberlin has developed his "Group Equilibrium" model taking into account, as in case of individual equilibrium, a variety of conditions pertaining to product, price, selling cost, price and selling cost taken together, action and reaction of competitors, and constant and variable price and selling costs. We present here only the final form of his model of group equilibrium. His group equilibrium model is based on the following explicit and implicit assumptions:

(i) there is a group of firms all aiming at maximisation of profits;
(ii) price for the group product is given, say by custom or otherwise;
(iii) "demand curves, production cost curves, and selling cost curves are uniform for all the products in the group" — "the drastic assumption"[1];
(iv) the firms make competitive advertisement either to increase the demand for their product or to recapture their lost market share; and
(v) all of them face the identical demand and cost curves.

The group equilibrium of the firms in monopolistic competition is illustrated in Fig. 18.10 under the assumptions given above. The curve *APC* represents the average production cost of the firms. Price of the group product is given at OP_3 and, at the given price, the price line for all the firms is given by the line labelled $AR = MR$. None of the firm is incurring any selling cost. Under these conditions, all the firms are shown to be in equilibrium at point *E* where they all make only normal profits.

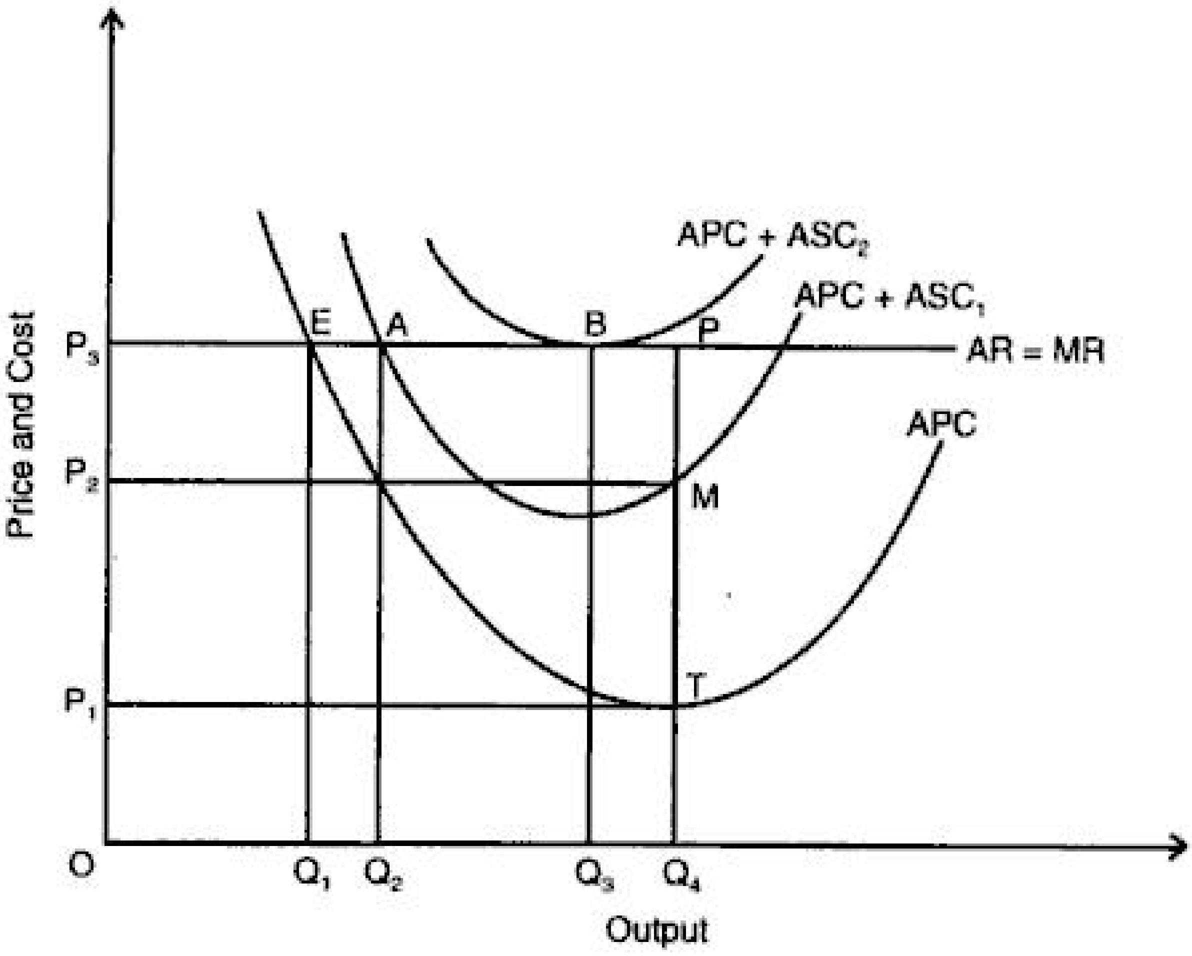

Fig. 18.10 Selling Costs and Group Equilibrium

Now suppose that one of the firms incurs selling cost so that its *APC* added with average selling costs (*ASC*) rises to the position shown by the curve $APC + ASC_1$ and its total sale increases to

1. Chamberlin has himself called this assumption as "the drastic assumption". He has however, defended it in the following words. "...let us not exaggerate the drastic nature of this assumption. Markets are often fairly uniform in composition, consumer's preferences fairly evenly distributed, difference between products [is] such as to give rise to no marked diferences in costs, and selling methods [are] stable and unsensational. Where these things are true, our assumptions are sufficiently realistic to make the results of some direct applicability" (p. 150).

OQ_4. At output OQ_4, the firm makes supernormal profits of P_3PMP_2. This profit is, however, possible only so long as other firms do not advertise their own products. If other firms do advertise their products and incur the same amount of selling cost, the initial advantage to firm advertising first will disappear and its output will fall to OQ_2. In fact, all the firms reach equilibrium at point A and produce OQ_2 units. But their short sightedness impels them to increase their selling cost because they expect to reduce their APC by expanding their output. With increased selling cost, their $APC + ASC$ curve shifts further upward. This process continues until $APC + ASC_2$ becomes tangent to the $AR = MR$ line, as shown by point B. Beyond point B, advertising is of no avail to any firm. The equilibrium will be stable at point B where each firm produces OQ_3 and makes only normal profit.

18.7 MONOPOLISTIC COMPETITION VS. PERFECT COMPETITION: A COMPARISON

As mentioned earlier, the monopolistic competition as perceived by Chamberlin, is characteristically closer to perfect competition. There are, however, significant differences between the two kinds of markets. This section presents a comparison of monopolistic competition and perfect competition is respect of (i) the number of firms, (ii) the natue of products, (iii) the nature of competition, (iv) efficiency in production, and (v) capacity utilization.

1. The number of firms. The number of firms in both monopolistic competition and perfect competition is very large. Though numbers cannot be specified numerically, there is significant conceptual difference. The number of firms in perfect competition is so large that an individual firm has absolutely no control on the price of its product: price is determined by the market forces and is given to the firm. A firm cannot change its price without incurring losses. Under monopolistic competition, however, the number of firms is only so large that an individual firm does have power to change price of its product. A firm can increase the price of its product and still retain some of its buyers (which is not possible in perfect competition) and if a firm cuts down the price of its product, it captures a part of the market of the rival firms. On the contrary, if a firm in perfect competition cuts down the price, it goes out of the market itself.

2. The nature of the product. Under perfect competition, product is ***homogeneous*** and, therefore, the product of each seller is a ***perfect substitute*** for that of the others. In monopolistic competition, on the other hand, there is ***product differentiation*** and the product of each firm is a ***close substitute*** for that of the others. As discussed earlier, *product differentiation* adds the ***element of monopoly*** and the scope for competition, making the market monopolistically competitive.

3. The nature of competition. Under perfect competition with homogeneity of products, there is ***virtually no competition***. Each firm facing a horizontal demand curve, can sell any quantity without affecting the market share of other firms. Under monopolistic competition, on the contrary, there is competition among the firms as they face a downwad sloping demand curve due to product differentiation. Competition may take the form of *price competition* or *non-price competition*. The basis of ***price competition*** is the firm's perception that the demand curve for its product (i.e., the *perceived demand curve*) is more elastic than the market demand curve. So the firms can cut down the price of its product and increase its sales. This leads to price competition. More important is the *non-price competition*. ***Non-price competition*** takes the form of ***competitive advertising*** of the product by the firms. Advertising is of two tyeps: (i) informative, and (ii) persuasive. *Informative advertising* aims at providing information to the potential buyers about the product, its quality and price, and location of availability. *Persuasive advertising* aims at attracting customers of the other firms which leads to intensive advertising of the product. For example, Pepsi and Coca-Cola companies have been involved in aggressive advertising of their product over a decade without making profits. This is a non-price competition for market share. On the contrary, advertising by a firm in perfect competition is a waste.

as a "product group". An attempt to group them under different product groups will violate the concept of industry: each brand name of certain size will make a different industry. Under these conditions, it is extremely difficult to find a demand curve for the product group.

3. Chamberlin's model makes unrealistic assumptions. Chamberlin's theory has also been criticized for making unrealistic assumptions. The arguments against three of his basic assumptions are as follows.

(i) Assuming identical cost and revenue curves are not justified. Critics argue that Chamberlin's ***heroic assumption*** that firms have *identical* or 'uniform' cost and revenue curves is questionable. In monopolistic competition, products are so widely differentiated that each product makes an industry and has a different demand curve. Also, where product differentiation is very significant, it does make a difference in the cost of production. Therefore, assuming identical demand and cost curves is unrealistic.[1]

(ii) Assuming no interdependence is not reasonable. Chamberlin assumes that the number of firms in monopolistic competition is so large that pricing and selling strategies adopted by an individual firm goes unnoticed by the competitors and, therefore, there is no *interdependence* between the firms. This assumption has been questioned on the ground that rival firms are bound to be affected by the pricing and selling strategies adopted a firm because their products are deemed to be close substitutes. Therefore, rival firms are bound to react and adopt a countervailing policy. It is, therefore, not reasonable to assume *absence of interdependence.*

(iii) Assuming that firms do not learn is not correct. Chamberlin's model of price output determination assumes implicity that firms do not learn from their mistakes and experience. Cohen and Cyert[2] question the validity of this assumption. They argue that it is puzzling to accept that firms repeat the mistake of cutting down the price of their products time and again even if price reduction results in no gain. Therefore, firms cannot be supposed to continue to stick to their belief that their *perceived demand curve* provides them with real opportunities. If this argument is accepted, Chamberlin's model of price competition breaks down.

4. Chamberlin's measure of excess capacity is logically inconsistent. Harrod[3] has questioned the logic of Chamberlin's measures of the excess capacity. He argues that it is logically *inconsistent* because Chamberlin uses *long-run MC* curve with *short-run MR* curve to determine the actual output. Consistency requires that *with long-run MC curve, only long-run MR curve should be used.* If long-run *MR* curve is used, the actual output will be larger than Chamberlin's output because the long-run demand and *MR* curves will be more elastic. In that case, the measure of excess capacity will be lower than one suggested by Chamberlin. Also, Chamberlin's measure of excess capacity is not corroborated by empirical evidence.

5. Chamberlin's model lacks empirical validity. Cohen and Cyert[4] claim that *it is difficult to find any example in the real world to which Chamberlin's model of monopolistic competition is relevant*. According

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1. Chamberlin has himself called this assumption as "the drastic assumption". He has however defended his assumption. To quote him again,"...let us not exaggerate the drastic nature of this assumption. Markets are often fairly uniform in composition, consumer's preferences fairly evenly distributed, difference between products [are] such as to give rise to no marked diferences in costs, and selling methods [are] stable and unsensational. Where these things are true, our assumptions are sufficiently realistic to make the results of some direct applicability" (p. 150).
2. K.J. Cohen and R.M. Cyert, *Theory of the firm* 2nd Edn. (Prentice Hall of India, New Delhi, 1976).
3. R.F. Harrod, *Economic Essays* (Harcourt Brace, NY, 1952).
4. *Op. cit.*, p. 230.

3. Theories of monopolistic competition and monopoly do not represent the real business world whereas theory of monopolistic competition offers an explanation to price and output determination in a real business world. Explain and justify the statement.
4. What are the characteristics of monopolistic competition? Compare the characteristics of monopolistic competition with those of perfect competition?
5. There is an element of monopoly in monopolistic competition. What factors give monopoly power to a firm in monopolistic competition?
6. What is meant by product differentiation? What is the purpose of product differentiation? How does it affect firm's demand curve?
7. In monopolistic competition, firms think that the demand curve for their individual product is different from that of the industry as whole. Illustrate graphically firm's perception of their individual demand curve.
8. What is meant by selling costs? How is selling cost different from advertisement cost? Why do firms in monopolistic competition incur selling costs?
9. According to Chamberlin, average selling cost (*ASC*) curve is U-shaped. What factors determine the shape of the *ASC*? Illustrate graphically how selling costs affect the overall cost structure of the firm.
10. The purpose of selling cost is to increase the demand for the product and to make demand curve more elastic. But there is limit to it. How can a firm find the optimum level of selling cost? Explain using appropriate diagrams.
11. What is Chamberlin's concept of "product group"? How is the concept of "product group" different from the traditional meaning of industry?
12. How does a monopolistically competitive firm adjust its price and output to arrive at its equilibrium? Explain and illustrate how a firm in monopolistic competition reach its equilibrium in the short-run? Does a firm in equilibrium in monopolistic competition always make a super-normal profit?
13. Suppose market demand curve is given $Q = 500 - 0.5\,P$. Work out the proportional demand curve for a firm assuming there are 50 firms in the industry. Is the elasticity of the proportional demand curve at a given price is the same as that of the market demand curve or different?
14. How are the long-run conditions different from short-run conditions for a firm in monopolistic competition? Illustrate and explain the long-run equilibrium of firm in monopolistic competition? How is firm's long-run equilibrium different from its short-run equilibrium?
15. What is meant by 'ideal output' and 'excess capacity'? Illustrate Chamberlin's measure of excess capacity. How does Harrod's measure of excess capacity differ from Chamberlin's measure?
16. What are the wastages of monopolistic competition? Do you agree with the view that the 'traditional' concept of excess capacity is an overstatement of one of the wastages of monopolistic competition? Give reasons in support of your answer.

