



Managerial ECONOMICS

Dr. D.M. MITHANI

Himalaya Publishing House

MANAGERIAL ECONOMICS

[FOR MMS MUMBAI UNIVERSITY]

D. M. MITHANI, M.A., Ph.D.,

Professor Emeritus
L.J. Institute of Management, Ahmedabad.

Professor,
College of Business,
Norths University of Malaysia.

Formerly Reader
Department of Commerce,
University of Mumbai,
Mumbai.

First Edition: 2010

Himalaya Publishing House

MUMBAI • NEW DELHI • NAGPUR • BENGALURU • HYDERABAD • CHENNAI • PUNE • LUCKNOW • AHMEDABAD • ERNAKULAM • BHUBANESWAR • INDORE • KOLKATA

First Edition : 2010

Published by : Mrs. Meena Pandey for **Himalaya Publishing House Pvt. Ltd.,**
"Ramdoot", Dr. Bhalerao Marg, Girgaon, **Mumbai - 400 004.**
Phone: .022-2386 01 70/2386 38 63, Fax: 022-2387 71 78
Email: himpub@vsnl.com Website: www.himpub.com

Branch Offices

New Delhi : "Pooja Apartments", 4-B, Murari Lal Street, Ansari Road, Darya Ganj, New Delhi - 110 002. Phone: 011-23270392/23278631, Fax: 011-23256286

Nagpur : Kundanlal Chandak Industrial Estate, Ghat Road, Nagpur - 440 018. Phone: 0712-2738731/3296733, Telefax: 0712-2721215

Bengaluru : No. 16/1 (Old 12/1), 1st Floor, Next to Hotel Highlands, Madhava Nagar, Race Course Road, Bengaluru - 560 001. Phone: 080-22281541/22385461, Telefax: 080-22286611

Hyderabad : No. 3-4-184, Lingampally, Besides Raghavendra Swamy Matham, Kachiguda, Hyderabad - 500 027. Phone: 040-27560041/27550139, Mobile: 09848130433

Chennai : No. 85/50, Bazullah Road, T. Nagar, Chennai - 600 017. Phone: 044-28344020/32463737/42124860

Pune : First Floor, "Laksha" Apartment, No. 527, Mehunpura, Shaniwarpeth (Near Prabhat Theatre), Pune - 411 030. Phone: 020-24496323/24496333

Lucknow : Jai Baba Bhavan, Church Road, Near Manas Complex and Dr. Awasthi Clinic, Aliganj, Lucknow - 226 024. Phone: 0522-2339329, Mobile:- 09305302158/09415349385/09389593752

Ahmedabad : 114, "SHAIL", 1st Floor, Opp. Madhu Sudan House, C.G.Road, Navrang Pura, Ahmedabad - 380 009. Phone: 079-26560126, Mobile: 09327324149/09314679413

Ernakulam : 39/104 A, Lakshmi Apartment, Karikkamuri Cross Rd., Ernakulam, Cochin – 622011, Kerala. Phone: 0484-2378012/2378016, Mobile: 09344199799

Bhubaneswar : 5 Station Square, Bhubaneswar (Orissa) - 751 001. Mobile: 09861046007, E-mail: orissa@himpub.com

Indore : Kesardeep Avenue Extension, 73, Narayan Bagh, Flat No. 302, IIIrd Floor, Near Humpty Dumpty School, Narayan Bagh, Indore 452 007(M.P.) Mobile: 09301386468

Kolkata : 108/4, Beliaghata Main Road, Near ID Hospital, Opp. SBI Bank, Kolkata - 700 010, Mobile: 09910440956

DTP by : HPH Editorial Office, Bhandup (Rajani Tambe)

Printed by : Prabhat Book Binders, Mumbai

Preface

This book explores Managerial Economics for the understanding and application of economic analysis in the process of business decision-making by the managers. Understanding of economics as an applied science in management is crucial for the decision-makers in business tasks, such as correct pricing and marketing decisions and resource allocation as well as business forecasting and planning.

The book offers an exploration of managerial economic concepts, principles and tools of analysis with illustration and cases on practical consideration as an outcome of over four decades long teaching and writing experience of the author in India and abroad.

The volume is especially designed to cater to the syllabus of MANAGERIAL ECONOMICS prescribed by the Mumbai University for the MMS Course, (w.e.f. academic year 2010–2011). The book is research-based on the guidelines indicated in the syllabus. In covering the topics of the syllabus, a synthetic approach is made by filling up the gaps in the logical development of the subject for a better understanding by the Indian students. The text will be equally useful to the teaching fraternity as well. The book can also be fruitfully used by the students of management discipline in other Universities in India and abroad.

The author is grateful to Dr. Shirhhalti, Director general of Oriental Institute of Management, Vashi, Prof. Timojit Roy, H.K. Institute of (HKMR) Management and Research, (Mumbai), Prof. G.H. Hamlani, and Shri Wasim Javed Khan, Managing Director of HKMR, Mumbai, Prof. Mukul Mukerjee, Oriental Institute of Management, Vashi for their valuable suggestion and interaction with the author on the subject.

Mumbai, 9 March, 2010 **D. M. MITHANI**

Syllabus

(a) The Meaning, Scope and Methods of Management Economics

(b) Economics Concepts Relevant to Business, Demand and Supply, Production, Distribution, Consumption and Consumption Function, Cost, Price, Competition, Monopoly, Profit, Optimisation Margin and Average, Elasticity Micro and Macro Analysis.

(c) Demand Analysis and Business Forecasting Market Structures, Factors Influencing Demand Elasticities and Demand Levels Demand Analysis for Various Products and Situations, Determinants of Demand Durable and Non-Durable Goods Long Run and Short Run Demand and Autonomous Demand Industry and Firm Demand.

(d) Cost and Production Analysis, Cost Concepts, Short Term and Long Term, Cost Output Relationship, Cost of Multiple Products Economies of Scale Production Functions Cost and Profit Forecasting Break-even Analysis.

(e) Market Analysis, Competition, Kinds of Competitive Situations, Oligopoly and Monopoly, Measuring Concentration of Economics Power.

(f) Pricing Decisions, Policies and Practices, Pricing and Output Decisions under Perfect and Imperfect Competition, Oligopoly and Monopoly, Pricing Methods, Products Line Pricing, Specific Pricing Problem, Price Dissemination, Price Forecasting.

(g) Profit Management, Role of Profit in the Economy, Nature and Measurement of Profit, Profit Policies, or Profit, Maximisation, Profits and Control, Profit Planning and Control.

(h) Capital Budgeting, Demand for Capital, Supply of Capital, Capital Relationing Cost of Capital Appraising of Profitability of a Project, Risk and Uncertainty, Economics and Probability Analysis.

(i) Macro Economics and Business, Business Cycle and Business Policies, Economic Indication, Forecasting for Business, Input-output Analysis.

Contents

UNIT – 4 : COST AND PRODUCTION ANALYSIS

UNIT – 6 : PRICING DECISIONS

UNIT – 7 : PROFIT MANAGEMENT

UNIT – 8 : CAPITAL BUDGETING

UNIT – 9 : MACROECONOMICS AND BUSINESS

Unit I

The Meaning of Managerial Economics

The Meaning, Scope and Methods of Managerial Economics

1
CHAPTER

1. MEANING OF MANAGERIAL ECONOMICS

In management studies, the terms 'Business Economics' and 'Managerial Economics' are often synonyms. Both the terms, however, involve 'economics' as a basic discipline useful for certain functional areas of business management.

Economics is the study of men as they live, behave, move and think in the ordinary business of life. Economics in essence pertains to an understanding of life's principal preoccupation. It is a religion of the day-in living for the want satisfying activity. Economics, as a social science, studies human behaviour as a relationship between numerous wants and scarce means having alternative uses.

Economics is a logic of choice. It teaches the art of rational decision-making, in economising behaviour to deal with the problem of scarcity. Economics is of significant use in modern business, as decision-making is the core of business, and success in business depends on right decisions. A firm or business unit faces the problem of decision-making in the course of alternative actions, in view of the constraint set by given resources, which are relatively scarce.

> Managerial economics is essentially applied economics in the field of business management. It is the economics of business or managerial decisions. It pertains to all economic aspects of managerial decision making.

Managerial economics, in particular, is the study of allocation of resources available to a business firm or an organisation. Business or managerial economics is fundamentally concerned with the art of economising, *i.e.,* making rational choices to yield maximum return out of minimum resources and efforts, by making the best selection among alternative courses of action.

Managerial economics, in the true sense, is the integration of economic principles with business management practices. The subject-matter of business economics apparently pertains to economic analysis that can be helpful in solving business problems, policy and planning. But, one cannot make good use of economic theory in business practices unless one masters the basic contents, principles and logic of economics.

> Managerial economics is an evolutionary science, it is a journey with continuing understanding and application of economic knowledge — theories, models, concepts and categories in dealing with the emerging business/managerial situations and problems in a dynamic economy.

Managerial economics is pragmatic. It is concerned with analytical tools and techniques of economics that are useful for decision-making in business. Managerial economics is, however, not a branch of economic theory but a separate discipline by itself, having its own selection of economic principles and methods. In essence, managerial economics rests on the edifice of economics. Knowledge of economics is certainly useful to business people. Businessmen/business managers must know the fundamentals of economics and economic theories for a meaningful analysis of business situations.

> Decision-making is the crucial aspect of dealing with business problems. Decision becomes essential since business problems would usually imply a basic question: What is the alternative course of action? For instance, business/managerial decisions: Should an electronic goods manufacturer cut the price of its best selling television set in response to a rival company's launching of a new model? Should a commercial bank go for Internet banking? Should a publisher offer more trade discount in response to a new competitors' entry into the market of educational books? Should a pharmaceutical firm undertake a promising but costly R&D programme? What tender should a construction company submit to get a road construction contract from the municipal corporation in a city? These are all economic decision-making issues in essence. A sensible economic analysis in each case is required in determining alternative course of action and making the best choice.

It would be an economic choice — the rational choice towards optimisation. To understand and appreciate business decision-making, in actual practice, therefore a sound knowledge of tools of economics is warranted. A course in managerial economics thus provides an understanding of the framework and economic tools needed by managers/businessmen as an aid to better business decision-making.

Managerial Economics: An Integration of Economics, Decision Science and Business Management

Managerial economics is a specialised discipline of management studies which deals with application of economic theory and techniques to business management. Managerial economics is evolved by establishing links on integration between economic theory and decision sciences (tools and methods of analysis) along with business management in theory and practice — for the optimal solution to business/managerial decision problems. This means, managerial economics pertains to the overlapping area of economics along with the tools of decision sciences such as mathematical economics, statistics and econometrics as applied to business management problems. The idea is presented in a nutshell through Figure 1.1.

Fig. 1.1: The Nature of Managerial Economics

Managerial economics is confined only to a part of business management. It is primarily addressed to the analysis of economising aspects of business problems and decision-making by a business firm or an organisation. It is not directly concerned with the managerial problems and actions involving implementation, control, conflict resolution and other management strategies in day-to-day operations of the business. (Mote, *et al.*: 1963)

Managerial economics draws heavily on traditional economics, as well as decision science in analysing the business problems and the impact of alternative courses of action on the efficient allocation of resources or optimisation.

Managerial economics is however, not a branch of economic theory but a separate discipline by itself having its own selection of economic principles and methods. In essence, managerial economics rests on the edifice of economics. Knowledge of economics is certainly useful to business people. Businessmen/business managers must know the fundamentals of economics and economic theories for a meaningful analysis of business situation.

Managerial economics is, by and large, the application of knowledge of economic concepts, methods and tools of analysis to the managerial/business decision-making process, involved within the firm or organisation in conducting the business or productive activity. The relation of managerial economics to economic theory is somewhat like that of medicine to biology.

In short, managerial economics deals with the application of economic principles and methodologies to the decision-making process, within the firm under the given situation. It seeks to establish rules and principles to facilitate the attainment of the chosen economic goals of business management, such as minimisation of costs, maximisation of revenues and profits, and so on. It follows that certain economic theories are directly useful in business analysis and practice of decision-making as well as forward planning of management. Managerial economics deals with this kind of knowledge and principles. It is a collection of those methods/analytical techniques that have direct application to business management.

In economic theory, mostly a single goal is assumed for the sake of simplicity and convenience of analysis. For example, it is assumed that a rational consumer aims at the maximisation of utility or a firm's objective is to maximise its profit. Economic theory is thus based on *ceteris paribus, i.e.,* given conditions with certainty of actions or events, or within the framework of axioms.

In business decision-making, however, the real situation tends to be quite different from theoretical assumptions. Actually,

- there are multiple goals in running a business;
- there is lack of certainty due to dynamic changes;
- the element of uncertainty may create disappointment in the realisation of business expectations.

As a result, economic theory cannot provide clear-cut solutions to business problems. Nonetheless, economic theory does help in arriving at a better decision. But, there may be a number of obstacles and weaknesses of economic analysis in an actual decision-making exercise.

There exists a wide gap between theory and actual business in practice. In economic theory, for instance, the firm — decision-maker — identifies profit maximising output by equating marginal revenue with marginal cost. But, in actual practice, this may not be possible to attain due to resource constraints. In this case, the business decision should be made with the help of linear programming for optimisation. Again, economic theory of firm assumes 'profit maximisation' to be the sole objective. It disregards the businessman's 'psychic income' and such other aims in running a business. In practice, prices are set by the firms in view of some standard mark-up on costs, rather than following the behavioural rule of equating marginal cost with marginal revenue.

Managerial economics, thus, attempts to bridge the gap between the purely analytical problems dealt with in economic theory and decisions problems faced in real business. It seeks to provide powerful tools of analysis and reasoning approaches for managerial/business policy-making.

> Decision-making is an art as well as science. Many managerial decisions are addressed in a routine manner. Rules of thumb or the tried-and-true decision rules are, however, invalidated by the changes in routine situations. Dynamic changes in business situations need that decisions are to be addressed in a proactive manner. In proactive decision-making, many alternatives have to be explored; conditions and assumptions have to be reviewed and structured in a perspective manner. Managerial economics offers an understanding of business and economic perspectives, jargons, tools, technique and tactics that will facilitate manager's development as a proactive decision-maker — a decision-maker who addresses dynamic business situations in a critical, comprehensive and careful manner, right in time, using formal analytical tools and skills that are guided by the knowledge, judgement, experience and intuition.

2. THE SALIENT FEATURES AND SIGNIFICANCE OF MANAGERIAL ECONOMICS

Following are the main characteristic features of Managerial Economics as a specialised discipline:

- It involves an application of economic theory — especially, microeconomic analysis to practical problem solving in real business life. It is essentially applied microeconomics.
- It is a science as well as art facilitating better managerial discipline. It explores and enhances economic mindfulness and awareness of business problems and managerial decisions.
- It is concerned with firm's behaviour in optimal allocation of resources. It provides tools to help in identifying the best course among the alternatives and competing activities in any productive sector whether private or public.

Managerial economics incorporates elements of both micro and macroeconomics dealing with management problems in arriving at optimal decisions. It uses analytical tools of mathematical economics and econometrics with two main approaches to economic methodology involving 'descriptive' as well as 'prescriptive' models. Descriptive models are data based in describing and exploring economic relationships of reality in simplified abstract sense. Prescriptive models are the optimising models to guide the decision makers about the most efficient way of realising the set goal. Often, descriptive models provide a building block for developing optimising models in solving the managerial or business problems. For example, a descriptive model explains and predicts the general behaviour of price movements. It may serve as a base for constructing an optimising model for profit maximisation goal of the firm. In a prescriptive model, the set of alternative strategies towards attainment of the objective function in operation terms within specified constraints may be derived with the help of descriptive models in background.

Managerial economics differs from traditional economics in one important respect that it is directly concerned in dealing with real people in real business situations. Furthermore, unlike the present trend of modern economics, which is leaning towards sophisticated theoretical, mathematical and complicated econometrics models, managerial economics is concerned more about behaviour on the practical side. Policy executives have to respond to behavioural approach of managerial economics for a better understanding of the day-to-day economy at micro and macro levels in sharpening their logic of choice. Needless to say that choice is the core of all business problems in general including economic decision-making. The choice has to be professional, efficient and effective. Managerial economics becomes more meaningful when co-ordinated with other discipline of management with a broader knowledge, techniques/methods, dogmas and theories involved — using sharp common sense in practical decision making. The significance of managerial economics is to be traced in the development of business/corporate planning and policy decisions — which are firmly based on a closely argued analysis of all relevant data, evidence and past experience, present outcomes and future expectations. Managerial economics has a pivotal place in allied business disciplines concerned into the arena of decision-making. Managerial economics as an applied economic science deals/helps in analysing the firm's markets, industry trends and macro forces which are directly relevant to the concerned business activity. Knowledge of managerial economics is of great help in seeking maximisation of the firm's efficiency through the analysis of its operations and their interaction with the external environment. It also guides management by interpretation of that environment in terms, which are relevant to the conduct of the concerned business activity and action. Managerial economics provides necessary skills in furtherance of business goals and functions. It is fundamentally concerned with the interaction between the internal operations of the business firm and the business and economic environment: such as marketing, business development, government business policies, government liaison, investment climate and finance affected by the macro-economic behaviour and policies of the government. It is truly an applied economic science — a discipline useful in pursuit of objectives as well as efficient functioning and performance of a business firm — especially, in a corporate system. Indeed, managerial economics is basically concerned with micro rather than macro area of economic analysis, which is directly relevant to the practical business-economic decision-making. Managerial economics, in short, deals directly with business realities and realisations.

Managerial economics deals with a thorough analysis of key elements involved in the business decision-making. For example, if a business manager wants to enlarge his firm's products' share in the market, knowledge of managerial economics will help him in determining the size and dimensions of the market with a better understanding of its competitive structure. Further, the technique of economic analysis will assist him in designing the course of action as well as measuring the effectiveness of the decision arrived at. Economists, in general, are usually asked to comment on, to support or criticise, or to provide solutions for allied economic-oriented business problems in various industries, trade and commerce.

Managerial economics helps the manager to understand the intricacies of the business problems which make the problem-solving easier and quicker, arrive at correct and appropriate decisions, improve the quality of such decisions, and so on. A major contribution of managerial economics to management pertains to its guidance for economising/optimisation and identification of key variables in the business decision-making process.

Most managerial decisions are made under conditions of varying degrees of uncertainty about the future. To reduce this element of uncertainty, it is essential to have homework of research/investigation on the problem-solving before the action is undertaken. For example, if a businessman when decides to adopt a new variety of product in his product mix, it would pay him a rich dividend if he conducts some market research in advance to ascertain the customer needs, their likings, and the possibility of the market acceptance of the new product envisaged. The process of such business research involves some common steps such as: *(i)* problem definition, *(ii)* research design, *(iii)* data collection, *(iv)* data analysis and *(v)* interpretation of results. Knowledge of managerial economics coupled with management science and statistical techniques will be of great help to a manager in understanding, interpretation and evaluation of quantified variables pertaining to market and business economy. Modern business decision-making is more fact-based, evidence-based and as such has greater degree of validity and reliability.

Ostensibly, knowledge of managerial economics is a boon to a manager/businessman/ entrepreneur. In these days of competition and dynamism, it is inevitable for a manager/ businessman to specialise in his business, management as well as economics of business (*i.e.*, managerial economics) to determine and realise the competitive advantage of the firm and the concerned industry to win. Modern businessman never believes in sheer luck. He bangs on skilful management and appropriate timely economic decision-making. This art is facilitated by the science of managerial economics.

Managerial economics deals with practical business problems relating to production, pricing and sale. These problems are theoretically analysed by traditional economics. For conceptual understanding and analysis of relevant business problems, we need to resort to economics theory. For further data-based analysis on practical side, we make use of tools and techniques of decision sciences such as statistics and econometrics Statistics shown how to collect, summarise and analyse data. Econometrics technique are useful in tracing empirical relationships. For example, how much to produce is a business decision. This can be arrived at through demand analysis. For this we may construct a statistical; and econometric; and econometric demand function and its estimation gives up a quantitative insight for appropriate decision.

3. MANAGERIAL ECONOMICS: NORMATIVE OR POSITIVE

Economics studies economic activities of mankind without reference to their ethical significance. Economic activities may be good or bad but so long as they involve the use of limited resources to satisfy many wants, they constitute a part and parcel of economics. This raises a further question, *viz.,* does economics study activities, as they ought to? It involves saying whether economics is a positive science, which studies things as they are. For example, Physics, Chemistry and other positive sciences do not suggest how things should work, but study things as they actually work or behave. Normative sciences study things, as they ought to. Ethics, for example, is a normative science. It tells us how we should behave. As a matter of fact, the positive sciences simply describe, while the normative sciences simply prescribe.

> Positive Economics explains the economic phenomenon as: What is, what was and what will be. Normative Economics prescribes what it ought to be.

Whether economics is a positive science or a normative science is a controversial question. According to economists like Professors Marshall and Pigou, the ultimate object of the study of any science is to contribute to human welfare. According to these economists, economics should be a normative science. It should be able to suggest policy measure to the politicians. It should be able to prescribe guidelines for the conduct of economic activities. Economists have to be both tool makers and tool users. It means that not only economists should build up the economic theory but also, at the same time, they should provide policy measures.

According to Prof. Robbins, however, economics is a positive science. Science is, after all, a search for truth and, therefore, economics should study the truth as it is and not as it ought to be. This is because when we say that this ought to be like this, we presume that our point of view is correct. When we express opinions, our own value enters into our consideration. In the study of a problem at a given point of time, not only economic considerations but also many other considerations, such as ethical, political, etc., must be considered. It is after weighing the relative importance of these various factors that a policy decision is to be taken. There are, therefore, bound to be differences in respect of policy prescription and it is, therefore, better to keep away from areas which are controversial and study the facts as they are.

Obviously, Prof. Robbins's point of view is not accepted by many. His critics say that the view that science is for science's sake should be discarded, as we discard the view that art is for art's sake. Science is, no doubt, a search for truth but it is equally important to determine which is a significant truth, *i.e.,* significant from the point of view of the betterment of life.

We must strike a balance between these two extreme views. The main function of economics, as Lord Keynes has said, is not to provide a body of settled conclusions immediately applicable in policy. It provides a method, or a technique of thinking, which enables its possessor to draw correct conclusions. It means that those who know economics can make intelligent analyses of economic problems, and point out their whys and wherefors. This might provide them some guidelines for the conduct of economic affairs. Thus, economists can give directional advice and then leave the decision taking function to the supreme bosses. The main task of an economist is not to stand in the forefront of attack (*i.e.,* to provide policy) but to stand behind the lines, in order to provide the armoury of knowledge, *i.e.,* to indicate the implications of the various policy measures.

> Managerial economics is a blending of pure or positive science with applied or normative science. It is positive when it is confined to statements about causes and effects and to functional relations of economic variables. It is normative when it involves norms and standards, mixing them with cause-effect analysis.

Normative approach in managerial economics has ethical considerations and involves value judgements based on philosophical, cultural and religious positions of the community. One cannot disregard the normative functions of managerial economics, though the discipline may be treated primarily as a positive science. If business economic studies are completely detached from all normative significance, the significance of managerial economics itself will not be more than a purely formal technique of reasoning, algebra of choice. Essentially, managerial economics is a logic of rational choice and a science for the betterment of business management, which cannot and should not refrain from essential value judgements.

The value judgements and normative aspect and counselling in managerial economics studies can never be dispensed with altogether. As an applied social science, managerial economics is firmly rooted in the realm of social values and problems; hence, it cannot be and should not be made a pure value free science. Managerial economics is something more than a science, a science calling not only for systematic thinking but for human sympathy, imagination and in an unusual degree for the saving grace of commonsense in business culture. Cultural values and religious sentiments of the people coin the business ethics, which governs the managerial decision-making in designing the production pattern and planning of the business in a country. Islamic culture, for instance, approves only the 'Halal' products prescribed in the light of Hadith and Sunnah. Similarly, the Hinduism or Buddhism followers may not approve products originating from the killings of animals. A modern multinational business firm has to abide by such norms in determining its business policy and expansion in different regions. Likewise, in entertainment business, a film producer needs to judge the social impact of the movie. So, the publishers must see that their publications should not cause damage to the social values or degrade morality. Media managers also bear similar responsibilities and so on. Furthermore, in industrial pursuit, environmental abuses need to be minimized and ecological balance has to be maintained.

Managerial economists should seek to understand and examine not only what is happening in the business field; they should also seek to devise or guide in formulating and choosing alternative policies that may influence the course of business events for the betterment of the society at large.

Economists Differ

Often economists have appeared to have differences of opinions on the solutions to given problems and their advise to the policy-makers. They disagree on several issues and diagnosis.

This happens, because economic policy-making is a blending of positive and normative approaches.

Secondly, economists may disagree on the ground of different economic theories and their axioms in analysing the working of an economy.

Thirdly, economists may disagree on the incorporated variances and their significance in the economic models constructed for empirical investigations. Disagreement may be on the ground of sample size and methodology.

Fourthly, economist may have disagreements on the pricing norms and suggestions. They may differ on the value judgements.

Often, in the course of public policies, therefore, economists be different and argue for as against on certain measures and values. In the matter of public expenditure, for instance, there are differing views about the percentage of allocations on defence and development.

Likewise, economists have no common agreement whether interest rates showed are high or low or zero for the financial sector growth and its impact on the real economic growth in the country.

Same way, in trade policy their views differ on free trade and protection devices. As a result, often the policy-makers get confused by receiving conflicting devices from different ground of economists and the public policy issue tends to became controversial.

For instances, the monetarists argue that the money matter the must and inflation is a monetary phenomenon. The fiscalists, on the other hand, used that money does not matter and inflation is caused by the inflationary gap when aggregate demand exceeds the aggregate supply.

Hence, solution lies in the fiscal management of aggregate demand. Whereas, to supply side economists the solution implies the supply management. Nonetheless, the study of economics has its significance. Managers get a better insight about the working of the economy by learning the principles of economics, economics theories, dogmas and mode of analysis that will be of at most significance in the course of business and managerial decision-making.

4. SCOPE OF MANAGERIAL ECONOMICS

Business economics, in the true sense, is the integration of economic principles with business practice. The subject-matter of business economics, as such, should pertain to economic analysis that can be helpful in solving business problems, policy and planning. But, one cannot make good use of economic theory in business practices unless he masters the basic contents, principles, and logic of economics. Business economics is pragmatic. It is concerned with analytical tools that are useful for decision-making in business.

Managerial economics is an evolving science. It is a newly developing subject with the popularity of management studies. Hence, there is no demarcation or any uniform pattern of its subject-matter and scope.

Business economics has picked-up relevant concepts, techniques, tools and theories from micro and macroeconomics applicable to business issues and problems of decision-making.

Following are the core topics of managerial economics:

- Demand Function and Estimation
- Demand Elasticity
- Demand Forecasting
- Production Function and Laws
- Cost Analysis
- Pricing and Output Determination in different market structures such as perfect competition, monopoly, oligopoly and monopolistic competition
- Pricing Policies and Practices in Real Business
- Profit Planning and Management
- Project Planning and Management
- Project Planning
- Capital Budgeting and Management
- Break-even Analysis
- Linear Programming
- Game Theory
- Government and Business.

The scope of business economics is usually restricted to the understanding of the business behaviour and problems of a firm at a micro level in the context of the prevailing business environment.

The methodology of business economics involves microeconomic analysis in analysing the behaviour and problems of the business unit in particular.

- Microeconomic analysis is understand the business environment in the economy.

Business economics is a science as well as art. Further, it is positive as well as normative science. As a positive science, it deals with empirical studies of business phenomenon such as demand cost, production, etc. As a normative science, it discusses policy objectives and business practices with a critical approach and suggest for the socially desirable course of business actions.

Following are the main characteristic features of business economics as a specialised discipline:

- It involves on application of economics theory – especially microeconomics analysis to practical problem solving in real business life. It is essentially applied microeconomics. It is a science and facilitating better managerial discipline.

- It is concerned with firm's between in optimal allocation of resources. It provides tools to help identify the best source among the alternatives and competing activities in any productive sector whether private or public.

Managerial economic incorporate elements of both micro and macroeconomics dealing with management problems in achieving at optimal decisions. It uses analytical tools at mathematical with two main approaches to economic methodology involving descriptive as well as prescriptive models. Descriptive models are data based in describing and exploring economic relationships of reality in simplified abstract sense. Prescriptive models are the optimising models to guide the decision-makers above the most efficient way of realising the set goal. Often, descriptive models provide a building block for developing optimising models in solving the managerial on business problems. For example, a descriptive model explain and predicts the general behaviour of price movement It may serve as a base for constructing an optimising model for profit maximisation goal of the firm. The set of alternative strategies towards attainment of the objective function in operation terms within specified constraints, in prescriptive model, may be derived with the help of descriptive models in background.

Uses/Objectives of Managerial Economics

Managerial economics is pragmatic. It is concerned with analytical tools that are useful for decision-making in business.

In short, business economics essentially implies the application of economic principles and methodologies to the decision-making process within the firm under the conditions of uncertainty.

Managerial economics is a selection from the tool box of economic priciples, methods and analysis applied to business management and decision-making.

It follows, thus, that economic theories are very useful in business analysis and practice for decision-making and forward planning by management.

Managerial economics may be useful in the following respects:

- It makes problem-solving easy in business;
- It improves the quality and preciseness of decisions;
- It helps in arriving at quick and appropriate decisions.

Business economics is applicable to several areas of business and management in practice, such as production management, inventory management, marketing management, finance management, human resource and knowledge management.

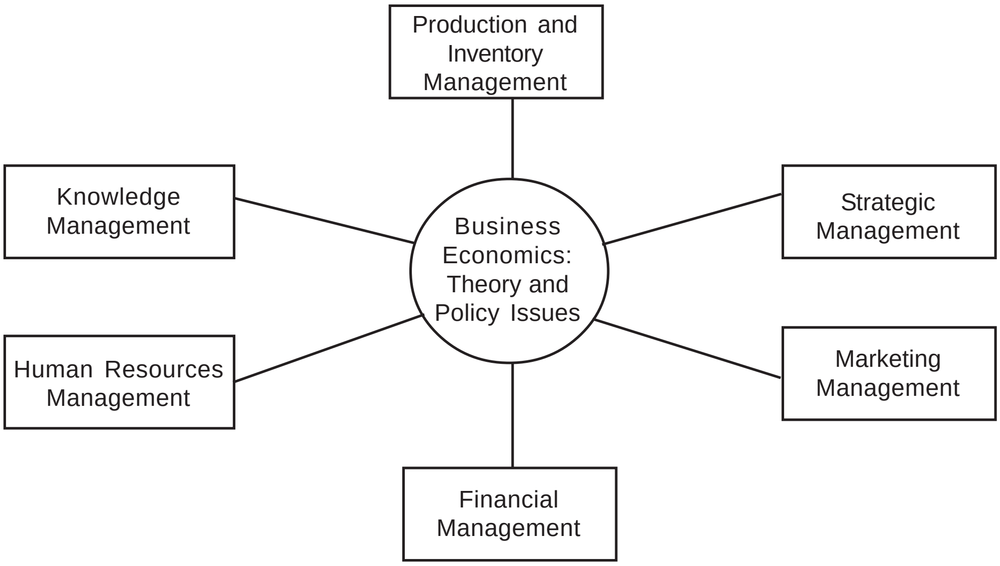


Fig. 1.2: Application Areas of Managerial Economics in Business Decision-making

The application of Managerial economics in business decisions, problems and allied areas of management are pinpointed in Fig. 1.2.

5. SCIENTIFIC METHOD OF ECONOMIC ANALYSIS IN THE MANAGE RIAL DECISION-MAKING

Economics is an applied social science. In studying human economic behaviour in the society, it adopts a scientific approach. In understanding and examining the economic life and problem of the people, an economist behaves like a scientist because of the scientific method involved in the study.

The Scientific Method

The scientific method implies an analytical approach in the study of a phenomenon. The economist while studying man's economic behaviour and the associated problem. The man's economic behaviour on the whole pertains to the want-satisfying activity against using the available limited on scarce resources.

In economic analysis, therefore observation are made first and the hypothesis is formed. Then, data are collected for testing the hypothesis. When, the hypothesis is proved and then the outcome is generalised as economic theory. Time and again, the theory is tested and evaluated by further observation and empirical investigation. Unlike, natural science, there is no laboratory experimentation. But the whole society, economy on the world at large is considered as a working lab in practice. Episodes in the economic life are analysed and economic theory is formed. Or, the existing economic theories are evaluated further in the light of new episodes occurring time-to-time in economic society.

Modern economic life is dynamic and one's behaviour governed by human mind is not certain. This keeps economics as a social science little less than perfect with permanency of the theory in its universal application.

Managerial economists tend to rely on the scientific research method in building and empirically testing business-oriented economic models. This scientific approach consists of the following steps:

- Defining the problem
- Formulation of the hypothesis
- Abstraction for the model building
- Data collection
- Testing the hypothesis
- Deduction based on data analysis
- Evaluating the test results
- Conclusion for decisions

Defining the Problem

The starting point of business economic investigation/research and analysis is the statement of the problem to be solved in the concerned business. The problem needs to be clearly defined by isolating the exact business phenomenon of economic interest and application. It involves framing the relevant questions to be explored in specific terms. In general, the defining of problem helps the manager/analyst in shaping the nature, course and direction of the business research.

Indeed, the problem needs to be defined in view of the goals and the constraints.

Out of several business goals, a specific goal is selected to determine the problem and the constraints are identified in the way of fulfilment.

Constraints

In reality, firms may encounter several constraints in its business operations, such as:

- Availability of required inputs in required proportions.
- Quality standards of labour and the productivity. Different workers have different attitude to their work and the proficiency may differ. All labour units are not alike in performance of their tasks.
- Production capacity of the organisation in short and long run.
- Managerial talents.

- Government regulations.
- Taxation.
- Warehousing and logistic facilities.
- Business capital funds.
- State of technology.
- Provision of company's hardware and software.
- Quantum of information and knowledge acquisition, management and utilisation.
- Corporate culture of the company.
- Diversity of human resource and its mode of utilisation.

Formulation of Hypothesis

A hypothesis in a business enquiry is a tentative/largerly untested explanation of the behaviour, assumption about the course of behavioural tendency and discovering the cause-effect relationships among the governing factors/variables of the concerned business phenomenon. In managerial economic analysis, hypothesis are formed to identify pattern of economic behaviour and discover the business variables' economic relationship with a view to test the proposition and shed new lights on the issues and, thus, draw inferences for decision-making.

Abstraction/Model Building

Abstraction and model building were essential in framing up the enquiry to a manageable proportion by eliminating complexities and unnecessary or insignificant details. The process involves distillation and restrictions for choosing variables and selecting relevant informations. The investigation problem is much simplified through appropriate model building based on abstraction of reality by simplifying assumptions.