    [DU, B.Com. (H), 2001]
17. What is the usual form of non-price competition in monopolistic competition? Explain and illustrate the firm's long-run equilibrium under non-price competition. Why do firms involved in non-price competition make only normal profit in the long-run?

its customers swtich over to other products which become automatically cheaper. Thus, the firm expects a different and more elastic demand curve for its product, as shown by dd_2. This is called as the *perceived demand curve*. But, if all the firms change their prices simultaneously this advantage to an individual firm is lost and all the firm eturn to the original demand curve DD_1.

Having introduced the perceived demand curve, let us now replicate Chamberlin's analysis of long-run equilibrium of a firm with price competition. The long-run equilibrium with price competition is presented in Fig. 18.3A. The curves DD' and dd_1 are the firm's normal and perceived demand curves, respectively, and LAC is the long-run average cost curve of a 'typical' firm of the group. Let the initial short-run equilibrium of the firms of the group be at point P where price is OP_2 and output is OQ_1. At this price and output, the firm makes the total supernormal profit represented by the area $CMPP_2$.

Let us now introduce price competition and analyse its effect on firm's equilibrium. Competition begins with the firms' belief that DD' is market (or group) demand curve and dd_1 is the demand curve for their own product. Note that dd_1 is more elastic than DD'. Therefore, each firm thinks that it can increase its profit by cutting down its price and increasing the demand for its product. In an attempt to increase profits, each firm reduces its price expecting to move along the demand curve dd_1. But, instead of moving along dd_1, the firms move along the market demand curve DD' because all of them reduce their prices simultaneously.

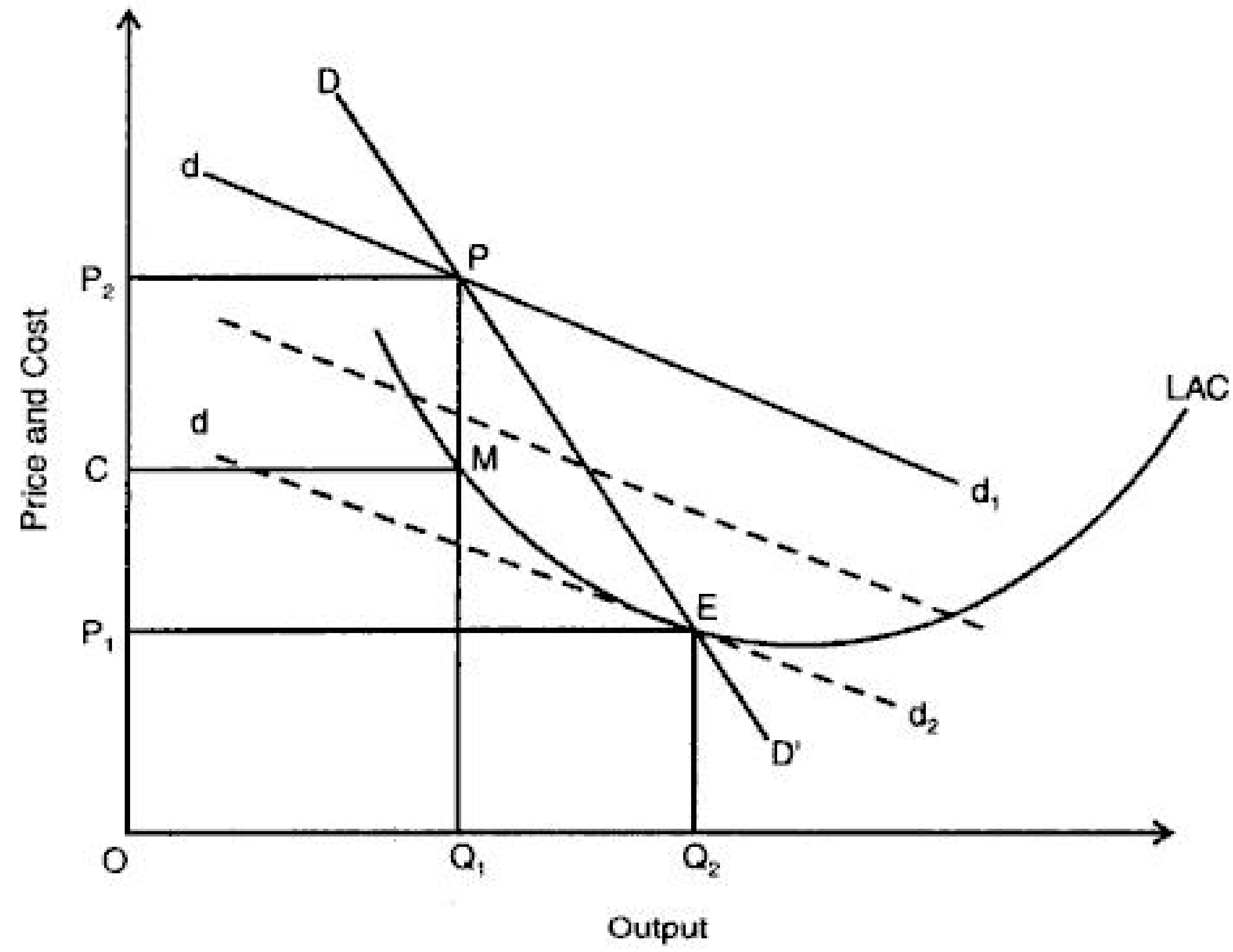

Fig. 18.3A Long-run Equilibrium: Price Competition

Why do firms not realise this phenomenon? According to Chamberlin, ***the firms do not learn from their past experience*** and each firm sticks to its own belief that price-reduction will make the demand curve for its product more elastic than the market demand curve (DD'), as shown by demand curve dd_1. Therefore, the firms go on reducing their prices independently and their assumed demand curve (dd_1) slides downward along the curve DD'. This process continues until the downward shift in dd_1 makes it tangent to the LAC curve, at point E, as shown by dd_2 in Fig. 18.3A. Here price is OP_1. A further reduction in price will make firms incur losses. Therefore, reduction in price below OP_1 is

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2. Interdependence of decision-making. The *most striking feature* of an oligopolistic market structure is the ***interdependence*** of oligopoly firms. The characteristics fewness of firms under oligopoly brings the firms in keen competition with each other. The competition between the firms takes the form of action, reaction and counteraction in the absence of collusion between the firms. Since the number of firms in the industry is small, the business strategy of each firm in respect of pricing, adevertising, product modification is closely watched by the rival firms and it evokes imitation and retaliation. What is equally important in strategic business decisions is that firms initiating a new business strategy anticipate and take into account the counteraction by the rival firms. This is called ***interdependence*** of oligopoly firms.

An illuminating example of strategic maneuvering is cited by Robert A. Meyer.[1] To quote the example, one of the US car manufacturing companies announced in one year in the month of September[2] an *increase* of $ 180 in the price list of its car model. Following it, a second company announced a few days later an increase of $ 80 only and a third announced an increase of $ 91. The first company made a counter move: it announced a *reduction* in the enhancement in the list price from $ 180 to $ 71. This is a pertinent example of interdependence of firms in business decisions under oligopolistic market structure. In India, when Maruti Udyog Limited (MUL), announced a price cut of Rs. 24,000 to Rs. 36,000 in early 1999 on its passenger cars, other companies followed the suit. However, *price competition* is not the major form of competition among the oligopoly firms as price war destroys the profits. A more common form of competition is *non-price competition* on the basis of product differentiation, vigorous advertising and provision of services.

3. Barriers to entry. Barriers to entry to an oligopolistic industry arise due to such market conditions as (i) huge investment requirement to match the production capacity of the existing ones, (ii) economies of scale and absolute cost advantage enjoyed by the existing firms, (iii) strong consumer loyalty to the products of the established firms based on their quality and service, and (iv) resistance by the established firms by price cutting. However, the new entrants that can cross these barriers can and do enter the industry, though only a few, that too mostly the branches of *MNCs*.

4. Indeterminate price and output. Another important feature, though controversial, of the oligopolistic market structure is the indeteminateness of price and output. The characteristic fewness and interdependence of oligopoly firms makes derivation of the demand curve a difficult proposition. Therefore, price and output are said to be indeterminate. However, price and output are said to be determinate under collusive oligopoly. But, collusion may last or it may breakdown. *An opposite view is that price under oligopoly is sticky*, i.e., if price is once determined, it tends to stabilize.

19.3 THE OLIGOPOLY MODELS: AN OVERVIEW

As already mentioned, under oligopolistic conditions, rival firms adopt an intricate pattern of actions, reactions and counteractions showing a variety of behaviour patterns. The uncertainty arising out of unpredictable behaviour, actions and reactions of oligopoly firms makes systematic analysis of oligopoly an extremely difficult task. As Baumol puts it, "Under [these] circumstances, a very wide variety of behaviour pattern becomes possible. Rivals may decide to get together and cooperate in the pursuit of their objectives, ... or, at the other extreme, may try to fight each other to the death. Even if they enter an agreement, it may last or it may breakdown."[3] Economists have, therefore,

1. *Micreconomic Decisions*, Houghton Miflin Company, Boston, 1976, p. 249.
2. The month in which automobile manufacturers introduce new models.
3. Baumol, W.J., *Economic Theory and Operations Analysis* (New Delhi, Prentice Hall of India), 4th Edn., 1985, p. 410.

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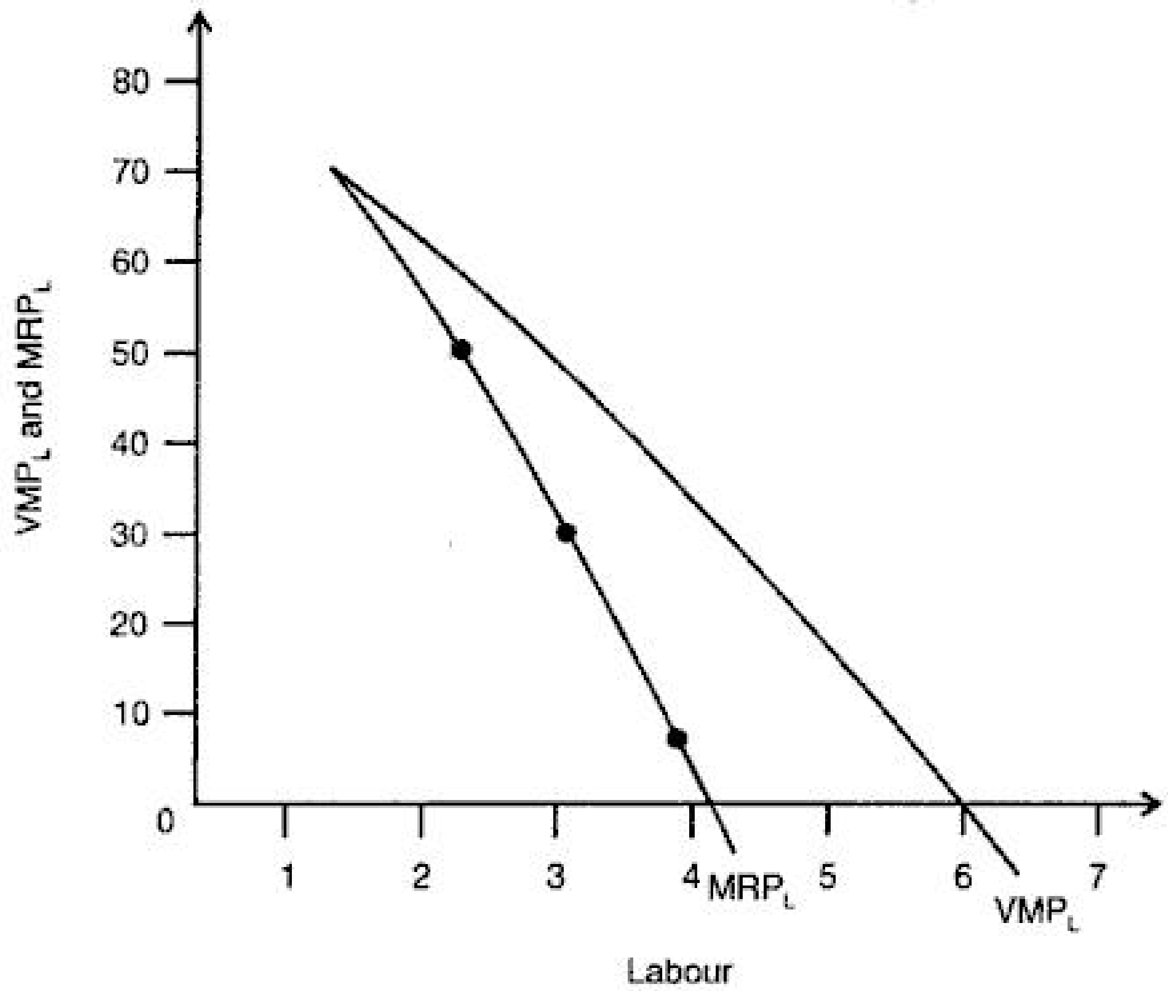

Fig. 20.13 MRP$_L$ and *VMP*$_L$ Schedules of a Variable Factor (Labour)

Having derived the MRP_L curve for a product monopoly, let us now show the derivation of labour demand curve for a product monopoly assuming

(i) monopoly uses only labour as a variable factor; and

(ii) it uss both labour and capital as vairbale factors.

(i) Monopoly Demand for Labour — Single Variable Factor. Let us recall the assumption that the monopolist hires labour from a perfectly competitive labour makret. Since labour market is perfectly competitive, a monopoly firm faces a perfectly elastic labour supply curve, as shown by the curve S_L in Fig. 20.14. As regards the monopoly firm's demand for labour, the curve MRP_L is its demand curve for labour. A profit maximising monopoly firm will hire labour up to the point where marginal revenue productivity of labour (MRP_L) equals the marginal cost of labour (MC_L). Since wage rate $(\overline{W})$ remains constant in a perfectly competitive labour market, the profit maximizing monopolist will employ labour up to the point where $MRP_L = MC_L = \overline{W}$.

As Fig. 20.14 shows, MRP_L and S_L curves intersect at point E. At this point, $MRP_L = \overline{W} = MC_L$. Point E, therefore, determines the equilibrium demand for labour at OL. In other words, the profit maximising monopoly will employ OL units of labour because this level of employment satisfies the profit maximizing condition, i.e., its $MRP_L = MC_L = \overline{W}$. By employing OL units of labour, the monopolist maximizes its profits at point E. When wage rate decreases to OW_1, the monopolist employs OL_2 units of labour. Similarly, when wage rate rises to OW_2, the firm will employ OL_1 units of labour. It is thus clear that as the wage rate decreases (increases) the demand for labour increases (decreases) along the MRP_L. Therefore, the MRP_L curve is monopoly's demand curve for labour, where labour is the only variable factor used by the monopoly firm.

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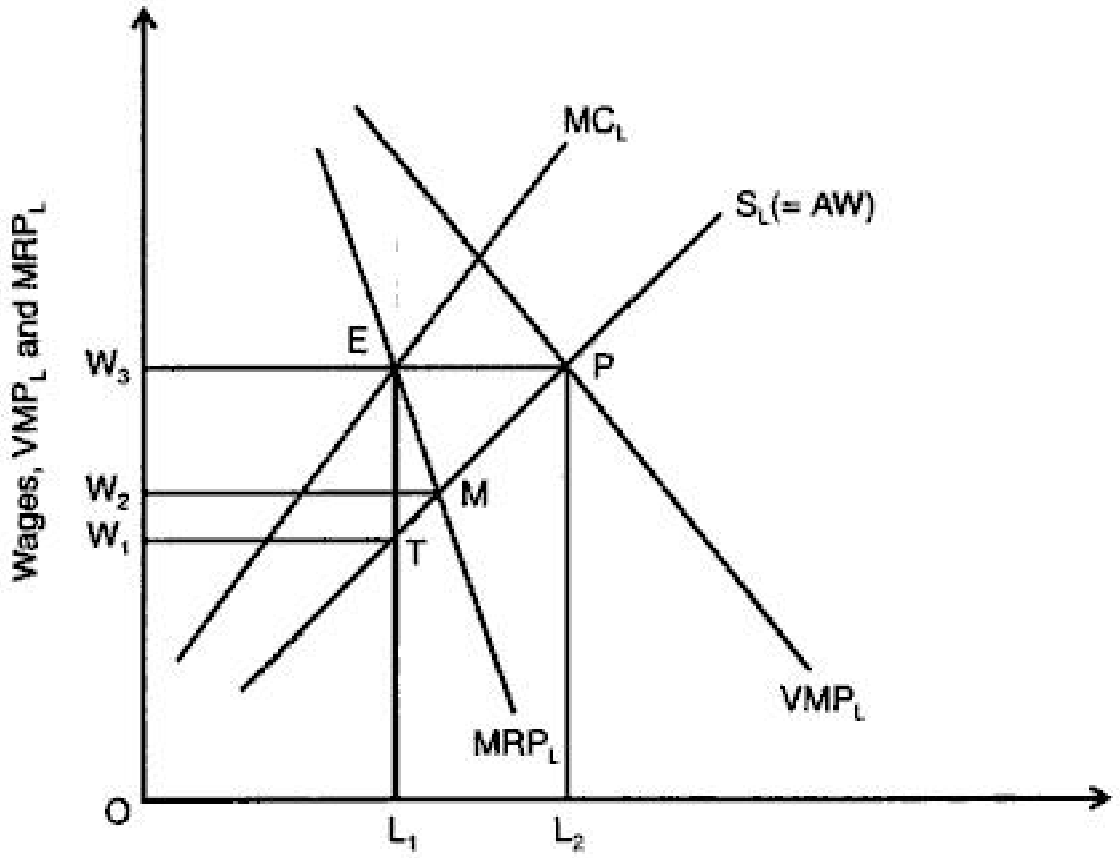

Fig. 20.20 Monopsonistic and Monopolistic Exploitation of Labour

Let us now look at wage determination assuming that there is monopoly in the commodity market while labour market remains *perfectly competitive* and market demand curve for labour is given by MRP_L curve in Fig. 20.20. The MRP_L intersects the labour supply curves, S_L, at point M, determining wage rate at OW_2. Thus, labour market reaches a new equilibrium point (M) where wage rate is determined at OW_2. Note that monopoly wage rate OW_2 is less than the competitive wage rate OW_3. The difference between OW_3 and OW_2, (i.e., $OW_3 - OW_3 = W_2\,W_3$) is the ***monopolistic exploitation*** of labour. Besides, when there is monopoly in the product market, employment of labour decreases as indicated by point M. Thus, monopolistic exploitation is accompanied by a lower level of employment and at a lower wage rate.

Finally, let the product monopolist have ***monopsony*** in the labour market. This is the category of market organisation with which we are concerned mainly in this section. The monopsonist must employ labour until $MRP_L = MC_L$, the marginal cost of labour. As Fig. 20.20 shows, MRP_L and MC_L curves intersect at point E which determines he equilibrium level of employment at OL_1. The ordinate EL_1 intersects the labour supply curve S_L at point T, which determines the equilibrium wage rate for the monopsonist at OW_1. Thus, the wage rate under monopsony in labour market goes further below the competitive rate, even below the monopoly level. The difference between the competitive wage rate, OW_3, and the monopsony wage rate, OW_1 measures the ***monopsonistic exploitation*** of labour, i.e.,

$$\text{Monopsonistic Exploitation} = OW_3 - OW_1 = W_1W_3$$

The monopsonistic exploitation W_1W_3 may be split into two parts W_2W_3 and W_1W_2. The exploitation to the extent of W_2W_3 is attributable to monopoly power in the commodity-market. This part of factor exploitation is not unique to the monopsonist. But the remaining part, W_1W_2, is unique to the monopsonlist. Thus, the main feature of the monopsonistic exploitation is that each factor is paid a price less than even its MRP.

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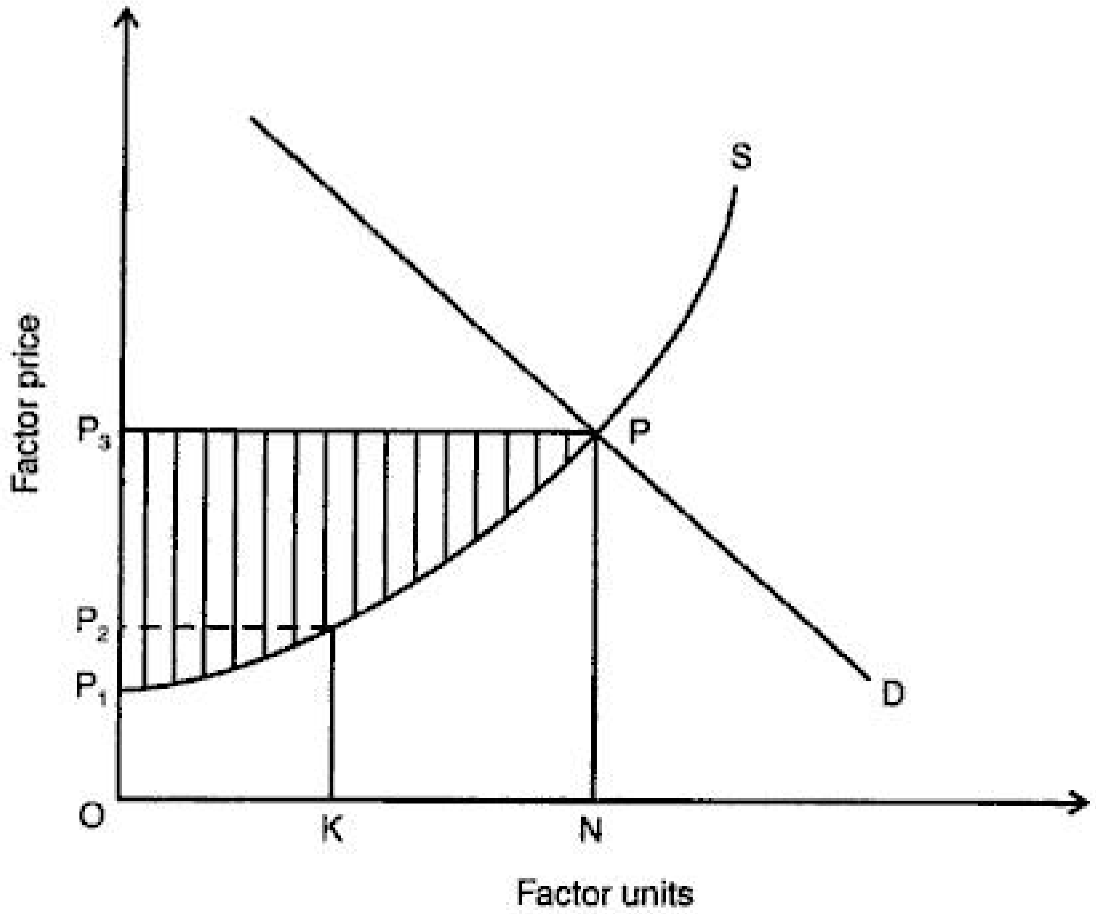

Fig. 21.3 Economic Rent

i.e., the last unit of the factor, does not earn economic rent because its actual earning equals its transfer earning. The total transfer earning is shown by area OP_1PN.

21.5 QUASI-RENT: THE SHORT-TERM EARNING OF FIXED FACTORS

The concept of ***quasi-rent*** was introduced my Marshall[1] to analyse the short-term earnings of man-made factors including machinery and other capital equipments. An important feature of capital equipments is that their *supply is **inelastic** in the short-run* and ***elastic** in the long run.* The short-term earning of man-made factors may be called, for the time being, as the *surplus of total revenue after the payment to variable factors.* In Marshall's view, short-run earning of man-made factors cannot be called 'rent' in usual sense of the term because, unlike rent, it is subject to fluctuation in the short-run depending on the change in the price of the product they produce, in combination with variable factors, e.g., labour. If demand for the product increases in the short-run, its price goes up. But more of capital equipments cannot be hired to increase production because their supply in the short-run is fixed. Therefore, price of the product stays high. This increases the total revenue. Consequently, surplus of total revenue over the cost of variable factors increases. As a result, the surplus accruing to man-made factors exceeds their ***normal earnings***, i.e., their rentals. Similarly, when demand for the product decreases, its price goes down. As a result, total revenue goes down. Therefore, the surplus over the variable cost goes down, reducing the earning of the man-made factors. It may go below the normal rate of rentals. That is, short-term earnings sometimes exceed the normal rentals and sometimes go much below it. That is why, perhaps, Marshall did not find it appropriate to use the term 'rent' for the short-run earnings of the man-made factors. Marshall coined a new term ***'quasi-rent'*** for the short-term earnings of the man-made factors in inelastic supply, in the short run.

1. Alfred Marshall, *Principles of Economics*, 8th Edn. (Macmillan, New York, 1949), p. 74.

tenants, especially in a market where demand for house exceeds its supply. Some house owners like tenants with small size of family or families without children and pets, tenants with stable job and high incomes, tenants of some particular profession, area or community.

Another disadvantage of rent control is the reduction in the house tax base. House or property tax is one of the most important source of revenue for the municipal corporations. Rent control lowers both the market value of the property and its ratable value. Whether market value or ratable value is the tax base, both go down due to rent laws that reduce rentals below the market rate. However, lower house tax works as an incentive for construction of houses in a larger number which compensates over time for the loss of revenue.

For these reasons, it is difficult to generalize whether rent control is advantageous to the landlords or to tenants. Generalization becomes more difficult when some classes of tenants benefit and some lose, and among those who benefit, some benefit more and some less.

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REVIEW QUESTIONS AND EXERCISES

1. How land as a factor of production is different from other factors? How does this difference matter in the determination of rent?
2. Explain the Ricardian concept of rent and his theory of rent. Can Ricardian theory of rent be applied to the pricing of other factors of production? Give reasons for your answer.
3. Ricardian concept of rent applies to only extensive cultivation, not to intensive cultivation. Do you agree with this statement? Explain your view with example.
4. Examine criticially the Ricardian theory of rent. What modifications does modern theory of rent make to this theory of rent?
5. Explain the difference between the modern and Ricardian theories of rent. Can modern productivity theory of factor pricing be applied to rent determination? If yes, how?
6. Explain the concept of quasi-rent and distinguish between rent and quasi-rent. Why is quasi-rent said to be short-run phenomenon?
7. Explain the concept of transfer earning and economic rent. Can economic rent exist in the long-run? Explain the conditions under which the whole price paid to a factor is economic rent.
8. What is the role of elasticity of demand for and supply of a factor in determining the economic rent of the factor. Explain and illustrate graphically.

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different. If income rises continuously, it becomes subject to the law of diminishing marginal utility. If individuals act so as to maximise the sum of utilities of all future incomes, they would be willing to pay a premium on present goods (when income is rising). The reason for this is that increase in present consumption adds more to the total utility than the increase in the future consumption. That is why people prefer present goods to future goods.

Secondly, *people underestimate future* because of (a) deficiency of imagination, i.e., myopia in respect of future; (b) limited will power; and (c) the shortness and uncertainty of life. These factors lead to discounting of future wants.