In practical business studies, thus, assumptions and identifications are utilised to simplify and highlight the essential features of the events, situation and behavioural relationship for an easy investigation, analysis, inference and quick decision-making. As such, out of many goals in hand, only a few major ones or sometimes a single one is being selected at a time in a business decision-making based on scientific economic enquiry. For instance, profit maximisation is identified as a basic goal in studying a firm's business behaviour. Similarly, in tracing the cause effect relationships among some major overriding variables, even from a practical business viewpoint, it is customary to assume that all other relevant factors which are not of any primary concern are constant in the model constructed for an enquiry. The abstract or axioms in the business economic model should, however, be reasonably representing the real world phenomena.

Data Collection

As per the model specification of the variables such as price, demand, sales, advertising expenditure, and so on relevant data have to be collected. Data may be time series, cross-sectional or pooled.

Time series data are based on the time movement and historical records.

$y = f(t)$ where y = a micro or macro economic quantity and t = time element which may be a year, quarter, month, week or day.

Cross-sectional data are based on the relationship of dependent variable with other elements such as geographical place, firms, etc. Say, for instance, data on profits of different banks in a given year constitute cross-sectional data.

Pooled data are the mix of time and other elements. For example, yearly profits of different banks during a certain period, say over a decade.

Testing the Hypothesis

The hypothesis need to be verified on empirical basis by using the relevant data. Furthermore, the significance of statistical coefficient should be determined. For further details, read Appendix 2.1.

Deduction based on Data Analysis

If properly formulated hypothesis indicates not only cause effect relationship, but also serves as the basis for predictions on empirical results. Predictions, forecasts or conclusions are derived from logical deductive reasoning. (Thompson and Formly, 1993, p. 5). Say, for example, if we find a significant positive correlation between advertising expenditure and sales volume of a firm, we may conclude that for further expansion of sales the firm should increase its advertising expenditure.

Evaluating the Test Results

When real world events confirm a hypothesis — (cause-effect relationship) — it is accepted. This, however, does not, mean that the hypothesis is proved. What it simply means is that the investigated events have failed to disprove the hypothesis. Hypothesis can only be tested; it can never be proved. The empirical results of the hypothesis researched can only be tested/evaluated by examining its predictions in the light of experimental and observational facts (Beveridge, 1957, p. 118).

A hypothesis is rejected when observed facts contradict its prediction. A hypothesis when successfully survives a number of tests, it acquires the status of a theory.

Conclusion for Decisions

When a hypothesis is accepted — having passed various statistical tests, it can be useful for making inferences or drawing conclusions about a business situation for decision-making.

Interpretation and inference making from empirical results for the future course of action is an art and the success of decision depends on the skill of the manager or the decision-maker.

Chart 1.1

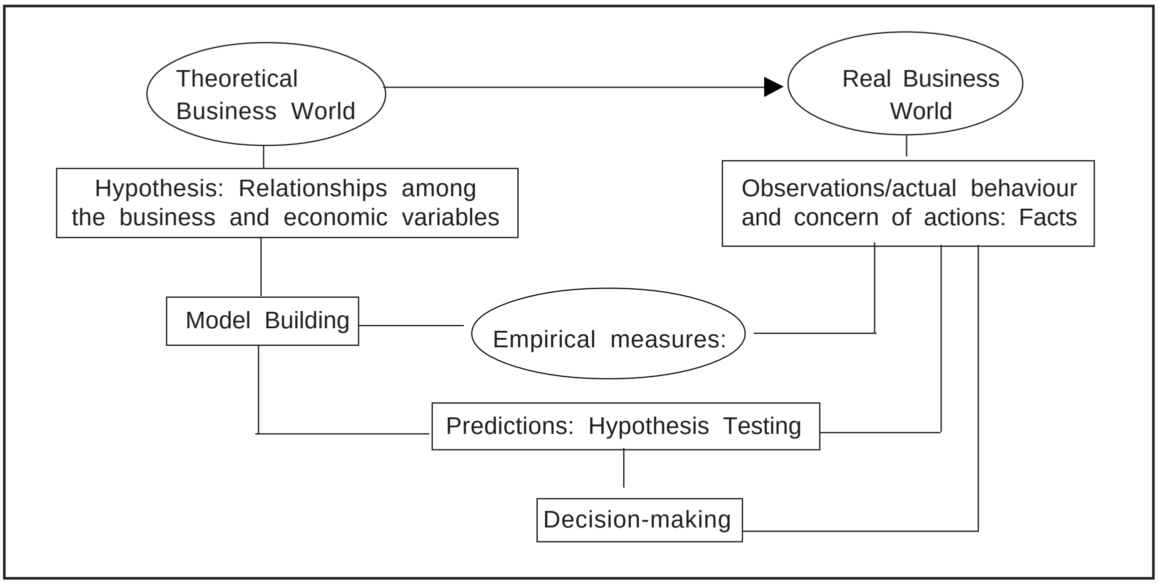


Chart 1.1 outlines the scientific approach to managerial economic research/analysis in solving a business problem. It involves a bridging between theory and real business world.

> The significance of economic models and micro-macro analysis lies in the logical framework created by them for the decision-making process in business management. Managerial economics, thus, becomes useful as it makes the task of successful business management easier through characterisation of business behaviour with a scientific blending of economic theory and business experience in practice.

As any decision tool, analysis and techniques of managerial economics, however, must be used with discretion.

6. BASIC ASSUMPTIONS IN ECONOMIC MODELS AND ANALYSIS

Economists usually construct models for analysing economic behaviour and problems in view. An economic model is a set of assumptions about economic variables and their relationships concerning certain aspects of economic reality. In essence, an economic model is an abstract of economic reality. It is constructed to simplify the complexities of reality in order to comprehend the interactions of forces operating in an economy.

Economic models are constructed by using logic and mathematics for deducting implications on the basis of assumptions. In short, economists develop and use theoretical models as aides to understanding economic complexities, with simplifying assumptions.

Ceteris Paribus Assumption

In analysing problems and business situation such as markets, demand, competition, price and cost strategies and so on, managerial economics make use of economic and econometric models as an abstraction or realty. Eventually, these model tends to be less than perfectly realistic. This is simply because, the models are constructed with a focus on particular aspect or issue of the business or managerial economic problem assuming all other things being equal the typical *ceteris paribus assumptions.*

Ceteris paribus is always taken for granted in constructing most of economic models. In fact, laws and hypothesis of economics are always stated with the qualifying phrase: "other things being equal", *i.e., ceteris paribus* assumption.

Ceteris paribus is a Latin phrase meaning "all other things remaining the same" or "all relevant factors being equal or unchanged." The term is used frequently as an axiom in the analysis of a variety of economic phenomena. For example, in price theory the analysis of a price change is carried under *ceteris paribus* assumption regarding the market behaviour. It is assumed, for instance, that only demand changes, supply and determinants of supply remaining unchanged. Thus, it is inferred that when demand rises, supply being constant, price rises.

Economic inferences based on *ceteris paribus* axiom models are logically sharp, but many times irrelevant for the practice. *Ceteris paribus* implies static model which is unsuitable for application to a dynamic situation. In reality, we usually find dynamism. Thus, static theoretical models have least practical relevance, they are good for theoretical understanding only. A large part of micro economics based on *ceteris paribus* assumption suffers from such limitation.

Modern economics is a more positive economics in nature, which provides "a system of generalisations that can be used to make correct predictions about the consequences of any change in circumstances." Economics, thus, becomes an objective science when its dogmas are based on a number of explicit and implicit assumptions. Professor Friedman mentions the following three interrelated, positive roles of assumptions in an economic theory: "*(a)* They are often an economical mode of describing or presenting a theory; *(b)* they sometimes facilitate an indirect test of a hypothesis by its implications; *(c)* they are sometimes a convenient means of specifying the conditions under which the theory is expected to be valid."

The basic assumptions in economics may be broadly classified into three categories: psychological, structural and institutional.

Psychological Assumptions

Since economics is a science concerned with human behaviour, certain psychological assumptions, some of which may even be tacitly made, are basic to the inferences drawn and explanations furnished, relating to varied economic phenomena. In economic analysis, it is basically assumed that the behaviour of an economic man, whether he is a consumer or a producer or an agent of production, is normal and that he is a rational person. Thus, in every economic analysis, it is explicitly or tacitly assumed that decision-taking units in the economic system such as consumers, factors or firms, behave in a rational manner. Their behaviour is treated as rational when it is confined to some specific well-defined motivation. Thus, in various economic theories, we always find that a rational consumer is seeking maximisation of his total satisfaction in his purchases. He is, thus, assumed to behave to pursue this total of utility maximisation. And, we have laws of economics, like the law of equi-marginal utility, which explain how such a goal is attained by the consumer. Similarly, in analysing a firm's behaviour, economists usually assume that the firm is rational and seeking maximisation of total profits in its business.

The assumption of rationality in the behaviour of an economic entity is a psychological assumption. It also implies consistency in the choice and behaviour of the economic man concerned. It is thus assumed, for instance, that the tastes, habits and preference of the consumer remain unchanged, while examining the demand behaviour.

Structural Assumptions

Economics is the study of economic activities. Economic activities are basically confined to the exploitation of productive resources: natural, human and manmade, for the satisfaction of the multiple human wants. In constructing an economic model, to study the working of a particular phenomenon or in selling an economic dogma, certain implicit assumptions about the related structural issues involved about the nature of physical structure, or the topography of a region, the climatic conditions, or the biological limitations of human resources, are to be made. These are the many implied structural assumptions in the analysis of an economic phenomenon. For instance, in studying agricultural economics, it is implicitly assumed as a fact that all lands are not capable of being used for all kinds of crops in all seasons. In industrial activity, on the other hand, it is assumed that the biological factor limits the labour supply of an individual worker. Thus, a firm cannot double the working hours of the workers in order to double its output. Workers get tired once their normal capacity is exhausted. It is a biological fact. Again, it also involves a psychological factor that workers often prefer leisure to work, once their income rises to a certain point.

Institutional Assumptions

Man is a socio-political animal, his behaviour is influenced by the social, political and economic institutions of the time. Thus, in analysing his economic behaviour, we have to make assumptions about the social, political and economic institutions surrounding him. Institutional assumptions are specifically related to the type of economic system and its political setting. For instance, if the behaviour is studied in a capitalist economic system, we have to assume that there is least government control and that the market mechanism has a strategic role in arriving at economic decisions. If, on the other hand, a socialist economic system is considered, the complete control of the government on economic resources, and a centralised comprehensive planning are automatically implied. Similarly, in a mixed economy, the strategic role of the public sector and the relative scope of the private sector, have to be clearly defined. Needless to say, economic dogmas and economic policies should be formulated within the constraints of the psychological, structural and institutional assumptions. Evidently, a meaningful scientific theory is based on the selection of some 'crucial' assumptions which are specific to understand a particular class of phenomena. Indeed, there can be more than one set of assumptions, in terms of which an economic theory may be set forth. According to Friedman, "The choice among such alternative assumptions is made on the grounds of the resulting economy, clarity and precision in presenting the hypothesis; their capacity to bring indirect evidence to bear on the validity of the hypothesis; by suggesting some of its implications that can be readily checked with observation or by bringing out its connection with other hypothesis dealing with related phenomena and similar considerations."

Above all, in modern economic analysis, it is being assumed that the pattern of regular behaviour of economic entities is reasonably stable — at least in the short-run, and it is the most fundamental feature of an operational economic proposition.

7. TIME PERSPECTIVE

Economists widely used the concepts of functional time periods, short-run and long-run in their analysis. This time perspective of short and long period is also important in business decision-making. Especially, the entrepreneur or business manager has to review the long-range effects on costs and revenues of decisions. "The really important problem in decision-making is to maintain, the right balance between the long-run, short-run, and intermediate-run perspectives." (Haynes, Mote, Paul: 1971).

Time is an important factor in business decision-making. A timely decision is always effective and rewarding, if appropriate.

Usually, decisions for the future actions are based on the past observations. A foreseeable future outcome is generally the extension of the course of action and the results obtained in the relevant past period in the business trend analysis.

In business decisions, in relation to time-period, thus, there are short-term and long-term perspectives.

Short-term time perspectives are based on the short-run analysis of the business data and performance. Usually, from trade cycles' point of view, seasonal fluctuations in the business are observed and decisions are carried to deal with the changing circumstance in the course of business within a short period. For instance, a banker would also find it necessary to maintain a high quantum of cash flow as liquidity to honour the demand for deposits withdrawals in the first week of every month, as people have to pay out their monthly bills and meet necessary expenses of a high order. During Diwali season, fireworks producers/sellers have to keep a larger stock than otherwise.

By and large, inventory management is based on short-term perspectives. A bus company has to manage extra tyres; a bookseller keeps high stock only before and initial month of school/college semester beginning. Guides-books are stored more in quantity when examination period, October/April is near. It involves short-term business planning to maintain business routine with the given business size.

In long-run, the perception is towards growth, development and expansion. It is related to the long-run business planning for progress. In this regard, external influencing factors are also considered. For instance, when an airline assumes that business is expanding and it has increased flights due to increasing number of travellers in the years to follow on account of rising income level and economic growth rates, it has to order extra aircrafts for replacement and for additional flights, it is a long-term perspective.

For a successful business and just-in-time strategy, a manager has to decide the time perspective of business options and actions well in advance and implement at an appropriate time. He should avoid unwise decision on time perspectives. For example, a long-run preparation of sweets by a sweet shop is obviously not a wise decision.

The market demand for education when projected on a short-run basis by a university is an unwise decision. It should go for a long-term projection and long-term growth planning.

8. DISCOUNTING PRINCIPLE

A present gain is valued more than a future gain. Thus, in investment decision-making, discounting of future value with the present one is very essential. The following formula is useful in this regard:

where, V = present value, A = annuity or returns expected during a year, i = current rate of interest.

To illustrate the formula, suppose A = 110 and i = 10% or 1/10, we can ascertain the present value of Rs. 110 one year after as:

$$V = \frac{110}{1+0.1} = \frac{110}{1.1} = 100$$

$$V = \frac{A}{(1+i)}$$

In business decision-making process, thus, the discounting principle may be stated as: "If a decision affects costs and revenues at future dates, it is necessary to discount those costs and revenues to present values before a valid comparison of alternatives is possible."

Case Study

Decision-making — A Mini Case [Hypothetical]: Method of Managerial Economics

Pioneer Automobiles projected an increasing demand for their cars in the country by 20 per cent per annum. Currently, all their 10 plants are fully in operation up to their maximum capacity. The firm intends to expand its output with an objective of earning more profits. The management has two options to choose for expanding the output:

(1) Strategy one: S1: Construct two new additional plants.

(2) Strategy two: S2: A rival firm, Prestige Automobiles, is in financial trouble and wishes to sell out its two plants in the vicinity of the pioneer. Buy this and modify.

Decision-making Process

1. Objective: Increase in Profit (P)
2. Analysis: Work out relative cost and profit analysis in the case of these two strategies:

   PS1 and PS2

3. Decision Rules:

When,

(i) PS1 > PS2

Choose S1

(ii) PS1 = PS2

Choose S1

(iii) PS1 < PS2

Choose S2.

MODEL QUESTIONS

1. What is managerial economics?
2. "Managerial economics is an integration of economic theory, decision science and business management." Comment.
3. Discuss the salient features and significance of managerial economics.
4. Is managerial economics a positive or normative science?
5. Explain and illustrate the stages in the process of managerial decision-making.
6. Write explanatory notes on:
   (a) The nature of managerial economics.
   (b) The scope of a managerial economist.
   (c) Significance of managerial economics.
7. Explain the scientific method of managerial economic analysis.

❐ ❐ ❐

Unit II

Economic Concepts Relevant to Business

2
CHAPTER

Economic Concepts

In this chapter, some fundamental economic concepts relevant to business have been discussed.

1. DEMAND

Ordinarily, by demand is meant the desire or want for something. In economics, however, demand means much more than that. The economics meaning of demand refers the effective demand, *i.e.,* the amount the buyers are willing to purchase at a given price and over a given period of time. From managerial economic's point of view, thus, the concept of demand may be looked upon as follows:

1. Demand is the Desire or Want Backed up by Money. Demand means effective desire or want for a commodity, which is backed up by the ability (*i.e.,* money or purchasing power) and willingness to pay for it.

Obviously, to a businessman, a buyer's wish for the product without possessing money to buy it or unwillingness to pay a given price for it will not constitute a demand for it. For instance, a pauper's wish for a Maruti car will not constitute its potential market demand, as he has no ability to pay for it. Likewise, a miser's desire for the same, how rich he may be, will not become an effective demand when he is unlikely to spend the money for the fulfilment of that desire.

In short:

Demand = Desire + Ability to pay (*i.e.,* Money or Purchasing Power) + Will to spend

2. Demand is Always Related to Price and Time. Demand is not an absolute term. It is a relative concept. Demand for a commodity should always have a reference to price and time. For instance, an economist would say that the demand for grapes by a household, at a price of Rs. 40 per kg, is 10 kilograms per week.

Economists always mention the amount of demand for a commodity with reference to a particular price and specific time period, such as per day, per week, per month or per year. 'They are not concerned over with a single isolated purchase, but with a continuous flow of purchase.' In economics studies, therefore, demand is expressed 'as so much per period of time — one million oranges per day, say, or seven million oranges per week, or 365 million per year' (*Ibid.*, p. 47).

We may, thus, define demand as follows:

Definition of Demand. The demand for a product refers to the amount of it which will be bought per unit of time at a particular price.

3. Demand may be Viewed Ex-Ante or Ex-Post. Demand for a commodity may be viewed as ex-ante, *i.e.,* intended demand or ex-post, *i.e.,* what is already purchased. The former denotes potential demand, while the latter refers to the actual amount purchased.

2. SUPPLY

In economics, supply during a given period of time means the quantities of goods which are offered for sale at particular prices. Thus, the supply of a commodity may be defined as the amount of that commodity which the sellers (or producers) are able and willing to offer for sale at a particular price during a certain period of time.

Supply is a relative term. It is always referred to in relation to price and time. A statement of supply without reference to price and time conveys no economic sense. For instance, a statement such as 'the supply of milk is 500 litres' is meaningless in economic analysis. One must say, 'the supply at such and such a price and during a specific period.' Hence, the above statement becomes meaningful if it is said 'at the price of Rs. 20 per litre, a dairy farm's daily supply of milk is 500 litres.' Here, both price and time are referred to with the quantity of milk supplied.

Secondly, supply is what the seller is able and willing to offer for sale. The ability of a seller to supply a commodity, however, depends on the stock available with him. Thus, stock is the determinant of supply. Similarly, another determining factor is the will of the seller. A seller's willingness to supply a commodity, however, depends on the difference between the reservation price and the prevailing market price or the price which is offered by the buyer for that commodity. If the ruling market price is greater than the seller's reservation price, he (the seller) is willing to sell more. But at a price below the reservation price, the seller refuses to sell. In short, supply always means supply at a given price. At different prices, the supply may be different. Normally, the higher the price, the greater the supply and *vice versa*.

3. PRODUCTION

Production is an outcome of economic activity. Its purpose is the satisfaction of wants – collective or individual. Production is meant for changing the form or arrangement of matter by man, in order to create further utility and make it more useful for satisfying human wants. Consumption is not possible without production.

Production means the process of transforming the factors of production such as land, labour and capital into goods and services. It is the process by which the input of factors of production results in the output economic goods.

Production eventually means creation of utilities such as form utility, place utility and time utility. It implies creation of additional utilities by changing form, place and time.

production by changing form: Manufacturing activities lead to the creation of form utility. For example, changing of cotton into cloth or of wood into furniture is the production by creating form utility.

Production by changing place: Activities relating to the change of place of commodities, i.e., bringing apples from Simla to Bombay, is also regarded as production, as there is creation of place utility.

Production by changing time: Supplying the goods at a time when they are needed most is the production by creating time utility. Traders, for instance, keep stocks of goods for sale at a proper time to satisfy the buyers' needs when the demand rises considerably. Preserving fruits in cold storages and supplying them during off season, is production by creating time utility. The utility of stored grain and grass increases during the pre-monsoon period and in the event of a famine or scarcity. This is also production.

As a matter of fact, creation of place utility and time utility may be described as "distributive services" or "exchange activities." Thus, production includes transportation, trading and commerce, together with industry and agriculture. Therefore, all productive economic activities are the process of production of material goods. Non-material goods resulting from direct services of doctors, lawyers, teachers, dancers, musicians, actors, etc., are also regarded as production.

According to J.R. Hicks, 'any activity towards the satisfaction of other people's wants through exchange' is production. Value (in use) of the commodity produced is also increased because its utility has increased. Hence, production is also the creation of values.

Features of Production

The concept of production would be still clearer, if we notice the following features of economic production or productive activity.

1. **Wider Term**: "Production" is a wider term which relates to both goods and services produced in different sectors of the economy – agriculture, mining and quarrying, manufacturing, trading, transport and communication, banking and other professional services like those of doctors, lawyers, teachers, etc.

2. **Creation of Value:** Production implies creation of economic goods having exchange values. Production process, thus, results in the creation of value, measurable in terms of money (i.e., price).

3. **Transformation of Resources:** "Production" refers to transformation of productive resources (inputs) into marketable goods and services (outputs). The term "inputs" or "productive resources" means factors of production. Thus, production is the result of combined efforts of the various factors of production – land, labour, capital and enterprise.

4. **Complete Process:** Production is the complete process in the creation of economic goods to satisfy consumers' wants. Thus, production implies all processes necessary, say, from manufacturing to marketing, to bring goods into the hands of the consumers.

5. **Flow over a Period of Time:** Production is a flow concept. Thus, productive activity is measured as a rate of output per unit of time period, *e.g.,* 1000 TV sets produced per month by an electronic firm.

Firm as a Producing Unit

The firm is a producing unit. It is a business unit which undertakes production activity. The firm buys and coordinates the services of productive factors such as land, labour and capital along with its organisation for producing a commodity and sells it in the market to the households.

The firm is controlled by the entrepreneur who undertakes major decisions such as:

- What to produce
- Where to produce
- How and how much to produce
- Whom to sell and at what price

The firm hires factors of production and pays them remuneration to compensate for their productive services.

In short, the firm organises the business and bears risks. Thus, a firm, *i.e.,* the entrepreneur or a businessman as the owner/controller of the firm earns profits as the reward.

Firm owns/organises a plant. It may be a factor/plant as a production plant containing shed, machineries, equipments etc. A plant is a place arrangement for a production process. Whereas firm is a decision-making unit.

4. DISTRIBUTION

In a modern economy, the production of goods and services is a joint operation. All groups of factors of production, *viz.,* land, labour, capital, and enterprise, are combined together in productive activity. Productive activity is thus the result of the joint efforts of these four factors of production which work collectively to produce wealth. These factors need to be paid or rewarded for their services for producing wealth, and hence the problem of distribution follows. Distribution thus refers to the sharing of the wealth that is produced among the different factors of production.

The wealth that is produced by the people is distributed in the following forms: *(i)* rent as share of land, *(ii)* wages as remuneration for labour, *(iii)* interest as return on capital, and *(iv)* profit as reward of enterprise. Distribution thus implies the division of national income amongst the different classes: landlords, labourers, capitalists and entrepreneurs. It is through distribution of production that different individuals in the community receive their income.

Thus, distribution is an economical method by which the real wealth, collectively produced by the agents of production, is divided or distributed among them.

Functional Distribution vs. Personal Distribution

In economics, the term 'distribution' has at least two connotations: *(i)* functional distribution, and *(ii)* personal distribution. Functional distribution refers to the distinct share of national income received by the people, as agents of production per unit of time, as reward for the unique functions rendered by them through their productive services. These shares are commonly described as wages, rent, interest, and profits. Briefly, thus, functional distribution relates to the share of the factors of production in the form of rent, wages, interest and profits in the aggregate production. It is a macro concept.

Personal distribution, on the other hand, is a micro concept. It refers to a given amount of wealth and income received by individuals in society through their economic efforts, *i.e.,* individual's personal earnings of income through various sources. The concept of equality and inequality of income distribution and social justice is basically concerned with the personal distribution of income. Taxation measures are designed to influence personal distribution of income and wealth in a community.

The theory of distribution deals with functional distribution and not with personal distribution of income. It seeks to explain the principles governing the determination of factor rewards — rent, wages, interest and profits — *i.e.,* how prices of the factors of production are set. Needless to say, rent is the price of land. Wage is the price of labour. Interest is the price of capital, and profit of enterprise. The theory of distribution thus states how the product is functionally distributed among the cooperating factors in the process of production.

The theory of distribution does not explain what is the income of each and every individual in the community, and why it is so much. It just explains how labour, as a whole, or as a class, as a factor of production, would receive its share of national income, and as also the other factors of production.

5. CONSUMPTION

Consumption is the action of consumer for using the satisfaction of given wants. Consumption, however, does not imply the using up or the destruction of goods. In the consumption process, there is destruction of utility. Its end result is the satisfaction of want.

In the consumption of perishable goods, however, with the destruction of utility, the good is also used up or literally consumed. It vanishes or disappears in the process of consumption, *e.g.,* when we drink milk or tea, eat banana or biscuits, they are also destroyed together with the destruction of utility for satisfying our thirst or hunger. Whereas in the case of durable goods, though their utility is destroyed, goods remain in existence. The depreciation of such goods is slow, so the same goods go on satisfying our wants again and again. Their utility remains till they become old and deteriorate or break down. Thus, a car in use does not disappear and if well maintained may not even deteriorate perceptibly. But in the real consumption process, we definitely exhaust its utility, though gradually, by using its services in a steady flow over its life time.

Further, wealth and not capital is consumed by the consumers for satisfying wants, *e.g.*, when we travel by a railway, we directly consume railway's services and not the rail-carriage or engine. Engine or train compartment is just a capital for facilitating railway services. At the most, this is regarded as indirect consumption.

Briefly, thus, consumption is the using up of utility, directly or indirectly, when we come to satisfy our wants.

Importance of Consumption

1. Consumption is the beginning and end of economic activity. Wants are satisfied through the consumption of goods. And, wants are the starting point of economic activity. Thus, the desire for consumption comes before production. Producers produce goods because there is want, there is consumption. And every economic effort results in the production of goods and services. This production is ultimately consumed for the satisfaction of wants.
2. Production and consumption are associated with each other. Without production, consumption is not possible; without consumption, production is useless.
3. In a market-oriented economy, consumption behaviour of the consumer and their demand pattern determine the mode of production.

Household as a Consuming Unit

In a market economy, households and firms are the major economic entity. Micro economic theory deals with their behaviour in particular.

The household refers to a basic consuming unit. A household may be defined as an individual or a group of individuals in a family under one roof who undertake decisions regarding consumption for the satisfaction of their numerous wants.

In macroeconomics, thus, a household is a consumer. It seeks to describe consumer behaviour in demand theory.

The behaviour of household is important because it constitutes demand for a commodity. The market demand is composed by the aggregate of individual demand.

A Consumer is sovereign in a market economy. He chooses his wants and buys goods accordingly to satisfy them. Consumer's preference is thus very important in determining the pattern of demand as well as the forms of production in a market. Since a consumer has many wants against his limited income, he has to make a rational choice.

Scale of Preference

Scale of preference means the arrangement of wants and the relative preference of goods in accordance with the degree of intensity or urgency of different wants. We have to arrange our wants according to our scale of preference because our means to satisfy our wants are limited. It is because our wants are of varying importance and that they can be arranged on our scale of preference so that choice is possible. A man will give the highest order of priority of preference to some wants and put other wants in a descending order of preference. This ordering of wants is called the scale of preference.

Every consumer has his unique scale of preference. It is obvious that the scale of preference will differ from individual to individual, from time to time and from place to place. Today, we might prefer to coffee and after some time, we might prefer coffee to tea.

Human beings may be conscious or unconscious, rational or irrational, consistent or inconsistent in preparing a scale of preference.

6. CONSUMPTION FUNCTION

Consumption expenditure is the major constituent of aggregate demand in an economy. The level of a community's expenditure on consumption is determined by a multitude of factors such as, household income, tastes and preferences, current and expected prices, expected future income, holding of liquid assets, interest rates, debts, real wealth, advertising and sales propaganda, taxation, inflation and the availability of goods. Keynes, however, assumed that in the short-run, real consumer spending is primarily determined by current real personal disposable income (that is, gross personal income minus personal tax liabilities). Prof. Hansen remarks that "income is singled out as the main determined of consumption just as in the case of the familiar demand wave, price is singled out as the primary determinant of the quantity taken."

In specific terms, Keynes held that current consumption depends upon current disposal income. A rise in income leads to a rise in consumption and *vice versa*. The empirical consumption income relationship is represented by the consumption function.

The consumption function or propensity to consume is nothing but an expression of an empirical income-consumption relationship. In technical terms, Keynes postulates that *ceteris paribus* consumption is a function of income.

Algebraically, the relationship between consumption as a dependent variable and total real income as the independent variable is expressed as:

$C = f(Y); f > 0$

Fundamental idea of Keynesian economics is that an increased level of employment can only be achieved and maintained by an increased level of expenditure on either consumption or investment or both.

In short, effective demand which determines the level of employment in an economy is determined by the size of aggregate demand expenditure or the aggregate demand function, which is composed of consumption and investment functions.

The consumption function appears to be a significant factor determining the level of effective demand in an economy. Consumption function, or the propensity to consume, denotes the consumption demand in the aggregate demand of the community, which depends on the size of income and the share that is spent on consumption goods. The propensity to consume is a schedule showing the various amounts of consumption corresponding to different levels of income. Thus, by consumption function, we mean a schedule of functional relationship, indicating how consumption reacts to income variations. Keynes, on the basis of a fundamental psychological law, observed that as income increases, consumption also increases, but less proportionately. Secondly, he also states that the propensity to consume is relatively stable in the short-run, and, therefore, the amount of community consumption varies in a regular manner with aggregate income. Since consumption increases less than income, there is always a widening gap between income and consumption as income expands. Keynes, thus, argues that in order to sustain the level of income and employment in the economy, investment demand should be increased because consumption demand is relatively a stable component of the aggregate "effective demand".

7. COST

Production is the outcome of the transformation process under by employing various resource-inputs together. These resources comprising land, labour, capital and entrepreneur are called factors production. To secure a regular supply of these factor units, a firm compensate the factor owners in the for of payment of rent, wages, and profits. From the factor owners' point of view, rent, wages, and profit are incomes but to the firms they are costs. The volume of that a firm produces depends upon the costs of the factors and the price the firm is likely to get the output. These considerations also determine the profitability of a produced commodity. The cost of production good depends on the number of factor units necessary to produce level of output and the prevailing prices of the factor units. The number of factor units required in turn depends on the technique of production the efficiency of factor units. As such, the cost of production is jointly determined by the technique of production adopted, the organisational efficiency of entrepreneurs and the productive efficiency of factors and their prices, along with the rate of output and size of plant.

There are different viewpoints on the cost concepts. We shall review some of them as follows.

Outlay Cost and Opportunity Cost

Outlay cost refers to the actual financial expenditure of the firm. It is recorded in the firm's books of account. For instance, payment of wages, interest, cost of raw materials, cost of machineries, etc. are the actual or outlay costs.

Opportunity cost, on the other hand, is a notional idea. It is not the actual expenditure incurred by the firm. It is measured in terms of the opportunity lost. It represents sacrificed alternatives. Opportunity cost may be measured in terms of profits from the next best alternative venture that are foregone by the firm by using the available resources for a particular business.

Usually, the opportunity cost of investing owned capital fund in the business is measured in terms of the current interest rate, as the businessman could have lent this money instead of investing in business earned interest thereon. Thus, interest is the sacrifice of investing owned business capital. It is its opportunity cost. It is just a notional idea which does not appear in the books of account.

Thus, the opportunity cost is measured in terms of the forgone benefits from the next best alternative use of a given resource.

Definition: The opportunity cost of a given economic resource is the forgone benefits from the next best alternative use of that resource.

In other words, the opportunity cost of producing certain commodity is the value of the other commodity that the resource used in its production could have produced instead.

It should be noted that opportunity cost of anything is just the next best alternative (the most valuable other commodity) forgone in the use of productive resources and not all alternative possible uses.

8. PRICE

"Price" refers to the amount of money which must be exchanged for one unit of commodity. In other words, price is the value of a commodity determined in money terms.

Price is the money measurement of the exchange value of a commodity, *e.g.,* price of an apple may be Rs. 2/-, the price of an orange may be Re. 1/- and so on.

Relative prices of two goods reflect their real ratio of values-in-exchange, *e.g.,* the price of apple Rs. 2 and orange Re. 1 means that 1 apple = 2 oranges.

The price of a commodity is determined by the interaction of its demand and supply.

Thus, price depends on two factors: *(i)* utility and *(ii)* cost of production. Apart from utility, basically a high cost of production would imply a higher price of the commodity and *vice versa*.

Distinctions between Value and Price

Conceptually, value and price may be distinguished as under:

(1) Value is a *real* concept. Price is a *money* concept.

(2) Value is a *relative* term. The exchange value of one commodity is measured in terms of another commodity, *e.g.,* 1 Kilo Rice = 2 Kilos Wheat.

Price is an *absolute* term. Price is the exchange value of a unit of a good or service measured in absolute terms through money, *e.g.,* the price of 1 kilo rice is Rs. 6.

(3) Value is expressed as the *ratio of exchanges* between two commodities. Thus, the value of one commodity is related to the value of another commodity in terms of each other. It involves comparison, *e.g.,* 1 Kg. Rice = 2 Kgs. Wheat. Alternatively, it means 1 Kg. Wheat = ½ Kg. Rice.

Price is just related to the *money value* of a commodity.

(4) Value can relate to *any quantity* of goods, such as 10 Kgs. Rice = 20 Kgs. Wheat.

Price is always determined *per unit* of a commodity.

(5) Value of goods *cannot rise* or *fall together* in general. When the exchange value of one commodity rises, that of another related commodity must necessarily fall, *e.g.,* take 1

apple = 2 oranges. Now, if the exchange value of apples rises in terms of oranges, then 1 apple = 4 oranges, which means a decline in the exchange value of oranges in terms of apples as 1 orange = ¼ apple now, as against 1 orange = ½ apple previously.

Thus, the two values move in opposite directions.

In short, all values cannot change in a uniform manner simultaneously, because value is a relative term and it is the ratio of exchange.

On the other hand, prices of all goods *can rise* or *fall together*. It is possible that the prices of pins, pens, pencils, apples, bananas, oranges and thousands of other commodities may increase or decrease at a time.