Thirdly, present goods are economically superior to future ones. This is so because 'present goods can be invested now and reinvested as they accrue tomorrow, but available tomorrow can be invested tomorrow' only. Besides, present goods invested today in round-about method of production yield a larger physical output in the future than an equal quantity invested in future either in direct or in round-about production. The reason for this is, even if other things remain the same, yields from investment today compound over a longer period by one time unit. This is a very strong reason why people prefer present goods to future ones and why they are willing to pay a premium on present goods and discount on future goods. This third reason, according to Bohm-Bawerk, constitutes an independent ground for a positive rate of interest.

Irving Fisher, however, argued that any one reason is not sufficient to make interest rate positive. It is in fact the interaction of the three reasons which is fundamental to the interest being greater than zero. As Blaug remarks, Bohm-Bawerk's three 'reasons' and their interaction provide an exhaustive explanation of the existence of interest in a stationary as well as in a dynamic economy.[1]

According to Bohm-Bawerk's theory, the rate of interest is determined by the demand for and supply of funds. The demand for funds comes solely from the capitalists and supply comes primarily from the retained earning. The total capital consists of subsistence wages paid to the workers, which is fixed. The marginal productivity of this part of capital decreases over time. The rate of interest is determined where present value of expected marginal product equals the wage rate.

22.4.2 Fisher's Theory of Interest:[2] The Time Preference Theory

Fisher's notion of interest is the same as that of Bohm-Bawerk. According to Fisher, interest arises because people prefer present to future income. The rate of interest, according to Fisher's theory, equals the price that people are willing to pay for income now rather than income at some future date. This price (or the rate of interest) is determined by the interaction of "willingness to give up present consumption in favour of a larger consumption in future, and 'opportunity' to invest." The opportunity to invest is measured by the rate of return over cost. By 'cost' is meant the loss of income due to withdrawal of an income stream, and by 'return' is meant the gain that results from substituting a new income stream. Fisher's 'rate of return over cost' is that critical discount rate at which two or more alternative investment opportunities have the same present net values.

Fisher's theory of interest determination is presented in Fig. 22.1. Horizontal axis measures *income today* and vertical axis measures *income tomorrow.* The 45° line represents a constant flow of income, i.e., income available today is available tomorrow also. The indifference curves, I_1, I_2 and I_3, represent the people's willingness curve which shows their time preference with respect to income

1. Mark Blaug, *op. cit.*, p. 508.
2. Propounded first in his *Rate of Interest* (1907) and later revised in his *Theory of Interest* (1930).

$$NPV = \sum_{j=1}^{n} R_n \left[\frac{1}{(1+r)^n} \right] - C \tag{22.7}$$

In Eq. (22.7), C represents the total investment or the cost of project without any recurring expenditure. If investment does involve a recurring expenditure, the total present cost (TPC) for n years can be calculated in the same manner, as present value, i.e.,

$$TPC = \sum_{j=1}^{n} \frac{C_n}{(1+r)^n} \tag{22.8}$$

The NPV can then be computed as

$$NPV = \sum_{j=1}^{n} \frac{R_n}{(1+r)^n} - \sum_{j=1}^{n} \frac{C_n}{(1+r)^n}$$

$$= \sum_{j=1}^{n} \frac{R_n - C_n}{(1+r)^n} \tag{22.9}$$

If the NPV is positive (i.e., $NPV > 0$) the project is worth investment. The firm can borrow any amount at the existing interest rate (r) and invest it. Where a choice between a number of alternative projects has to be made, the one with higher NPV would be chosen.

4. Internal Rate of Return (IRR) and Investment

The *IRR* criterion of investment decision, or what Keynes called ***Marginal Efficiency of Investment*** (*MEI*) is defined as "the rate of interest or return which renders the discounted present value of its expected future marginal yields exactly equal to the investment cost of project". In other words, *IRR is the rate of return (r)* at which the discounted present value of receipts and expenditures are equal. The *IRR* may also be defined in terms of Eq. 22.9. That is, *IRR* is the rate (r) at which

$$\sum_{j=1}^{n} \frac{R_n}{(1+r)^n} = \sum_{j=1}^{n} \frac{C_n}{(1+r)^n} \tag{22.10}$$

The *IRR* criterion tells that so long as internal rate of return (r in Eq. 22.10) is greater than the market rate of interest (i), it is always worthwhile to borrow and invest. However, in a perfectly competitive market $r = i$. It implies that in a perfectly competitive market, firm's internal rate of return always equals the market rate of interest.

5. Internal Rate of Returns Vs. Present Value

From Eq. 22.10, it may be inferred that *IRR* and *NPV* criteria lead to the same conclusion or yield the same decision. There are situations, however, where the two criteria give the conflicting results. For example, suppose that a firm has to make a choice between Project *A* and Project *B*, each having a productive life of two years. The stream of net income* at the end of the year from the two projects and their respective costs are presented in Table 22.1.

* Net Income = Annual Receipts – Annual Cost.

risk and high return would choose point *H*. This pattern of portfolio selection does not provide an optimal combination of stocks and securities, etc.

The optimal combination of portfolios can, however, be determined by superimposing a risk-return indifference map on the same figure, as shown by curves, I_1, I_2 and I_3. It is not impossible, at least in principle, to draw risk-return indifference curves for the prospective investors. The risk-return indifference curves would of course be inverted as compared with standard indifference curves used in consumer analysis or isoquant curves used in the analysis of optimal input-combination. Contrary to the isoquant, the risk-return indifference curves (I_1, I_2 and I_3) have a positive slope because as the risk increases, a relatively higher rate of return must be associated with it to keep the investor indifferent between the lower and higher risk-return combinations.

Like optimal combination of inputs is determined by the point of tangency between isoquants and isocosts, the optimal combination of protfolios is decided by the point of tangency between the risk-return possibility curve and the risk-return indifference curves. The optimal combination is shown by point *T* in Fig. 22.6. This proposition is however only a theoretical solution to the problem of protfolio selection. In practice, it depends, by and large, on the risk-taking attitude of the investors.

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REVIEW QUESTIONS AND EXERCISES

1. How is capital as a factor of production different from land and labour? How does capital earn a payment for its services?
2. What is meant by 'time preference' in the context of interest theory? What is the importance of this concept in changing and paying interest?
3. Why is interest charged and paid? Will interest accrue in an economy in which there is excess idle supply of savings?

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sellers of all the commodities appear also as buyers to acquire the goods. This maintains their consumption and also productive capacity in the next period at the existing level. As a result, there emerges, 'an unchanging economic process which flows on at constant rates in time and merely reproduces itself."[1]

Under these conditions of stationary equilibrium, total receipts from the business are exactly equal to the total outlay—there is no profit. Profit can be made by introducing innovations in manufacturing and methods of supplying the goods. Innovations include:

(i) introduction of a new good or a new quality of good;
(ii) introduction of a new method of production;
(iii) opening of a new market;
(iv) finding and using new sources of raw material; and
(v) organising the industry in a different and more efficient manner.

When an entrepreneur introduces an innovation, it generates a surplus over cost of innovation, provided following conditions are fulfilled.

1. When new supply comesforth as a result of innovation, the price of commodity does not fall to such an extent as to eliminate all gains from the larger product.
2. The unit cost of output with new technique is less than that of older methods.
3. The increase in demand for the productive services due to innovation does not lead to such a rise in remuneration to the productive services as to cause the cost per unit of the commodity to be higher than the revenue per unit.

If these conditions are fulfilled, the surplus realised becomes *ipso facto* a *net profit*. However, these profits exist only for a short period. This is so because when an entrepreneur introduces an innovation others are likely to imitate it for its profitability. First a few and then many entrepreneurs follow the lead and produce the commodity in the same manner. This causes a keen competition for the productive inputs and services to be employed with the new techniques. The inputs supply remaining the constant, factor prices tend to increase. As a result, cost of production increases. On the other hand, when other firms adopt the innovation, supply of goods and services increases resulting in a fall in their prices. Thus, on the one hand, cost per unit of output goes up and, on the other, revenue per unit decreases. Ultimately, a time comes when the difference between cost and receipts disappears and disappears the profit. In the process, however, the economy reaches a higher level of stationary equilibrium.

It is, however, quite likely that profit exist in spite of the process of profits being wiped out. Such profits are in the nature of *quasi-rent* arising due to some special characteristics of productive services. Furthermore, where profits arise due to factors like patents, trusts, cartels, etc., such profits would be in the nature of monopoly revenue rather than entrepreneurial profits.

It may be inferred from the above that ***profit is the child as well as victim of economic development***. Economic development consists of increase in national output. When innovations occur the national output increases because the same output can be produced at lower costs, or what is the same thing, with the same amount of resources greater output can be produced. But producing at lower cost or producing more output with the same cost results in profits. Thus, ***economic development gives birth to profits***. But, when other producers also adopt the technique introduced by the innovator, the total national output increases, i.e., economic development catches pace. The widespread use of innovation, however, wipes out the profits, as explained earlier. Hence, economic development itself is responsible for the disappearance of profits.

1. J.A. Schumpeter, *Business Cycles*, (New York and London, McGraw Hill Book Company, Inc., 1939).

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REVIEW QUESTIONS AND EXERCISES

1. State and explain Euler's theorem? How does it explain the distribution of national income?
2. The marginal productivity theory of distribution states that if all of productive agents are rewarded in accordance with their marginal product, then the total output will be exhausted. Explain.
3. What is Clark-Wicksteed-Walras theorem of output distribution? How does it differ from Euler's theorem?
4. Assuming a homogeneous production function of Cobb-Douglas type, prove that if factors of production are paid according to their marginal value of productivity, the output will be exhausted.
5. How does a change in the elasticity of factor substitution affect the relative share of factors in the total output? Suppose elasticity of substitution equals 0.5, and wages/interest ratio changes by 10%, what will be the change in the share of labour in the total output?

curve for coffee and increase in coffee price depends on the ***cross-elasticity*** of demand for coffee. The process of action and reaction between the two markets does not end here. When coffee price increases to P_{C2}, some consumers find it relatively costlier than tea even with tax and, therefore, they switchover back to tea. Consequently, tea demand curve shifts upwards, say, to D'_T pushing tea price further up to P_{T3}. This rise in tea price will send some consumers back again to the coffee market. This makes tea demand curve shift downward as shown by the dashed demand curve in panel (a). This process of interaction between the tea and coffee markets continues till both the markets reach their final equilibrium.

This description shows ***interdependence of the markets.*** It is ***important*** to note that the story does not end here. The effects of changes in tea and coffee markets bring about changes in their input markets (labour, capital and raw materials).

25.3 GENERAL EQUILIBRIUM IN EXCHANGE

Having shown the market interdependence, we now move to discuss general equilibrium in a sectoral framework. We will first show the ***general equilibrium in exchange.*** The general equilibrium in exchange requires that consumer goods are so allocated between the consumers that each consumer is in equilibrium with *MRS* being equal to commodity price ratio and that the total product is exhausted. For the purpose of our analysis, we will use a simple case of two consumers (*A* and *B*) and two goods (food and clothing). A popular technique used to show the general equilibrium in exchange (and also in production) is ***Edgeworth box diagram.*** We will first describe the *Edgeworth box diagram*[1], then use it to show how consumers (*A* and *B*) arrive at the general equilibrium.

Edgeworth Box Diagram

The Edgeworth box diagram is a graphical technique for illlstrating optimum allocation of a given quantity of two goods between two consumers and of a given quantity of two inputs between two industries. Here, we use this technique to illustrate the general equilibrium in exchange. Let us first show the formation and the application of the Edgeworth box diagram.

Figure 24.3 illustrates the Edgeworth box assuming that there are only two goods, *food* and *clothing* and two consumers, *A* and *B*, and that the maximum quantity of food and clothing are given. In the Edgeworth box, the point of origin for consumer *A* is given at south-west end by O_A and for consumer *B* at the north-east end by O_B. Horizontal axis measures the maximum quantity of food and vertical axis measures the maximum quantity of clothing. What is important to note is that for consumer *B*, quantity of food is to be read leftward from the point of origin O_B as shown by the arrow and the quantity of clothing is to be read downward from the point of origin. In case of consumer *A*, quantities are measured in the usual manner. The terminal points of the box mark the maximum availability of the two goods.

Each point inside the box shows a combination of food and clothing available to consumers *A* and *B*. For example, at point *S*, consumer *A* has O_AA_2 of food and SA_2 of clothing, and consumer *B* has SB_1 of clothing and O_BB_1 of food. With this distribution, the total stock of food and clothing is exhausted. The consumers can move to any other point only by exchanging food and clothing between them. For example, if *A* has to move from point *S* to point *Q*, he will have to exchange *SP* of food for *PQ* of clothing. After the exchange, both *A* and *B* are placed at point *Q*. This exchange possibility

1. We have already used the Edgeworth box diagram in Chapter 8 to measure the gains of optimal allocation of two goods, *X* and *Y*, between two consumers, *A* and *B*. Here we discuss the Edgeworth box diagram in detail because this technique will be used frequently in this and the next chapter.

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Figure 25.5 shows also that if more of labour and capital is used for any of the products, less of them will be available for the other commodity. For example, movement from point M to K means that more of labour (JK) and less of capital (JM) are allocated to food production and share of clothing in labour and capital changes to the same extent. Besides, the figure shows also the possibility of substitution between labour and capital. For example, movement from point K to M implies substitution of JK of labour for JM of capital in food production. One can similarly locate a number of points inside the box and examine their implications with reference to one another.

The Condition for General Equilibrium in Production

As mentioned above, the general equilibrium in production requires that factor inputs are so distributed among the various industries that ***marginal rate of technical substitution (MRTS)*** between the inputs in each industry is the same. With reference to our two-industry-and-two-input model, the condition for general equilibrium in production can be specified as follows.

$$MRTS^{F}_{LK} = MRTS^{C}_{LK}$$

The $MRTS$ is given by the slope of the *production isoquants*, given the production function. To show the general equilibrium in production, we need therefore to introduce isoquants to Fig. 25.5. It may be recalled here that Fig. 25.5 shows only the possible combinations of inputs (labour and capital): it does not show the quantity of food and clothing that can be produced with each combination of inputs. The introduction of isoquants to the Edgeworth production box diagram reveals both possible input combinations and the corresponding production of food and clothing. This is accomplished in Fig. 25.6. Note that the isoquants pertaining to food production are shown in the usual manner whereas those pertaining to clothing production are shown up side down (as in case of indifference curves in Fig. 25.4). Isoquants F_1, F_2, F_3 and F_4 represent food production and, isoquants C_1, C_2, C_3 and C_4 represent production of clothing.

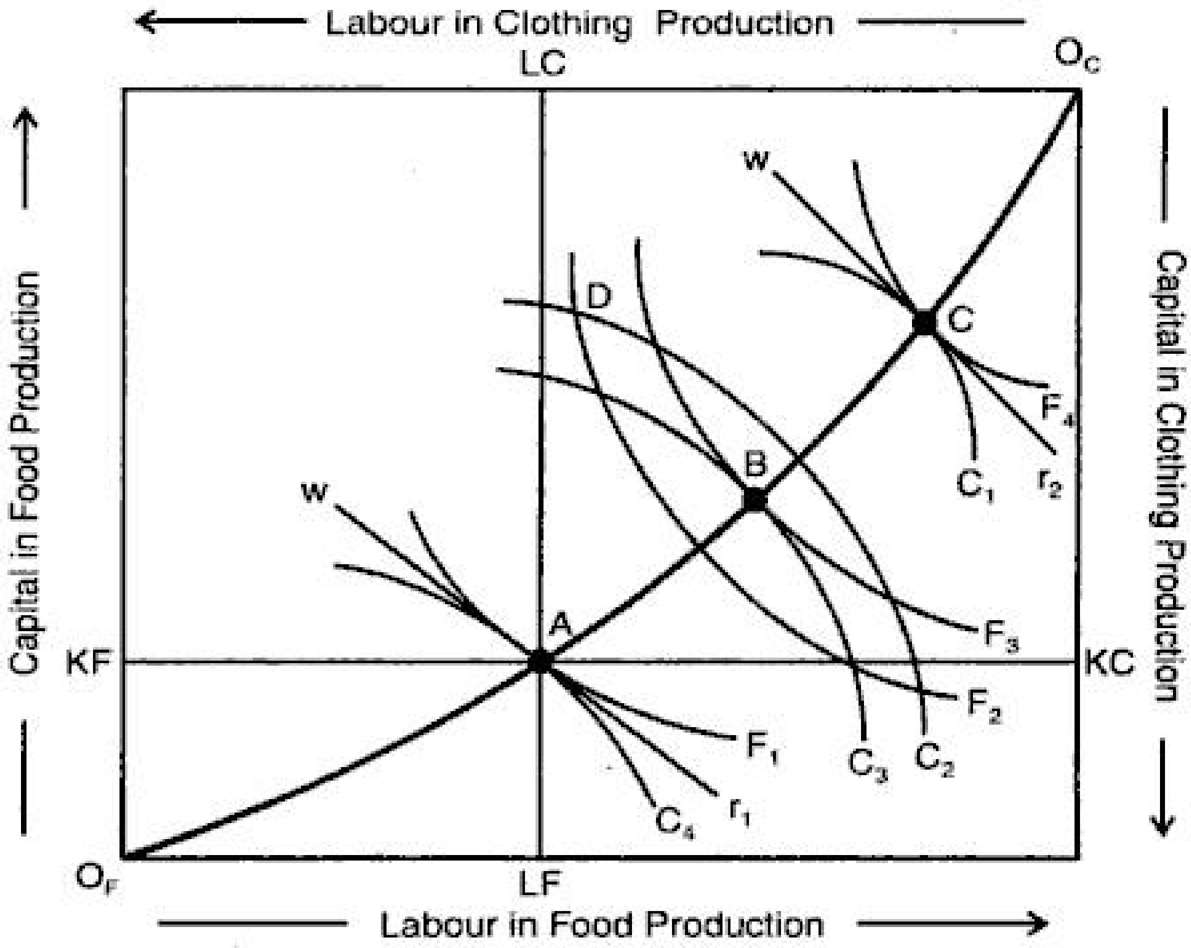

Fig. 25.6 General Equilibrium in Production

Given the isoquants, various combinations of inputs and corresponding production of each commodity can be found in Fig. 25.6. For example, point A shows that if LF units of labour and KF

The slope of the *PPF* curve equals *MRT* and slope of the price line *pp*' equals the price ratio of clothing and food (P_C/P_F). Note that *pp*' is tangent to *PPF* at point *E*. Therefore, at point *E*,

$$MRT = P_C/P_F$$

We know that a consumer is in equilibrium where commodity price ratio equals *MRS*. Therefore, at consumer's equilibrium, $P_C/P_F = MRS$. It means that at point *E*.

$$MRT = MRS$$

This equation satisfies the condition that production possibility matches with consumers' demand. What about factor prices and employment? We know also that in competitive output and input markets, prices of goods equal their marginal cost. Therefore, $P_C = MC_C$ and $P_F = MC_F$. Thus,

$$P_C/P_F = MC_C/MC_F$$

Therefore, at point *E*,

$$MRT = MRS = MC_C/MC_F$$

This satisfies the general equilibrium condition.

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(**Note.** Most of these readings are advanced and highly mathematical.)

REVIEW QUESTIONS AND EXERCISES

1. Distinguish between partial equilibrium and general equilibrium analyses. In what sense is partial equilibrium analysis provides a partial economic analysis?
2. What is meant by the interdependence of markets? Illustrate how a change in one market affects the equilibrium of another related market.
3. What is Edgeworth box diagram? How is Edgeworth exchange box diagram different from Edgeworth production box diagram?
4. What is contract curve in Edgeworth exchange box diagram? How is it derived and what is its significance in general equilibrium analysis?

is much more difficult than the propositions of general positive economics.[1] The information gained through positive analysis is useful in devising appropriate policy measures to maximise the welfare of the society. Welfare economics is a ***normative science*** in that it provides guidelines for policy formulations to maximise social welfare. Maximisation of economic welfare of a society presumes a social welfare function which consists essentially of value judgements. Given the welfare function, welfare economics, as a normative science, provides guidelines for appropriate policy measures.

In this chapter, we will discuss briefly the welfare economics including concept of social welfare, Pareto's optimality conditions for maximising economic welfare, new welfare economics and, finally, present a summary of critique of welfare economics. Let us begin with the concept of social welfare.

26.3 THE CONCEPT AND MEASUREMENT OF SOCIAL WELFARE

The term 'welfare' has been defined in diverse ways, perhaps, because it is extremely difficult to give it a precise meaning. The difficulty arises from the fact that welfare of an individual or of a group of individuals depends on many immeasurable social, political and economic factors and also on the philosophical attitude of the people towards life and society. In economics, however, the concept of welfare is used in a narrow sense: it is limited to only ***economic welfare***. Even the term economic welfare eludes a precise definition. Nevertheless, economists have tried to give it a precise meaning for the purpose of economic analysis.

26.3.1 Some Early Concepts of Welfare

Jeremy Bentham defined ***social welfare*** as "the sum total of the happiness (or welfare) of all the individuals in society."[2] Following Benthamite doctrine, Pigou defined social welfare as the arithmetic sum of the individual welfare. In nutshell, social welfare was regarded by the economists of cardinal utility tradition as the arithmetic sum of the utility gained by the individual members of society.

This concept of social welfare has, however, met with certain serious ***objections***. ***First***, it is argued that utility cannot be cardinally measured and, hence, cannot be added to obtain the social welfare. It is, therefore, meaningless to define social welfare as the sum of the individual utilities. This objection is universally accepted. ***Secondly***, it is also widely accepted that ordinal measurement of utilities is not possible either and, therefore, interpesonal comparison of utilities is not possible in an objective or scientific manner. It would, therefore, not be possible to determine how a change in existing pattern of resource allocation would affect the aggregate welfare unless it is unrealistically assumed that all individuals have identical income-utility and commodity-utility functions.

Owing to these problems, Benthamite and Pigovian concepts of social welfare had become in-operational, in the sense that, it cannot be used objectively in any policy formulation. Therefore, the cardinal utilitarian thesis that the welfare of different individuals could be added up to arrive at the welfare of society had to be abandoned.

26.3.2 Pareto's Concept of Welfare

It was Vilfred Pareto, an Italian economist, who broke away from the cardinal utility tradition and gave a new orientation to welfare economics. Pareto introduced a new concept, i.e., the concept of ***social optimum***. This concept is central to Pareto's welfare economics. Accoding to Pareto, although

1. E.J. Mishan, *op. cit.*, p. 157.

2. Quoted in I.M.D. Little, *A Critique of Welfare Economics*, Second Edn., (Oxford University Press, 1957), p. 70.

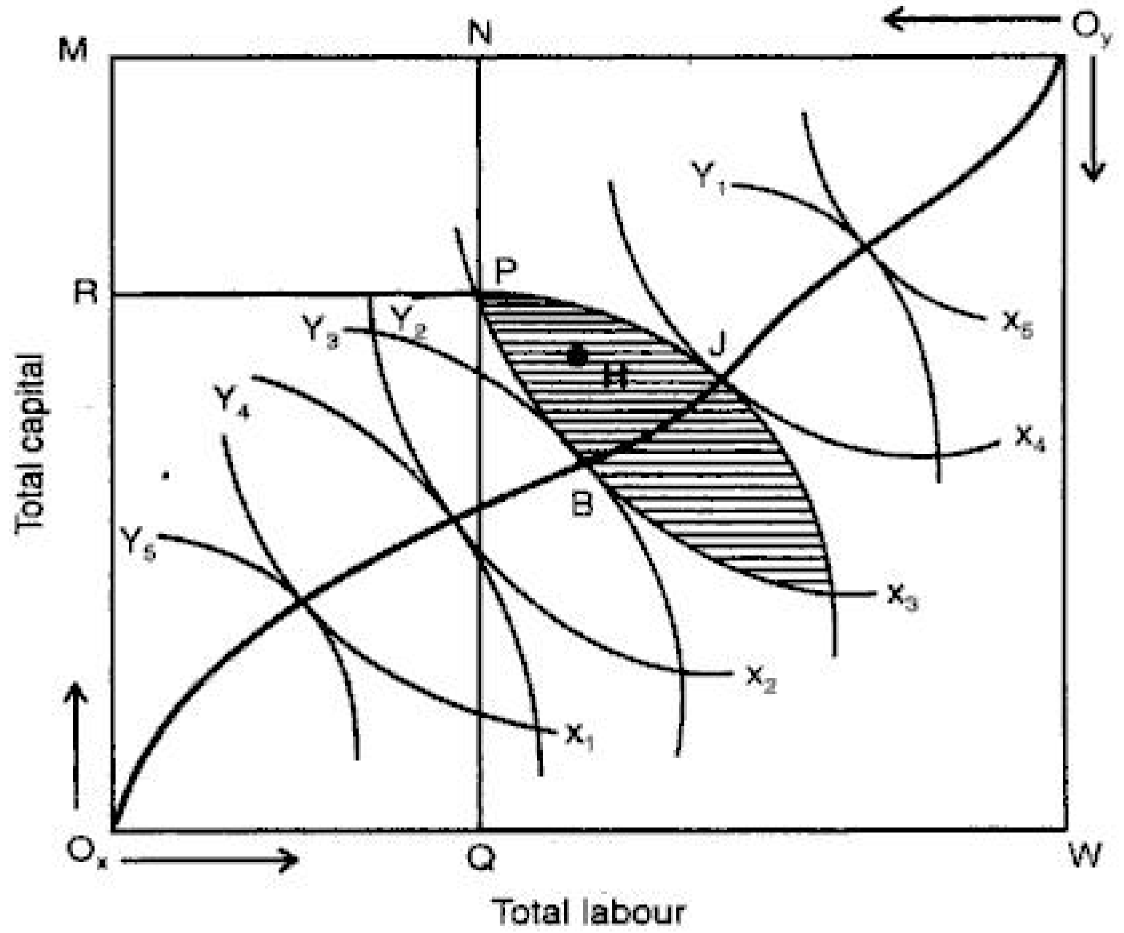

Fig. 26.2 Edgeworth Box Diagram: Pareto Efficiency in Production

Therefore, only those points that lie on the production contract curve ($O_x O_y$) represent the Pareto optimality (or Pareto efficient production). Any other point that satisfies the above condition is not efficient. For example, point *P*, the point of intersection of isoquants X_3 and Y_2, satisfies the Pareto optimality condition but production is not Pareto efficient. At point *P*, O_xQ (= *MN*) of labour is allocated to the production of *X* and *QW* (= $O_y N$) of labour to the production of *Y*. And, *PQ* of capital is allocated to *X* while *PN* of capital goes to the production of *Y*. This allocation of *L* and *K* between *X* and *Y* is not Pareto efficient because point *P* falls away from the contract curve, $O_x O_y$. Therefore, any movement towards the contract curve, through the shaded areas, will improve the efficiency in resource allocation for both the goods. For example, factor allocation represented by point *H* will increase the production of both, *X* and *Y*, as both products move onto higher isoquants.

Movements along the ridge lines of the shaded area improves the output of one of the commodities without reducing production of the other. Therefore, any point on the ridge lines indicates a more efficient allocation of *L* and *K*, than point *P*. For example, movement along *PJ* indicates reallocation of factors which lead to increase in the production of *X* without reducing production of *Y*. Similarly, movement along *PB* increases production of *Y* without affecting output of *X*. But, once a point on contract curve is reached, it will not be possible to increase the production of any commodity without reducing that of the other. Thus, each point on the production contract curve ($O_x O_y$) represents optimal allocation of *K* and *L* between goods *X* and *X* in Paretian sense.

It may be noted here that *Pareto optimality condition of production does not offer a unique solution.* It may be inferred from Fig. 26.2 that there are infinite points on the contract curve of production that satisfy the marginal condition of Pareto optimality in production. By a reasoning analogous to one applied to consumption-exchange-optimality condition shown in Fig. 26.1, it is not possible to say which point on the production contract curve represents optimum optimorum.