Thus, there can be a general fall or rise in prices because price is an absolute term expressed in money.

Economists, however, refer to the value theory as the price theory as price is a monetary equivalent of the exchange value of a commodity.

9. COMPETITION

Business managers are always concerned with the competition in markets. Degree of competition in the market crucially affects the business strategies, policies and profits of the business firm. Competitive framework is pivotal in determining the business goals and mode of actions to be undertaken by the operating firms.

In modern times, the competitiveness of the market is actually determined by the individual seller (firm)'s power to influence market price [Lipsey and Chrystal (2004) Economics, Oxford University Press, New York]. The market trends to the more competitive, when a firm will now no power as less power to influence the market supply and price. Apparently, when the firm posses a high degree of power to influence the market in the matter of supply and price, the market turns out to the less competitive.

By and large, the nature of competition as the competitiveness of the market is conditional by the number of sellers (firms) existing in the market. As a matter of fact, larger the number of firms in existence competition tends to the high. Fewer the number of sellers, competition tends to the less.

When there are many firms and each having zero degree of market power, the market tends to the perfectly competitive. For example, farmers in India selling their farm output such as rice have no power to influence the market price for their produce independently, so the agrarian market thought to be highly competitive and the price is solely determined by the interaction of the forces of demand and supply in the market.

Zero degree of market power implies perfect competition in the market. In this regard, economists usually mention perfectly competitive market existing in some cases such as stock exchange market and agricultural output market.

Pure and Perfect Competition

A distinction is often made between pure competition and perfect competition. But this distinction is more a matter of degree than of kind. For a market to be purely competitive, three fundamental conditions must prevail. These are: (i) a large number of buyers and sellers; (ii) homogeneity of product and (iii) free entry or exit of firms. For the market to be perfectly competitive, four additional conditions must be fulfilled, *viz., (a)* perfect knowledge of market, *(b)* perfect mobility of factors of production, *(c)* absolute government non-intervention, and *(d)* no transport cost difference.

Incidentally, the term "perfect competition" is traditionally used by the British economists while discussing the price theory. American economists, however, prefer to construct a "pure competition" market model, realistically assuming that additional conditions for perfect competition, such as perfect mobility of labour, perfect knowledge of market, etc., may not be attainable.

Perfect competition in fact is just a concept, a suggestive norm or an ideal for the market structure. Pure competition substantiates the norm of perfect competition without fully attaining it.

10. MONOPOLY

Monopoly is the other extreme form of market situation. Pure monopoly is just the opposite of perfect or pure competition. Monopoly is the antithesis of competition. Under monopoly, a seller has the capacity to influence the price of this product for the sole supplier in the market.

If the firm is a single seller, there is a pure absolute monopoly. The degree of monopoly power tends to the less with the increase in the number of sellers in the market.

Pure monopoly is a market condition in which there is only one seller. He controls the entire market supply of a product. Because there is no rival producing a close substitute, the monopoly firm itself is an industry, so its output constitutes the total market supply.

In a monopoly market, the seller (the monopolist) is faced by a large number of competing buyers. But, being the sole supplier, the monopolist has a strong hold over price determination. He usually tries to set the price and output of his product entirely in his own interests of profit maximisation.

11. PROFIT

Profit is the price of entrepreneurship.

Profit is the reward earned by an entrepreneur for his contribution to the process of production. In a capitalist system, profit is the primary measure of success of a business firm.

An entrepreneur is entitled to receive profits for his basic entrepreneurial functions, *viz., (i)* the organisation of business, and *(ii)* bearing of business risks. Profit may be defined as the surplus of revenue over the cost of production.

In symbolic terms: π = TR – TC (where, π = Profit, TR = Total revenue, and TC = Total cost)

Characteristics of Profit

Profit is the earning of an entrepreneur. It differs from other factor rewards like rent, wages and interest, on account of the following peculiarities:

(1) Profit is a residual reward. Profit is received by the entrepreneur as a residual surplus, which is left over after meeting all the business expenses from the sales receipts.

(2) Profit is not contractual. Unlike rent, wages and interest, profit is not a predetermined contractual payment. Therefore, it is not an explicit cost.

(3) Profit is the end result of business. Other factor rewards such as rent, wages and interest are received by their agents during the process of production. Profit is realised by the entrepreneur only after the completion of business, *i.e.,* after completing the sales and meeting all the expenses.

(4) Profit is not a fixed income. All other factor incomes such as rent, wages and interest are predetermined and fixed. Profit being a residual income cannot be fixed in a predetermined manner.

(5) Profit is uncertain and fluctuating. Unlike other factor prices, profit is not a certain reward of entrepreneurship. It varies from time to time. It is conditioned by business prosperity. Profits may be high during a period of prosperity. Profits decline during a recession. There may be even losses during a depression.

Thus, while other factor incomes are generally stable over a period of time, profit is widely fluctuating.

(6) Profit can also be negative. All other factor rewards such as rent, wages and interest are always positive. Profit is not always positive. It can also be negative such as when an entrepreneur suffers a loss in the business.

(7) Profit is not determined through a formal factor market. All other factor prices are determined in a formal factor market. For instance, rent is determined in the land market, wages in the labour market and interest in the capital market. There is no such formal entrepreneurial market for determination of profit.

(8) Profit is a dynamic concept. Profit depends on many factors such as enterpreneur's organisational ability, changes in market demand and supply conditions, element of monopoly power, innovation such as production of new items, discovery of new markets, new modes of advertising and sales propaganda, etc., and many other dynamic changes in the economy.

Accounting and Economic Interpretation of Profit

The term "profit" has different connotations in the accounting sense and in the economic sense.

In the accounting sense, when the total cost is subtracted from the total revenue or total sales receipts of the firm, the residual is termed as "profit."

Profit = Total Revenue – Total Cost

In the economic sense also, profit is measured in the same fashion. But conceptually, there is a sharp difference in its measurement. There is a distinction between accounting and economic definition of costs.

In accounting practice, when the total cost is measured, only explicit costs, *i.e.,* contractual payments made to different factor inputs by the firm, are considered. These include wages, salaries, expenses on raw materials, fuel and power, rent and interest. To these inputs, costs of depreciation charges are also added.

In the economic sense, when the total costs are measured, we include explicit as well as implicit costs. Implicit costs refer to costs which are to be deemed and imputed as costs when a firm uses its own capital for which obviously, no interest is payable to anybody. Similarly, the entrepreneur provides managerial service for which he does not receive any remuneration by way of salary. For such functional work rendered by the entrepreneur, therefore, we find implicit wage, implicit interest, and implicit rent included in the cost of production. Thus, in the economic sense:

Profit = Total Revenue – Total explicit and implicit costs

In this way, in the economic sense, profit is looked upon as a surplus, *i.e.,* a surplus of a firm's total receipts over its total costs (explicit plus implicit).

Gross Profit and Net Profit

In ordinary parlance, profit actually means gross profit. It is the surplus of total revenue over total money expenditure incurred by a firm during the production process. Gross profit, thus, includes many items of input, service and other miscellaneous costs. So it cannot be regarded as profit in the real sense. Thus, though profit is a residual income, the whole of it is not pure economic profit which is a return for the risk-bearing function of the entrepreneur.

Gross profit includes the following items:

1. Imputed Costs. Imputed costs like maintenance and depreciation charges. To arrive at net profit, these are to be deducted from the gross profit.

2. Implicit Returns. Implicit returns, such as implicit rent, implicit wages, and implicit interest for the factors — land, labour and capital — owned and supplied by the entrepreneur himself. In many business firms, the entrepreneur uses his own land, invests his own capital, and also he himself works as manager.

3. Normal Profit. Normal profit is also the implicit cost of entrepreneurial input. It is the imputed minimum return for the entrepreneur's organisational function.

4. Non-entrepreneurial profit. It includes windfall gains, monopoly gains, etc., which accrue to the entrepreneur as a result of change in events and market imperfections. This profit element is not related to entrepreneurial ability in the strict sense.

5. Net Profit. It is the pure economic profit earned by the entrepreneur for his services and efficiency.

In short:

Gross Profit = *Net Profit + implicit rent + implicit wages + implicit interest + normal profit + depreciation and maintenance charges + non-entrepreneurial profit.*

Thus, it follows that:

Net Profit = *Gross Profit — (implicit rent + implicit wages + implicit interest + normal profits + depreciation and maintenance charges + non-entrepreneurial profit)*

Indeed,Net Profit = Economic profit or pure business profit.

12. MARGIN AND AVERAGE

The concept of margin is fundamentally used in economic thinking and arriving at the right rational decision.

In economic science, that the terms like marginal utility, marginal buyer, marginal cost, marginal revenue, etc., are used in a pivotal sense.

Margin refers to the last in the total or an extra into the total. For example, if buyer buys four apples then 4^{th} apple is taken as marginal. Likewise, in a given total of 4 apples, when an addition is made by one more apple, this extra one is considered a margin.

In measuring the cost, therefore, the addition made to total cost by cost of producing an extra unit of the product is considered as marginal cost. In a given total units of a product, thus, the marginal cost is measured as follows:

$$MC_n = TC_n - TC_{n-1}$$

Where, n = number of units

MC = Marginal Cost

TC = Total Cost

n – 1 = the last unit into the total

Similar formula is used to measure the marginal utility in the product purchased by a consumer.

$$MU_n = TU_n - TU_{n-1}$$

Where, MU = Marginal Utility

TU = Total Utility

Average

Average refers to total value divided by the number of items. Thus, average cost (AC), for instance, is measured as:

$$AC = \frac{TC}{Q},$$

Where TC = Total Cost,

Q = Total quantity of output.

13. OTIMISATION

The equi-marginal principle is fundamental in economic analysis. It is very significant in determining optimal condition in resource allocation. According to the equi-marginal principle, a factor input should be employed in different activities in such a proportion that its value of marginal product is equal (or the same) in all the uses, so that optimum level is reached. In symbolic terms, for instance:

(VMPL)a = (VMPL)b = (VMPL)c.

(Here, VMPL refers to the value of marginal product of labour; a, b, c are three activities.)

The equi-marginal principle is greatly useful in investment decisions and in the allocation of research expenditures.

Application of equi-marginal principle in the business or managerial activity is illustrated, as under:

- Multi-Plant Firm: Cost Minimisation

  $MC_1 = MC_2 = MC_3 = \ldots = MC_n$

  [Where, MC refers to the marginal cost in plant 1, 2, 3,... n (number of plants)]

- Multi-Market Territories: Sales Revenue Maximisation

  $MR_1 = MR_2 = MR_3 = \ldots = MR_n$

  [Where, MR refers to the marginal revenue in market territory 1, 2, 3,...n (number of territories)]

- Multi-Product Firm: Profit Maximisation

  $MPF_1 = MPF_2 = MPF_3 = \ldots = MPF_n$

  [Where, MPF refers to the marginal profit earned in product 1, 2, 3,...n (number product)]

A manager has to either maximise or minimise an outcome. It is referred to as optimisation technique. Techniques and tools of optimisation involve finding the value of an independent or determining business variable that would result into maximisation of the value of the dependent variable. For example, a competitor firm has to determine the level of output (Q), at a given price, that would maximise its profit. As a rule, thus, the firm tends to equate its marginal cost with marginal revenue resulting into maximisation of total profit.

Likewise, labour cost is minimised when the marginal product of labour is equated with the wage rate paid. Thus:

W = MPL.

Where, W = wage rate

MPL = marginal product of labour

Rule of Maximisation

As a rule, total profit (Đ) of a firm is maximised when the difference between its total revenue (TR) and total cost (TC), thus; (TR – TC) is maximum.

Since, profit function is ∠ = TR – TC, in order to maximise profit (Đ) we have to maximise total revenue (TR) and minimise total cost (TC).

For further details, see chapter on Theory of Profit Maximisation.

Total revenue is maximised, when marginal revenue is zero.

TR = PQ

Where, P = Price and

Q = Quantity of output.

Let, a praise function be:

$$P = 600 - 6Q$$

By substitution,

$$PQ = (600 - 6Q)\,Q$$

$$\therefore\ TR = 600Q - 6Q^2$$

To find Q maximising TR, using first derivative in calculus, thus:

$$\frac{dTR}{dQ} = 600 - 12Q$$

If we set above equation to zero, then:

$$600 - 12Q = 0$$

$$\therefore\ -12Q = -600$$

$$\therefore\ Q = 50$$

This suggests that when Q = 50, total revenue (TR) is maximum.

Substituting Q = 50 in the equation $TR = 600Q - 6Q^2$

$$\therefore\ TR = 600\,(50) - 6\,(50)^2$$

$$\therefore\ TR = 30{,}000 - 15{,}000$$

$$= 15{,}000$$

If we change Q by 1 unit more or less, the total revenue will decline in this case.

Check:

If $Q = 51$

$$TR = 600(51) - 6(51)^2$$
$$= 30{,}600 - 15{,}606$$
$$= 14.994$$

If $Q = 49$

$$TR = 600(49) - 6(49)^2$$
$$= 29{,}400-14{,}406$$
$$= 14{,}994$$

It follows that only when $Q = 50$ in this case, TR is maximised.

14. ELASTICITY

Term elasticity refers to degree of responsiveness of a dependent variable to the change in determining variable in an economic function. For example, in a given demand function:

$D = f(P)$ for a product,

Where, D= demand, P= price and f denotes functional relation. Suppose, price (P) increases by 10; where, demand rises by 20%, it implies that demand is highly responding to the change in price.

Concept of elasticity is widely used in managerial decision-making.

15. FIRM AND INDUSTRY

Firm and industry are the basic concepts in price theory. In economics, the terms 'firm' and 'industry' connote some special meanings than what is understood in common parlance.

Firm

Firm refers to a business unit — an enterprise undertaking the production of a commodity. In economic theory, the term firm connotes a particular production unit. It symbolises a unit of control over a group of factors of production coordinated for the purpose of producing a commodity.

A firm may be a small one or a very large one. The term *'small firm'* refers to a single plant, factory, business or retailing unit, which has small capital investment, producing small quantities of a product per unit of time. On the other hand, a large firm is one which has a number of plants under a complex managerial organisation, with a diversity of financial capital investments, which may produce a wide variety of products and in large quantities per unit of time.

Industry

The term industry refers to a group of firms engaged in the production of a specific commodity, including its close substitutes. Thus, an industry is a set of firms producing homogeneous goods. Here, the term '*homogeneity*' implies similarity of productive activity, results, and satisfaction of similar wants by similar kinds of goods. Thus, there are firms, which are engaged in the same type of production. All these firms together constitute the industry. A firm's production plant has a specific location. An industry is spread over a wide region.

In short, a firm is an individual productive unit. An industry is a set of all such firms, big or small, engaged in identical productive activity. In fact, grouping all the firms, big and small, according to the most prominent characteristics that they have in common constitutes an industry. In this way, an industry may be considered just a classification of a number of firms having common characteristics in regard to the production activity.

MODEL QUESTIONS

1. Define the following concepts:
    (a) Demand
    (b) Supply
    (c) Production
    (d) Distribution
2. Write explanatory note on:
    (a) Consumption
    (b) Consumption Function
    (c) Cost
    (d) Price
    (e) Competition
    (f) Monopoly
3. What is profit? What are its characteristics?
4. Explain the techniques of optimisation.

❐ ❐ ❐

Macro and Micro Analysis

3
CHAPTER

1. MICRO AND MACROECONOMICS

Microeconomics and macroeconomics are the two major branches of modern economic theory. The terms “microeconomics” and “macroeconomics” were originated by Ragnar Firsch in 1933. The prefixes “micro” and “macro” have been derived from the Greek words *Mikros* and *Makros* which mean “small” and “large”, respectively. In other words, “micro” means individualistic and “macro” means aggregative.

Meaning of Microeconomics

Micro means a small part. Microeconomics, is thus, the branch of economics which is concerned with the analysis of the behaviour of the individual (specific or particular) economic units or variables, such as an individual consumer or a producer or the price of a particular commodity, etc. Microeconomics, as Boulding puts, “is the study of particular firms, particular households, individual prices, wages, incomes, individual industries, particular commodities.” Essentially, microeconomics is a study of particular economic organisms (consumers, producers, etc.) and their interactions, and of particular economic quantities (prices, wages, income, etc.) and their determination.

In figurative terms, microeconomics consists of observing the economy through a microscope, as it were, to see how the millions of cells in the body economic, *i.e.,* millions of consumers, producers, etc., act and react in the course of working of the whole economic organism. In other words, microeconomics is useful in understanding a firm’s view of some very specific components of an economic system.

Microeconomics basically deals with individual decision-making and the problem of resource allocation. It examines, in particular, as to how individual consumers and producers behave and how their behaviours interact. This helps us in understanding how an economic process determines which goods should be produced, who will produce them, how they will be produced and how they will be distributed. Microeconomics, as such, examines the allocation of resources in certain situations involving individuals, groups and society as a whole. But its approach is always specific or non-aggregate.

Microeconomic theory is often called the 'price theory' or 'value theory' because it is primarily concerned with determination of relative prices of different goods. The subject-matter of microeconomics fundamentally covers the following areas: *(i)* Theory of Value, i.e., 'Product Pricing' and 'Factor Pricing', and *(ii)* Theory of Economic Welfare.

Meaning of Macroeconomics

"Macro" means large or aggregate (total). Macroeconomics is, thus, a branch of economics which deals with the aggregate behaviour of the economy as a whole. Macroeconomics is essentially an aggregate economics. It makes a study of the economic system in general. Macroeconomics perceives the overall dimensions of economic affairs of a country. It looks at the total size, shape and functioning of the economy as a whole, rather than working of articulation or dimensions of the individual parts. To use Marshall's metaphorical language, macroeconomics views the forest as a whole, independently of the individual trees composing it.

Microeconomics did refer to aggregates like market demand, market supply, industry, etc., but these are not considered in relation to the economy as a whole. On the other hand, macroeconomics concerns itself with aggregates relating to the economy as a whole. In macroeconomics, economic phenomena are studied in their aggregate size, shape and behaviour. Macroeconomics is, in fact, a study of very large, economy-wide aggregate variables like national income, total savings, total consumption, total investment, money supply, price levels, unemployment, economic growth rate, etc.

2. DISTINCTION BETWEEN MICRO AND MACROECONOMICS

Broadly speaking, microeconomic analysis is individualistic, whereas macroeconomic analysis is aggregative. In essence, thus, microeconomics deals with the part (individual) units while macroeconomics deals with the whole (all units taken together) of the economy. Since both approaches tend to provide an insight or understanding into the working of an economic system, both are interrelated. Hence, the differences between microeconomics and macroeconomics are bound to be more or less of a degree rather than of kind.

For analytical reasons, however, microeconomics and macroeconomics may be distinguished on the following counts:

Difference in Nature

Microeconomics is the study of the behaviour of the individual units, in particular, consumers, firms and resource owners (factors of production), rather than aggregates. Macroeconomics, on the other hand, is the study of the behaviour of the economy as a whole.

Difference in Methodology

Individualistic and aggregative. Microeconomics is individualistic, whereas macroeconomics is aggregative in the methodological approach.

Traditional economic analysis, especially that followed by the neoclassical economists, was largely confined to the study of individual aspects of economic behaviour activities, problems, experiences — and the equilibrium process of an economic activity, isolated from the general set-up. Again, the results of such analysis were averaged out and generalised by traditional economists to explain the aggregative behaviour of the system as a whole. Modern economists, including Keynes, however, realised the inadequacy of such an analysis and argued that such generalisation of individual behaviour cannot just be a summation of individual activities. A community's economic behaviour has its own distinctive modes and courses. It is, therefore, wrong to extend micro-level study to understand macro-level aggregative working of the economy as a whole.

Obviously, as the overall macroeconomic system is highly synchronised and interconnected in nature, no one part of the system can be considered in isolation from the others. A separate branch of study was needed to comprehend the aggregative economic relations. Macroeconomics was consequently developed to describe the typical nature of aggregate economic behaviour as distinct from isolated individual activities. Microeconomics, of course, did refer to aggregates like market demand, market supply, industry, etc., but these were not considered in relation to the economy as a whole. On the other hand, macroeconomics concerns itself with aggregates relating to the economy as a whole. In macroeconomics, economic phenomena are studied in their aggregate size, shape and behaviour.

Difference in Economic Variables

Micro quantities and Macro quantities. Microeconomics is concerned with the behaviour of micro variables or micro quantities such as individual demand, supply, particular commodity prices, wages, individual industries, etc.

Macroeconomics is, however, concerned with the behaviour of macro variables or macro quantities such as national income, price levels, national output, total investment, total consumption, total savings in the economy, etc. In short, microeconomics deals with the individual incomes and output, whereas macroeconomics deals with the national income and national output.

Difference in the Field of Interest

Microeconomic theories and macroeconomic theories. Microeconomics primarily deals with the problems of pricing and income distribution. It seeks to explain the determination of relative prices of particular commodities in the product markets. It is also concerned with the determination of factor pricing such as rent, wages, interest and profit and in turn, the theory of income distribution.

Macroeconomics, on the other hand, pertains to the problems of the size of national income, economic growth and the general price level.

Difference in Outlook and Scope

In fact, both microeconomics and macroeconomics deal with the phenomena of aggregation. However, from the point of view of scope, the concept of aggregation in microeconomics is different from that of aggregation in macroeconomics.

In macroeconomics, usually, behavioural elements of units with homogeneous characteristics are aggregated. For example, the concept of 'industry' in microeconomics is an aggregate concept. Industry refers to a set of all firms producing homogeneous goods taken together. Similarly, market is the aggregate concept. Likewise, market demand is measured as the summation of all individual consumer's demand for a given product in the market. Also, market supply is the aggregate of the production supplied by individual firms. As such, microeconomics, however, never uses aggregates relating to the economy-wide total. Its scope is limited.

Macroeconomics, on the other hand, uses aggregates which relate to the entire economy or to a large sector of the economy and when it considers industrial output, it refers to the whole of output produced by the industrial sector and similarly, agricultural output for the entire agricultural sector. These are sub-aggregates constituting the economy's total output. Likewise, when macroeconomists talk of aggregate demand, they refer to the demand for all products by all households taken together for the economy as a whole. Thus, aggregate demand covers all market demands.

> In short, macroeconomics always considers aggregates as economy-wide total. Its scope is total or much wider than the partial scope of the microeconomics in using the concept of aggregates.

Demarcation in Areas of Study

Theory of value and theory of economic welfare are the major areas covered in microeconomics. The theory of value includes pricing and distribution, *i.e.,* product pricing and factor pricing.

On the other hand, income and employment theory and monetary theory are the core topics of macroeconomics. In a broad sense, public finance, growth and international trade are also included in the fields of macroeconomics.

3. THE SUBJECT-MATTER AND THE SCOPE OF MICROECONOMICS

Microeconomics is basically concerned with market behaviour and allocation of resources. It, thus, seeks to examine the fundamental questions of economic analysis, such as:

- What goods shall be produced out of the given resources and in what quantities?
- Who will produce them and how?
- How these goods shall be valued or priced in the exchange process?
- To whom and how the wealth so produced shall be distributed?
- How efficiently are the resources allocated for production and consumption in the economic society?

The subject-matter of microeconomics is, thus, confined to the following major fields:

- Pricing;
- Distribution; and
- Welfare.

Pricing

A major part of microeconomic theory is confined to the price theory. Microeconomics assumes the total quantity of resources available in an economic society as given and seeks to explain how these shall be allocated to the production of particular goods for the satisfaction of chosen wants. In a free market economy, the allocation of resources is based on the relative prices and profitability of different goods. As such, to explain the allocation of resources, microeconomics seeks to explain the pricing phenomenon.

Price theory explains how the price of a particular commodity is determined in the commodity market. For in-depth analysis of price determination, it contains:

- Theory of demand of the analysis of consumer behaviour.
- Theory of production and cost or the analysis of producer behaviour.
- Theory of product pricing or price determination under different market structures.

Distribution

Distribution is an equally important branch of microeconomics. The theory of distribution basically deals with factor pricing. It seeks to explain how rewards of the individual factors of production such as land, labour, capital and enterprise are determined for their productive contribution. In other words, it is concerned with the phenomena of rent, wages, interest and profits, as the respective rewards of these four categories of factors, *viz.,* land, labour, capital and enterprise.

Since demand and supply of each of these factors are characteristically different, there are separate theories to explain rent, wages, interest and profits. Thus, distribution field includes, general theory of distribution, theories of rent, theories of wages, theories of interest and theories of profits.

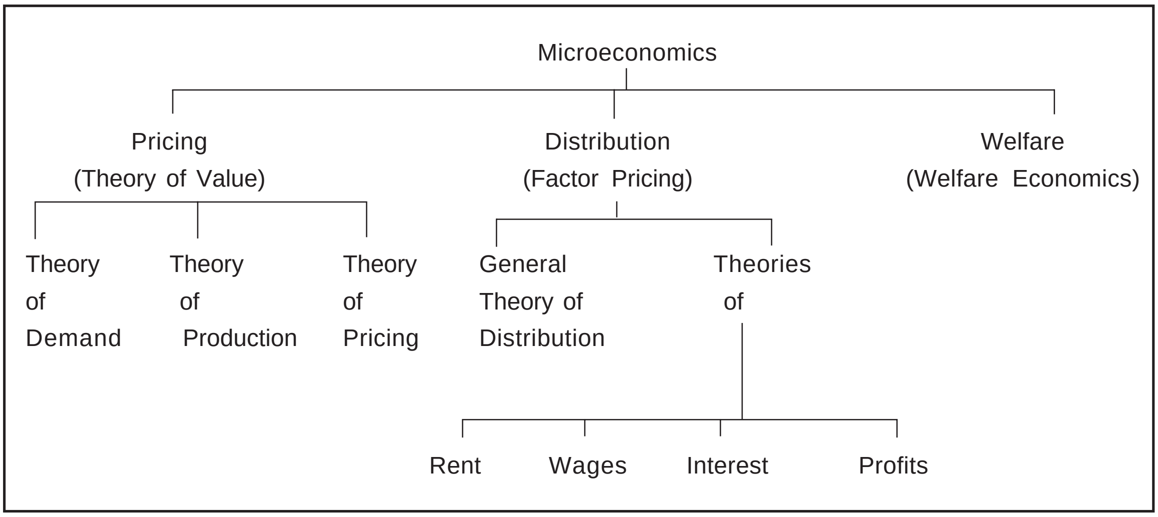
Welfare

Welfare economics is an important branch of microeconomics as it seeks to explain how efficient is the allocation of resources so determined. It seeks to explain under what conditions the efficiency in production, efficiency in distribution and overall economic efficiency, *i.e.,* the efficiency in the direction of production are attainable.

The theory of economic welfare explains how an individual consumer maximises his satisfaction when production efficiency is achieved by allocation of resources or reallocation of resources in such a way as to maximise output from a limited set of input.

Along with individual economic welfare, welfare economics is also confined to the social welfare. Social welfare is based on overall economic efficiency of the system. When maximum individual wants are satisfied at the best possible or optimum level by a production pattern through efficient allocation of resources, overall economic efficiency or 'Pareto optimality' condition is reached. Conditions of overall economic efficiency, *i.e.*, Pareto optimality conditions, are of great help in raising the standard of living of the population and maximisation of social welfare. The subject-matter and scope of microeconomics may be thus pinpointed as in Chart 3.1 given below:

Chart 3.1



4. IMPORTANCE AND USES OF MICROECONOMICS

Microeconomics has great theoretical and practical significance.

- **It explains price determination and the allocation of resources**. It provides an understanding of the working of market mechanism in a capitalist/free enterprise economy.
- **It has direct relevance in business decision-making.** The knowledge of price theory has its own significance in practical business decision-making. It is useful to a businessman in determining the price policy. It guides him in attainment of maximum productivity through optimum allocation of his given resources. It teaches him the analysis of the costs of production and estimation of the demand for his product.
- **It serves as a guide for business/production planning.** Tools of microeconomics are useful in preparing the expansion plan of a business. It is also helpful in investment decision taking by the firm.
- **It serves as a basis for prediction.** Microeconomic theory is useful to make conditional predictions. Demand forecasting, for instance, rests on microeconomic principles of demand.

- **It teaches the art of economising.** Microeconomic principles deal with the economising of scarce resources and show how to use them efficiently so as to gain maximum out of minimum. Microeconomic law, like the law of substitution, shows how a consumer can maximise his satisfaction by equating the ratios of marginal utilities to the prices of different goods which he buys. Likewise, there is optimum utilisation of the factors of production when their marginal products become unequal.
- **It is useful in determination of economic policies of the government.** For instance, in determining a tax policy the government can know the effect and incidence of a particular tax through microeconomic tools and then judge its rationality and desirability. It also provides the principle for determining the price policy for the public enterprise. Similarly, the nature of price control administered prices, and such other policy issues can be determined on the basis of relevant microeconomic analysis.
- **It serves as the basis for welfare economics.** Microeconomics examines the subjective satisfaction that individuals derive from consuming goods and services and from enjoying leisure. It also suggests how to eliminate wastages and have optimisation of resources so as to fetch maximum social welfare which is the underlying goal of welfare economics.
- **It explains the phenomena of international trade.** Microeconomic theories explain many aspects of international trade such as the emergence, nature and gains of international trade, determination of exchange rate, impact of tariffs on prices, etc.

5. LIMITATIONS OF MICROECONOMICS

Despite being a significant major branch of economic science and its immense usefulness in explaining economic behaviour of the individual economic units, microeconomics has inherent limitations as follows:

- **Concept of marginalism.** Microeconomic theories are based on the principle of marginalism. Marginal changes are assumed in the relevant phenomena. Marginal change refers to the addition of just a single unit more. Thus, these are concepts like marginal utility, marginal cost, marginal product, marginal revenue, etc. It, thus, refers to a bit by bit change in the total variation. The theories, thus, imply equilibrium conditions in terms of margin, such as a consumer equating marginal utility with price for the maximisation of total satisfaction, a producer equating marginal cost with marginal revenue for maximisation of profits, etc. In practice, however, it is very difficult to realise this marginal approach.
- **Unrealistic assumption of full employment and over simplification.** The entire microeconomics is based on the assumption of full employment even in a short-term analysis, which is unrealistic. By assuming full employment, microeconomic theories have over simplified the conditions of reality.
- **Pure capitalist model.** Microeconomic theories assume *laissez-faire* policy and pure-capitalism in their behaviouristic models. Today there is no pure capitalism, so most of the microeconomic theories have no significant relevance to practice.

- **Incomplete explanation and misleading generalisation.** Microeconomics studies specific economic units separately from the rest of the whole economy. It, thus, explains only a part and not the whole of working of an economic system. Microeconomics, thus, does not furnish a complete explanation of the whole phenomenon. Again, application of deductive method in generalisation from particular behaviour is often misleading. What is true for an individual may not be true for the entire system.

In fact, the classical economists had made the same mistake in stating that when each individual saves, everyone of them would become wealthy so the society tends to be rich and wealthy. Here they failed to realise the paradox of thrift caused by deficiency of aggregate demand and consequently falling level of income.

To recapitulate, in a nutshell, microeconomics has certain inherent limitations:

- Most of the microeconomic theories are abstract.
- Most of the microeconomic theories are static — based on *ceteris paribus, i.e.,* assuming "other things being equal."
- Microeconomics unrealistically assumes *'laissez-faire'* policy and pure capitalism.
- Microeconomics studies only parts and not the whole of the economic system. Thus, it cannot explain the functioning of the economy at large.
- By assuming independence of wants and production in the system, microeconomics has failed to consider their 'dependence effect' on economic welfare.
- Microeconomics misleads when one tries to generalise from the individual behaviour. It is improper to portray the character and behaviour of aggregate, simply by generalising from character and behaviour of the individual components.
- Microeconomics in dealing with macroeconomic system unrealistically assumes full employment.

6. IMPORTANCE OF MACROECONOMICS

Macroeconomics has its unique importance:

- It explains the working of the economic system as a whole.
- It examines the aggregate behaviour of the macroeconomic entities like firms, households and the government.
- Its knowledge is indispensable for the policy-makers for formulating macroeconomic policies such as monetary policy, fiscal policy, industrial policy, exchange control, income policy, etc.
- It is very useful to the planner for preparing economic plans for the country's development.

- It is helpful in international comparison. *For example*, microeconomic data like national income, consumption, saving-income ratio, etc., are required for a comparative study of different countries.
- It explains economic dynamism and intricate interrelationships among macroeconomic variables, such as price level, income, output and employment.
- Its study facilitates overall purposes of control and prediction.

7. LIMITATIONS OF MACROECONOMICS

Macroeconomics has certain limitations.

- It ignores, individual behaviour altogether.
- It has a tendency to excessive generalisation. Thus, analysing in aggregate terms, it pays least attention to the differences involved in the constituents.
- It is not easy to get correct and complete measures of economic aggregates. Thus, macroeconomic analysis lacks precision in actual practice.
- Macroeconomic predictions are not fully reliable when they are based on incomplete information or inaccurate measures. National income, price index number, etc., are only rough indicators.
- Often macro-level policies may not produce the same results at micro-levels.

The manager or businessman should be aware of the changing economic policies at national, international and global levels. In most countries, a shift is taking place from state intervention to a freer market economy. Macroeconomic policies such as monetary, fiscal, industrial and trade policies are now oriented more to stable and sustainable economic growth and development with human face rather than being just anti-cyclical in nature. Knowledge of macroeconomics in this respect is essential for an effective manager.

For macroeconomic events and policy regimes have important implications for business. Liberalised economic policies are seeking to inspire market economy by being more supportive, pro-business and innovative in many countries today. Business enterprises should perform and progress in the new environment by grabbing the opportunities at all level through such awareness.

MODEL QUESTIONS

1. Define microeconomics.
2. Distinguish between microeconomics and macroeconomics.
3. What is the subject-matter of microeconomics?
4. Trace the significance of microeconomics.
5. What are the limitations of microeconomics?

❒ ❒ ❒

Unit III

Demand Analysis and Business Forecasting

4

CHAPTER

Market Structures

1. MEANING OF MARKET

Ordinarily, a market is understood as a place where commodities are bought and sold at retail or wholesale prices. Thus, a marketplace is thought to be a place consisting of a number of big and small shops, stalls and even hawkers selling various types of goods.

In economics, however, the term "market" does not refer to a particular place as such but it refers to a market for a commodity or commodities. Thus, economists speak of, say, a wheat market, a tea market, a gold market and so on.

Definition. An arrangement whereby buyers and sellers come in close contact with each other directly or indirectly to sell and buy goods is described as market.

It follows that for the existence of a market, buyers and sellers need not personally meet each other at a particular place. They may contact each other by any means such as telephone or telex.