(iii) Optimum Distribution of Goods between Firms

Optimum Specialisation of Firms. Another condition that must be satisfied for Pareto optimality in production is optimum degree of specialisation by firms. It means, that the production of goods *X*

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is that it presupposes a given distribution of income which is not determined by the optimality conditions of welfare maximisation. If income distribution (presumed arbitrarily to be given) changes, it will cause a change in welfare maximising output and factor allocations.

26.5 PERFECT COMPETITION AND PARETO OPTIMALITY

A necessary condition for the Pareto optimality is the existence of perfect competition in both product and factor markets. This is, in fact, one of the basic assumptions of Pareto optimality. Let us see how perfect competition leads to Pareto optimality in exchange or consumption and production.

Efficiency in Exchange

Pareto optimality in exchange requires that marginal rate of substitution between any two goods must be the same for the two consumers, i.e.,

$$MRS^{A}_{x,y} = MRS^{B}_{x,y}$$

We know that every utility maximising consumer attains his equilibrium (or the level of maximum satisfaction) where

$$MRS_{x,y} = \frac{P_x}{P_y}$$

where P_x and P_y are prices of commodities, X and Y, respectively.

We know also that under perfect competition, P_x and P_y are given for each consumer. Therefore, at equilibrium.

$$MRS^{A}_{x,y} = MRS^{B}_{x,y} = P_x/P_y$$

Under perfect competition, this condition holds for any pair of goods for all the consumers. Perfect competition, therefore, ensures optimality in exchange.

Efficiency in Production

Pareto efficiency (or optimality) in production requires that *MRTS* between any two factors must be the same for all the commodities. With reference to two-products, X and Y, and two factors, L and K in our model, this condition is expressed as

$$MRTS^{X}_{L,K} = MRTS^{Y}_{L,K}$$

Profit maximising firms are in equilibrium, with respect to X

$$MRTS^{X}{}_{L,K} = \frac{P_L}{P_K} = \frac{w}{r}$$

where $P_L = w$ = wages, and $P_K = r$ = price of capital.

When factor market is perfectly competitive, P_L and P_K are the same for all the firms. Therefore,

$$MRTS^{X}_{L,K} = MRTS^{Y}_{L,K} = P_L/P_K$$

This shows that perfect competition ensures also the optimality in production, i.e., the first order condition of maximum welfare.

Efficiency in Production and Exchange

The third condition of Pareto optimality requires that *MRS* must be equal to *MRT* for all products. We have already shown that

$$MRS_{x,y} = \frac{P_x}{P_y}$$

However, in case social benefits and social costs of production cancel out each other, the Pareto optimality can be realised under perfect competition. The equality of social cost and benefits is however not guaranteed.

(b) Externalities in Consumption

Interdependence of utility functions. Like externalities in production, there are externalities in consumption which prevent the realisation of Pareto optimality in consumption. We have shown below how external economies and diseconomies in consumption affect Pareto optimality under competitive conditions.

External Economies in Consumption

When a housewife replaces her traditional charcoal-stove with a gas-stove, her neighbours benefit because air-pollution caused by smoke is reduced. When a household buys a TV set, its neighbours benefit when the TV owner allows them to watch the TV programmes. Similarly, if a person plants trees around his house or decorates his courtyard with flower pots, his neighbours benefit from the oxygen produced by the trees and also from the beautiful greenery around. A well-maintained car improves the safety of the people on the road and reduces air-pollution. Expenditure on education by some gives people benefit of an educated society.

All such external benefits imply that utility functions of some individuals are dependent on the consumption of others. Interdependence of utility functions violates one of the marginal conditions of Pareto optimality, i.e., it affects the condition that *MRS* between any pair of goods must be the same for all consumers. Since utility of one consumer increases because of increase in the consumption of another consumer, it is always possible to redistribute the goods and increase total social utility.

External Diseconomies in Consumption

Analogous to diseconomies in production, there are diseconomies in consumption too. Diseconomies in consumption arise when consumption of a commodity by an individual decreases the total utility of others. For example, (i) smoking cigarette in a bus, railway compartment, theatre or restaurant causes disutility to non-smokers; (ii) neighbours' colour TV reduces the utility of owners of black and white set; (iii) **Veblen** and **snob effects** also cause diseconomies in consumption; (iv) using automobiles causes air-pollution and breathing problems also to non-users; and (v) playing radio and tape-recorder, and using loud-speakers for religious and marriage ceremonies cause disutility to others. Such diseconomies of consumption imply interdependence of utility functions, since utility of a commodity for a consumer depends on the consumption of that commodity by others.

The interdependence of consumers' utility functions affects Pareto optimality. The effect of interdependence of utility functions on Pareto optimality is illustrated graphically in Fig. 26.9(a) and (b). Let us suppose (i) that there are two consumers, *A* and *B* of two commodities *X* and *Y*; (ii) that indifference maps of *A* and *B* are given as in Fig. 26.9(a) and (b), respectively, (iii) that utility level of *A* is not affected by *B*'s consumption; and (iv) that utility level of *B* is affected by *A*'s consumption of *X*, but not of *Y*.

To begin the analysis, let us assume that *A* and *B* are at points *J* and *R*, respectively, on the their respective indifference maps and at these points $MRS^{A}_{x,y} = MRS^{B}_{x,y}$. Given this condition, let the distribution of commodities be changed in such a way that consumer *A* moves to point *L* where his consumption of commodity *X* decreases by *JK* and of *Y* increases by LK. Since *A* remains on the same indifference curve his total utility remains unchanged.

to have the change and by asking B how much she would pay to prevent the change. Suppose A puts his amount at M_a and B puts it at M_b. If $M_a > M_b$, the policy change makes an improvement in welfare. But, it is difficult to evaluate social welfare implication of a movement from J to K on the Kaldor-Hicks criterion. The same argument can be applied to the change from point K back to J. Note that in the change from J to K, point K can be regarded a superior point. But in a change from K to J, point J is a superior point and K an inferior point. Thus, Kaldor-Hicks criterion is self-contradictory.

26.7.2 The Scitovsky Double Criteria

As mentioned above, Scitovsky pointed out a contradiction in Kaldor-Hicks criterion. He then proposed his own criterion, called ***double-criterion***.[1] His criterion may be stated as follows. A change in economic situation of individuals would increase welfare only if (i) the change improves welfare on Kaldor-Hicks criterion; and (ii) losers are not capable of bribing the gainers for voting against the change. Obviously, Scitovsky's criterion is rather stringent.

Scitovsky's criterion is based on the premise of Kaldor-Hicks criterion. In fact, one of his double criteria is the same as Kaldor-Hicks criterion. It can therefore be said that most of criticism against Kaldor-Hicks criterion apply also to Scitovsky's double-criterion. In addition, there are only a few changes in real life that would meet the Scitovsky double-criterion. In fact, if the double-criterion is to be satisfied for an increase in welfare, the general welfare should not be affected by change in expenditure pattern and in income distribution.[2]

26.7.3 The Bergson Criterion: The Social Welfare Function

It may be concluded from the foregoing discussion that the attempts to device value-free welfare criterion have not yielded satisfactory results. It is not possible to evaluate a change which makes some persons better-off and some worse-off without making some implicit value judgement about the deservingness of an individual or a group. Recognising the inevitability of value judgement, Bergson[3] suggested that the only way out to resolve this problem is to formulate a set of explicit value judgements which enable the analyst to evaluate the situation. The value judgements may be set by the analyst himself, government authorities, legislators, social reformers, or an individual or a group of the society.

Bergson suggested that value judgements may be explicitly formulated in the form of a social welfare function. A social welfare function is an indifference map which ranks different combinations of individual utilities according to a set of explicit value judgements about the distribution of income. It is analogous to the utility function of a consumer. More precisely, a social welfare function is an ordinal index of welfare of the society and is a function of the utility levels of all individual members. It may be expressed as

$$W = f(u_1, u_2 ..., u_n)$$

where W denotes social welfare and u_1, u_2, etc. are utility index of the ith individual.

Assuming an economy of two persons, A and B, the social welfare function may be written as

$$W = F(U_A, U_B)$$

1. Scitovsky, "A Reconsideration of the Theory of Tariff," *Rev. of Eco. Stud.*, Vol. IX, No. 2, 1942-43. See also his "A Note on Welfare Proposition in Economics", *Rev. of Eco., Stud.*, Vol. IX, November 1941.

2. Blaug, *op. cit.*, p. 625.

3. Abraham Bergson, "A Reformulation of Certain Aspects of Welfare Economics", *Quarterly Journal of Economics*, Vol. 52, February 1938.

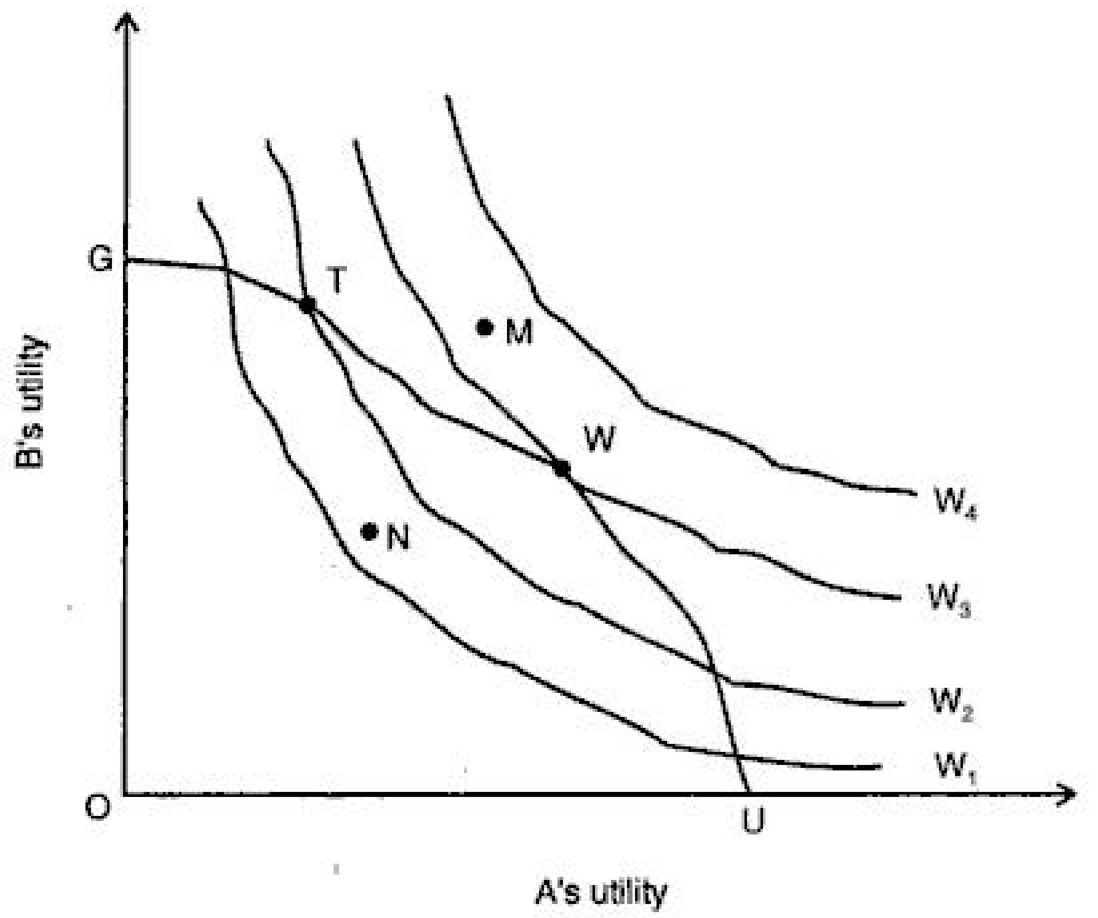

Fig. 26.15 Maximisation of Social Welfare: The Point of Blios

26.8 THE THEORY OF SECOND BEST

The basic idea underlying ***the theory of the second best*** was recognised and discussed by different authors in different contexts. The principle of **second best** was however generalised for the first time by Richard G. Lipsey and Kelvin Lancaster.[1] The theory of second best as formulated by Lipsey and Lancaster is briefly described here.

The basic idea behind the theory of **second best** is as follows. The **first best** solution to welfare maximisation is obtained when all the marginal conditions of Pareto optimality are simultaneously satisfied. But if any of the the marginal conditions is not satisfied somewhere in the economy, the first best solution (i.e., the Pareto optimum solution) cannot be obtained. And, there are reasons to believe that, because of institutional constraints (like monopolies and imperfect market conditions etc.), externalities and indivisbilities, one or more of the first order conditions may not be satisfied. This would mean that the first best solution is not attainable.

For a long time, economists believed that, if for some reason or other, one or more of the first order conditions of Pareto optimality are not fulfilled, it is still desirable to satisfy the remaining conditions to have a solution as close as possible to Pareto optimum. Economists believed that the greater the number of conditions satisfied, the closer would be the solution to Pareto optimum. This belief found application to the fields like public finance and international trade[2] until Lipsey and Lancaster devastated the belief.

Lipsey and Lancaster suggested that if "... one of the Paretian optimum conditions cannot be fulfilled, then an optimum situation can be achieved only by departing from all the other Paretian

1. Richard G. Lipsey and Kelvin Lancaster, "The General Theory of Second Best," *Rev. of Eco. Stud.*, Vol. XXXIV (1), 1956-57.
2. S.K. Nath, *A Reappraisal of Welfare Economics*, London, Routledge and Kegan Paul, 1969.

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27.2 GROWTH OF MONOPOLY POWER AND MARKET FAILURE

Monopolies in product markets grow over time for such reasons as (i) patent rights, (ii) legal restrictions, (iii) efficiency, (iv) mergers and take-over. In input markets, especially in the labour market, monopoly powers grow due to politicization of labour force and formation of labour unions. Growth of monopoly powers distorts the competitive structure of the markets which results in inefficient allocation of resources among the industries and of consumer goods among the consumers. How monopoly power in product markets causes market failure is discussed below.

Recalling our example of food and clothing in the previous chapter, let us suppose that food market remains perfectly competitive while clothing market in monopolized. Also, recall from our earlier analysis of product pricing, that in perfectly competitive food market, price of food (P_F) equals its marginal cost (MC_F). Therefore, in competitive food market,

$$P_F = MC_F$$

In monopolized clothing market, however, price of clothing (P_C) is greater than MC_C, i.e.,

$$P_C > MC_C$$

and monopoly output is lower than the competitive output. This means inefficiency in production due to monopoly power.

Prior to monopolilzation of clothing industry, both the markets worked efficiently because product-price ratio equalled the input-price ratio, i.e.,

$$P_C/P_F = MC_C/MC_F$$

Now that clothing industry is monopolized, the relative product price is no more equal to relative factor price. The relative price relationship is now given as

$$P_C/P_F > MC_C/MC_F$$

The change in relative price ratio *distorts the product mix,* though it may not affect the equilibrium in exchange and in input combination. Consumers' equilibrium is not affected because consumers adjust their consumption pattern so that $MRS^A_{X,Y} = MRS^B_{X,Y}$ and input combination is not affected because labour and capital prices are given (though not necessarily) and firms employ factors that $MRTS_{L,K} = w/r$.

However, since clothing industry is monopolized and profit maximizing monopoly output is less than the competitive output, some factors are spared which are transferred to food industry. This situation is illustrated in Fig. 27.1.

Let us suppose that prior to monopolization of clothing industry, the two-sector economy was in equilibrium at point *A* on the production possibility frontier *PF*. As Fig. 27.1 shows the relative factor price line *pp*' is tangent to production possibility frontier *PF* at point *A*. Therefore, at point *A*,

$$P_C/P_F = MC_C / MC_F = MRT$$

After monopolization of clothing industry, however, $P_C/P_F > MC_C/MC_F$. The relative factor price line *pp*' shifts to *jj*' and a new equilibrium is reached at point *B*. Note that at point *B*, slope of the factor price-line changes—line *jj*' is steeper than line *pp*'. With this change, the product price-line changes and remains parallel to the factor-price line *jj*' and consumers are in equilibrium at point C. What is *important* to note here is that change is relative product price has changed the *product mix*. Prior to the monopolization of clothing industry, product-mix included OF_1 of food and OC_2 of clothing. After monopolization of clothing industry, production of clothing decreases from OC_2 to OC_1 and food production increases from OF_1 to OF_2. Now product mix combines OF_2 of food and OC_1 of clothing. This means a larger production of food and a smaller production of clothing than

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27.5 EXTERNALITIES AND MARKET FAILURE

Another reason for market failure is the existence of "externalities" in both production and consumption. *Externalities* refer to the costs people have to pay and the benefits they enjoy due to production and consumption by others. For example, air-pollution caused by industrial units located inside the city of Delhi and 2.4 million cars running on Delhi roads cause health problems like breathing problem, asthma, bronchitis, lung infection; and industrial units polluting Yamuna river are all the cases ***negative externalities***. This is called ***external cost*** to the society. There are ***positive externalities*** also. For example, private cost of immunization against contagious diseases and car owners getting their cars regularly checked for pollution and benefit the people who do not pay it. Such benefits are called ***external benefits***. External costs and benefits are together called ***externalities*** or ***spillovers***. Market system fails to work efficiently where externalities exist because private entrepreneurs take into account only their private explicit cost and there is no way to compensate the losers and to charge the gainers. Externalities lead in non-optimal allocation of resources from social welfare point of view: they create divergence between social and private costs and between private and social benefits. The market system does not provide a mechanism to account for such social costs and benefits. Therefore, market fails to work efficiently.

27.6 PUBLIC PROVISION OF PUBLIC GOODS

We have discussed above how existence of public goods causes market failure and why private firms abstain from producing and supplying pure public goods. But public goods have to be provided for the benefit of the society as whole. In this section, we will discuss how government can make an ***efficient provision of public goods***.

Suppose that public authorities have to buy anti-mosquito sprayers for a malaria-prone area of the city. Sprayers are a public good in the sense that their benefits are equally distributed and no resident can be excluded. All the persons living in the area would benefit, but only two persons, *A* and *B*, are willing to reveal their benefits and preferences for it. The benefits which they derive from the sprayers is shown by their demand curves, *AA'* and *BB'*, respectively, in Fig. 27.2. Note that these curves are not, in fact, their demand curves in usual sense of the terms: these curves reflect only the marginal benefit which individuals are likely to derive from the use of sprayers.

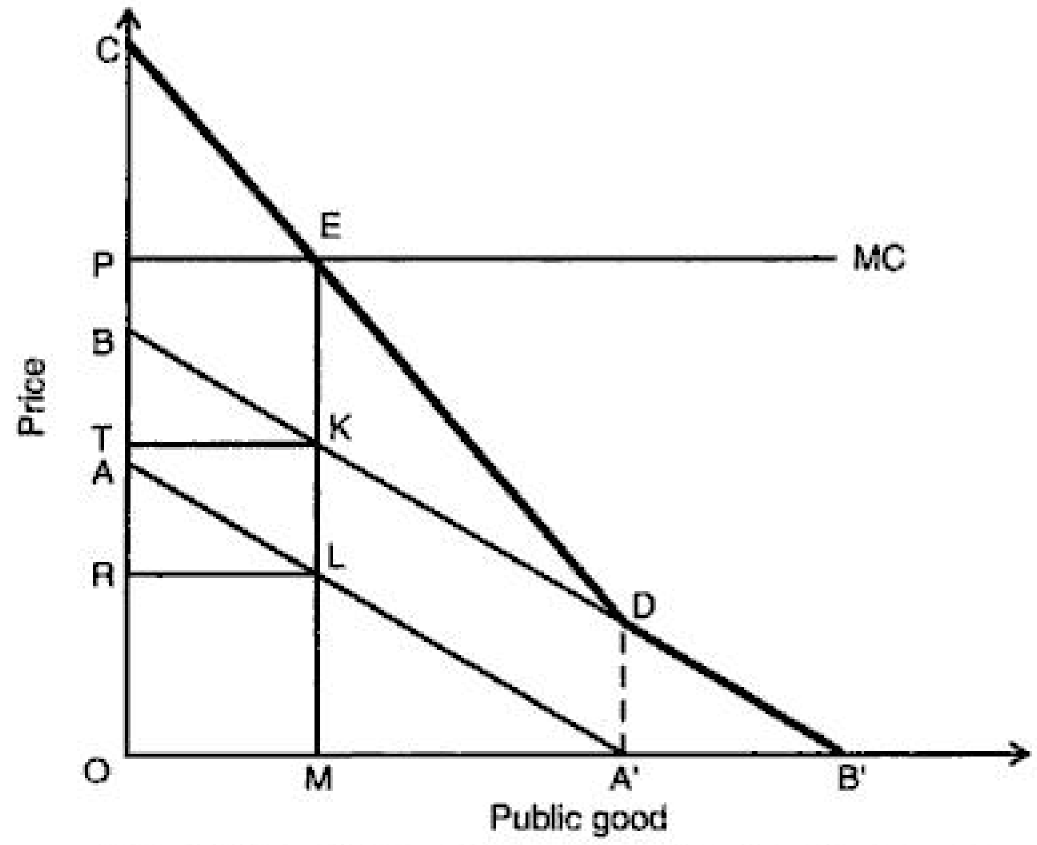

Fig. 27.2 Efficient Provision of a Public Good

28 Classical Theories of International Trade

CHAPTER OUTLINE

28.1 Distinction Between Internal and International Trade
28.2 Basis of Foreign Trade
28.3 Adam Smith's Absolute Advantage Theory of Trade
28.4 Ricardo's Comparative Advantage Theory of Trade
28.5 Drawbacks of Comparative Advantage Theory
Further Readings
Review Questions and Exercsies

We have so far discussed economic theories pertaining to the internal trade in the framework of a **closed economy**—an economy in which there is no economic transaction with the rest of the world. In this Part of the book, we are concerned with the theories that pertain to the trade between two or more nations. This part of economic analysis is called ***'International Trade'***.

28.1 DISTINCTION BETWEEN INTERNAL AND INTERNATIONAL TRADE

The international trade, i.e., the trade between two nations, differs from the intra-country trade, i.e., the trade between any two units (individuals, firms, cities and regions) of the same nations, for the following reasons.

(i) immobility of factors between two nations;
(ii) different economic systems, laws, customs and trade practices;
(iii) use of different currencies and monetary systems in different nations;
(iv) different systems of taxation; and
(v) different economic policies pursued by nations.

For these reasons, the conventional *price theory* cannot be applied to international trade. This makes it necessary to study the international trade as a separate branch of economic science.

In this part of the book, we present a brief discussion on the theory of international trade and the related issues. In this chapter, we discusses the classical theories of international trade from Adam Smith to Ricardo. Chapter 29 discusses the *Heckscher-Ohlin Theory of Trade*. In Chapter 30, we have analysed the demand side of international trade by using Marshallian **offer curves** and have determination discussed **terms of trade** of.

Let us now drop the assumption of autarky and allow free trade between India and Bangladesh. Let India specialise in rice and Bangladesh in jute production. India will export rice to and import jute from Bangladesh. On the other hand, Bangladesh will import rice from and export jute to India.

Now, whether two countries gain from foreign trade or not will depend on whether or not their *external* exchange rate, i.e., **terms of trade**[1], is higher than the domestic exchange rate. If external exchange rate is higher than the domestic exchange rate, the two countries definitely gain from foreign trade and *vice versa*.

On this criterion, both the countries gain through specialisation and foreign trade. As Table 28.4 shows, in India's domestic market, 1 quintal of rice is exchanged for only 0.5 quintal (50 kg) of jute. But if India exports 1 quintal of rice to Bangladesh, she can get 0.67 quintal (or 67 kg) of jute because in Bangladesh 1 quintal of rice is domestically exchange for 0.67 quintal of jute.

Similarly, in the internal market of Bangladesh, 1 quintal of jute is exchanged for 1.5 quintals of rice. But, if Bangladesh export 1 quintal of jute to India, she can import 2 quintals of rice.

Table 28.4 Grains from Foreign Trade

Country	*Domestic barter rate*	*External barter rate*	*Net gain*
India	$1\ QR = 0.5\ QJ$	$1\ QR = 0.67\ QJ$	$0.17\ QJ$
Bangladesh	$1\ QJ = 1.5\ QR$	$1\ QJ = 2.0\ QR$	$0.5\ QR$

QR = Quintals of Rice; QJ -Quintals of Jute.

Thus, both the countries gain from specialisation and trade between them. On the contrary, if India specialises in jute and Bangladesh in rice, and they exchange their produce, both countries will be worse-off. The obvious conclusion, therefore, is that India would specialise in rice production and import jute, and Bangladesh would specialise in jute production and import rice. This is what Ricardo has shown in his ***theory of comparative advantage***.

Distribution of Gains: Which Country Gains More?

The distribution on gains from trade between India and Bangladesh depend on the ***terms of trade*** (i.e., the barter rate) between the two countries. For India, the gainful range of barter rate lies between 0.5 and 0.67 quintal of jute for 1 quintal of rice, and for Bangladesh, it ranges between 1.5 and 2 quintals of rice for 1 quintal of jute. Given the lower and upper limits of exchange rates, a country's gain depends on how close is the barter rate to the upper limit of gainful exchange rate. For example, if terms of trade is such that 1 quintal of rice is exchanged for 0.67 quintal of jute, the total gain from foreign trade goes to India. And, if 1 quintal of jute is exchanged for 2.00 quintals of rice, the total gains from trade go to Bangladesh. Any barter rate between these two rates will be advantageous to both the countries. How is the actual terms of trade determined? The answer to this question lies in the reciprocal demand for rice and jute in India and Bangladesh. We will return to this aspect in Chapter 29.

Ricardo's theory of comparative advantage may be summarised as follows. A country specialises in the production of those commodities in which it has comparative advantage over other countries and exports its surplus to other countries. In return, it imports the goods in which it has comparative disadvantage or the least comparative advantage. This kind of specialisation by the different countries

1. The 'term of trade' means the rate at which two countries exchange their products.

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29 The Standard Theory of International Trade

CHAPTER OUTLINE

29.1 Introduction
29.2 Production Possibilities Frontier with Increasing Cost
  29.2.1 The Opportunity Cost
  29.2.2 The Marginal Rate of Transformation (MRT)
29.3 The Social Indifference Curve
29.4 Equilibrium of a Closed Economy
29.5 The General Equilibrium with Trade: A Single Country Case
29.6 The General Equilibrium with Trade: A Two-Country Case
Further Readings
Review Questions and Exercises

29.1 INTRODUCTION

In the previous chapter, we have discussed classical theories—absolute and comparative cost advantage theories—of international trade and noted their drawbacks. One of the drawbacks of the classical theories of international trade is that these theories are based on *labour theory of value*, which is now regarded as an outdated, rather invalid, theory of value. In the 1930s, Gottfried Haberler[1] reconstructed the Ricadian theory of comparative advantage, and developed a more general form of trade theory. His theory is called ***opportunity cost theory of international trade***. Haberler made two significant improvement in comparative advantage theory of trade: (i) he replaced *labour cost of production* with *opportunity cost* and recast comparative advantage theory in terms of opportunity cost, and (ii) used both labour and capital to measure the opportunity cost. However, Haberler's theory, too, was found to be inadequate in dealing with many complex problems of international trade. An important drawback of Haberler's theory of international trade is the *omission of demand side*. Economists have, however, integrated Haberler's *opportunity cost theory of trade* with demand for the products by means of *social indifference curve* to find the general equilibrium in international trade. Some authors[2] call this development in trade theory as ***standard theory of international trade***.[3]

1. Gottfried Haberler, *The Theory of International Trade* (W. Hodge and Company, London, 1936), Chs. 9-11.
2. For example, see Dominick Salvatore, *International Economics* (John Wiley & Sons, New York, 7th Edn., 2001), Ch. 3.
3. The *standard theory of international trade* should not should not imply that other theories of trade are sub-standard. It is a rather new nomenclature of the standardized form of the classical and neo-classical postulates of international trade theories.