Thus, the term "market" is used in economics in a typical and a specialised sense:

- It does not refer only to a fixed location. It refers to the whole area of operation of demand and supply.
- It refers to the conditions and commercial relationships facilitating transactions between buyers and sellers. Thus, a market signifies any arrangement in which the sale and purchase of goods take place.
- Thus, to create a market for a commodity, what we need is only a group of potential sellers and potential buyers; they may be at different places.
- Markets may be physically identifiable, *e.g.*, the cutlery market in Mumbai situated at Jumma Masjid Street or one which is identified in a general sense, without any

reference to a particular commodity, such as the labour market, the stock market, etc.

- Existence of different prices for a specific commodity means existence of different markets.

2. PRODUCT AND FACTOR MARKETS

Analytically, markets may be categorised into: *(i)* product market, and *(ii)* factor market.

A 'product market' or 'commodity market' refers to an arrangement in effecting buying and selling of commodities. In fact, each commodity has its market. We, thus, speak of the cotton market, the wheat market, the rice market, the gold market, the tea market, the cloth market, the automobile market, the tyre market, the fish market, the cutlery market, the timber market and so on. Markets for precious metals such as gold and silver are called the bullion exchanges or bullion markets. Markets for capital change such as government securities bonds, shares, etc., are called the stock exchanges, while markets for commodities are called produce exchanges.

Similarly, there are factor markets in which factors of production such as land, labour and capital are transacted. There are, thus, markets called labour market, land market, and capital market. The households or the consumers are the buyers in the product markets. Their demand is the direct demand for the consumption of goods.

The firms or the producers are the buyers in the factor markets. Their demand for productive resources or factors of production is a derived demand. In the product market, the commodity price of a specific commodity is determined individually in the concerned commodity market by the interaction of demand for and supply of the commodity. The product market facilitates exchange of goods in the society. Factor prices such as rent of land, wages of labour and interest for capital are determined in the factor markets as the price of each factor is determined by the interaction between its demand and supply in its respective market. Factor markets, in essence, facilitate distribution of income, in the form of rents, wages, interest and profits.

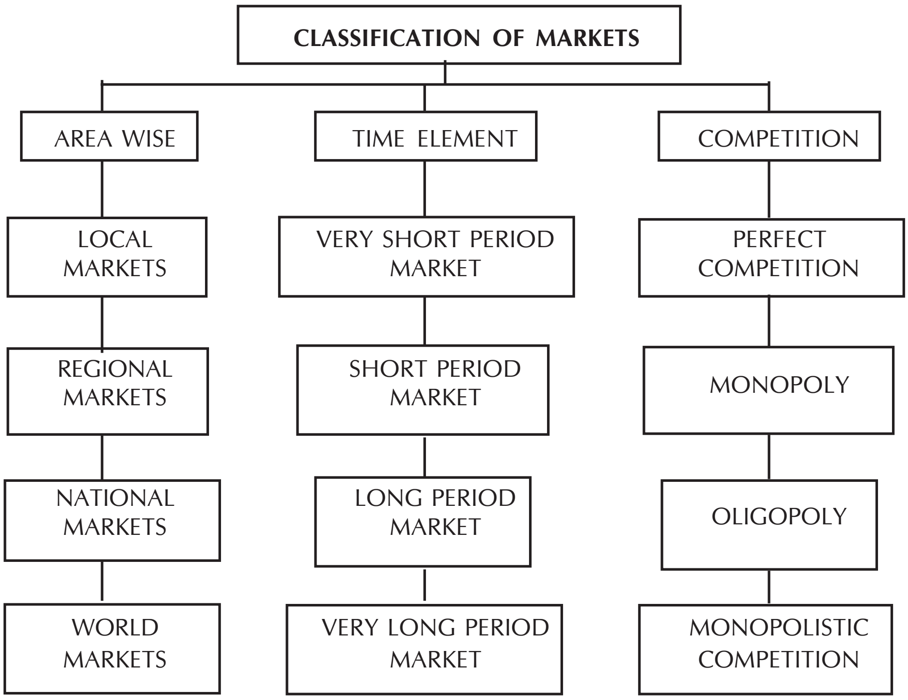
3. CLASSIFICATION OF MARKET STRUCTURES

The market is a set of conditions in which buyers and sellers come in contact for the purpose of exchange. The market situations vary in their structure. Different market structures affect the behaviour of buyers and sellers (firms). Further, different prices and trade volumes are influenced by different market structures. Again, all kinds of markets are not equally efficient in the exploitation of resources, and consumers welfare also varies accordingly. Hence, the different aspects of the pricing process should be analysed in relation to the different types of markets.

Markets may be classified on the basis of different criteria, such as geographical space or area, time element and the nature of competition.

Chart 4.1 pinpoints the classification of different types of market structures.

Chart 4.1 Different Types of Market Structures



In view of the space element, or the geographical area covered by the market, we may enlist the following types of markets:

- Local Markets,
- Regional Markets,
- National Markets, and
- World Markets.

Local Markets

Markets pertaining to local areas are called local markets. When commodities are bought and sold at one place or in one locality only, they have local markets. Local market has a narrow geographical coverage. It is confined to a particular village, town or city only. Retail trading has a local market only. Perishable goods like milk, vegetables, fruits, etc., are mostly sold in local markets. Tailoring shops, dispensaries, restaurants, coaching classes, etc., are confined to the local markets. Goods supplied only in local markets are usually produced on a small scale.

Regional Markets

There are regional markets when goods are sold within a particular region only. For example, most of the films produced in regional languages in India have their regional markets only. Similarly, textbooks sanctioned by the Maharashtra State SSC Board have a regional market.

National Markets

When goods are demanded and sold on a nationwide scale, there is a national market. The goods produced by large scale industries tend to have national markets. A large number of items such as TV sets, cars, scooters, fans, vanaspati ghee, cosmetic products, etc., produced by big companies have national markets. A good network of transport and communication and banking facilities help in promoting national markets.

World Markets

When goods are traded internationally, there exist world markets or international markets. In international markets, goods are exchanged between buyers and sellers from different countries. In the world market transactions, we use the terms "exports" and "imports" of goods.

Multinational corporations have world markets for their products. Similarly, export business is confined to the world market. Incidentally, on geographical or spatial consideration, trade and markets may also be broadly classified into: *(i)* domestic or internal, and *(ii)* international. We shall, thus, distinguish between internal trade and international trade.

4. MARKETS BASED ON TIME ELEMENT

Time element to the functional or operational time period pertaining to production processes and market forces at work. The time element may be distinguished by the following functional time periods of varying durations, namely:

- market period,
- short period,
- long period, and
- very long period or secular time.

Considering these time periods, markets may be distinguished as: *(1)* Very short period market, *(2)* Short period market, *(3)* Long period market, and *(4)* Very long period market.

Very Short Period Market

The market for a commodity during the market period is referred to as "the very short period market." On functional basis, the market period is regarded as a very short time period during which it is physically impossible to change the stock of a commodity even by a single unit further. The basic characteristic of a very short period (or market period) market is that in this market it is not possible to make any adjustments in the supply to the changing demand conditions.

In a very short period market, the equilibrium price of a commodity is referred to as the "market price" which is established by the intersection of market period demand and market period supply.

Short Period Market

The market of a commodity during short period is referred to as "the short period market." The short period is a functional time period during which it is possible for a firm to expand output of a commodity to some extent by changing the variable inputs such as labour, raw materials, etc., under its fixed plant size. Thus, the firm is in a position to make some adjustment in the supply in the changing demand conditions. In the short period market, the equilibrium price is established by the intersection of short period demand and short period supply.

Long Period Market

The market for a commodity in the long period is referred to as "the long period market." The long period refers to a functional time period which is sufficient to permit changes in the scale of production to a firm by changing its plant size. In the long period market, the firm is in a position to make better and sufficiently well and even full adjustments in supply in the changing demand conditions. In the long period market, the equilibrium price of a commodity is established by the interaction of long period demand and long period supply. It is referred to as the normal price.

Very Long Period Market

The market for a commodity in the very long period is referred to as "the very long period market." The very long period market is a secular time period which runs over a series of decades. During such a very long functional time period, dynamic changes take place in demand and supply situations. There can be perfect adjustment between demand and supply in the secular period. Thus, secular equilibrium is determined between demand and supply in the secular period. However, the secular period is of little theoretical significance on account of the too long period involved in its operation.

5. TYPE OF MARKET STRUCTURES FORMED BY THE NATURE OF COMPETITION

Traditionally, the nature of competition is adopted as the fundamental criterion for distinguishing different types of market structures. The degree of competition may vary among the sellers as well as the buyers in different market situations. Usually, the market structures are classified in accordance with the nature of competition among the sellers. The nature of competition among the sellers is viewed on the basis of two major aspects: *(1)* The number of firms in the market; and *(2)* The characteristics of products, such as whether the products are homogeneous or differentiated. Individual seller's control over the market supply and his hold on price determination basically depend upon these two factors.

On the selling side or supply side of the market, the following types of market structures are commonly distinguished: *(1)* Perfect competition; *(2)* Monopoly; *(3)* Oligopoly; and *(4)* Monopolistic competition.

In examining market structures on the supply side, we shall basically confine our attention to the two extremes of the market situations, namely: *(i)* perfect competition; and *(ii)* monopoly.

Other forms of market such as oligopoly and monopolistic competition fall in between these two extremes. Oligopoly and monopolistic competition are the market situations characterised by imperfect competition.

6. PERFECT COMPETITION

Perfect competition refers to the market structures where competition among the sellers and buyers prevails in its most perfect form. In the perfectly competitive market, a single market price prevails for the commodity, which is determined by the forces of total demand and total supply in the market. Under perfect competition, every participant (whether a seller or a buyer) is a price-taker. Everyone has to accept the prevailing market price as individually no one is in a position to influence it.

Conditions or Characteristics of Perfect Competition

The following conditions must exist for a market structure to be perfectly competitive. These are also the distinct features or distinguishing marks of perfect competition:

- **Large Number of Sellers.** A perfectly competitive market structure is basically formed by a large number of actual and potential firms and sellers. Their number is sufficiently large and as the size of each firm is relatively small, so the individual seller's or firm's supply is just a fraction of the market supply. Consequently, any variation in individual supply has a negligible effect on the total supply. Thus, an individual firm or seller cannot exert any influence on the ruling market price. In a perfectly competitive market, thus, a firm is a price-taker.
- **Large Number of Buyers.** There are a very large number of actual and potential buyers so that each individual buyer's demand constitutes just a fraction of the total market demand. Hence, no individual buyer is in a position to exert his influence on the prevailing price of the product. From the above two conditions, it follows that though an individual buyer or seller cannot affect the price, all firms together or all buyers together can change the market supply or demand as a whole, so that the market price will be affected.
- **Product Homogeneity.** The commodity supplied by each firm in a perfectly competitive market is homogeneous. That means, the product of each seller is virtually standardised, *i.e.*, there is no identification of the product of each seller, as there is no product differentiation. Since each firm produces an identical product, their products can be readily substituted for each other. Hence, the buyer has no specific preference to buy from a particular seller only. He purchase from any particular seller is a matter of chance and not of choice, on account of the homogeneity of goods.
- **Free Entry and Exit of Firms.** There is free entry of new firms into the market. There is no legal, technological, economic, financial or any other barrier to their entry. Similarly, existing firms are free to quit the market. Thus, the mobility of firms ensures that whenever there is scope in the business, new entry will take place and competition will remain always stiff. Due to the natural stiffness of competition, inefficient firms would have to eventually quit the industry.

- **Perfect Knowledge of Market Conditions.** Perfect competition requires that all the buyers and sellers must possess perfect knowledge about the existing market conditions, especially regarding the market price, quantities and sources of supply. When there is such perfect knowledge, no buyer could be charged a price different from the market price. Similarly, no seller would unnecessarily lose by selling at a lower price than the prevailing market price. This way, perfect knowledge ensures transactions at a uniform price.
- **Perfect Mobility of Factors of Production.** A necessary assumption of perfect competition is that factors of production are perfectly mobile. Perfect mobility of factors alone can ensure easy entry or exit of the firms. Again it also ensures that the factor costs are the same for all firms.
- **Government Non-intervention.** Perfect competition also implies that there is no government intervention in the working of market economy. That is to say, there are no tariffs, subsidies, rationing of goods, control on supply of raw materials, licensing policy or other government interference. Government non-intervention is essential to permit free entry of firms and for automatic adjustment of demand and supply through the market mechanism.
- **Absence of Transport Costs Element.** It is essential that competitive position of no firm is adversely affected by the transport cost differences. It is thus assumed that there is absence of transport cost as all firms are closer to the market or there is equal transport cost faced by all, as all firms are supposed to be equally faraway from the market.

7. MONOPOLY

Monopoly is the other extreme form of market situation. Pure monopoly is just the opposite of perfect or pure competition. Pure monopoly is a market structure in which there is only one seller. He controls the entire market supply of a product. Because, there is no rival producing a close substitute, the monopoly firm itself is an industry, so its output constitutes the total market supply. In a monopoly market, the seller (the monopolist) is faced with a large number of competing buyers. But, being the sole supplier, the monopolist has a strong hold over price determination. He usually tries to set the price and output of his product entirely in his own interests of profit maximisation.

Features of Monopoly

The following are the main characteristics of a pure monopoly market:

- There exists only one seller but there are many buyers.
- The monopoly firm is the industry.
- There are many entry barriers such as natural, economic, technological or legal, which do not allow competitors to enter the market. The monopolist has, therefore, complete hold over the market supply and price determination.

- A monopoly firm is a "price-maker." In a monopoly market, the price is solely determined at the discretion of the monopolist, since he has control over the market supply.
- There are no closely competitive substitutes for the product of the monopolist. So the buyers have no alternative or choice. They have to either buy the product from the monopolist or go without it.
- Monopoly is a complete negation of competition.
- Since a monopolist has a complete control over the market supply in the absence of a close or remote substitute for his product, he can fix the price as well as quantity of output to be sold in the market. Though a monopolist is a price-maker, he has no unlimited power to charge a high price for his product in the market. This is because, he cannot disregard demand situation in the market. If buyers refuse to buy at a very high price, he has to keep a lower price. He will produce that level of output which maximises the profits and charge only that price at which he is in a position to dispose of his entire output. Thus, the monopolist sets price for his product in relation to the demand position, and not just fix any price he likes.

8. TYPES OF MONOPOLY

The following are the important types of monopoly:

Pure Monopoly and Imperfect Monopoly

Pure monopoly means a single firm which controls the supply of a commodity which has no substitutes, not even a remote one. It possesses absolute monopoly power. Such a monopoly is very rare. Imperfect monopoly means a limited degree of monopoly. It refers to a single firm which produces a commodity having no close substitutes. The degree of monopoly is less than perfect in this case and it relates to the availability of a close substitute. In practice, there are many cases of such imperfect monopoly. Pure monopoly is a complete negation of competition. Imperfect monopoly, however, does not totally rule out the possibility of competition. It implies a threat of competition from the rivals producing remote substitutes. Hence, imperfect monopoly lacks absolute monopoly power in deciding price and output policy. Pure monopoly is referred to as absolute monopoly, while imperfect monopoly is referred to as limited or relative monopoly.

Legal, Natural, Technological and Joint Monopolies

On the basis of the sources of deriving monopoly power, monopolies may be classified as: *(i)* legal, *(ii)* natural, *(iii)* technological, and *(iv)* joint. Legal monopolies emerge on account of legal provisions like patents, trade marks, copyrights, etc. The law forbids the potential competitors to imitate the design and form of products registered under the given brand names, patents or trade marks. Natural advantages like good location, old-age establishment, involvement of huge investment, business reputation, etc., confer natural monopolies on many firms. Technological expertise, economies of large scale and efficiency of superior capital use and the process of mechanisation, etc., confer technological monopolies to big firms. Through business combinations like trusts, cartels, syndicates, etc., some firms may unite in a group and acquire joint monopolies in the market.

Simple Monopoly and Discriminating Monopoly

A simple monopoly firm charges a uniform price for its product to all the buyers. A discriminating monopoly firm charges different prices for the same product to different buyers. A simple monopoly operates in a single market. A discriminating monopoly operates in more than one market.

Private Monopoly and Public or Social Monopoly

Considering the nature of ownership, monopolies may be grouped into: *(i)* private monopolies, and *(ii)* public or social monopolies. When an individual or a private body controls a monopoly firm, it is regarded as a private monopoly. When production is solely owned, controlled and operated by the state, it is regarded as a social or public monopoly. Public monopolies are confined to nationalised industries.

9. IMPERFECT COMPETITION

Theoretically, perfect competition is the simplest market situation assumed by the economists. Modern economists like Mrs. Joan Robinson and Prof. Chamberlin have, however, challenged the very concept of perfect competition. They regard it as a totally unrealistic model, something imaginary, without any relation whatsoever to economic reality. All conditions of perfect competition do not exist simultaneously. So, in reality there is imperfect rather than perfect competition.

In reality competition is never perfect. So, there is imperfect competition when perfect form of competition among the sellers and the buyers does not exist. This happens as the number of firms may be small or products may be differentiated by different sellers in actual practice. Similarly, there is no pure monopoly in reality. Imperfect competition covers all other forms of market structures ranging from highly competitive to less competitive in nature. Traditionally, oligopoly and monopolistic competition are categorised as the most realistic forms of market structures under imperfect competition.

Oligopoly

Oligopoly refers to the market structure where there are a few sellers (more than two but not too many) in a given line of production. Fellner defines oligopoly as "competition among the few." In an oligopolistic market, firms may be producing either a homogeneous product or may have product differentiation in a given line of production. The oligopoly model fits well in such industries as automobile, manufacturing of electrical appliances, etc., in our country. Following are the distinguishing features of an oligopolistic market:

- There are a few sellers supplying either homogeneous products or differentiated products.
- Firms have a high degree of interdependence in their business policies in fixing price and determining output.

- Firms under oligopoly have always the fear of retaliation by rivals.
- Competition is of a unique type in an oligopolistic market. Here, each oligopolist faces competition, and has to wage a constant struggle against his rivals.
- Advertising and selling costs have strategic importance to oligopolist firms.

Monopolistic Competition

Monopolistic competition refers to the market structure in which there are a large number of firms producing similar but not identical products. Monopolistic competition is a blend of monopoly and competition. Monopolistic competition is similar to perfect competition in that it has a large number of sellers, but its dissimilarities lie in its product differentiation. In perfect competition, goods are identical or homogeneous, while in monopolistic competition, products are differentiated through trade marks, brand names, etc. For example, in the soft drink market, products are distinguished by brand names such as Thums-Up, Limca, Gold Spot, etc. Product differentiation confers a degree of monopoly to each seller in a market under monopolistic competition. Thus, in such a market, many monopolists compete with each other on the selling side. There are a large number of buyers too. But each buyer has preference for a particular seller or a brand of the product in the market. For instance, a smoker may prefer Panama brand cigarettes to Wills.

Following are the major characteristics of monopolistic competition:

- There are a large number of sellers.
- There are a large number of buyers.
- There is product differentiation. Each seller tries to distinguish his product from the rest.
- Each seller resorts to advertising and sales promotion efforts. Thus, selling costs are a unique feature of monopolistic competition.
- Monopolistic competition has two aspects: *(i)* price competition, *i.e.*, sellers compete in price determination, and *(ii)* non-price competition, *i.e.*, sellers compete through product improvements and advertising sales promotion efforts.

10. MARKET ECONOMY PARADIGM

A firm's business performance in terms of price, output and profit strategy is governed by its behaviour in the given/changing market structure. The market economy paradigm in Figure 4.1 below shows that the market structure is crucial in determining the business behaviour/course of decision-making and action of the firm, which in turn determines the various aspects of business performance of the firm in a market economy.

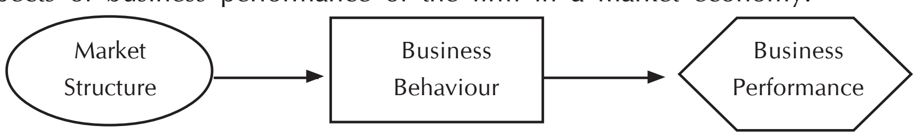


Fig. 4.1: Market Economy Paradigm

MODEL QUESTIONS

1. Distinguish between:
   (a) Perfect competition and monopoly.
   (b) Product market and factor market.
2. What do you mean by the term "market" in economics?
3. Explain the different types of market structures.
4. Write short notes on:
   (a) Types of monopoly.
   (b) Oligopoly.
   (c) Monopolistic competition.
   (d) Sources of monopoly.
   (e) Market Economy Paradigm.
5. Perfect competition, monopoly, monopolistic competition and oligopoly are the types of market structures considered in economic analysis.

   Which of these types would you relate to the following markets?

   (i) Foodgrains: Rice and Wheat, *(ii)* Stock market, *(iii)* Market for bus transport in New Delhi, *(iv)* Passenger Cars, *(v)* Petrol, *(vi)* Confectionery, *(vii)* Fireworks, *(viii)* Cigarettes, *(ix)* Market for liquor in Goa, *(x)* Branded fastfood in Mumbai.

❐ ❐ ❐

Demand Analysis

5

CHAPTER

1. INTRODUCTION

The success of a business largely depends on sales. Sales depend on market demand behaviour. Market demand analysis is a core topic in managerial economics, for it seeks to search out and measures the determinants of demand, thus, forces governing sales of a product.

Market demand analysis serves the following managerial purposes:

- It is an important technique for sales forecasting with a sound base and greater accuracy.
- It provides a guideline for demand manipulation through advertising and sales promotion programmes.
- It shows direction to product planning and product improvement.
- It is useful in determining the sales quotas and appraisal of performance of the personnel in sales department.
- It is an anchor for the pricing policy.
- It indicates the size of the market for given product and the market share of the concerned firm.
- It, thus, reflects the scope of business expansion and competitive position of the firm in market trend.

For these reasons, demand analysis is essential for successful production planning and business expansion in managerial decision-making.

We shall, therefore, learn the basic concept, law and theory of demand to understand consumer behaviour first, and then discuss the main ideas about demand elasticity, demand estimation and demand forecasting as applied in business decision-making.

2. INDIVIDUAL DEMAND AND MARKET DEMAND

Consumer demand for a product may be viewed at two levels: *(i)* Individual demand, and *(ii)* Market demand.

Individual demand refers to the demand for a commodity from the individual point of view. The quantity of a product consumer would buy at a given price over a given period of time is his individual demand for that particular product. Individual demand is considered from one person's point of view or from that of a family or household's point of view. Individual demand is a single consuming entity's demand.

Market demand for a product, on the other hand, refers to the total demand of all the buyers, taken together. Market demand is an aggregate of the quantities of a product demanded by all the individual buyers at a given price over a given period of time.

Market demand function is the sum total of individual demand function. It is derived by aggregating all individual buyer's demand function in the market.

Market demand is more important from the business point of view. Sales depend on the market demand. Business policy and planning are based on the market demand. Prices are determined on the basis of market demand for the product. In a competitive market, interaction between total or market demand and market supply determine the equilibrium price. Under monopoly also, the seller has to determine the price of his product with due consideration to the position of market demand. He simply cannot determine any high price, disregarding the market demand for the product.

Usually, under market mechanism, resources would be automatically channelled in producing those goods which have a greater intensity of market demand and consequently, higher prices and more profitability. Market demand, thus, serves as a guidepost to producers in adjusting their supplies in a market economy.

3. DETERMINANTS OF DEMAND

Demand for a commodity depends on a number of factors. Several factors may affect the individual demand for a product. Likewise, the market demand for a product is influenced by many factors. We shall identify some of the major determinants of demand as under:

Factors Influencing Individual Demand

An individual's demand for a commodity is generally determined by such factors as:

- **Price of the Products.** Usually, price is a basic consideration in determining the demand for a commodity. Normally, a larger quantity is demanded at a lower price than at a higher price.

◆ **Income.** A buyer's income determines his/her purchasing capacity. Income is, therefore, an important determinant of demand. Obviously, with the increase in income one can buy more goods. Rich consumers usually demand more and more goods than poor customers. Demand for luxuries and expensive goods is related to income.

◆ **Tastes, Habits and Preferences.** Demand for many goods depends on the person's tastes, habits and preferences. Demand for several products like ice-cream, chocolates, beverages and so on depends on individual's tastes. Demand for tea, betel, cigarettes, tobacco, etc., is matter of habits.

People with different tastes and habits have different preferences for different goods. A strict vegetarian will have no demand for meat at any price, whereas a non-vegetarian who has liking for chicken may demand it even at high price. Similar is the case with demand for cigarettes by non-smokers and smokers.

◆ **Relative Prices of Other Goods — Substitute and Complementary Products.** How much the consumer would like to buy of a given commodity, however, also depends on the relative prices of other related goods such as substitute or complementary goods to a commodity.

When a want can be satisfied by alternative similar goods, they are called substitutes. For example, peas and beans, groundnut oil and *til* oil, tea and coffee, *jowar* and *bajra*, etc., are substitutes of each other. The demand for a commodity depends on the relative price of its substitutes. If the substitutes are relatively costly, then there will be more demand for this commodity at a given price than in case of its substitutes are relatively cheaper.

Similarly, the demand for a commodity is also affected by its complementary product. In order to satisfy a given want, two or more goods are needed in combination, these goods are referred to as complementary goods. For example, car and petrol, pen and ink, tea and sugar, shoes and socks, sarees and blouses, gun and bullets, etc., are complementary to each other. Complementary goods are always in joint demand. If a given commodity is a complementary product, its demand will be relatively high when its related commodity's price is lower than otherwise. Or, when the price of one commodity decreases, the demand for its complementary product will tend to increase and *vice versa*. For example, a fall in the price of cars will lead to an increase in the market demand for petrol.

◆ **Consumer's Expectation.** A consumer's expectation about the future changes in the prices of a given commodity also may affect its demand. When he expects its prices to fall in future, he will tend to buy less at the present prevailing low price. Similarly, if he expects its price to rise in future, he will tend to buy more at present.

◆ **Advertisement Effect.** In modern times, the preferences of a consumer can be altered by advertisement and sales propaganda, albeit to a certain extent only. In fact, demand for many products like toothpaste, toilet soap, washing powder, processed foods, etc., is partially caused by the advertisement effect in a modern man's life.

Factors Influencing Market Demand

The market demand for a commodity originates and is affected by the form and change in the general demand pattern of the community of the people at large. The following factors affect the common demand pattern for a product in the market.

- **Price of the Product.** At a low market price, market demand for the product tends to be high and *vice versa*.
- **Distribution of Income and Wealth in the Community.** If there is equal distribution of income and wealth, the market demand for many products of common consumption tends to be greater than in the case of unequal distribution.
- **Community's Common Habits and Scale of Preferences.** The market demand for a product is greatly influenced by the scale of preferences of the buyers in general. For example, when a large section of population shifts its preferences from vegetarian foods to non-vegetarian foods, the demand for the former will tend to decrease and that for the latter will increase.
- **General Standards of Living and Spending Habits of the People.** When people in general adopt a high standard of living and are ready to spend more, demand for many comforts and luxury items will tend to be higher than otherwise.
- **Number of Buyers in the Market and the Growth of Population.** The size of market demand for a product obviously depends on the number of buyers in the market. A large number of buyers will usually constitute a large demand and *vice versa*. As such, growth of population over a period of time tends to imply a rising demand for essential goods and services in general.
- **Age Structure and Sex Ratio of the Population.** Age structure of population determines market demand for many products in a relative sense. If the population pyramid of a country is broadbased with a large proportion of juvenile population, then the market demand for toys, school bags etc., *i.e.,* goods and services required by children will be much higher than the market demand for goods needed by the elderly people. Similarly, sex ratio has its impact on demand for many goods. An adverse sex ratio, *i.e.*, females exceeding males in number (or, males exceeding females as in Mumbai) would mean a greater demand for goods required by the female population than by the male population (or the reverse).
- **Future Expectations.** If buyers in general expect that prices of a commodity will rise in future, then present market demand would be more as most of them would like to hoard the commodity. The reverse happens if a fall in the future prices is expected.
- **Level of Taxation and Tax Structure.** A progressively high tax rate would generally mean a low demand for goods in general and *vice versa*. But, a highly taxed commodity will have a relatively lower demand than an untaxed commodity — if that happens to be a remote substitute.
- **Inventions and Innovations.** Introduction of new goods or substitutes as a result of inventions and innovations in a dynamic modern economy tends to adversely affect

the demand for the existing products, which as a result of innovations, definitely become obsolete. For example, the advent of electronic calculators has made adding machine obsolete.

- **Fashions.** Market demand for many products is affected by changing fashions. For example, demand for commodities like jeans, salwar-kameej, etc., is based on current fashions.
- **Climate or Weather Conditions.** Demand for certain products is determined by climatic or weather conditions. For example, in summer, there is a greater demand for cold drinks, fans, coolers, etc. Similarly, demand for umbrellas and raincoats is seasonal.
- **Customs.** Demand for certain goods is determined by social customs, festivals, etc. For example, during *Dipawali* days, there is a greater demand for sweets and crackers, and during Christmas, cakes are more in demand.
- **Advertisement and Sales Propaganda.** Market demand for many products in the present day is influenced by the sellers' efforts through advertisements and sales propaganda. Demand is manipulated through sales promotion. When these factors change, the general demand pattern will be affected, causing a change in the market demand as a whole. Of course, there is always a limit.

4. DEMAND FUNCTION

In demand analysis, one should recognise that at any point in time the quantity of a given product (good or service) that will be purchased by the consumers depends on a number of key variables or determinants. In technical jargon, it is stated in terms of demand function for the given product. A demand function in mathematical terms expresses the functional relationship between the demand for the product and its various determining variables.

In composing the demand function for a product, therefore, one should identify and enlist the most important factors (key variables) which affect its demand. To suggest a few, such as:

- The '*own price*' of the product itself (P)
- The price of the substitute and complementary goods (Ps or Pc)
- The level of disposable income (Yd) with the buyers (*i.e.*, income left after direct taxes)
- Change in the buyers' taste and preferences (T)
- The advertisement effect measured through the level of advertising expenditure (A)
- Changes in population number or the number of the buyers (N).

Using the symbolic notations, we may express the demand function, as follows:

$$Dx = f\ (Px,\ Ps,\ Pc,\ Yd,\ T,\ A,\ N,\ u)$$

Here, we assumed commodity *X*; hence, Dx represents the amount demanded for the commodity *X* and *Px* refers to the price of *X*. Further, *u* is incorporated to recognise 'other' unspecified/unknown determinants of the demand for commodity *X*.

The symbolic notations in stating the demand function are arbitrarily chosen and there is no hard and fast rule in their regard. Sometimes, even, X_1, X_2, X_3.... X_n, etc., are used to denote the determining variables. In symbolic terms, thus, the demand function can also be stated as under:

$$Qd = f\ (P, X_1, X_2 ... X_n)$$

Where, Qd = quantity demanded

P = price

$X_1, X_2 ... X_n$ = other demand determinants

For easy comprehension, however, it is preferable to use alphabets easily connoting the particular factors, such as *T* is used for taste, *P*s for price of substitute, *A* for advertising effect and so on.

In reality, the demand function is a complex phenomenon. Utmost care is thus needed in identification of the key determinants. Beside theoretical knowledge, long practical experience, correct perception and common sense play an important role in arriving at an appropriate demand function for a given product.

In economic theory, however, a very simple statement of demand function is adopted, assigning all other determining variables, except the own price of the product, to be constant. An over-simplified and the most commonly stated demand function is, thus:

$$Dx = f\ (Px)$$

which connotes that the demand for commodity *X* is the function of its price. The traditional demand theory deals with this demand function specifically.

It must be noted that by demand function, economists mean the entire functional relationship, *i.e.*, the whole range of price-quantity relationship, and not just the amount demanded at a given price per unit of time. In other words, the statement, *'the amount demanded is a function of price'* implies that for each possible price there is a different quantity demanded.

To put it differently, demand function for a commodity relates to the entire demand schedule, which shows the varying amounts purchased at alternative prices over a given time of period.

5. DEMAND SCHEDULE

A tabular statement of price/quantity relationship is called the demand schedule. It relates the amount the consumer is willing to buy corresponding to each conceivable price for that given commodity, per unit of time. There are, thus, two types of demand schedule: *(i)* the individual's demand schedule, and *(ii)* the market demand schedule.

Individual Demand Schedule

A below list showing the quantities of a commodity that will be purchased by an individual at each alternative conceivable price in a given period of time (say per day, per week, per month or per annum) is referred to as an individual demand schedule. Table 5.1 illustrates a hypothetical (purely imaginary) demand schedule of an individual consumer, say Mr. X for mangoes.

Table 5.1: Individual Demand Schedule

Price of Mangoes (Rs. per kg)	*Amount Demanded per Week (Quantities in kg)*
80	2
70	4
60	6
50	10
40	16

The demand schedule has the following characteristics:

- The demand schedule does not indicate any changes in demand by the individual concerned, but merely expresses his present behaviour in purchasing the commodity at alternative prices.
- It shows only the variation in demand at varying prices.
- It seeks to illustrate the principle that more of a commodity is demanded at a lower price than at a higher one. In fact, most of the demand schedules show an inverse relationship between price and quantity demanded.

Market Demand Schedule

The demand side of the market is represented by the demand schedule. It is tabular statement narrating the quantities of a commodity demanded in aggregate by all the buyers in the market at different prices over a given period of time. A market demand schedule, thus, represents the total market demand at various prices. Theoretically, the demand schedule of all individual consumers of a commodity can be complied and combined to form a composite demand schedule, representing the total demand for the commodity at various alternative prices. The derivation of market demand from individual demand schedules is illustrated in Table 5.2. Here is it is assumed that the market is composed only of three buyers, A, B and C.

Table 5.2: A Market Demand Schedule (Hypothetical Data)

Price (in Rs.)	Units of Commodity X Demand per Day by Individuals			Total or Market Demand
	A +	B +	C =	
4	1	1	3	5
3	2	3	5	10
2	3	5	7	15
1	5	9	10	24

Apparently, the market demand schedule is constructed by the horizontal additions of quantities at various prices related in the individual demand schedules. It follows that like individual demand schedule, the market demand schedule also depicts an inverse relationship between price and quantity demanded.

In general, the demand schedule (whether of an individual or of a market) denotes an inverse functional relationship between price and quantity demanded. That is to say, when the price rises, demand tends to fall and *vice versa*. It refers to the general tendency of the consumers that more will be bought at low prices and less will be bought at high prices. This tendency is described as the fundamental law of demand.

> Market demand function serves as the basis for knowing the revenue consequences of alternative output and pricing policies of the firm.

Demand Equation and Demand Schedule

A linear demand function may be stated as follows:

$$D = a - bP$$

where, D stands for the amount demanded, a is constant parameter signifying initial demand irrespective of the price. Similarly, b is a constant parameter which represents a functional relationship between the price (P) and demand (D), b having a minus sign denotes a negative function. It implies that the demand for a commodity is a decreasing function of its price. In fact, b measures the slope of the demand curve. Indeed, b suggests that the demand curve is downward sloping.

We may, now illustrate a demand equation and the computation of demand schedule, assuming estimated demand functions, as:

$$Dx = 20 - 2Px$$

Where, Dx = Amount demanded for the commodity X

Px = Price of X

Suppose, the given prices per unit of the commodity X are: Rs. 1, 2, 3, 4 and 5 alternatively. In relation to these prices, a demand schedule may be constructed as in Table 5.3.

Table 5.3: Demand Schedule for Commodity X

Price per Unit Rs. (Px)	*Units Demanded (Dx)*
1	18
2	16
3	14
4	12
5	10

When, this schedule of Table 5.3, is represented graphically, a linear (straight-line) demand curve is drawn, as in Figure 5.1.

6. THE DEMAND CURVE

A demand curve is a graphical presentation of a demand schedule. When price quantity information of a demand schedule is plotted on the graph, a demand curve is drawn. Demand curve thus depicts the picture of the data contained in the demand schedule. It relates the amount the consumer is willing to buy at each alternative conceivable price for the commodity over a given period of time.

Customarily, the price variable is represented on the y-axis and the demand variable on the x-axis. Figure 5.1 illustrates the demand curve based on the data contained in Table 5.1.

In Figure 5.1, the quantity demanded is measured on the horizontal axis (x-axis) and the price is measured on the vertical axis (y-axis). Corresponding to the price-quantity relations given in the demand schedule (Table 5.3) related points are obtained on the graph. These points are joined and the smooth curve *DD* is drawn, which is called the demand curve.

The demand curve has a negative slope. It slopes downwards from left to right, representing an inverse relationship between price and demand. Figure 5.1 however, represents an individual demand curve. Likewise, by plotting the market demand schedule graphically, the market demand curve may be drawn.

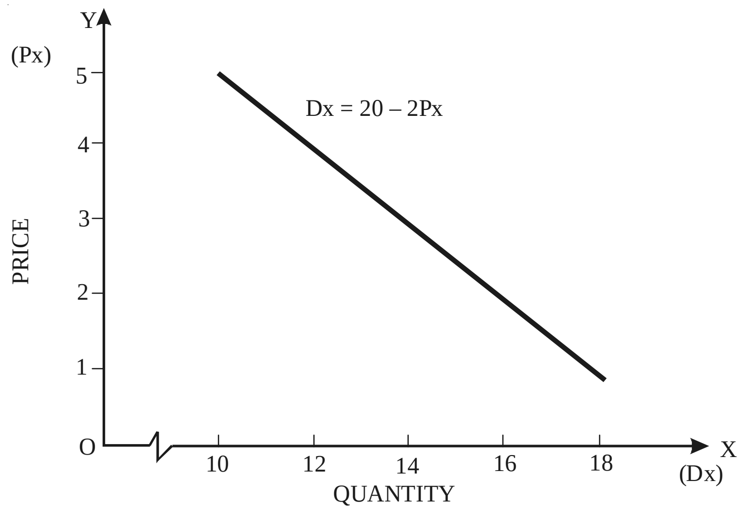


Fig. 5.1: Demand Curve

Derivation of Market Demand Curve

The market demand curve is derived by the horizontal summation of individual demand curves for a given product. Figure 5.2 illustrates this. Figure 5.2 is drawn by plotting the data contained in Table 5.2.

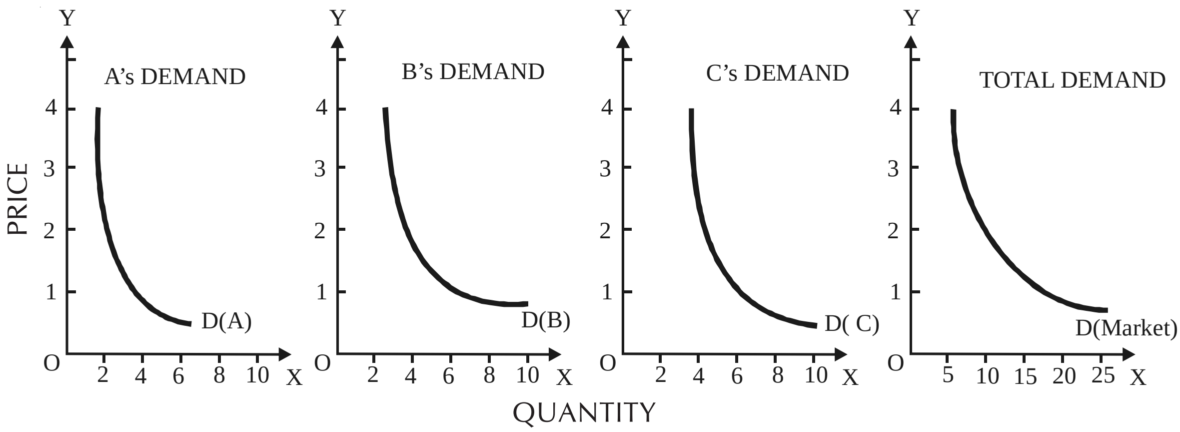


Fig. 5.2: Derivation of Market Demand Curve

It may be observed that the slope of the market demand curve is an average of the slopes of individual demand curves. Essentially, the market demand curve too has a downward slope indicating inverse price-quantity relationship.

Characteristics of a Typical Demand Curve

It is interesting to note certain characteristics of a typical demand curve. These are as under:

- The demand curve is drawn by joining the loci of points representing alternative amounts of the commodity demanded by the consumer per period of time at all relevant prices.

- Usually, a demand curve has a negative slope, which reflects the inverse relationship between price and quantity demanded. It thus shows that demand contracts with a rise in price, and when the price falls, there is an expansion of demand.
- A particular point on the demand curve depicts specifically a single price-quantity relation. The entire range of the demand curve relates to a complete functional relationship between price and demand. The demand curve as a whole, and not its particular point, reflects the demand behaviour of the consumer in relation to all possible alternative price variation.
- A demand curve may be linear or non-linear. This depends on the data obtained in compiling the demand schedule. When the demand curve turns out to be a straight-line, it is called a linear demand curve. A non-linear demand curve has a curvature.

In theoretical discussion, economists often draw a diagram of demand curve with algebraic interpretation in a general sense rather than an arithmetical demonstration of any particular demand schedule. Such a demand curve is meant to describe only a behavioural tendency rather than looking for the measurement of an exact empirical relationship in a numerical sense between price and quantity demanded. A diagrammatic presentation of demand curve is shown in Figure 5.3.

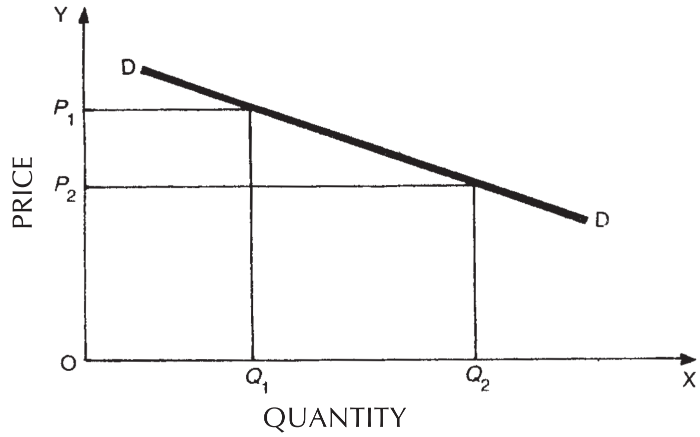


Fig. 5.3: A Linear Demand Curve

Figure 5.3 is a linear demand curve. It shows that at a higher price OP_1, demand is OQ_1. At a lower price, OP_2 a large quantity is demanded. It must be noted that no scale or exact numerical measurement of x-axis or y-axis is mentioned in this diagram. It is purely interpreted in algebraic sense, visualised geometrically. Of course, one can also give numerical values to OP_1, OP_2, OQ_1, OQ_2, etc., and have a cardinal interpretation as well.

Figure 5.3 represents a straight-line demand curve, which is called a linear demand curve. Its slope is negative but constant. That means, there is the same proportionate inverse relationship between the price and quantity demanded at each stage or at each point on the demand curve. A demand curve is said to be non-linear when it is not a straight-line or it is, literally, with a curvature in slope. Figure 5.2 represents the cases of non-linear demand curves. Here, the market demand curve shows disproportionate functional relationship between price and quantities at various points.

7. THE LAW OF DEMAND

The law of demand describes the general tendency of consumers' behaviour in demanding a commodity in relation to the changes in its price. The law of demand expresses the nature of functional relationship between two variables of the demand relation, *viz.,* the price and the quantity demanded. It simply states that demand varies inversely to changes in price. The nature of this inverse relationship stressed by the law of demand which forms one of the best known and most significant laws in economics.

Statement of the Law of Demand. *Ceteris paribus,* the higher the price of a commodity, the smaller is the quantity demanded and lower the price, larger the quantity demanded.

In other words, the demand for a commodity extends (*i.e.,* the demand rises) as the price falls and contracts (*i.e.,* demand falls) as the price rises. Or briefly stated, the law of demand stresses that, other things remaining unchanged, demand varies inversely with price.

The conventional law of demand, however, relates to the much simplified demand function:

$$D = f(P)$$

where, D represents demand, P the price and f, connotes a functional relationship. It, however, assumes that other determinants of demand are constant, and only price is the variable and influencing factor. The relation between price and quantity of demand is usually an inverse or negative relation, indicating a larger quantity demanded at a lower price and smaller quantity demanded at a higher price.

Explanation of the Law of Demand

From the view point of Managerial Economics, the law of demand should be referred to the market demand. The law of demand can be illustrated with the help of a market demand schedule, *i.e.*, as the price of a commodity decreases the corresponding quantity demanded for that commodity increases and *vice versa*.

Table 5.4: A Market Demand Schedule (Imaginary Data)

Price of Commodity X (in Rs.)	*Quantity Demanded (Units Per week)*
5	100
4	200
3	300
2	400
1	500

Table 5.4 represents a hypothetical demand schedule for commodity X. We can read from this table that with a fall in price at each stage demand tends to rise. There is an inverse relationship between price and the quantity demanded. Usually, economists draw a demand curve to give a pictorial presentation of the law demand. When the data of Table 5.4 are plotted graphically, a demand curve is drawn as shown in Figure 5.4.

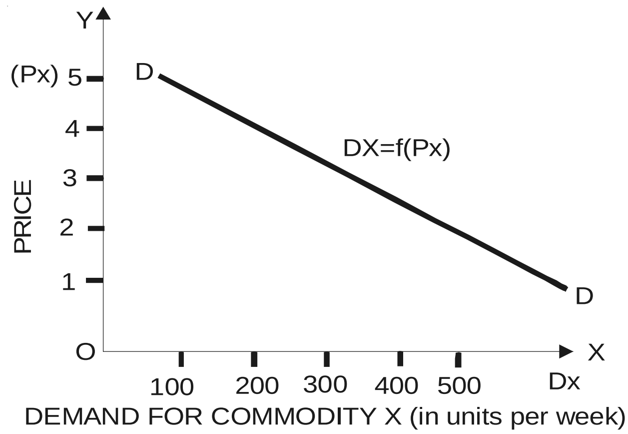


Fig. 5.4: Demand Curve

In Figure 5.4, *DD* is a downward sloping demand curve indicating an inverse relationship between price and demand. Demand curve is a very convenient means of further economics analysis. From the given market demand curve one can easily locate the market demand for a product at a given price. Further, the demand curve geometrically represents the mathematical demand functions:

$$Dx = f(Px).$$

Assumptions Underlying the Law of Demand

The above stated law of demand is conditional. It is based on certain conditions as given. It is, therefore, always stated with the '*other things being equal*.' It relates to the change in price variable only, assuming other determinants of demand to be constant. The law of demand is, thus, based on the following *ceteris paribus* assumptions:

- **No change in consumer's income.** Throughout the operation of the law, the consumer's income should remain the same. If the level of a buyer's income changes, he may buy more even at a higher price, invalidating the law of demand.
- **No change in consumer's preferences.** The consumer's taste, habits and preferences should remain constant.
- **No change in the fashion.** If the commodity concerned goes out the fashion, a buyer may not buy more of it even at a substantial price of reduction.
- **No change in the price of related goods.** Prices of other goods like substitutes and supportive, *i.e.*, complementary or jointly demanded products remain unchanged. If the prices of other related goods change, the consumer's preferences would change which may invalidate the law of demand.
- **No expectation of future price changes or shortages.** The law requires that the given price change for the commodity is a normal one and has no speculative consideration. That is to say, the buyers do not expect any shortages in the supply of the commodity

in the market and consequent future changes in the prices. The given price change is assumed to be final at a time.

- **No change in size, age composition and sex ratio of the population.** For the operation of the law in respect of total market demand, it is essential that the number of buyers and their preferences should remain constant. This necessitates that the size of population as well as the age structure and sex ratio of the population should remain the same throughout the operation of the law. Otherwise, if population changes, there will be additional buyers in the market, so the total market demand may not contract with a rise in price.
- **No change in the range of goods available to the consumers.** This implies that there is no innovation and arrival of new varieties of product in the market which may distort consumer's preferences.
- **No change in the distribution of income and wealth of the community.** There is no redistribution of incomes either, so that the levels of income of the consumers remain the same.
- **No change in government policy.** The level of taxation and fiscal policy of the government remains the same throughout the operation of the law. Otherwise, changes in income-tax, for instance, may cause changes in consumer's income or commodity taxes (sales tax or excise duties) and may lead to distortion in consumer's preferences.
- **No change in weather conditions.** It is assumed that the climatic and weather conditions are unchanged in affecting the demand for certain goods like woollen clothes, umbrella, etc.

In short, the law of demand presumes that except for the price of the product, all other determinants of its demand are unchanged. Apparently, the validity of the law of demand or the inference about inverse relationship between price and demand depends on the existence of these conditions or assumption.

8. EXCEPTIONS TO THE LAW OF DEMAND OR EXCEPTIONAL DEMAND CURVE (UPWARD SLOPING DEMAND CURVE)

It is almost a universal phenomenon of the law of demand that when the price falls, the demand extends and it contracts when the price rises. But sometimes, it may be observed, though, of course, very rarely, that with a fall in price, demand also falls and with a rise in price, demand also rises. This is a paradoxical situation or a situation which apparently is contrary to the law of demand. Cases in which this tendency is observed are referred to as exceptions to the general law of demand. The demand curve for such cases will be typically unusual. It will be upward sloping demand curve as shown in Figure 5.5. It is described as an exceptional demand curve.

In Figure 5.5, *DD* is the demand curve which slopes upward from left to right. It appears that when OP_1, is the price, OQ_1 is the demand and when the price rises to OP_2, demand also extends to OQ_2. It represents a direct functional relationship between price and demand.

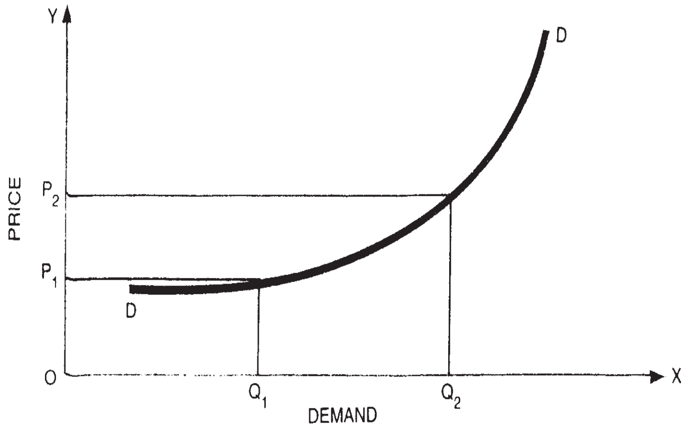


Fig. 5.5: Exceptions Demand Curve: Upward Sloping Demand Curve

Such upward sloping demand curves are unusual and quite contradictory to the law of demand as they represent the phenomenon that 'more will be demanded at a higher price and *vice versa*.' The upward sloping demand curve thus, refers to the exceptions to the law of demand. There are a few such exceptional cases, which may be categorised as follows:

- **Giffen goods.** In the case of certain inferior goods called Giffen goods (named after Sir Robert Giffen), when the price falls, quite often less quantity will be purchased than before because of the negative income effect and people's increasing preference for a superior commodity with the rise in their real income. Probably, a few appropriate examples of inferior goods may be listed, such as staple foodstuffs like cheap potatoes, cheap bread, *pucca* rice, vegetable ghee, etc., as against superior commodities like good potatoes, cake, *basmati* rice and pure *ghee*.
- **Articles of snob appeal.** Sometimes, certain commodities are demanded just because they happen to be expensive or prestige goods, and have a 'snob appeal.' They satisfy the aristocratic desire to preserve exclusiveness for unique goods. These are generally ostentatious articles, and purchased by the fewer rich people or using them as 'status symbol.' It is observed that, when prices of such articles like, say diamonds, rise their demand also rises. Similarly, Rolls Royce cars are another outstanding illustration.
- **Speculation.** When people speculate about changes in the price of a commodity in the future, they may not act according to the law of demand at the present price say, when people are convinced that the price of a particular commodity will rise still further, they will not contract their demand with the given price rise: on the contrary, they may purchase more for the purpose of hoarding. In the stock exchange market, some people tend to buy more shares when their prices are rising, in the hope that the rising trend would continue, so they can make a good fortune in future.
- **Consumer's psychological bias or illusion.** When the consumer is wrongly biased against the quality of a commodity with the price change, he may contract this

demand with a fall in price. Some sophisticated consumers do not buy when there is stock clearance sale at reduced prices, thinking that the goods may be of bad quality.

9. CHANGE IN QUANTITY DEMANDED VERSUS CHANGE IN DEMAND

In economic analysis, the technical jargon 'changes in quantity demanded' and 'changes in demand' altogether have different meanings.

The phrase 'changes in quantity demanded' relates to the law of demand. It refers to the changes in the quantities purchased by the consumer on account of the changes in price. We may say that the quantity demanded of a commodity increases when its price increases. But, it is incorrect to say that demand decreases when price increases or demand increases when price decreases. For 'increase and decrease' in demand, refers to changes in demand caused by the changes in various other determinants of demand, price remaining unchanged.

The movement along the demand curve measures changes in quantity demanded in relation to changes in price, while changes in demand are reflected through shifts in demand curve. The phrase 'changes in quantity demanded' essentially implies variation in demand referring to 'extension' or 'contraction' of demand which are quite distinct from the term 'increase' or 'decrease' in demand.

Extension and Contraction of Demand

A variation in demand implies 'extension' or 'contraction' of demand. When with a fall in price more of a commodity is bought, there is an extension of demand. Similarly, when a lesser quantity is demanded with a rise in price, there is a contraction of demand. In short, demand extends when the price falls and it contracts when the price rises. The terms 'extension' and 'contraction' are technically used in stating the law of demand.

The terms 'extension' and 'contraction' of demand should, however, be distinguished from 'increase' or 'decrease' in demand. The former is used for indicating variation in demand, while the latter for denoting changes in demand. Variation in demand is the connotation of the law of demand. It expresses a functional relationship between demand and price. A change in demand due to a change in price is called extension or contraction. Extension and contraction, relates to the same demand curve. A change in demand due to causes other than price is called increase and decrease in demand.

In graphical exposition, 'extension' or ' contraction' of demand is shown by the movement along the demand curve. A downward movement from one point to another on the same demand curve implies extension of demand, for instance, movement from *a* to *b* in Figure 5.6. It suggests that when the price reduces from OP to OP_1, demand extends from OQ to OQ_1, while an upward movement from one point to another on the same demand curve implies contraction of demand, *e.g.,* movement from *a* to *c* in the figure. It suggests that when price rises from OP to OP_2, demand contracts from OQ to OQ_2.

In short, a change in the quantity demanded in response to a change in price is explained by the term 'extension' or 'contraction' of demand. Further, extension or contraction implies a movement on the same demand curve. It, thus, signifies that the demand schedule remains the same.

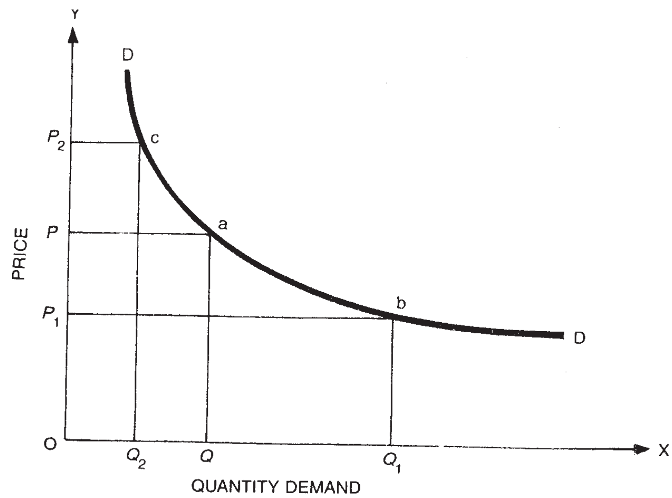


Fig. 5.6: Change in Quantity Demanded: Extension and Contraction of Demand

Increase and Decrease in Demand

These two terms are used to express changes in demand. Changes in demand are a result of the change in the conditions or factors determining demand, other than the price. A change in demand, thus, implies an increase or decrease in demand. When more of a commodity is bought than before at any given price, there is an increase in demand. For example, suppose a consumer purchased yesterday 2 kg. of apples at a price of Rs. 50 per kg. If today at the same price of Rs. 50 per kg, he buys 3 kg. of apples, then it means there is an increase (by 1 kg.) in his demand for apples. Similarly, with price remaining unchanged less of a commodity is bought than before, there is a decrease in demand. In our previous examples, if the consumer now buys only 1 kg, at the same price of Rs. 50 per kg., it means decrease (by 1kg.) in his demand.

An 'increase' in demand signifies either that more will be demanded at a given price or same will be demanded at a higher price. An increase in demand really means that more is now demanded than before at each and every price. Likewise, a 'decrease' in demand signifies either that less will be demanded at a given price or the same quantity will be demanded at the lower price. Decrease in demand really means that less is now demanded than before at each and every rise in price. Shifting the demand curves shows the increase and decrease in demand.

The terms 'increase' and 'decrease' in demand are graphically expressed by the movement from one demand curve to another. In other words, the change in demand is denoted by the shifting of the demand curve. In the case of an increase in demand, the demand curve is shifted to the right. In Figure 5.7(A), thus, the shift of demand curve from *DD* to D_1D_1 shows an increase in demand. In this case, the movement from point *a* to *b* indicates that the price remains the same at *OP*, but more quantity (OQ_1) is now demanded, instead of *OQ*. Here, increase in demand is QQ_1. Similarly, as in Figure 5.7(B) a decrease in demand is depicted by the shifting of the demand curve towards its left. In the figure, thus, the shift of demand curve from *DD* to D_2D_2 shows a decrease in demand. In this case, the movement from point *a* to *c* indicates that the price remains the same at *OP*, but less quantity QQ_2 is now demanded than before. Here, decrease in demand is QQ_2.

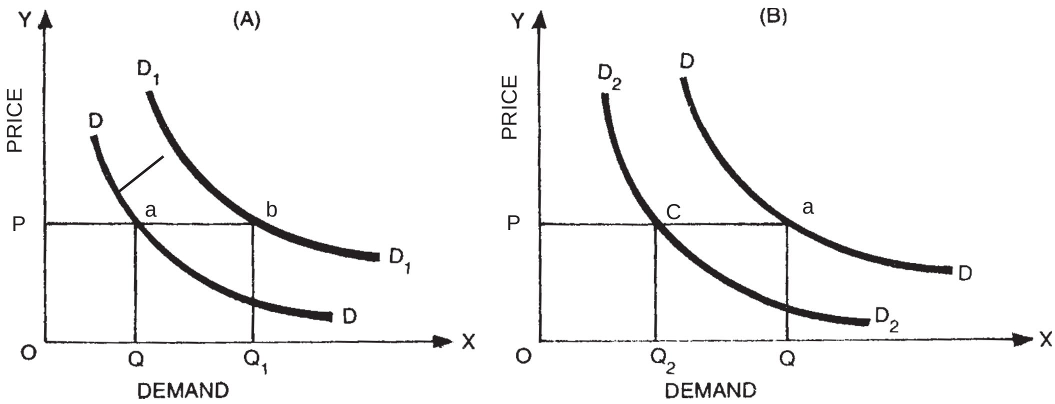


Fig. 5.7: Increase in Demand (A) and Decrease in Demand (B)

In short, a change in the quantity demanded due to change in the overall pattern of demand results in an increase or decrease in demand. For a change in demand, the change in factors other than price is responsible.

10. REASONS FOR CHANGE (INCREASE OR DECREASE) IN DEMAND

A change in demand occurs when the basic conditions of demand change. An alteration in the demand pattern (increase or decrease in demand) is caused by many kinds of changes. Some of the important changes are:

- **Changes in income.** A change in the income of the consumer significantly influences his demand for most commodities. The demand for superior commodities in general and for comforts and luxury articles increases with a rise in the consumer's income. Similarly, overall demand generally decreases with a fall in income. In estimating demand function for commodities such as cars, for instance, changes in gross national product (GNP) or per capita real income is considered as crucial factors by the researchers in general.
- **Changes in taste, habits and preference.** When there is a change in taste, habits or preference of the consumer, his demand will change. For instance, when a person gives up his smoking habit, this demand for cigarettes decreases.
- **Change in fashions and customs.** Fashions and customs of our society determine many of our demands. When these change, demands also change.
- **Change in the distribution of wealth.** Through fiscal measures, government can reduce inequality of income and wealth and bring about a just distribution of wealth, consequently the demand pattern may change in a dynamic welfare society. Welfare programes like free medical aid, free education, pension schemes, etc., raise the purchasing power of the poorer sections of the community and their standard of living, so the overall demand pattern may change.

- **Change in substitutes.** Changes in the supply of substitutes, change in their prices, the development of new and better quality substitutes certainly affect the demand for the given product. For instance, introduction of ballpoint pens has caused a fall in the demand for fountain pens.
- **Change in demand of position complementary goods.** When there is a change in the demand conditions of a complementary good (which is jointly demanded), there will be side effects on demand. For instance, a change in the demand for shoes will automatically bring about a similar change in the demand for shoe laces.
- **Change in population.** The market demand for a commodity substantially changes when there is change in the total population or change in its age or sex composition. For instance, if the birth rate is high in a country, more toys and chocolates will be demanded. But when the birth rate is substantially reduced through overall family planning efforts, their demand will decrease. Similarly, if the sex ratio of the country changes and if females outnumber males, demand for skirts will increase and that for shirts will decrease.
- **Advertisement and publicity persuasion.** A clever and persistent advertisement and publicity programmes by the producers affects consumer's preference and causes alteration in the demand for products. Generally, demand for patent medicines and toilet articles is very much determined by salesmanship and publicity. Often a change in demand for a new brand of the article in question, or the changed version of the former one (*e.g.*, when *Charminar* cigarettes became Gold (*Char Minar*) it causes a spurt in sales.

The Case of US Snack Cake Industry

In the US snack cake industry with a decline in the health-consciousness trend, bakeries responded by reducing the number of low-calories/low-fat products in 1993. Again in 1994, under the impact of the Nutrition Labelling and Education laws, the buyers' preference shifted to more health-prone foods. The producers responded to this demand change and supplied low and reduced fat-varieties of products. The Figure 5.8 below represents this phenomenon of the shifting market-demand.

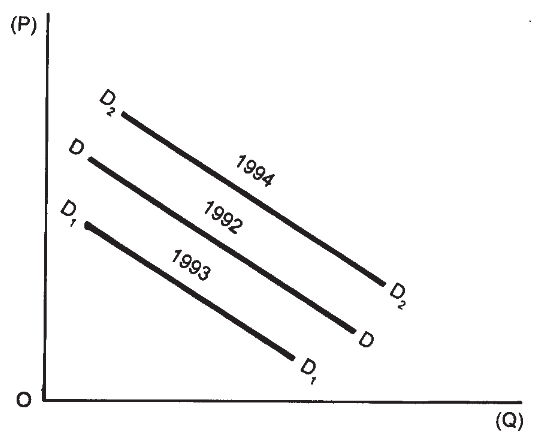


Fig. 5.8: Demand for Low-Calorie/Low-Fat Products of the US Snack Cake Industry

Again in 1998, the buyers started preferring sweet goods. The producers catered to the changed demand by producing more tastier/sweeter healthy food products.

It is also observed that demographic trend influenced the market demand for snack cakes. The demand increased with the rise in the percentage of children population component. Snack cake producers, therefore, have to reach this teenagers market segment to expand the sales of bakery products by launching upon better-tasting low-fat snack cakes. (See Krosky, C.M. (1996): "It's a Brave New World," *Bakery Production and Marketing,* January, 15).

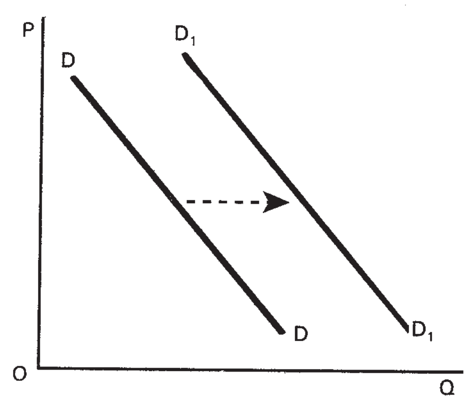
By and large, through improvements in manufacturing efficiencies/productivity, cost economies and product price increase, the Tasty Baking Company could successfully reduce its cost of sales as a percentage of net sales by 63% in 1995 and by 60.8% in 1997. The company's net income increased by 15% in 1997.

[***Source:*** Wheelen, T.L. and J.D. Hunger (2000): *Cases in Strategic Management*, Prentice-Hall, New Jersey]

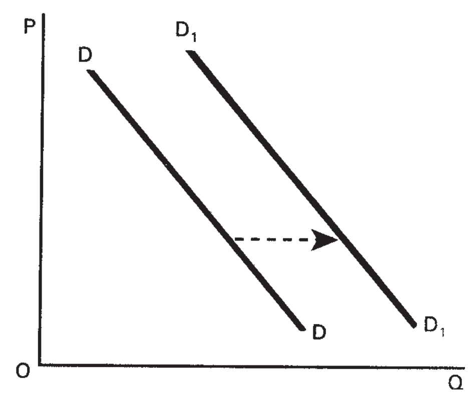
- **Change in the value of money.** When there are inflationary or deflationary tendencies developing in the general price level, consequently the value of money falls or rises, and there may be change in the relative prices of different goods, causing widespread changes in the demand pattern of various items.
- **Change in the level of taxation.** When the government changes its tax structure, especially if direct taxes such as income tax, wealth tax, etc., are reduced the disposable income of the people increases, which may lead to changes in the overall demand. On this count usually, the government in order to decrease the demand for foreign goods imposes high tariff duties on imports.
- **Expectation of future changes in prices.** When the consumer expects that there will be a rise in prices in future, he may buy more at the present price and so his demand increases. In the reverse case, his demand decreases.

Cases of Change in Demand

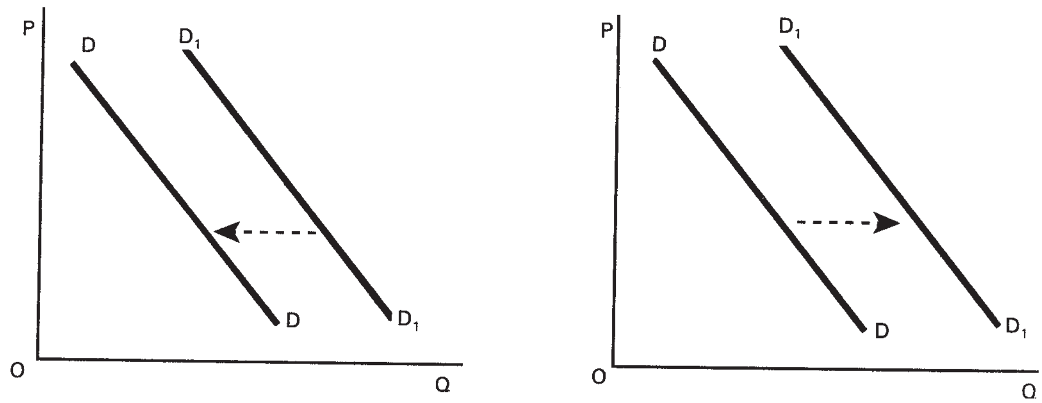
Some illustrations of shifts in demand curve are represented in Figure 5.9.



[a] An increase in advertising budget by a manufacturer of cosmetic product. D-curve likely to shift rightwards.



[b] Easy availability of housing loans at a lower interest rate. Demand for housing tends to increase even at rising prices in a city like Mumbai. D-curve shifts rightwards.



[c] Recession in the economy leading to decline in consumer's incomes. D-curve for consumption goods will tend to shift leftwards.

[d] Government's proposal for the cut in income tax rates causing rise in disposal incomes of the people. Market D-curve for goods may shift rightwards.

Fig. 5.9: Cases of Shifts in Demand Curves

11. DEMAND DISTINCTIONS: TYPES OF DEMAND

The demand behaviour of the buyer or consumer differs with different types of demand. From managerial business economic's point of view, thus, we may distinguish the following important types of demand:

1. Demand for Consumer's Goods and Producer's Goods;
2. Demand for Perishable Goods and Durable Goods;
3. Autonomous Demand and Company Demand;
4. Industry Demand and Long-run Demand;
5. Short-run Demand and Company Demand;
6. Joint Demand and Composite Demand; and
7. Price Demand, Income Demand, and Cross Demand.

Demand for Consumers' Goods and Producers' Goods

Commodities may be divided into two sub-groups: *(i)* consumer goods, and *(ii)* producer goods.

◆ Goods and services demanded by consumers for the direct satisfaction of their wants, *i.e.,* consumption purpose are referred to as consumer goods, *e.g.,* food, clothes, house, services of a lawyer, doctor, teacher, cobbler, housemaid, etc. Goods which are demanded by producers in the process of production are referred to as producer goods or capital goods, *e.g.,* tools and equipments, machinery, raw materials, factory buildings, offices, etc.

- Demand for consumer goods is direct or autonomous. Demand for producer goods is derived. It is based on the demand for the output.
- Demand for customer goods depend on its marginal utility. Demand for producer goods depends on its marginal productivity or the marginal revenue products.
- Since marginal utility curves are usually negatively sloping, the demand curves for consumer goods are negatively sloping.