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29.4 EQUILIBRIUM OF A CLOSED ECONOMY

As noted above, our main aim in this Chapter is to trace and analyse the international trade equilibrium. We begin by analysing how a closed economy reaches its equilibrium with respect to production and consumption in the absence of trade. A *closed economy* is one that has no economic transactions with the rest of the world. A closed economy reaches its equilibrium where its marginal rate of transformation (*MRT*) *equals* the social marginal rate of substitution (*MRS*) at the highest possible social indifference curve. An additional condition that needs to be fulfilled is that the price ratio of the two goods must be equals to *MRT* and *MRS*. In our two-country-and-two-commodity model, the equilibrium condition may be expressed more precisely as follows.

$$MRT_{x,y} = MRS_{x,y} = P_y/P_x$$

Figure 29.4 illustrates the equilibrium conditions of countries A and B under the assumption that there is no trade between them. Panel (a) of Fig. 29.4 shows A's equilibrium in the absence of foreign trade. The curve JK represents A's production possibility curve or production frontiers—its slope gives $MRT_{x,y}$. The curves A_1, A_2 and A_3 represent A's social indifference map—their slope gives $MRS_{x,y}$ and the line PR gives the price ratio (P_y/P_x) which is constant. Note that A's production possibility curve (JK) and social indifference curve (A_2) are tangent to one another at point A. The price line PR passes through the same point (A). At point A, therefore,

$$MRT^A_{x,y} = MRS^A_{x,y} = P^A_y / P^A_x$$

It means that the equilibrium conditions for country A (closed) is fulfilled at point A.

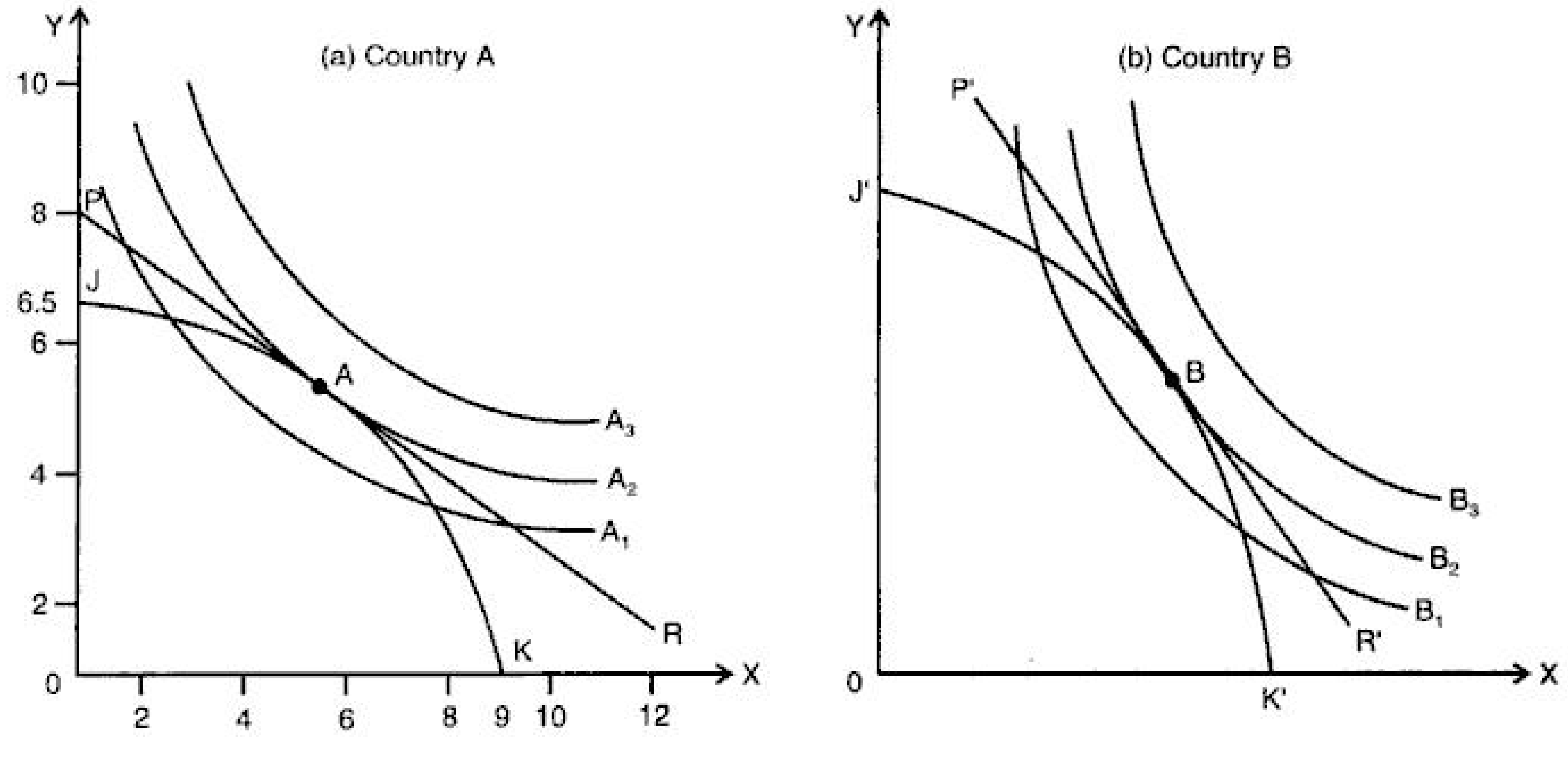

Fig. 29.4 The Equilibrium of a Closed Economy: Countries *A* and *B*.

One can similarly trace the equilibrium of the country B in the absence of foreign trade in panel (b) of Fig. 29.4. The production possibility curve of country B shown by the curve $J'K'$ and its social indifference curve B_2 are tangent to one another at point B. Its price line $P'R'$ also passes through the same point. Therefore, its economy is in equilibrium at point B. This point fulfills the equilibrium condition for the economy of country B. At point B,

$$MRT^B_{x,y} = MRS^B_{x,y} = P^B_y / P^B_x$$

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30 Heckscher-Ohlin Theory of Trade

CHAPTER OUTLINE

30.1 Introduction
30.2 The Basic Assumptions of Heckscher-Ohlin Model
30.3 Factor Intensity, Factor Abundance and Production Frontier
30.3.1 Factor Intensity
30.3.2 Factor Abundance
30.3.3 Factor Abundance and Production Possibilities Frontier
30.4 Heckscher-Ohlin Theory of Trade
30.4.1 The Equilibrium in Autarky
30.4.2 The Heckscher-Ohlin Theorem: Theorem I
30.5 Factor Price Equalisation Theorem: Theorem II
30.6 Criticism of Heckscher-Ohlin Theory
30.7 The Empirical Validity of Heckscher-Ohlin Theory
Further Readings
Review Questions and Exercises

30.1 INTRODUCTION

Ricardo's comparative advantage and Haberler's opportunity cost theories of trade assume comparative advantage as a given factor. These theories do not take into account the reason for comparative advantage enjoyed by a country. That is, these theories do not answer such questions as (i) why does one nation have comparative advantage in the production of one commodity and comparative disadvantage in another? (ii) what are the ultimate determinants of comparative advantage? and (iii) why do production possibilities frontier vary from country to country? About a century later, a Swedish economist, Heckscher[1] and later his student Ohlin[2] attempted to explain the international differences in comparative advantages in terms of ***difference in factor endowments*** of various countries and formulated a new theory of international trade. This theory is called ***Heckscher-Ohlin theory*** or ***factor endowment theory*** of trade. Heckscher-Ohlin theory of trade offers

1. Eli Heckscher, "The Effects of Foreign Trade on the Distribution of Income", *Economisk Jidskrift*, Vol. 21 (1919), reprinted in Howard S. Ellis and Lloyd A. Metzler (eds.), *Readings in the Theory of International Trade* (The Blakiston Company, Philadelphia, 1959), Chapter 13.

2. Bertil Ohlin, *Interregional and International Trade*, (Harvard University Press, Cambridge, 1933).

in Fig. 30.4 correspond to autarky equilibrium points E_A and E_B in Fig. 30.3. At point Q, country A produces and consumes OX_2 of commodity X and QX_2 of commodity Y, and at point P, country B produces and consumes PX_1 of Y and OX_1 of X. This is their equilibrium in autarky. As noted above, with specialization and trade between the nations, relative product price tends to get equalized. With the equalization of relative product prices, the relative price line for the countries becomes a uniform straight line as shown by the price line JK in Fig. 30.4. The new relative price line JK is tangent to A's production possibilities frontier at point T and at point R on B's production possibilities frontier. This shows clearly that with trade, equilibrium point of each country shifts away from its position without trade. The equilibrium of country A has shifted from point Q to T and that of country B from point P to R.

Given the new production pattern, we can now find the trade between the two countries and their gain from trade. Note that the relative price line JK is tangent to an upper indifference curve IC_2 at point E. This implies that country A produces at T and consumes at point E. Similarly, country B produces at point R and consumes at point E.

As regards the ***trade between the two countries***, the triangle ENT shows the trade pattern of country A and triangle RME shows that of country B. Triangle ENT shows that country A exports NT of its capital-intensive commodity X and imports EN of labour-intensive commodity Y. Likewise, triangle RME shows that country B exports RM of labour-intensive commodity Y and imports ME of capital-intensive commodity X.

The ***gain from trade*** is clearly indicated by the fact that both the countries move to a higher social indifference curve — from IC_1 to IC_2. Note that point E falls much above the production possibilities frontiers of both the countries. This means that foreign trade makes it possible for the trading nations to consume beyond their production possibilities frontier. It means international trade increases their respective levels of consumption and raises their levels of living.

30.5 FACTOR PRICE EQUALISATION THEOREM: THEOREM II

Heckscher-Ohlin-Samuelson Theorem

The factor price equalisation theorem is, in fact, a corollary to the Heckscher-Ohlin trade theorem. It holds only so long as Heckscher-Ohlin trade theorem holds. It was Samuelson who provided a rigorous proof to the Heckscher-Ohlin theorem of factor-price equalisation. For this reason, the above theorem is also referred to as Heckscher-Ohlin-Samuelson theorem. In this section, we have very briefly presented the basic idea of the theorem.[1]

The factor price equalisation theorem states that international trade brings about equalisation in the absolute and relative returns to homogeneous factor of production and in their prices. In other words, the wages of homogeneous labour and rentals to homogeneous capital will be the same in all the nations trading between themselves.

Figure 30.5 illustrates the factor-price equalization theorem in our 2-country (A and B), 2-commodity (X and Y) and 2-factor (K and L) model with our earlier assumptions (i) that country A is capital-abundant and country B is labour-abundant; and (ii) that commodity X is capital-intensive and commodity Y is labour-intensive. Lines K_AL_A and K_BL_B are pre-trade isocost of countries A and B,

1. For a detailed and rigorous proof, see, P.A. Samuelson, "International Trade and Equalisation of Factor Prices", *Eco. Jl.*, June 1948, and his "International Factor Price Equalization—Once Again" *Eco. Jl.*, June 1949, Reprinted in Jagdish Bhagwati (ed.), *International Trade: Selected Readings*, (Cambridge, Massachusets, MIT Press 1981). For a good summary see, Sodersten, B., *International Economics*, *op. cit.*, Chapter 4.

Studies Supporting Leontief Paradox

Despite its criticism, many studies carried out in respect of exports and imports of other countries produce results in support of the Leontief paradox. For instance, Baldwin[1] carried out a similar study and concluded that, in 1962, the US import substitutes were 27 per cent more capital-intensive than its imports. Baldwin's findings fully support the Leontief paradox. Some would argue on this basis that Leontief paradox tended to disappear in the later years.

Tatemoto and Ichimura[2] examined Heckscher-Ohlin theorem by using Japanese exports and imports data and produced results supporting the Leontief paradox. According to their findings, Japan, an intermediate country from resources endowment point of view, exported goods which embodied relatively more capital and less labour than its import-competing goods. This implies that Japan exported capital-intensive goods and imported labour-intensive goods. This finding is in contradiction of Heckscher-Ohlin theorem and in line with the Leontief paradox.

In his study of Canada's trade with the United States, Wahl[3] found that Canada exported capital-intensive goods and imported labour-intensive goods. Wahl's finding too negates Heckscher-Ohlin theorem and supports Leontief paradox. In a similar study, Bharadwaj[4] found that India, a labour-abundant country, exported capital-intensive goods to and imported labour-intensive goods from the United States.

It may be noted here, that all the studies mentioned above confine to trade with the United States. Their findings are, therefore, bound to be in line with Leontief paradox. Their findings are, therefore, not of great significance. A more sound support could have come from the studies of foreign trade between other sets of countries excluding the United States. It may thus be concluded that the Leonief paradox continues to remain a controversial issue and so is the case with Heckscher-Ohlin theorem.

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D.N.Dwivedi

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Dr. D. N. Dwivedi is Reader in Ramjas College, University of Delhi. He has over three decades experience of teaching undergraduate and postgraduate courses in economics. He has been the visiting faculty of several management institutes. He has published over 36 papers on different economic issues of the country in academic journals and periodicals. His research publications include *problems and Prospects of Agricultural Taxation in Utter Pradesh and Economic Concentration and Poverty in India. Dr. Dwivedi has authored several popular textbooks including Managerial Economics, Principles of Economics, Macroeconomic Theory, International Economics and Readings in Indian Public Finance.*

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