Similarly, the producer goods too have negatively sloping demand curves because the marginal productivity or marginal revenue product curves are also negatively sloping.

Dean (1976), assigned the following reasons for explaining the distinctive demand behaviour for producer goods in the economy:

- The buyers of producer goods are professionals. They are usually experts. They are less likely to be influenced by sales promotion activities.
- The producers buyers are more sensitive to factor price differences and substitutes. Thus, the demand for capital labour and other products tends to be elastic.
- The motives of the producers buyers are purely economic. They buy capital goods on account of profit prospects.
- Their demand being derived from consumption demand, there are frequent and violent fluctuations in it.

The distinction between some capital goods and consumption goods is, however, arbitrary. It is based on who buys the goods and why. For example, a refrigerator purchased by the households is regarded as the consumer goods, while if it is purchased by a hotel it is considered to be the producer goods. Further, economic motive alone is not always kept in mind by the producers buyers. For instance, while buying the office furniture quite often costly items are ordered to maintain prestige rather than to see the economy of purchases. As Joel Dean (1976, p. 148) mentions, 'There are thousands of incidental needs on any business that are simply not worth the cost of scientific purchase planning.'

Demand for Perishable Goods and Durable Goods

From durability point of view, goods in general may be sub-divided into: *(i)* perishable goods, and *(ii)* durable goods.

- Perishable goods have no durability. That is, they cannot be stored for a long time., *e.g.,* milk, eggs, fish, vegetables, etc. Durable goods last long, whereas perishable goods perish soon. Durable goods are storable for a long period, *e.g.,* house furniture, car, clothes, etc.
- Use of non-durable goods or perishable goods gives one short service. Durable goods, on the other hand, can be used for several years.
- There are durable and perishable consumption goods, *e.g.,* vegetables, fish, etc., are perishable consumption goods, while TV set, car, etc., are durable consumption

goods. Similarly, there are durable and non-durable capital goods, *e.g.,* factory-plant, machinery, etc., are durable capital goods, while raw material, power, etc., are non-durable capital goods. Durable physical capital assets are referred to as fixed capital. Non-durable capital, which has one-time use only in the process of production, is called working or circulating capital. Fixed capital remains a fixed input component in the short period, while working capital is a variable capital input all the time.

Capital assets are referred to as fixed capital. Non-durable capital, which has one-time use only in the process of production, is called working or circulating capital. Fixed capital remains a fixed input component in the short period, while working capital is a variable capital input all the time.

- Perishable goods have more elastic demand. Durable goods have less elastic demand in the short run. Their demand tends to be more elastic in the long run.
- The demand for perishable goods is always immediate. Demand for durable goods is postponable.
- The existing conditions of style, convenience and the income of the buyers usually govern the demand for non-durable goods.

Demand for durable goods depends on current trends, the state of optimism, the rate of obsolescence, lifetime of the product, improvement in product design, apart from prices and incomes and such other considerations.

Demand for durable goods is more volatile in relation to business condition. Hence, demand analysis of durable goods is a complex phenomenon. Storability, postponability, replacement and expansion are the interrelated problems involved in determining the demand for durable goods. (See Dean: 1976, p. 148).

Total demand for durable goods is composed of new demand as well as replacement requirement. Thus: $D = Dn + Dr,$

where, D = total demand for durable goods, Dn = new demand and Dr = replacement demand. Dn and Dr are influenced by different factors.

The new demand or expansion demand (Dn) for durable goods is determined by a number of factors such as:

- prices
- buyers' incomes
- cost of maintenance
- operating costs
- resale value in future
- price changes
- product improvement

- price concessions on outdated models
- obsolescence rate, etc.

All these need to be included in the demand functions for the durable goods.

The replacement demand (*Dr*) for durable goods depends on:

- the degree of postponability
- expected shortages
- rate of obsolescence caused by technological advancement and innovations
- physical determination
- financial exigencies
- urge for renovation
- cultural lags
- rivalry of alternative investment
- competition in the market, etc.

Autonomous Demand and Derived Demand

Spontaneous demand for goods, which is based on an urge to satisfy some wants directly is called autonomous demand. Demand for consumer goods is autonomous. It is a final demand. It is a direct demand.

When the demand for a product depends on the demand for some other commodities it is called derived demand. 'When demand for a product is tied to the purchase of some parent product, its demand is called derived.' (Dean: 1976, p.150)

In many cases derived demand of the dependent product is owing to its being a component part of the main product, *e.g.,* demand for doors derived from demand for houses, or demand for bulbs derived from demand for lamps. Similarly, demand for antennas is derived from the demand for TV sets.

In many cases, demand for dependent product is caused by complementary consumption, *e.g.,* demand for sugar emerges from the demand for tea. Demand for all capital goods is derived.

In modern days, however, it is rare to see demand for goods to be wholly-independent of all others. In fact, mostly demands are derived demand, *e.g.,* even so-called autonomous demand for a car by a household is derived from the demand for transport service. There is a thin line of demarcation between autonomous demand and derived demand. The distinction between the two types of demand is rather arbitrary and a matter of degree.

Generally, derived demand is less price elastic than autonomous demand, *e.g.,* the demand for paints for automobiles is much inelastic as even a large percentage change in the price of paints carries insignificant impact on the total cost of producing automobiles.

The concept of derived demand facilitates demand forecasting very easy, especially in those cases where dependent and parent products are used in fixed proportions and there is a definite time lead in the parent product's demand.

Industry Demand and Firm or Company Demand

A firm is a business unit. Industry is the group of closely competitive firms. Industry demand refers to the total demand for the commodity produced by a particular industry, *e.g.,* total demand for cars in India is the demand for automobile industry's output in aggregate and essentially represents the market demand. Firm or company demands relate to the market demand for the firm's output.

In demand analysis, thus, it should be noted that within the industry, the products of one company or firm can be substituted for another owing to their similarities. Company or firm's demand, therefore, is fairly elastic. A basic relationship of a firm's demand and industry or market demand is established by the market structure whether perfect competition, monopoly, or monopolistic competition. In a perfectly competitive market, the degree of substitutability being perfect owing to homogeneity of goods of the different firms, the firms or company demand for the product tends to be perfectly elastic. So, the demand curve becomes horizontal straight-line.

If there is product differentiation and monopolistic competition among the firms, then the demand curve for the individual firm will be downward sloping. Industry's demand curve as a whole is downward sloping indicating inverse price quantity relationship. In case of monopoly, the firm itself is industry, so its demand is identical with the industry demand.

Figure 5.10 illustrates demand conditions of industry and company.

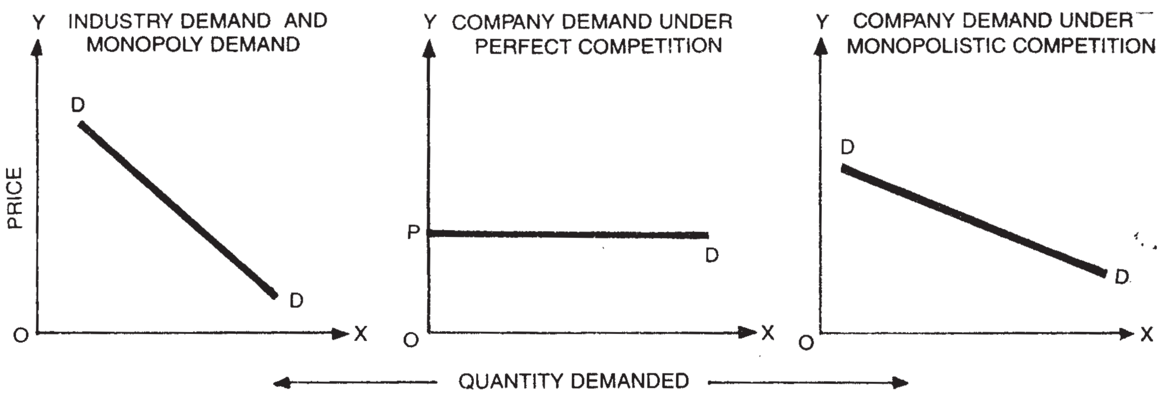


Fig. 5.10: Industry and Company Demand

Further industry demand may be classified customer groupwise, *e.g.,* cement demanded by the builders, individual households, housing boards and government departments.

A business economist or the business manager has to see the share of company demand in the industry demand. For undertaking sales forecasting, therefore, it is essential to project industry demand first and then given projection for the growth of company's demand in relation to the company's share in total demand and the possible growth of the rivals in the business.

Short-run Demand and Long-run Demand

Though there is no clear demarcation between the short-run and long-run demand, the distinction is useful for solving many decision-making problems. Especially, demand elasticity differs with time. In specific terms:

'Short-run demand refers to existing demand with its immediate reaction to price changes, income fluctuation, etc., whereas long-run demand is that which will ultimately exist as a result of the changes in pricing, promotion, or product improvement, after enough time is allowed to let the market adjust itself to the new situation.' (Dean: 1976, p. 150)

The short-run elasticity of industry demand is usually less than the long-run elasticity owing to many reasons, such as:

- cultural lags in information and experience;
- capital investment required of buyers to shift consumption patterns;
- time adjustment involved, *e.g.,* it takes time to change consumption habits, time needed to arrange for the finance, etc.

Figure 5.11 illustrates the long-run and short-run demand curves for an industry.

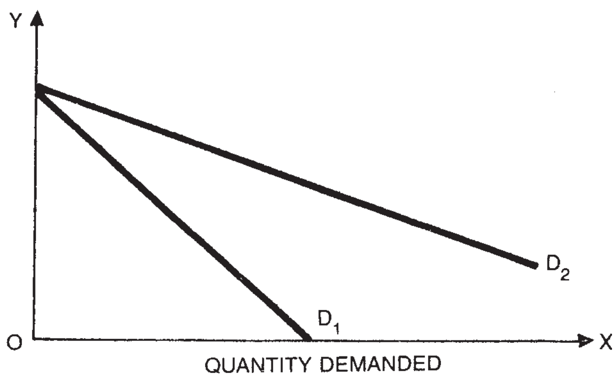


Fig. 5.11: Short-run and Long-run Demand

Joint Demand and Composite Demand

Demands for most of the commodities in real life are independent of each other. But there are several commodities the demands for which are interrelated. Interrelation in demand makes markets for physically different goods interlinked and interdependent. Broadly, two types of interrelationships exist in demand for such commodities.

Joint or complementary demand. When two goods are demanded in conjunction with one another at the same time to satisfy a single want, they are said to be joint or complementary demand. Examples are pens and ink, cars and petrol, bread and butter, coffee, sugar and milk, pipes and pipe tobacco and so on. In such cases, a change in demand for one commodity leads to a change in demand for the other in the same direction and often in the same proportion. Commodities so related are termed as complementary goods.

Composite demand. A commodity is said to be in composite demand when it is wanted for several different uses. Steel is needed for manufacturing cars, building, construction of railways, etc. Households, factories, railways, chemical industries, etc., demand coal. Wool is required in clothing, carpet manufacturing and in several other industries. Similarly, electricity also has a composite demand as it is used for lighting, cooking, TV, radio and many other electrical appliances by a household. Likewise, sugar is another illustration of composite demand. Sugar is needed for a variety of purposes ranging from the manufacture of sweets, toffees to preservatives, etc. A change in demand for the commodity by one user will affect its supplies to others and will bring about a change in its price and hence alter its demand pattern.

Price Demand, Income Demand and Cross Demand

Price demand refers to the various quantities of a product purchased by the consumer at alternative prices. In price demand, the demand function is based on the single price. Thus:

$D = f(p)$

where, D refers to demand, f shows functional relationship and p denotes price of the product.

Usually, price demand function has inverse functional relationship between the price and the demand. The law of demand pertains to the customer behaviour regarding price demand.

Income demand refers to the various quantities of a commodity demanded by the consumer at alternative levels of his changing money income. In income demand, the demand function is based on the income variable: (M). Thus:

$D = f(M)$

The income demand function is usually a direct function. It indicates that demand extends with the rise in income and *vice versa*.

Cross demand refers to the various quantities of a commodity (say, X) purchased by the consumer in relation to changes in the price of a related commodity (say, Y – which may be either a substitute or a complementary product).

Cross demand function may be stated as follows:

$Dx = f(Py)$

where, Dx = the demand for commodity X and Py = the price of commodity Y.

12. NETWORK EXTERNALITIES IN MARKET DEMAND

Theoretically, in earlier discussion (Section 3.3) it is assumed that individual demands for the product are independent, therefore, we desire market demand function/curve by simply summing individual buyers' demands. In reality, however, these may be interdependence of demand, *i.e.,* an individual demand may be depending on the demands of the other people in the case of some goods. This situation is described as 'network externalities' which may be positive or negative in effect.

Economists have identified two such network externalities:

- Bandwagon Effect
- Snob Effect or Veblen Effect.

The Bandwagon Effect

In today's life, demand for certain goods seems to be determined basically not by their usefulness or utility but mostly on account of bandwagon effect or demonstration effect. Thus, demand in such cases is influenced by the consumption of pace setters or trend setters (such as filmstars, models, group leaders, even friends and neighbours) in the community. That means demand of an individual is conditioned by the consumption of others; hence, the price becomes a minor consideration in this case.

Owing the bandwagon effect, the market demand curve trends to shift upward, as depicted in Figure 5.12.

In Figure 5.12 the initial demand curve *DD* is based on utility of the product. In this case, a price cut leads to a slight expansion of demand. In the diagram, for instance, PP_1 price reduction implies QQ_1 increase in quantity demanded, in the absence of bandwagon effect. In the presence of bandwagon effect, however, the demand curve shifts upward, suggesting an increase in demand. In our illustration, it is *DD*, thus, Q_1Q_2 increase in demand is measured on account of the bandwagon effect.

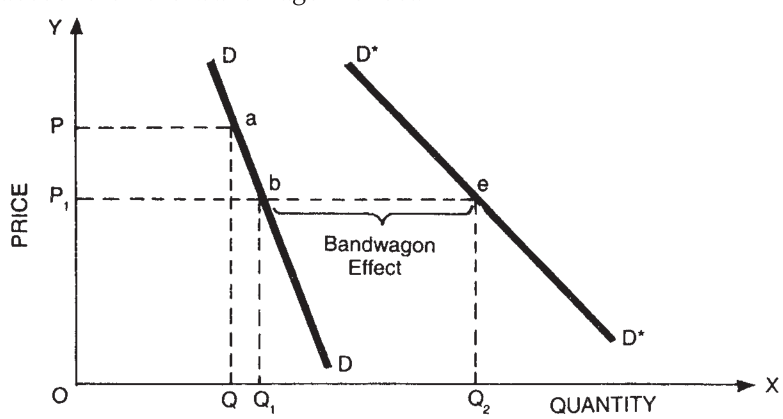


Fig. 5.12: Bandwagon Effect: The Demand Curve Shifts to the Right

In short, the bandwagon effect on market demand for a product is the result of the buyer's desire to be in style or fashion — that is, to have it because others have it. Demand for jeans and other fashionable clothes, for instance, is caused by the bandwagon effect.

For selling the clothes, therefore, marketing approach is to create a bandwagon effect. Likewise, in the case of children's toys such as Barbie dolls demand arises on account of the bandwagon effect. In advertising and marketing of many products, therefore, the object is to build up a bandwagon effect. Bandwagon effect leads to the manipulation of the market demand. It shifts the demand curve to the right as shown in Figure 5.12. Use of modern media such as TV, Movies, Fashion Shows and so on in advertising strategies are meant to produce such bandwagon or demonstration effect to manipulate market demand.

The bandwagon effect is essentially associated with stylishness, craze or fads of the people as greater and greater number of people want to use a product due to demonstration effect influencing on their desire through advertising media.The craze for compact disc (CD) songs albums of pop music is a good example of bandwagon effect that implies a positive network externality on market demand for the product. The bandwagon effect will be stronger when the intrinsic value of the product is also high. In the case of personal computer (PC), for instance, when more and more people tend to own it because of its usefulness, more software will be written and supplied at cheaper rates, then the PCs worth tends to rise further and so its demand too will shift. A price reduction due to large-scale production of PCs may further include more buyers to buy the computer. In this way, the bandwagon effect may have its significance in determining the pricing strategy of the business firm in such products. (See, Pindyck and Rubinfeld: 1995, pp. 119-120).

The Snob Effect: Veblen Effect

The snob effect refers to the desire of a person (usually the rich one) to own exclusive or unique product — called snob good or 'Veblen good.' It serves as a status symbol. When only a few people could own a snob good, its demand tends to be high among the affluent group. Designer clothes and other products such as Rolls Royce cars, Ray Ban goggles, a fancy restaurant, an antique, a rare painting, etc., are prestige goods and because of their snob value, the seller has to restrict the supply of such snob appeal goods. In marketing and advertising strategies of such exclusive type of goods, demand has to be made effective by creating a snob effect.

Rich buyer's choices are usually governed by the snob appeal. The snob effect is also referred to as Veblen effect. For the snobbish goods are described as Veblen goods (named after Thorstein Veblen). The Veblen effect is associated with the goods of conspicuous consumption or ostantatious articles used by the affluent people. Thorstein Veblen argued that the affluent class in the society has a tendency to demonstrate their superiority of 'high class' by spending on frivolous goods and services — super luxury items — such as diamonds, five-star hotels, palatial buildings, etc. When price of such luxuries rise, their snob appeal is enhanced, so their demand shifts upward. With the fall in the prices of such goods their snob appeal diminishes, causing a downward shift in their demand from the affluent section.

Network externality of snob effect, however, is negative. A snob good loses its prestige when it no longer remains exclusive and becomes a commonly used product. Though the market demand for such a commodity, when its price falls tend to rise, the individual demand of the snobbish buyer of the product will fall. That means, when a prestige good loses its snob value, its market demand from the snobbish buyers will decrease with the fall in its price; and the demand may be added up from the new common buyers. Maruti car in India, in the beginning, for instance, has gained status symbol among the richer sections of the society could have lost its snob appeal with the large expansion in its output.

In forming business strategies, such Veblen effect of snob appeal is gainfully exploited in certain cases. Airlines, for instance, keep a much high ticket fare for the business class in comparison to 'economy class.' Similarly, in 5-star hotels deluxe rooms are much higher priced as compared to the standard rooms.

Land values in posh locality tend to be much higher than those of dwellings by the ordinary people. For instance, the land price in Malabar Hill in Mumbai is much more than in Marol and a construction company must be well aware of such facts in execution of its business prospects.

Veblen Effect Paradox

In certain branded goods such as Ray Ban or Levis products, *i.e.,* exclusive or designer products there exists an inherent paradox. Initially, these goods are meant to serve the Veblen effect. At high prices, there is a limited but high demand from the richer section of the buyers. When these goods are produced in a large quantity, their prices will fall. It will carry a mass appeal to upper middle income groups. So their demand will expand. But a further increase in output will lead to further price reduction. At this price, however, the demand will tend to fall on account of the loss of exclusivity. The brand would lose its significance below this price and the product would be purchased on account of its functional utility.

The demand curve for the branded or designer products, *i.e.,* Veblen Goods (jeans, goggles, etc.), is 'Z' shape (assuming linearity for convenience) as shown in Figure 5.13.

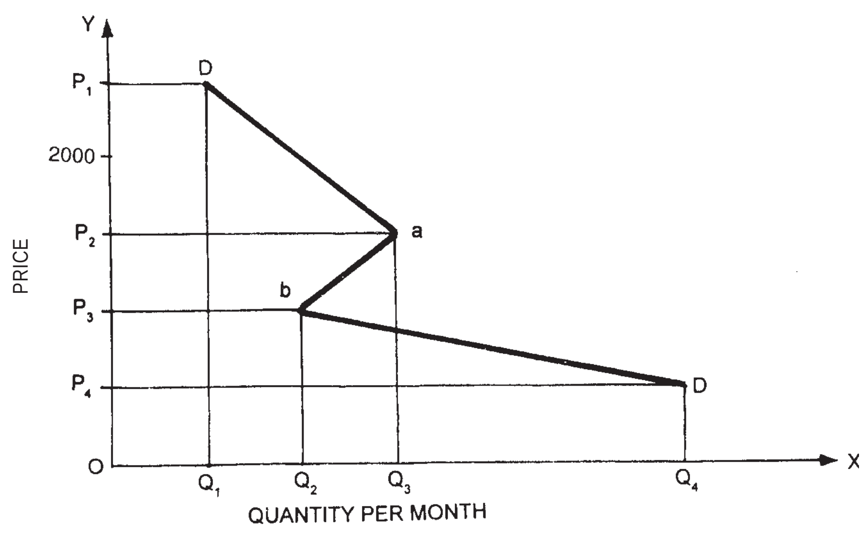


Fig. 5.13: The Market Demand Curve for Veblen Effect Product

In figure 5.13, the demand curve *DD* has changing slopes at *a* and *b* points. At price P_1, demand is Q_1. When price is lowered to P_2, demand is Q_2. A further reduction of price to P_3, leads to a fall in demand as the brand loses its exclusivity appeal. After that, the product demand is determined just by its functional utility. In case of Veblen paradox, thus, pricing the Veblen product is an art under the situation of 'Z' shape demand curve. Traditional price theory does not provide any clue when the demand curve contains both rising and falling segments. Stretched 'Z' shaped demand curve implies that at very high price, the market demand is limited but less elastic. When price is reduced, demand expands, as per the law of demand. But, beyond a limit, a further fall in price leads to contraction in market demand. And, when the branded goods lose their exclusivity appeal, these goods have to compete with unbranded goods in the market. Such unbranded goods are then disposed of in shopping centres and supermarkets at very high discounts to attract common buyers. (See Prager: 1993, pp. 126-127).

> The network externalities play a significant role in influencing the market demand for certain products such as computers, CD players, fax machines, handphones, etc. A positive network externality causes an upward shift in the market demand curve. The producers may experience a rapid growth in demand for such products, because of the bandwagon effect a positive network externality for quite a long time till the saturation point is reached.

13. PRACTICAL PROBLEMS

Practical problems in the context market demand function are illustrated as follows:

P:1. The demand function for beer in a city $Qd = 400 - 4P$

Where Qd = the quantity demanded of beer (in '000 bottles per week)

P = the price of beer per bottle

(a) Construct a demand curve assuming price Rs. 10, 12, 15, 20 and 25 per bottle.

(b) At what price would demand be zero?

(c) If the producer want to sell 3,80,000 bottles per week, what price should it charge?

Solution:

$P = 10 : Qd = 400 - 4 \times 10 = 360$

$P = 12 : Qd = 400 - 4 \times 12 = 352$

$P = 15 : Qd = 400 - 4 \times 15 = 340$

$P = 20 : Qd = 400 - 4 \times 20 = 320$

$P = 25 : Qd = 400 - 4 \times 25 = 300$

With suitable scale plot this data on a graph such as shown in Fig. 5.14.

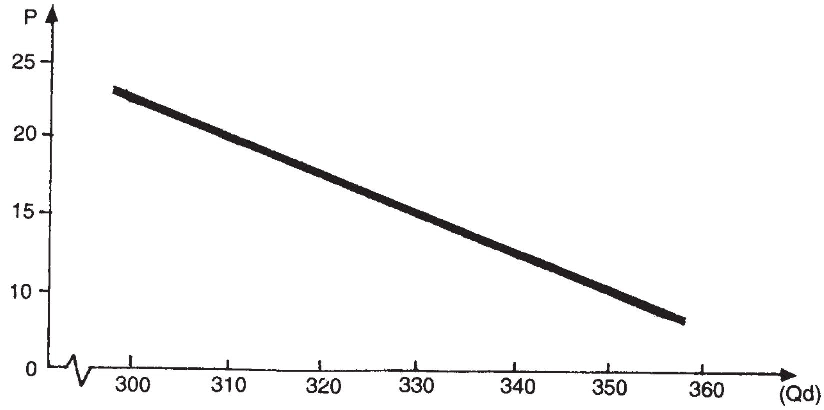


Fig. 5.14

Scale: y-axis: 2cm = 10
(***Note:*** For convenience, there is the scale from origin on x-axis).

DD is the linear demand curve derived on the basis of the given function and given the alternative price.

In the equation: $Qd = 400 - 4P$, let us put $Qd = 0$

$$400 - 4P = 0$$

By manipulation: $4P = 400$

$$P = 400/4 = 100$$

That is to say, at price Rs.100 per bottle, the demand for beer will be zero.

In the given demand equation:

$Qd = 400 - 4P$

Let $Qd = 380$

$380 = 400 - UP$

By manipulation:

$$4P = 400 - 380 = 20$$

$$P = 20/4 = 5$$

That is to say, the given demand function suggests that the producer should fix the price at Rs. 5 per bottle in order to sell 3,80,000 bottles per week.

P: 2. Truett and Truett (1980), stated the following demand function for a brand *X* of microwave ovens:

$Qx = f(Px, Pz, Nw, Y, A)$

Where, Qx = quantity demanded per year for brand *X* of microwave ovens in a city.

Px = price of *X* Brand

Pz = Price of Z Brand

Nw = Number of working women

Y = Mean annual household income

A = Annual advertising expenditure

Assuming hypothetical data, we may state the demand estimation as under:

$$Qx = 11{,}93{,}200 - 100Px + 20Pz + 0.002Nw + 1.8Y + 0.3A$$

On this basis, given that:

Px = Rs. 8,000

Pz = Rs. 9,000

Nw = 8,00,000 in a city

Y = Rs. 1,00,000

A = Rs. 60,000

We can estimate the demand for X Brand microwave oven as follows:

Qx = 26,500 – (100 × 8,000) + (20 × 9,000) + (0.002 × 8,00,000) + (1.8 × 1,00,000) + (0.3 × 60,000)

= 26,500 – (8,00,000 + 1,80,000 + 1,600 + 1,80,000 + 1,800)

= 11,93,200 – 11,634,000

= 29,800

Ans.: 29,800 microwave ovens of X Brand are purchased annually in this city.

P: 3. Raj Kumar & Co., the cabinet-maker has estimated the following demand function for the steel cabinets produced by them:

$$Qd = 1{,}500 - 0.03P + 0.09AE$$

Where, Qd = quantity demanded of steel cabinets

P = average price of the steel cabinet

AE = the firm's advertising expenditure.

All data are on a quarterly basis. The firm currently spends Rs. 10,000 per quarter on advertising.

State the demand curve equation for the price-demand relationship. Give graphical representation assuming price variable values to be Rs. 10,000, Rs. 9,000, Rs. 8,000, Rs. 7,000, and Rs. 6,000.

Solution:

Substituting the value for *AE* variable in the above equation, we have simplified price-demand equation as follows:

$Qd = 1{,}500 + 900 - 0.03P$

Thus:

P1 = Rs. 10,000	Q1 = 2,400 – 0.03 × 10,000 = 2,400 – 300 = 2,100
P2 = Rs. 9,000	Q2 = 2,400 – 0.03 × 9,000 = 2,400 – 270 = 2,130
P3 = Rs. 8,000	Q3 = 2,400 – 0.03 × 8,000 = 2,400 – 240 = 2,160
P4 = Rs. 7,000	Q4 = 2,400 – 0.03 × 7,000 = 2,400 – 210 = 2,190
P5 = Rs. 6,000	Q5 = 2,400 – 0.03 × 6,000 = 2,400 – 180 = 2,200.

[Plot price and quantity values on a graph]

MODEL QUESTIONS

1. Explain the important determinants of demand.
2. (a) What is meant by Demand Function, Demand Schedule and Demand Curve?

   (b) Explain how market demand is derived from individual demand.
3. What do you understand by a shift in demand curve? Enumerate three possible reasons for such shift.
4. Four of the following five events might reasonably be responsible in shifting the demand curve for coffee to a new position. Point out the one which would not shift the demand curve and why?

   (a) A fall in the price of tea.

   (b) An increase in the money income of the consumers.

   (c) A widespread advertisement campaign undertaken by the producers of coffee.

   (d) A change in the habit of the consumers.

   (e) A rise in price of coffee.
5. Over the years, the demand for textiles in India has grown inspite of rising prices. How would you reconcile this fact with the law of demand?
6. (a) State and explain the law of demand.

   (b) Are there any exceptions to the law of demand?
7. Distinguish between:

   (a) Industry demand and consumer demand.

   (b) Individual demand and market demand.

(iii) Increase in demand and extension of demand.

(vi) Decrease in demand and contraction of demand.

(v) Variation in demand and change in demand.

(vi) Demand schedule and demand curve.

(vii) Usual demand curve and exceptional demand curve.

8. Do you agree with the following statements? Give reasons.

(a) There are some exceptions to the law of demand.

(b) There are no exceptions to the law of demand.

(c) When the price of petrol rises, the demand for cars decreases.

(d) Demand is a relative term.

(e) Price is the sole determinant of demand.

(f) Demand curve can never have an upward slope.

(g) All desires become demand.

9. Explain and illustrate Veblen goods paradox.

10. Discuss the Bandwagon effect and Snob effect on market demand behaviour.

11. A producer of a Veblen good wishes to expand the supply and lower the price with a view to attract more buyers. What can be the outcome?

12. Draw and explain the market demand curve for the following quotation from The Wall Street Journal (March, 1987). "While many (baby boomers) might help fuel the initial success of a new ice-cream or fashion, many stop buying when one of these products becomes too commonplace." (Quoted by Ponger 1993: p. 131).

13. What is the significance of demand analysis to a manager?

14. Analyse the import on the market demand for cosmetics under the following situations:

(a) A change in the sex ratio of the population increasing the females against males in number.

(b) A general price rise in consumer product by 10 per cent.

(c) An increase in excise duties on cosmetics.

15. Specify the demand functions for the following:

(1) Gasoline

(2) Chicken

In each case, explain your choice of the variables included.

16. (a) What are the determinants of market demand for consumption goods in general?

    (b) Write demand function (in mathematical terms) for:

    (i) Pizza, and (ii) Fish

17. Identify the major influencing factors to the market demand for

    (a) Ice-cream

    (b) Sugar

    (c) Ballpen

    (d) Designer jeans.

18. The price of gold increases. Will this affect the demand for gold? How?

19. Is there any difference of expression between 'a rise in demand' and 'an increase in demand' for Godrej Hair Dye in Mumbai market.

Problems

[1] Construct a demand schedule for a product X for alternative prices Re. 1, Rs. 2, Rs.3, Rs. 4 and Rs. 5 given its demand function: Dx = 90 – 2Px. Draw the demand curve for the same? What is its mathematical attribute?

[Dx: 88, 86, 84, 82, 80 Dx = f(Px) $\frac{\Delta Dx}{\Delta Px} < 0$]

[2] The demand curve for commodity X is represented by Qx = 1,60,000 – 1,000 Px.

Construct the demand schedule assuming initial price to be Rs. 100 and consequent increase by Rs. 10 up to Rs. 150. Plot the demand curve.

[3] Suppose the demand function for Komal butter in a town is estimated to be:

Qd = 600 – 5P

Where, Qd is the quantity demanded of butter (in '000 kgs per week) and P stands for the price.

(a) Estimate at what price, demand would be zero.

(b) Draw a demand curve, at alternative prices: Rs. 25, Rs. 35, Rs. 50, Rs. 60 and Rs. 80 per kg.

(c) What is the statistical characteristics of this demand curve?

❒ ❒ ❒

6

CHAPTER

Elasticities and Demand Levels

1. THE CONCEPT OF ELASTICITY OF DEMAND

Demand usually varies with price. But the extent of variation is not uniform in all cases. In some cases, the variation is extremely wide; in some others, it may just be nominal. That means sometimes demand is greatly responsive to changes in price; at other times, it may not be so responsive. The economists, to measure this responsiveness or the extent of variation, use the term "elasticity." In measuring the elasticity of demand, two variables are considered: *(i)* demand, and *(ii)* the determinant of demand. For measuring the elasticity coefficient, thus, a ratio is made of the two variables.

$$\boxed{\text{Elasticity of Demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in determinant of demand}}}$$

The term 'elasticity of demand', when used without qualifications, is commonly referred to as price elasticity of demand. This is a loose interpretation of the term. In a strict logical sense, however, the concept of elasticity of demand should measure the responsiveness of demand for a commodity to changes in the variables confined to its demand function. There are, thus, as many kinds of elasticity of demand as its determinants. In view of its major determinants, however, economists usually consider three important kinds of elasticities of demand:

- Price elasticity
- Income elasticity of demand
- Cross price elasticity of demand or just cross elasticity.

2. PRICE ELASTICITY OF DEMAND

The extent of response of demand for a commodity to a given change in price, other demand determinants remaining constant, is termed as the price elasticity of demand. The price elasticity of demand may, thus, be defined as the ratio of the relative change in demand and price variables.

> **The coefficient of price elasticity *(e)* is measured as:**
>
> $$e = \frac{\text{The percentage in quantity demanded}}{\text{The percentage change in price}}$$

Since the relative change of variables can be measured either in terms of percentage change or proportional change, the price elasticity coefficient can be measured alternatively as:

$$e = \frac{\text{The Proportion al change in quantity demanded}}{\text{The Proportion al change in price}}$$

Representing it in symbols, the price elasticity formula can be stated as:

$$e = \frac{\Delta Q/Q}{\Delta P/P} \quad \text{Alternatively } e = \frac{\Delta Q}{Q} \times \frac{P}{\Delta P}$$

Or, by rearranging: $e = \dfrac{\Delta Q}{QP} \times \dfrac{P}{Q}$

where; Q = the original demand (say Q_1)

P = the original price (say P_1)

ΔQ = the change in demand. It is measured as the difference between the new demand (say Q_2) and the old demand (Q_1). Thus, Δ $(Q = Q_2 - Q_1$.

ΔP = the change in price. It is measured as the difference between the new price P_2 and the old price (say P_1). Thus, $\Delta P = P_2 - P_1$.

The above formula, in fact, relates to point price elasticity of demand, that is, the coefficient signifies very small or marginal changes only. To illustrate the use of the formula, suppose the following information is available from a demand schedule:

Price of Apples (Rs.)	*Quantity Demanded (Kgs.)*
20 (P_1)	100 (Q_1)
21 (P_2)	96 (Q_2)

Thus,

$\Delta P = P_2 - P_1 = 21 - 20 = 1$, and $P = P_1 = 20$

$\Delta Q = Q_2 - Q_1 = 96 - 100 = -4$, and $Q = Q_1 = 100$

(Here, minus signs are ignored).

Elasticity of demand

$$e = \frac{\Delta Q}{Q} \cdot \frac{P}{\Delta P} = \frac{-4}{100} \times \frac{20}{1} = \frac{4}{5} = -0.8$$

Owing to inverse price-demand relationship, the coefficient of price elasticity of demand is, usually, negative. Customarily, however, economists report it as a positive number, referring to its absolute value for the sake of convenient comparison and analysis. Hence, its signs are ignored. This means, in above illustration the elasticity of demand is less than one.

Using the above formula, the numerical coefficient of price elasticity can be measured from any such given data. Apparently, depending upon the magnitudes and proportional changes involved in data on demand and prices, one may obtain various numerical values of coefficient of price elasticity, ranging from zero to infinity.

When price elasticity coefficient is greater than unity ($e > 1$), the commodity is said to be price elastic. If it is less than unity ($e < 1$), the product is considered to be price inelastic. This knowledge is very useful in determining pricing policy and other business decisions.

3. TYPES OF PRICE ELASTICITY

Marshall has suggested a three-fold classification of types of price elasticity of demand, viewing the numerical coefficient of price elasticity in terms of unity or 1. Since the numerical coefficient *(e)* values range between zero and infinity, in terms of unity we may say either e is equal to, greater than or less than 1. Marshall's classification is as follows:

- Unit elasticity of demand ($e = 1$)
- Elastic demand ($e > 1$), *i.e.,* elasticity is greater than unity.
- Inelastic demand ($e < 1$), *i.e.,* elasticity is less than unity.

Marshall treats unit elasticity as normal or standard elasticity and all economists commonly hold the same notion. By elastic demand, we mean that demands respond greatly or relatively more to a price change. It, however, does not imply that the consumers are fully responsive to a price change. What it means simply is this that a relatively large change in demand is caused by a smaller changes in price. Similarly, inelastic demand does not mean that demand is totally insensitive. It only means that the relative change in demand is less than that of price. It means demand responds to a lesser extent only. Modern economists have elaborated the Marshallian classification further and stated five kinds of price elasticity as under:

- Perfectly elastic demand;
- Perfectly inelastic demand;
- Relatively elastic demand;
- Unitary inelastic demand; and
- Relatively inelastic demand.

Perfectly Elastic Demand

An endless demand at the given price is the case of perfectly elastic demand. When demand is perfectly elastic, with a slight or infinitely small rise in the price of a commodity, the consumer stops buying it. The numerical coefficient or perfectly elastic demand is infinity (e = a).

In a broad sense, the shape of demand curve is significant in ascertaining the elasticity of demand. In the case of perfectly elastic demand, the demand curve will be a horizontal straightline. Thus, the demand curve in Figure 6.1(A) implies that at the ruling price of *OP*, the demand is infinite, while a slight rise in price would mean zero demand.

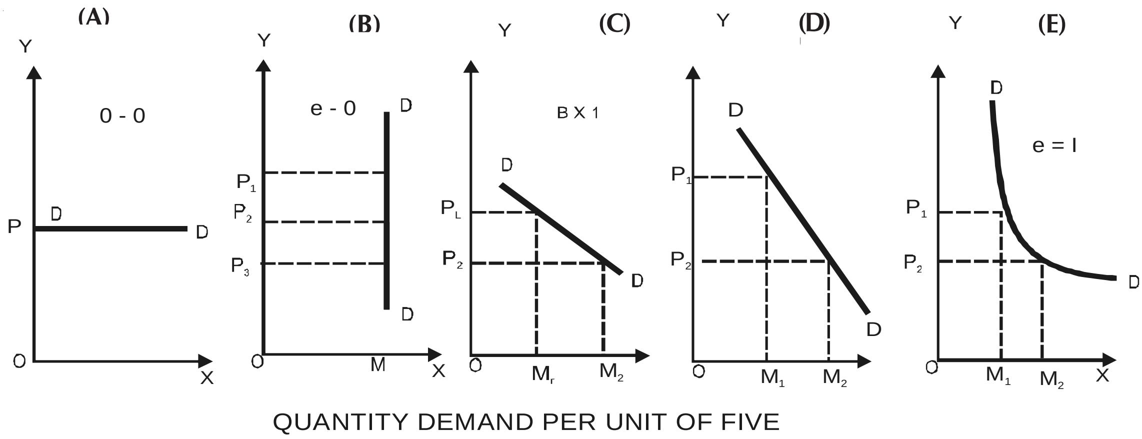


Fig. 6.1: Types of Price Elasticity of Demand

Figure 6.1(A) indicates that at price *OP* a person would buy as much of the given commodity as can be obtained, *i.e.*, an infinite quantity, and that even at a slightly raised price he would buy nothing. While, it is assumed that when price is lowered, the demand curve shifts down at this price — the demand curve remaining horizontal. Perfectly elastic demand is a case of theoretical extremity. It is hardly encountered in practice.

Perfectly Inelastic Demand

When the demand for a commodity shows no response at all to a change in price, that is to say, whatever change in price, the demand remains the same, it is called a perfectly inelastic demand. Perfectly inelastic demand has, thus, zero elasticity (e = 0). In this case, the demand curve would be a straight vertical line as in Figure 6.1(B). Figure 6.1(B) indicates that whether the price moves from OP_2 to OP_1 or OP_3, the quantity demanded remains the same, OM only. Perfect inelasticity is again a theoretical consideration rather than a very practical phenomenon. However, a commodity of absolute necessity like salt seems to have perfectly inelastic demand for most consumers.

Relatively Elastic Demand

When the proportion of change in the quantity demanded is greater than that of price, the demand is said to be relatively elastic. The numerical value of relatively elastic demand lies between one and infinity. Thus, what Marshall called elasticity greater than unity of demand is again referred to as "relatively elastic" demand or "more elastic" demand. A relatively elastic demand will be represented by a gradually sloping, *i.e.,* rather a flatter, demand curve as shown in Figure 6.1(C). In Figure 6.1(C) when the price falls from OP_1 to OP_2 the demand rises to OM_2 which is relatively large in proportion to the change in price $\frac{\Delta O}{Q} > \frac{\Delta P}{P}$; hence, elasticity is greater than one. It is a more realistic concept as many commodities have such higher elastic demand.

Relatively Inelastic Demand

When the proportion of change in the quantity demanded is less than that of price, the demand is considered to be relatively inelastic. The numerical value of relatively inelastic demand lies between zero and one. Hence, the concept "relatively inelastic" or "less elastic" demand is the same as what Marshall presented by a rapidly sloping, *i.e.,* rather a steeper, demand curve as shown in Figure 6.1(D). In Figure 6.1(D) when the price falls by P_1 P_2, the demand is extended just by M_1M_2 which is relatively very less in proportion to the change in price $\frac{\Delta O}{Q} < \frac{\Delta P}{P}$; hence, elasticity is less than one. This is also a very realistic concept.

Unitary Elastic Demand

When the proportion of change in demand is exactly the same as the change in price, the demand is said to be unitary elastic. The numerical value of unitary elastic demand is exactly 1. It is just the same as that of elastic demand, the demand curve would be a rectangular hyperbolar curve, as shown in Figure 6.1(E). In Figure 6.1(E) when the price falls by P_1 P_2, the demand is extended by M_1 M_2 which is in the same proportion to change in price $\left[\frac{\Delta O}{Q} > \frac{\Delta P}{P}\right]$ hence, elasticity is equal to unity. This is a theoretical norm, which helps to distinguish between elastic and inelastic demand in general.

The different kinds of price elasticity of demand discussed above can be summarised as in the following table:

Table 6.1: Price Elasticity of Demand

Numerical Value	*Terminology*	*Description*
e = a	Perfectly (or infinitely) elastic	Consumers have infinite demand at a particular price and none at all at an even slightly higher than this given price.
e = 0	Perfectly (or completely) inelastic	Demand remains unchanged, whatever be the change in price.
e > 1	Relatively elastic	Quantity demanded changes by a larger percentage than does price.
e < 1	Relatively inelastic	Quantity demanded changes by a smaller percentage than does price.
e = 1	Unitary elastic	Quantity demanded changes by exactly the same percentage as does price.

It should be noted that various demand curves drawn in Figure 6.1 are based on the same scale. If these are not drawn on the same scale, it will be erroneous to make assertions about their relative elasticities. Because, it is quite likely that the same demand schedules may have curves with different slopes when the scales along the x-axis are different. It is only when scales are the same, will the two demand curves have different slopes representing different demand schedules. Even then, just by looking at the demand curves, we cannot infer precisely anything about elasticities over different price ranges on each curve without some calculations. If two demand curves are drawn on the same scale and we consider the same price range in each case, then only can we assert that a flatter demand curve represents a greater elasticity of demand than a steeper demand curve.

Indeed, in a broad sense, the elasticity of demand for a commodity depends on the demand schedule or demand function and hence on the shape of the demand curve for that commodity. To recapitulate again, on a given scale, the different slopes of demand curve relating to price elasticity can be compared as in Figure 6.2.

In Figure 6.2 (A), the demand curve D_1 represents perfectly elastic demand. D_2 represents perfectly inelastic demand. Similarly, in Fig. 6.2 (B), unitary elastic demand is represented by the curves D_4 and D_5 respectively.

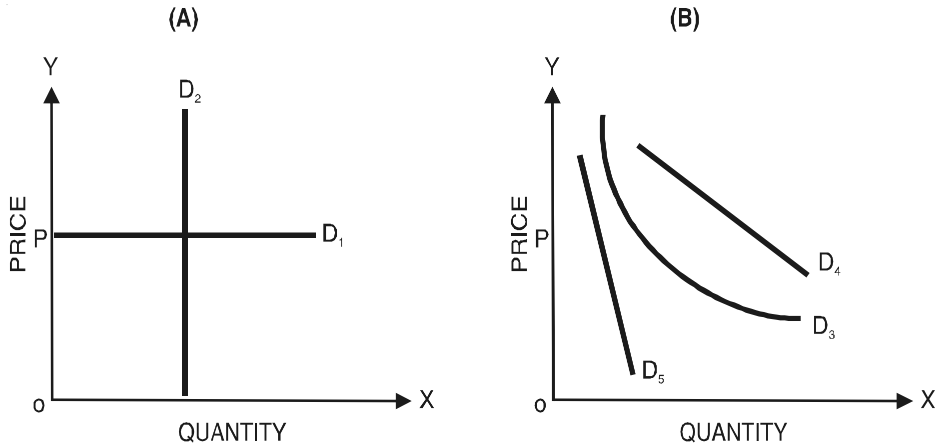


Fig. 6.2: Slopes of Demand Curve

4. MEASUREMENT OF PRICE ELASTICITY

There are three different methods of measuring price elasticity of demand:

- Ratio method to measure coefficient of price elasticity;
- Total revenue method; and
- Point method.

The Ratio Method

Of these, the calculation of coefficient of price elasticity by ratio method has been already discussed in the previous section using the formula:

$$e = \frac{\Delta Q}{Q} \times \frac{P}{\Delta P}$$

It is also known as percentage method, when we measure the ratio as:

$$e = \frac{\%\Delta\Delta}{\%\Delta\Delta}$$

Where, $\% \Delta Q$ = percentage change in demand.

$\% \Delta P$ = percentage change in price.

Total Revenue (or Total Outlay) Method

Marshall suggested that the easiest way of ascertaining whether or not demand is elastic is to examine the change in total outlay of the consumer or total revenue of the seller corresponding to change in price of the product.

Total Revenue (or Total Outlay) = Price × (Quantity Purchased or sold)

According to this method:

When with a change in price, the total revenue (*TR*) remains unchanged, demand is unit elastic ($e = 1$). The total remains constant in the case of unit elastic demand, because the demand changes in the same proportion as the price. This has been illustrated in Table 6.2.

- When with a rise in price, the total revenue falls or with a fall in price, the total revenue rises, elasticity of demand is greater than unity. This happens because the proportion of change in demand is relatively greater than that of price. In short, when the price and total outlay move in opposite directions, demand is relatively elastic (See Table 6.2).
- When with a rise in price, the total revenue also rises and with a fall in price, the total revenue falls, elasticity of demand is less than unity. This happens because the proportion of change in demand is relatively less than the proportion of change in price. Briefly, thus, when the price and total outlay move in the same direction, demand is relatively inelastic (Table 6.2).

Table 6.2: Total Outlay Method

		Price Rs.	*Quantity (Units)*	*Total Revenue (TR)*	*Elasticity of Demand (e)*
	Original	2	10	20	—
1.	Change	4	5	20	$e = 1$
		1	20	20	(unit)
2.	Change	4	4	16	$e > 1$
		1	24	24	(elastic)
3.	Change	4	6	24	$e < 1$
		1	16	16	(inelastic)

We may now summarise the total outlay method as follows:

Table 6.3: Total Revenue Method

Price	*Total Revenue (TR)*	*Type of Elasticity (e)*
1. Increases	Constant	$e = 1$
Decreases	Constant	(Unitary)
2. Increases	Decreases	$e > 1$
Decreases	Increases	(Relatively elastic)
3. Increases	Increases	$e < 1$
Decreases	Decreases	(Relatively inelastic)

Figure 6.3 represents the relationship between total outlay (or total revenue) and the price elasticity of demand. In Figure 6.3, Panel (A) represents an upward sloping total revenue

curve (T_1R) indicating that when price rises from P_1 to P_2 total outlay (or total revenue) rises from R_1 to R_2. It shows how the demand is relatively inelastic ($e < 1$).

Panel (B) represents a vertical straight-line total revenue curve (T_2R). Here, total revenue remains unchanged (OR), whether price changes from P_1 to P_2 or *vice versa*. It means that the demand is unitary elastic ($e = 1$).

Panel (C) represents a downward sloping total revenue curve (T_3R). So, with the rise in price from P_1 to P_2, total revenue decreases from R_1 to R_2. It means that the demand is relatively elastic ($e > 1$).

Thus, from the behaviour of total outlay or total revenue, we can infer the kind of price elasticity of demand. Likewise, from a given price elasticity, we can conclude about the nature of change in the consumer's total outlay or seller's total revenue. In the case of unitary elastic demand, with any change in price, total revenue remains unaltered. But when there is elastic demand, the total revenue is expected to move in the opposite direction of the change in price, while in the case of inelastic demand, the total revenue would change in the same direction as of the price change.

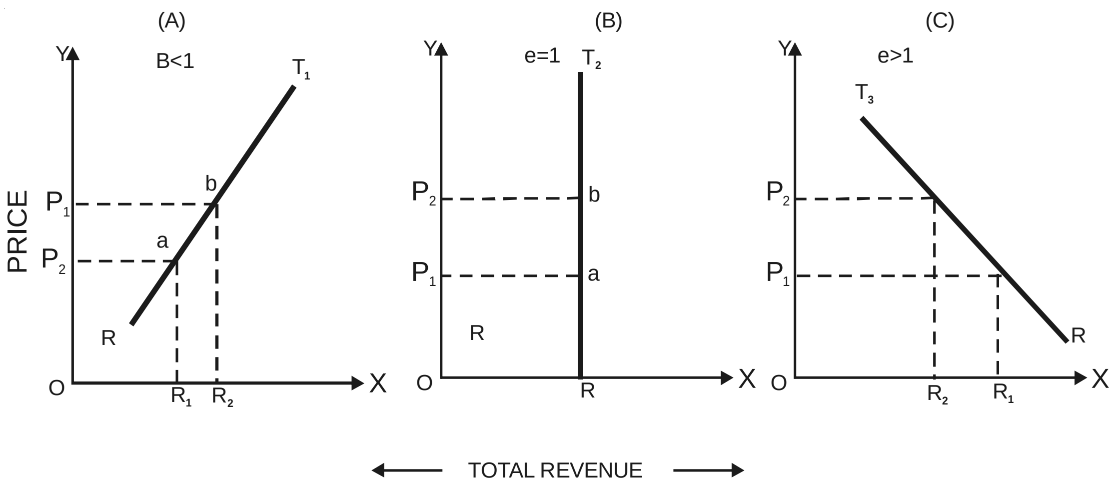


Fig. 6.3: Total Outlay (Revenue) and Elasticity of Demand

Behavioural relationships between price changes, elasticity, and total revenue may be summarised as under:

Table 6.4: Price Changes, Elasticity and Total Revenue

Change in Price	*Change in Total Revenue When:*		
	e < 1	*e > 1*	*e = 1*
Rise	Rise	Fall	No Change
Fall	Fall	Rise	No Change

The total revenue method of measuring elasticity is, however, less exact. It can indicate only the class of elasticity, but not its exact numerical value, we have to resort to the formula method or the point method. However, the economic significance of total outlay or total revenue method is that it shows more directly what happens to the total outlay or revenue as a practical guide for determining a price policy and its effect on demand and revenue.

However, the total revenue method gives the value of elasticity as equal to one, greater than one and less than one. It does not give correctly the numerical value of elasticity and therefore, the second method, *i.e.,* formula method is used.

Point Elasticity Method or the Geometric Method

Marshall also suggested another method called the point elasticity method or geometrical method for measuring price elasticity at a point on the demand curve.

The simplest way of explaining the point method is to consider a linear (straight-line) demand curve. Let the straight-line demand curve be extended to meet the two axes, as in Figure 6.4. When a point is plotted on the demand curve like point *P* in Figure 6.4, it divides the curve into two segments. The point elasticity is, thus, measured by the ratio of the lower segment of the curve below the given point to the upper segment of the curve above the point.

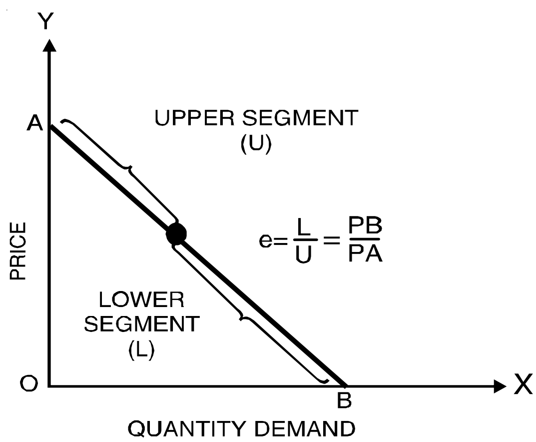


Fig. 6.4: Point Method

For brevity, we may again put that:

$$\text{Po int Elasticity} = \frac{\text{Lower segment of the curve below the given point}}{\text{Upper segment of the demand curve above the point}}$$

or, to remember through symbols, we may put as:

$$e = \frac{L}{U}$$

where, *e* stands for point elasticity, *L* stand for lower segment, and *U* for the upper segment.

In Figure 6.4, *AB* is the straight-line demand curve and *P* is a given point. Thus, *PB* is the lower segment and *PA* the upper segment.

$$\therefore e = \frac{L}{U} = \frac{PB}{PA}$$

If after the actual measurement of the two parts of the demand curve, we find that *PB* = 3 cms and *PA* = 2 cms, then elasticity at point *P* is $^3/_2$ = 1.5.

This measure is called a 'point' elasticity measurement because it effectively measures elasticity at a point on the demand curve assuming infinitely small changes in price and quantity variables.

5. PROOF OF THE GEOMETRIC METHOD

The above stated geometrical ratio of point method of measuring elasticity of demand can be proved as under:

Let us consider a straight-line demand curve *AB* which intercepts the two axes (See Fig. 6.5). Point *P* is given. Another point P_1 is taken so closely to denote just a marginal change. (In Fig. 6.5, however, the distance between *P* and P_1 is shown as significant only for the sake of analysis which should actually be interpreted as a difference of only a point and not a segment).

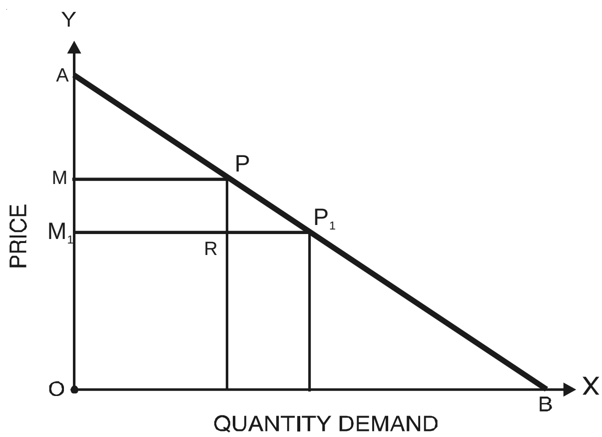


Fig. 6.5: Geometric Proof

Point elasticity formulation is $e = \frac{L}{U}$. Thus, we have to prove that point elasticity is

$$e = \frac{PB}{PA}$$

At points P and P_1 in the diagram, we get the following particulars:

1. The initial price (P) is OM;
2. The initial demand (Q) is OQ;
3. The change in price (DP) is MM_1; and
4. The change in demand (DQ) is QQ_1.

Since price elasticity of demand is defined as a ratio of the proportional change in quantity demanded to the proportional change in price, the formula for measuring elasticity coefficient is:

$$e = \frac{\Delta Q}{Q} \times \frac{P}{\Delta P}$$

Substituting the given geometrical particulars in the formula, we get

$$e = \frac{OQ_1}{OQ} \times \frac{OM}{MM_1}$$

By interchange:

$$e = \frac{QQ_1}{MM_1} \times \frac{OM}{OQ}$$

Now, let us plot point R at the intersection point of lines PQ and M_1P_1. It can be seen that:

$QQ_1 = RP$ and $MM_1 = PR$

$$e = \frac{RP_1}{RP} \times \frac{OM}{OQ}$$

Now, in Δ s PRP_1 and PQB

$\angle PRP_1 = \angle PQB$ (both being right angles)

$\angle RPP_1 = \angle QPB$ (common angle for both the triangles)

$\angle PP_1R = \angle PBQ$

Since all angles are equal for both the triangles, they are similar,

$\angle PRP_1 = \angle PQB_5$

Their corresponding sides are proportional.

Ratio of their corresponding sides are equal.

$$\frac{RP_1}{PR} = \frac{QB}{PQ}$$

However, $PQ = OM$

$$\therefore \frac{RP_1}{PR} = \frac{QB}{PQ} = \frac{QB}{OM}$$

$$\therefore e = \frac{OB}{OM} \times \frac{OM}{OQ} \therefore e = \frac{OB}{OQ} \qquad \ldots(3)$$

Now, $OQ = MP$

$$\therefore \ e = \frac{OB}{MP}$$

Taking QB as a base, we have $\Delta\, PQB$ and with MP as a base, we have $\Delta\, AMP$. In Δ s AMP and PQB

$\angle AMP = \angle PQB$ (both right angles)

$\angle MPA = \angle QBP$ (as per the Pythagoras theorem).

$\Delta\, MAP = \angle QPB$

$\therefore$ Δ AMP and PQB are similar.

$\therefore$ Their corresponding sides are proportional.

$$\therefore \frac{QB}{MP} = \frac{PQ}{AM} = \frac{PB}{PA}$$

$$\therefore e = \frac{PB}{PA}$$

Since PB is the lower segment and PA the upper one of the demand curves, the theorem is proved that point-elasticity on a linear demand curve is measured by the ratio of lower segment to the upper segment of the demand curve at the point.

If, however, the demand curve is non-linear, then draw a tangent at the given point, extending it to intercept both the axes (See Figure 6.6).

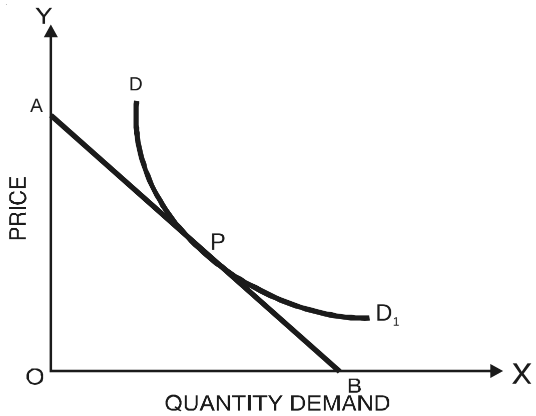


Fig. 6.6: Point Elasticity

Point elasticity is, thus, measured by the ratio of the lower part of the tangent below the given point to the upper part of the tangent above the point.

Then, elasticity at point *P* in Figure 6.6 can be measured as: $\frac{PB}{PA}$

Important Observations in Point Method

Regarding point elasticity measurement, it must be noted that, Point elasticity is different at different points on a given demand curve. This can be proved in two ways. First, by making use of the geometrical formula $e = L/U$, we may measure the price elasticity at different points of given demand curve as shown in Figure 6.7. It goes without saying that on any straight-line demand curve, price elasticity will be different at different points, since a demand curve represents a demand schedule and demand schedule has different elasticities at various alternative prices.

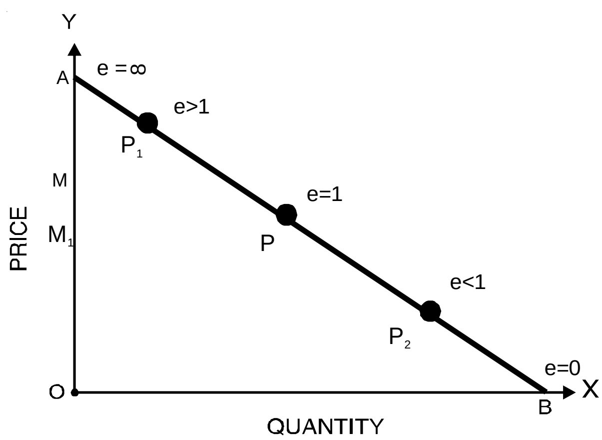


Fig. 6.7: Point Elasticities

We can prove this theorem in another way on the basis of treatment followed by Professor Lipsey. In Figure 6.7, point *P*, being exactly in middle, $e = 1$. Between *A* and *P* any point taken will show $e > 1$. Between *P* and *B* any point taken will show $e < 1$. At point *A*, $e = \infty$, at point *B*, $e = 0$.

We may, thus, conclude that if

$L = U: PB = PA : e = 1$

$L > U: P_1B > P_1A : e > 1$

$L < U: P_aB < P_2A : e < 1$

$U = 0: PB = 0 : e = C$

$L = 0: PA = 0 : e = \infty$

Since,

$$e = \frac{\Delta Q}{Q} \times \frac{P}{\Delta P} \text{ by interchange,}$$

$$e = \left(\frac{\Delta Q}{\Delta P}\right)\left(\frac{P}{Q}\right)$$

As such, elasticity measurement is split into two ratios:

- D*Q*/D*P*, the ratio of change in quantity demanded to a change in price, it is determined by the slope of demand curve.
- *P*/*Q* denotes price-quantity ratio. It depends on the position of the point on the demand curve at which we want to measure the degree of elasticity.

Evidently in the case of a straight-line demand curve, the slope remains constant. But when the position of point varies as P_1, P_2, etc., the price quantity relations change which affect elasticity. From an analysis of Figure 6.7 it follows that, as we move downward on the straight-line demand curve, the elasticity varies from infinity (∞) on the price axis to zero on the quantity axis. This is because, slopes at all the point are identical due to a change in the position of the *P* points, the price-quantity ratio *P*/*Q* varies. On the price axis (y-axis) $Q = 0$.

$\therefore$ $P/Q = \infty$. As we move downward, *P* decreases and *Q* increases.

$\therefore$ *P*/*Q* tends to fall, so elasticity tends to fall.

On quantity (x-axis), $P = 0$, $P/Q = 0$, $e = 0$.

While in the case of a non-linear demand curve (See Figure 6.8), it will be seen that not only the position of point *P*/*Q* relationship varies, but the slopes $\Delta O/\Delta P$ also changes at different points. As the tangent drawn on the curve tends to be flatter at each point moving downward on the demand curve, the ratio (*PB*/*PA*) tends to decrease PB/PA $PB_1 > PA_1 > PB_2 /PA_2$. Thus, elasticity decreases which means point elasticity decreases as we move downwards on the demand curve, whether it is linear or non-linear.

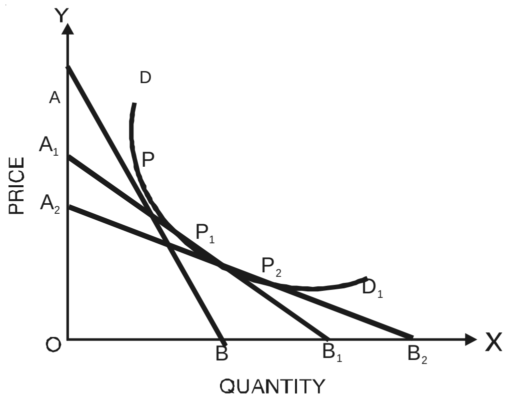


Fig. 6.8: Point Elasticity

Two parallel straight-line demand curves having identical slopes, do not have same elasticities at a given price

In Figure 6.9, D_1D_1 and D_2D_2 are two parallel linear demand curves. At price *OM*, we get points P_1 and P_2 on the respective demand curves. Since D_1D_1/D_2D_2, their slopes, as the ratio; $\Delta Q/\Delta P$ are the same at P_1 and P_2. However, elasticity is determined by two factors: slope and price-quantity ratio.

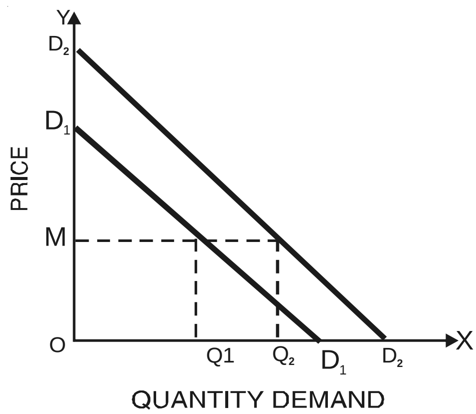


Fig. 6.9: Parallel Demand Curves and Price Elasticity

At

$$P_1 : \frac{P}{Q} = \frac{OM}{OQ_1}; \text{ at } P_2 : \frac{P}{Q} = \frac{OM}{OQ_2}$$

Since

$$OQ_2 < OQ_1 \quad \frac{OM}{OQ_1} < \frac{OM}{OQ_2}$$

The degree of price elasticity is at P_1 higher than at P_2. Thus, elasticities of two parallel demand curves at the same price are unequal. Again, the demand curve which is closer to the origin has a higher price elasticity at each price than the curve which is away from the origin.

It also follows, thus, that as the linear demand curve shifts towards its right (away from the origin), at each price, elasticity of demand will tend to be less than before. And, if it shifts towards the origin, at each price on new demand curve, elasticity will be higher than before. This means, an increase in demand tends to lower the elasticity and a decrease in demand raises price elasticity.

Two intersecting linear demand curves have unequal price elasticities at the point of intersection.

In Figure 6.10, D_1D_1 and D_2D_2 are two straight-line demand curves which cross at point P. At point P thus, $P/Q = OM/OQ$ is the same for both the demand curves. But, here the slopes of two curves differ, hence, the ratio $\Delta Q/\Delta P$ is not equal for both the curves. D_2D_2 is a flatter curve. Hence, in the case of D_2D_2 at point P, the price elasticity coefficient is larger than that of D_1D_1.

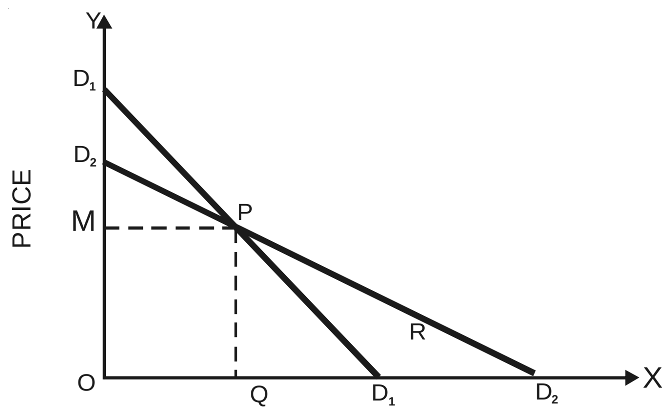


Fig. 6.10: Intersecting Demand Curves and Elasticity

Though the slope of demand curve is significant in determining price elasticity, it should not be confused with elasiticity coefficient. The slope, *i.e.*, steepness of the curve, alone will not indicate the degree of price elasticity. But, the position of point, so the price quantity relation P/Q, is equally significant in measuring the elasticity coefficient. Thus, elasticity coefficient is affected by the multiplication of two ratios; P/Q and DQ/DP. In the case of the hyperbola demand curve, the product of both these ratios remain unchanged (being equal to throughout the range of the curve) as we move from one point to the other. So price elaticity remains constant and equal to unity throughout the curve. Hence, in the case of the hyperbola demand curve, price elasticity does not vary between different points.

6. ARC ELASTICITY OF DEMAND

To calculate a price elasticity over some portion of the demand curve rather than at a point, the concept of arc elasticity of demand is used (See Figure 6.11).

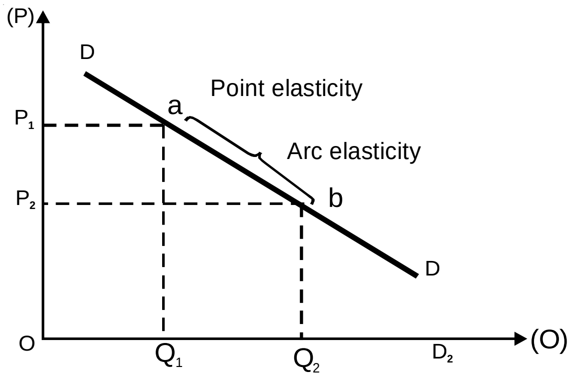


Fig. 6.11: Point *vs.* Arc Elasticity

In Figure 6.11, point elasticity is measured at a point (say '*a*') on the demand curve. Arc elasticity is measured on a range of demand curve, say between '*a* and *b*.' The formula for arc elasticity measurement is:

$$e_{arc} = \frac{\Delta Q}{\Delta P} \times \frac{P_1 + P_2}{Q_1 + Q_2}$$

where,

P_1 = original price,

P_2 = new price,

Q_1 = original quantity demand,

Q_2 = new demand,

$\Delta P = P_2 - P_1$; $\Delta Q = Q_2 - Q_1$

For all theoretical purpose, however, point elasticity rather than arc elasticity is commonly used. However, in practical consideration of decision-making, it is better to use arc elasticity measure, when the price change is more than 5%.

Illustration:

Suppose, initially $P_1 = 10$ and $Q_1 = 100$. Now, $P_2 = 12$ and $Q_2 = 90$. Then,

$\Delta Q = 90 - 100 = -10$

$\Delta P = 12 - 10 = 2$

$$e_{arc} = \frac{-10}{2} \times \frac{10+12}{100+90} = -0.57$$

Let us take another example: Initial price is Rs. 100 and 1,000 units are demanded. New price is Rs. 120 and 800 units are demanded. Thus:

P_1 = Rs. 100 Q_1 = 1,000

P_2 = Rs. 120 Q_2 = 800

ΔP = Rs. 20 $\Delta Q = -200$

I: Point elasticity at P_1 is measured as:

$$e = \frac{\Delta Q}{Q} \times \frac{P}{\Delta P} = \frac{-200}{1000} \times \frac{100}{20} = -1$$

II: Point elasticity at P_2 is measured as:

$$e = \frac{Q}{\Delta Q} \times \frac{P}{\Delta P} = \frac{200}{800} \times \frac{120}{20} = -1.5$$

In this case, a problem arises about how to classify demand elasticity. Is the demand unitary elastic or more elastic? Arc elasticity solves this dilemma.

III: Arc elasticity is measured as:

$$e_{arc} = \left(\frac{\Delta Q}{\Delta P}\right)\left(\frac{P_1 + P_2}{Q_1 + Q_2}\right) = \left(\frac{-200}{20}\right)\left(\frac{100 + 120}{1000 + 800}\right) = 10 \times 0.1222 = -1.222$$

It suggests that the elasticity of demand is greater than unity. It should be noted that arc elasticity tends to be in the middle of two point elasticities in consideration.

7. FACTORS INFLUENCING ELASTICITY OF DEMAND

When the demand for a commodity is elastic or inelastic will depend on a variety of factors. The major factors affecting elasticity of demand are:

- **Nature of commodity.** According to the nature of satisfaction the goods give, they may be classified into luxury, comfort or necessary goods. In general, luxury and comfort goods are price elastic, while necessary goods are price inelastic. Thus, for example, the demand for foodgrains, cloth, salt, etc., is generally inelastic while that for radio, furniture, car, etc., is elastic.
- **Availability of substitutes.** Where there exists a close substitute in the relevant price range, its demand will tend to be elastic. But in respect of commodities having no substitutes, their demand will be somewhat inelastic. Thus, for example, demand for salt, potatoes, onions, etc., is highly inelastic as there are no close or effective substitutes for these commodities. On the other hand, commodities like tea, coffee or beverages such as Thums-Up, Mangola, Gold Spot, Fanta, Sosyo, etc., having a wide range of substitutes, have a more elastic demand in general.
- **Number of uses.** Single use goods will have generally less elastic demand as compared to multi-use goods, *e.g.,* for commodities like coal or electricity having a composite demand, elasticity is relatively high. With the fall in price, these commodities may be demanded increasingly for various uses. It may be elastic in some of the uses, and may be inelastic in some other uses, *e.g.,* coal is used by the railways and consumers as fuel. But the former's demand is inelastic as compared to the latter's. Technically, thus, the demand for a multi-use commodity in those uses where marginal utility is high, will be inelastic while in those uses where the marginal utility is low, the demand will be elastic.

- **Consumer's income.** Generally, larger the income, the demand for overall commodities tends to be relatively inelastic. The demand pattern of a millionaire is rarely affected even by significant price changes. Similarly, the redistribution of income in favour of low-income people may tend to make demand for some goods relatively elastic.
- **Height of price and range of price change.** There are certain goods like costly luxury items or bulky goods such as refrigerators, TV sets, etc., which are highly priced in general. In their case, a small change in price will have a insignificant effect on their demand. Their demand will, therefore, be inelastic. However, if the price change is large enough, then their demand will be elastic. Similarly, there are perishable goods like potatoes and onions, etc., which are relatively low priced and bought in bulk, so a small variation in their prices will not have much effect on their demand, hence, their demand tends to be inelastic.
- **Proportion of expenditure.** Items that constitute a smaller amount of expenditure in a consumer's family budget tend to have a relatively inelastic demand, *e.g.,* a cinegoer who sees a film every fortnight is not likely to give it up when the ticket rates are raised. But one who sees a film every alternate day, perhaps may cut down his number of films. So, is the case with matches, sugar, kerosene, etc. Thus, cheap or small, expensive or large expenditure items tend to have more demand inelasticity than expensive or large expenditure items.
- **Durability of the commodity.** In the case of durable goods, the demand generally tends to be inelastic in the short-run, *e.g.,* furniture, bicycle, radio, etc. In the case of perishable commodities, on the other hand, demand is relatively elastic, *e.g.,* milk, vegetables, etc.
- **Habit.** There are certain articles which have a demand on account of habit and in these cases, elasticity is less than unity, *e.g.,* cigarettes to a smoker have inelastic demand.
- **Complementary goods.** Goods which are jointly demanded have less elasticity, *e.g.,* ink, petrol have inelastic demand for this reason.
- **Time.** In the short period, demand in general will be less elastic, while in the long period, it becomes more elastic. This is because it takes sometime for the news of a price change to become known to all the buyers. Consumers may expect a further change, so they may not react to an immediate change in price. People are reluctant to change their habits all of a sudden. When durable goods are worn out, these are demanded more. Demand for certain commodities may be postponed for sometime, but in the long run, it has to be satisfied.
- **Recurrence of demand.** If the demand for a commodity is of a recurring nature, its price elasticity is higher than that of a commodity which is purchased only once. For instance, bicycles, taperecorders, transistors, etc., are purchased only once, hence, their price elasticity will be less. But, the demand for fast food items such as pizza, burger, etc., would be more price elastic.
- **Possibility of postponement.** When the demand for a product is postponable, it will tend to be price elastic. In the case of consumption goods which are urgently and immediately required, their demand will be inelastic.

Price Elasticity of Demand for Food Items

The Annual Report of the National Food Survey Committee has estimated the price elasticity of demand for various food items for the period 1984-89 in the UK Table 6.5 represents a classification of demand elasticity of selected items from this Report. Demand for potatoes, vegetables and chicken tend to be inelastic. Whereas, the demands for the food items like cheese, carass meat and frozen peas, appear to be price elastic in the UK markets. In other countries also, a similar nature of demand elasticities of such items is quite probable.

Table 6.5: The Price Elasticity of Demand for Select Food Items

Elasticity of Demand *e > 1*		*Inelastic Demand* *e < 1*	
• Cheese:	e = 1. 20	• Bread:	e = 0. 09
• Carass Meat:	e = 1. 37	• Milk:	e = 0. 19
• Frozen Peas:	e = 1. 12	• Sugar:	e = 0. 24
• Potatoes:	e = 0. 21	• Vegetables:	e = 0. 27
		• Chicken:	e = 0. 13

Source: Annual Report of the National Food Survey Commitee, MAFF, 1989, Table 6.2.

Price Elasticities of Demand for Automobiles

Reviewing certain case studies on demand elasticities for automobiles available in the existing literature, some interesting findings have been observed:

- There is a marked a high cross-elasticity of demand between new and old cars. When price of new cars come down, the demand for second hand cars tend to decrease. When price of second hand better condition cars go down, the market demand for new cars is adversely affected.
- The price elasticity of demand for new cars is greater than unity, but the coefficient varies between 1.1 to 1.4. That means, by lowering the price in small business a dealer cannot expect much improvement in the sales revenue.
- According to a study in 1983[1] the price elasticity of specific models in some cases has tended to be very high. For example, in case of Ford Mustang it was estimated at 8.4 and for Impala it was estimated to be 14.8.

A study in 1995[2] observede price elasticity coefficient between 5 to 6.7 in the case of low-to- medium priced automobiles, whereas for high priced cars it was 3 to 4. Hence, the competitors/dealers find high cross-elasticities of demand in the segmented car markets.

References:

1. Irvine F.O. Jr (1983): 'Demand Equation for Individual New Car Models Estimated Using Transaction Price with Implication for Regulatory Issues,' *Southern Economic Journals,* 49, pp. 764-782.
2. Berry S. J. Levensohn and A. Parker (1995): 'Automobile Price in Market Equilibrium,' *Econometrica*, 63rd, 4 July, pp. 841-891.

Classification of Price Elasticity of Demand: Recapitalisation

In economic analysis, usually, the possible degrees/coefficient values of the price elasticity of demand are divided in terms of unity (*i.e.*,1) into five general categories:

- Unitary elastic demand: e = 1
- Elastic demand: e > 1
- Inelastic demand: e < 1
- Perfectly elastic demand: e = ∞
- Perfectly inelatic demand: e = 0

The last two categories are theoretical extremes and rarely found in pratice. Table 6.6 below summarily provides the classification of price elasticity of demand.

Table 6.6: Classification of Price Elasticity of Demand

Degree of Price Elasticity (e)	*Types of Price Elasticity of Demand*
(1) e = 1	Unitary Elastic
(2) e > 1	Elastic
(3) e < 1	Inelastic
(4) e = ∞	Perfectly Elastic
(5) e = 0	Perfectly Inelastic

8. INCOME ELASTICITY OF DEMAND

Income is a major determinant of demand for a number of goods. We may have an income demand function thus:

$D = f(M)$

Where, M refers to the money income of the buyer.

It suggests that the demand may change due to a change in the consumer's income, other factors remaining constant. The concept of income elasticity is, thus, introduced to ascertain the extent of such change. The income elasticity of demand measures the degree of responsiveness of demand for a good to changes in the consumer's income.

Definition: The income elasticity is defined as a ratio percentage or proportional change in the quantity demanded to the percentage or proportional change in income.

Income elasticity coefficient is, thus, measured by the following formula:

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

Symbolically,

$$e_m = \frac{\%\Delta\Delta}{\%\Delta\Delta}$$

Where, $\%\Delta Q$ signifies the percentage change in demand, and $\%\Delta M$ the percentage change in income.

$$e_m = \frac{\Delta Q}{Q} \times \frac{M}{\Delta M} \text{ or } \frac{\Delta Q}{\Delta M} \cdot \frac{M}{Q}$$

Where,

ΔQ = change in demand

Q = initial demand

M = initial income

ΔM = change in income

9. TYPES OF INCOME ELASTICITY

Income elasticity on the basis of its coefficient (e_m), may thus be classified as under:

- Unitary income elasticity of demand; ($e_m = 1$);
- Income elasticity of demand greater than unity; ($e_m > 1$);
- Income elasticity of demand less than unity; ($e_m < 1$);
- Zero income elasticity of demand; ($e_m = 0$); and
- Negative income elasticity of demand. ($e_m < 0$);

Unitary Income Elasticity

When the percentage change in demand is equal to the percentage change in income, the demand is unitary income elastic. Thus, $e_m = 1$.

The demand curve representing income demand function $D = f(M)$ will have an upward slope, and will be at 45° angle, as shown in Fig. 6.12 curve D_1.

Income Elasticity Greater than Unity

When the percentage change in quantity demanded is greater than the percentage change in income, the income elasticity of demand is greater than unity. Thus, $e_m > 1$. The demand curve will be flatter as D_2 in this case.

Income Elasticity Less than Unity

When the percentage change in demand is less than the percentage change in price, the income elasticity of demand is less than unity. Thus, $e_m < 1$. The demand curve in this case will be steeper like D_3 in Figure 6.12.

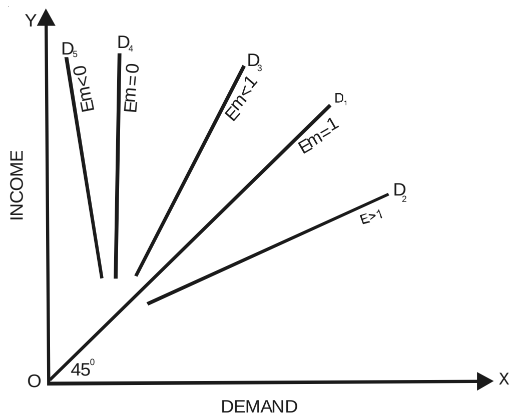


Fig. 6.12: Income Elasticity of Demand

Zero Income Elasticity

When the income change in any direction or in any proportion but carries no effect on demand, so that the quantity demanded remains unchanged, it is referred to as zero income elasticity of demand. Thus, $e_m = 0$. The demand curve in this case is a vertical line like D_4 in Figure 6.12.

Negative Income Elasticity

When an increase in income causes a decrease in the demand for a commodity, the demand is said to be negative income elastic. The income elasticity coefficient, $e_m < 0$. The demand curve in this case will be downward sloping like D_5 in Figure 6.12. Only in the case of a few exceptional inferior goods like jowar and bajra in India and margarine in the USA, do we find income elasticity.

Income elasticity is generally positive, as there is a positive correlation between income and demand. Other things remaining the same, with an increase in income, there will be an increase in demand and *vice versa*. Sometimes, however, negative income elasticity is also observed. Especially, in the case of Giffen goods and certain kinds of inferior goods, income elasticity is negative. That is to say, when with a rise in income the consumer buys less of a commodity, then there is negative income effect. But in most cases, the amount demanded increases with a rise in the consumer's income and decreases with a fall in income. Thus, income elasticity, which is a numerical expression of income effect on demand, is found to be positive in the case of most commodities.

Income elasticity of demand depends upon per capita income and the prevailing standard of living of a community. In industrially advanced countries of the West, with high living standards, the elasticity of demand for home appliances and gadgets, cars, new house, etc., is usually very high. Comparatively, for necessaries such as potatoes, salt, bread, income elasticity of demand is quite low.

A high positive income elasticity of demand may be found in many food items in India, because people here are already living on a subsistence level and they are underfed. So, with a rise in income, they would buy, first, more of food products on account of their high marginal propensity to consume. Even ordinary comfort goods will also have a high positive income elasticity of demand in India, as our standard of living is very low.

The income elasticity helps us in classifying the commodities. The following points may be stated in this regard:

- When income elasticity (e_m) is positive, the commodity is of a normal type.
- When income elasticity (e_m) is negative, the commodity is inferior. For instance, cereals like *jowar*, *bajra*, etc., are inferior goods, so their income elasticity is negative.
- If income elasticity coefficient is positive and greater than one ($e_m > 1$), the commodity is a luxury. For example, the demand for TV sets, cars, etc., is highly income elastic.
- If income elasticity coefficient is positive but less than unity ($e_m < 1$), the commodity is an essential one, e.g., the demand for foodgrains is income elastic.
- If income elasticity coefficient is zero ($e_m = 0$), the commodity is neutral. For instance, consumption of commodities like salt, matchbox, etc., has zero income elasticity.

10. APPLICATIONS OF INCOME ELASTICITY

K.K. Seo points out that income elasticity of demand is applicable to many planning and strategy problems, such as:

- **Long-term business planning.** In the long-run, demand for comforts and luxury goods may tend to be highly income elastic. Hence, prospects for long-run growth in sales for these goods are very bright. The firm can plan out its business accordingly.
- **Market strategy.** Income elasticity of demand is helpful in developing market strategies.
- **Housing development strategies.** On the basis of income elasticity, housing development requirement can be predicted and construction work can be effectively launched upon.

Combined Effects of Elasticities of Demand

Price effect and income effect together on the demand for a product can be captured through combined effects of price and income elasticities of demand by using the following equation:

$Q_2 = Q_1\ [1 + e_p\ (\%DP) + e_m\ (\%DM)]$

Where,

Q_1 = initial (current period) quantity demanded

Q_2 = estimated demand quantity in relation to changes in price and income

P = price

M = income

e_p = price elasticity at demand

e_m = income elasticity of demand

Illustration

[1] Panavision, a TV manufacturing company, is planning to increase the price of its television sets by 10 per cent next year. The Economic Report of the country has forecasted rise in per capita income by 5% during this period. Panavision economic adviser has estimated price elasticity for the TV set at -1.4 and income elasticity at 2.2. The Panavision currently sells 50,000 TV sets. Give the forecast for the sales. Is it advisable to raise the price of TV sets as has been decided in this case when each TV set is currently priced at Rs. 10,000?

Solution:

Given particulars:

$e_p = -1.4;\ e_m = 2.2$

$Q_1 = 50{,}000$

$\%DP = 10\%$ $\qquad \%DM = 5\%$

$Q_2 = 50{,}000\ [1 + (-1.4)(0.10) + (2.2)\ (0.05)]$

$= 50{,}000 \times 0.97 = 48{,}500.$

It follows that positive income effect in this case is more than offset by the negative price effect. As such, sales would be expected to decline to 48,500.

At initial price of Rs. 10,000 annual total revenue of the firm is Rs. 50 lakh. When the price is raised to Rs. 11,000; then 48,500 TV sets are expected to be sold. This would fetch total revenue of Rs. 53.35 lakh. As such, the company is going to gain and should, therefore, proceed by its decision.

[2] A number of empirical studies of automobile demand in a country have observed that the price elasticity is approximately –1.2 and the income elasticity is +2.8. The current sales amount to 8 lakh units. If the price rises by 10% and income rises 5% next year, how many cars are expected to be sold?

Ans: In this case, price effect on price elasticity (e_p) –1.2% and income effect on income elasticity (e_m) is +2.8%.

$\%DQ = e_p \times DP + e_m \times \%DM$

$= -1.2 \times 10\% + 2.8 \times 5\%$

$= 1.02$

Demand for automobiles $= Q_a = (1.02) \times 8$ lakh $= 8.16$ lakh cars.

11. CROSS ELASTICITY OF DEMAND

In arriving at the price elasticity of demand, one takes into account the change in demand due to a change in the price of the same commodity. In cross elasticity of demand, we take into account the change in the price of commodity *Y* and its effects on the demand for commodity *X*. The concept of cross elasticity is important in the case of commodities which are substitutes and complementary. Tea and coffee are substitutes for each other, pen and ink, car and petrol are complementary goods.

> **Definition:** The cross elasticity demand refers to the degree of responsiveness of demand for a commodity to a given change in the price of some related commodity.

The cross elasticity of demand between any two goods *X* and *Y* is measured by dividing the proportionate change in the quantity demanded of *X* by the proportionate change in the price of *Y*. Thus:

$$\text{Cross Elasticity of Demand} = \frac{\text{Proportion ate or percentage change in Demand for X}}{\text{Proportion ate or percentage change in Price of Y}}$$

Symbolically,

$$e_c \text{ or } e_{xy} = \frac{\Delta Q_x}{Q_x} \div \frac{\Delta Q_x}{\Delta P_y} \times \frac{P_x}{Q_x}$$

e_c or e_{xy} = cross elasticity of demand – (demand for *X* in relation to the price of *Y*)

ΔQx = change in quantity demanded for commodity *X*

Qx = initial demand for *X*

Py = initial price of commodity *Y*

ΔPy = change in the price of commodity *Y* (Preferably *d* instead of Δ is used to represent a point change.)

The cross elasticity of demand measures the extent to which products are substitute or complementary. A positive cross elasticity of demand indicates that the two products in consideration are substitutes, since an increase/decrease in the price of one causes an increase/decrease in the quantity demand of the other.

A negative cross elasticity of demand indicates that the two products in consideration are complementary to each other, since an increase/decrease in the price of one leads to a contraction/extension in demand for the other.

Illustration.

To illustrate the use of the formula, let us take data from Table 6.7.

Table 6.7: Monthly Demand of a Household

Commodity	*Original*		*Change*	
	Price (Rs.)	*Quantity (Units)*	*Price (Rs.)*	*Quality (Units)*
Tea	3	50	3	60
Coffee	4	30	5	20
Bread	2	80	2	90
Butter	75	30*	6	40*

(*Butter 50 gram packets)

Solution

- From Table 6.7, we may take data for tea and coffee and measure the coefficient of price cross elasticity as under:

  Let X = tea, Y = coffee,

  $Qx = 50,\ \Delta Qx = 60 - 50 = 10.$

  $Py = 4,\ \Delta Py = 5 - 4 = 1.$

  $$e_{xy} = \frac{\Delta Q_x P_y}{\Delta P_y Q_x} = \frac{10 \times 4}{1 \times 50} = 4/5 = 0.8$$

- Now, let X = bread, Y = butter, then:

  $Q_x = 80,\ \Delta Q_x = 10$

  $P_y = 7,\ \Delta P_y = -1$

  $$e_{xy} = \frac{\Delta Q_x P_y}{\Delta P_y Q_x} = \frac{10 \times 7}{-1 \times 80} = \frac{-7}{8} = -0.88$$

Thus, the numerical coefficient of cross elasticity of demand may be either positive or negative. Substitute goods have positive, price elasticity of demand. Jointly demanded or complementary products have negative price cross elasticity of demand.

A higher coefficient of cross elasticity obviously means a higher degree of substitutability or complementarity between two goods X and Y. Two unrelated goods have zero cross elasticity. Fig. 6.13 graphically illustrates the cross elasticity of demand.

When the demand function like $D_x = f(P_y)$ is plotted graphically, it will take different positions as per the price cross elasticity, as shown in Figure 6.13. It will have an upward slope like D_1 if X is a substitute of Y. It will have a downward slope like D_2, if X is a complementary to Y. It will be a vertical line (D_3) if X is unrelated to Y. So any change in the price of Y has no effect on the demand for X.

The nature of the goods relative to their uses mainly determines the cross elasticity of demand. The cross elasticity tends to be high when two goods satisfy the same wants equally well.

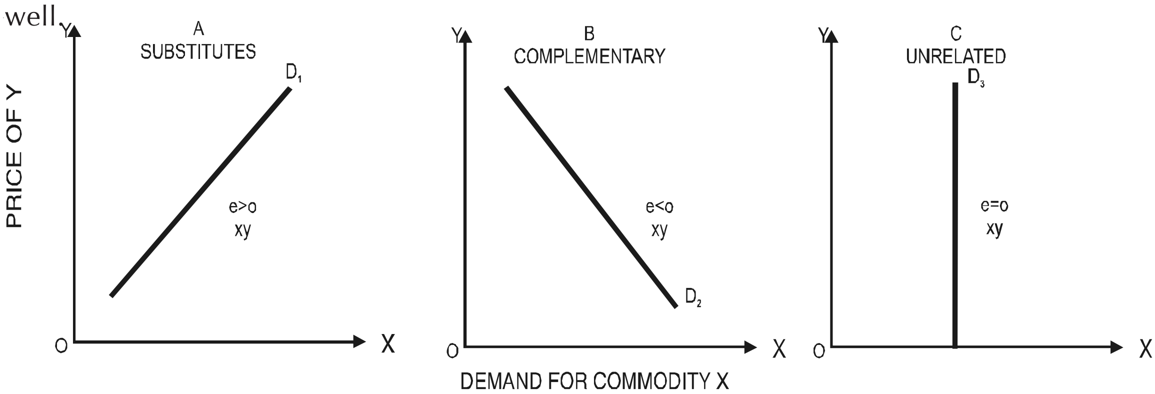


Fig. 6.13: Cross Elasticity

One should be rational in approach with a common sense that cross price elasticity should not be worked out in the case of totally unrelated goods. **For example**, change in the price of razor blade and the demand for petrol.

Application of Cross Elasticity of Demand in Transport System

The concept of cross price elasticity of demand can be useful in determining competitive price strategy and policy in the alternative rival modes of services, such as rail-road services. Cross elasticity, here is taken as a measure of the effect of a change in the fares on the demand for the rail service, and *vice versa*. To illustrate the point, let us consider a hypothetical case study.

The cross elasticity of demand for a train service from station *A* to *B* is the rate of change in the number of train tickets sold on that route in relation to the percentage change in the price of bus service for the same route. If the bus company reduced its fare from Rs. 40 to Rs.35, and the following data are observed:

	Fare (Rs.)		***Daily No. of Passengers***	
	Rail	***Bus (Ordinary Class)***	***Rail***	***Bus***
1. Before fare change	45	40	500	200
2. After fare change	45	35	400	300
Percentage change	0	–12.5%	–20%	50%

Cross elasticity is:

$$e_C = \frac{\%Q \text{ in Rail Service}}{\%P \text{ in Bus Service}} = \frac{-20\%}{-12.5\%} = 1.6$$

Such a high cross elasticity reflects that the market demand is greatly responsive to the competitive price variation.

Selected cross price elasticities of demand are presented in Table 6.8.

Table 6.8: Selected Cross-Price Elasticities of Demand in the USA

Demand for (x)	*Effect of Price on (y)*	*exy*
Coffee	Tea	0.15
Butter	Margarine	1.53
Electricity	Natural Gas	0.50

Source: Nelson (1995): *Microeconomics: Theory, Issues, Applications,* Dryden Press, New York, p. 220.

12. ADVERTISING OR PROMOTIONAL ELASTICITY OF DEMAND

In case of several products, the market demand is influenced through advertisement or promotional efforts. The demand function in this case may be stated as:

$Qx = f(A)$

where,

Qx = Demand for the product x measured through the quantity sold in the market.

A = Advertisement expenditure of the firm.

The degree of responsiveness of demand to changes in advertising or promotional elasticity of demand, (e_A) measured, thus:

$$e_A = \frac{\text{Percentage or proportion ate change in sales}}{\text{Percentage or proportion ate change in advertisem ent expenditur e}}$$

In symbolic terms,

$$e_A = \frac{\%\Delta Q}{\%\Delta A}$$

Alternatively,

$$C_A = \left(\frac{\Delta Q}{\Delta A}\right)\left(\frac{A}{Q}\right)$$

where, Q = Quantity of sales, and

A = Amount of advertisement expenditure.

Illustration

At initial advertisement expenditure of Rs. 50,000 the demand for a firm's product is 80,000 units. When the advertisement budget is increased to Rs. 60,000 the sales volume increased to 90,000 units.

The advertising elasticity of demand is measured, thus:

A_1 = Rs. 50,000 A_2 = Rs. 60,000

Q_1 = Rs. 80,000 Q_2 = Rs. 90,000

ΔA = Rs. 10,000 ΔQ = Rs. 10,000

$$e_A = \frac{\Delta Q}{\Delta A} \times \frac{\Delta A}{\Delta Q}$$

$$= \frac{10{,}000}{10{,}000} \times \frac{50{,}000}{80{,}000} = 0.63$$

In particular, point elasticity is used when the price-quantity changes are infinitesimally small — (assuming that a small price change is indicated by a virtual point on the demand curve). When there is a substantial price change, a discrete movement is observed. In this case, arc elasticity is preferable. For all practical purposes, when price change is over 5 per cent, it is better to use arc elasticity measurement to capture a more realistic idea of demand elasticity.

Arc Advertising Elasticity

The arc advertising elasticity is measured as:

$$e_A \text{ arc} = \left(\frac{\Delta Q}{\Delta A}\right)\left(\frac{A_1 + A_2}{Q_1 + Q_2}\right)$$

In the above example,

$$e_A \text{ arc} = \frac{10{,}000}{10{,}000} \times \frac{50{,}000 + 60{,}000}{80{,}000 + 90{,}000} = 0.65$$

13. PRACTICAL APPLICATIONS

The concept of elasticity of demand has a wide range of practical application in economics and business.

To Businessmen

In decision-making, the concept of elasticity of demand is of utmost practical use, for while taking decision for pricing policy, the businessman has to know the likely effect of price changes on the demand for his product in the market. He has to consider, for instance, whether a lowering of price will cause an expansion in the demand for his product, and if so to what extent and thus to what extent his total revenue would rise fetching what amount of profit. This he can know easily if he has an idea about the demand elasticity for his product. Most businessmen consciously or unconsciously know by intuition something about the elasticity of demand for their product while making a price decision. Several, however, do not pay any attention to the price elasticity of demand and make the wrong decisions, so suffer heavy losses. In scientific management decision-making, thus, one has to try to form as precise an idea as possible of the degree of elasticity of demand, for it is a convenient short-hand way of expressing the effects of price change on the demand for a product.

By knowing the type of elasticity of demand, it is easy to know whether a price cut is better or a price rise for increasing the sales, total revenue and the profit. When the demand for the product is found unitary elastic, price change is ineffective in bringing more total revenue, so unless the cost is changed it is not worthwhile to change the price.

In case of demand elasticity being more than unity, a price cut would lead to an increase in sales more than proportionately, so the total revenue will rise: hence in such a case, a price cut policy would be more appropriate.

On the other hand, if the product has inelastic demand, by raising a price, no significant decrease in sales will be effected, so the total revenue and the profit would rise. Hence, in such cases, a price rise policy would be appropriate.

In short, for elastic demand a businessman would be better off by charging a low price and in case of inelastic demand, by putting a high price for the commodity, the business would be profitable.

Particularly, a monopolist will be greatly influenced by the degree of price elasticity for his goods, so that he will have a rational price discrimination policy. That is he will charge different prices in different markets. The B.E.S.T., for example, charges different rates for the consumption of electricity, depending on the use to which it is put.

Illustration: Practical Application

In practice, the price variations and differentials in several businesses such as hotels, airlines, ferries, coaches, time-to-time, reflect differences in the level of demand, particularly the varying elasticity of demand at different times such as peak seasons and off-seasons over a year. A telephone company also decides its rate structure into peak rate, standard rate, discount rate, etc., at different times of the day. For example, during working day 8.00 a.m. to 7.00 p.m. peak rate is charged on calls, while lower or discount rates are charged during night hours. On public holidays, discount rate is charged. In all such cases, pricing is based on demand consideration rather than the cost element.

Likewise, the knowledge of income elasticity is important to certain producers in their demand and sales forecasting and planning business expansion. For instance, the demand for TV sets is highly income elastic, so when per capita income or income level of a class of consumers is found to be rising, TV manufacturers can expect a greater sale even at slightly higher prices.

Similarly, cross elasticity helps certain businessmen to mould their business policies. For instance, edible oil producers may find that the demand for oil increases when the price of ghee rises. Likewise, sugar in relation to changes in the price of gur. Similarly, demand for raincoats is bound to multiply considerably in the face of a rise in the prices of umbrellas and *vice versa*.

To the Government and Finance Minister

In determining fiscal policy also, the concept of elasticity of demand is very important to the government. The finance minister has to consider the elasticity of demand while selecting commodities for taxation. Tax imposition on commodities for getting a substantial revenue becomes worthwhile only if the taxed goods have an inelastic demand. Otherwise, if the demand is more elastic, it will contract very much with a rise in price as a result of added taxation (like sales tax or excise duty), hence, the total revenue yield would not be much. That is why, generally taxes are levied on commodities like kerosene, matches, cigarettes, sugar, etc., which have an inelastic demand.

In International Trade

The concept is also useful in formulating export and import policies of a country. Further, in determining terms in the sphere of international trade, the relative elasticities of demand for commodities in the two countries are very important.

To Policy-Makers

In economic analysis, the concept is useful in solving the mystery of how farmers may remain poor despite a bumper crop. Since agricultural products, particularly foodgrains, have inelastic demand, when there is a bumper crop it can be sold only by cutting prices substantially. Hence, the total income of farmers will be lower in spite of a bigger crop.

To Trade Unionists

The concept of price elasticity is useful to trade unions in wage bargaining. The union leaders, when they find that demands for their industry's product is fairly elastic, will ask for a higher wage to workers and use the producer to cut the price and increase sales which will compensate for his loss in total profit.

In this way, the concept of demand is of a great practical significance to businessmen, economists, farmers, trade unions and government policy-makers.

14. APPLICATION PROBLEM: A HYPOTHETICAL CASE STUDY

Adam, the owner of Ever-Joy Ice Cream Centre, near University Campus, was also a part-time student of management studies in a Commerce College. After having studied the theory of price elasticity of demand, he thought that the demand for ice cream should be price elastic. For an experiment he announced special-reduced price for the Ever-Joy Ice Cream Cone in the second week of August 2001 under the '54th Independence Anniversary Week.' He observed the following sales outcome.

Adam worked out price elasticity coefficient in this case to be:

$$e = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} = \frac{500}{1} \times \frac{5}{1000} = 2.5$$

Table 6.9: Sales Data for Ever-Joy Ice Cream Cone

August	*Price*	*Total Sales*	*Total Sales Revenue*
	Regular		
Ist Week	Rs. 5	1,000	Rs. 5,000
	Special		
2nd Week	Rs. 4	1,500	Rs. 6,000

Finding demand elasticity to be much above unity, he inferred that the price reduction led the total sales revenue to increase. This outcome encouraged him to reduce the price in October on a permanent basis to Rs. 4.50. To his utter surprise he found that his average weekly sales revenue rather declined to Rs. 4,770.

What happened? Though the average weekly demand had risen to 1,060 with the price reduction, the sales revenue declined. Because, this time the degree of price elasticity is:

$e = \frac{60}{0.5} \times \frac{5}{1000} = 0.6$ which turns out to be less than unity. Adam got puzzled. How did the demand suddenly become price inelastic? Why? What went wrong?

Adam's approach to price policy was purely theoretical, assuming all other things being equal. He did not care to look at other factors influencing the demand for ice-cream, such as possibilities like winter, climatic adverse effects, similar price war by the rivals' shops in the area.

Besides, Adam offered a 20% price reduction temporarily in August only for a week, so most buyers responded to take the advantage and probably the rival did not retaliate knowing it a short-term phenomenon at that time. Furthermore, now when the buyers realised that price-reduction in October is permanent, they did not react much on the buying-spree. In the previous case of price reduction, the buyers expected that in future — after the celebration week is over — price will go back to the original level, therefore, they purchased more. This phenomenon of further expectations was also not taken into accounting determining the later price-reduction policy. In short, the business decision of Adam was misled by overestimation of price elasticity from the very short-term data in a special situation rather than resorting to demand estimation based on the long-term sales data under normal circumstances.

From Adam's experience, we should learn one important lesson that any judgement based on a partial view may not always be good. Besides, reality widely differs from theory. Real life is never so simple as depicted in theory. Managerial decision-making in practice is, therefore, more of an art than science.

A Mini-Case: VCD Rentals

According to a Chamber of Commerce study in Mumbai's VCD-rental market, the price elasticity of demand for VCD rentals is 0.7. A 10% rise in rentals implies a decline the demand for VCDs on rentals by 7%. That means, the demand for VCD's on rentals is inelastic. Based on this information, the owner of Andheri Music Stores, a B.Com. graduate, increased the rentals by 25% in order to enhance its total revenue. Contrary to his expectations, the store's total revenue decreased, in consequence. What is the mystery?

Well, there is no mystery. It is a matter of simple economic behaviour of the customers. The study reported the measure of elasticity by assuming: if all VCD rental stores in Mumbai increased their prices by 10%, the market-demand will drop by 7%. But, in an isolated case, when the particular seller only charges a high price, the customers can easily shift to the other competitors in the vicinity. Then, the individual concerned seller loses his sales. In this case, the demand facing an individual seller tends to be elastic, though as a whole market demand for the product is inelastic. As such, the increase in price by an individual seller causes a decrease in his total sales revenue. The Andheri Music Store, obviously, experienced a decline in its total revenue, owing to its isolated action.

MODEL QUESTIONS

1. (a) What is elasticity of demand?
   (b) On what factors does elasticity of demand depend?
2. (a) Explain the concept of cross elasticity of demand.
   (b) Indicate its usefulness in the classification of market situations.
   (c) What are its limitations?
3. (a) Distinguish between price elasticity, income elasticity and cross elasticity of demand.
   (b) On a straight-line demand curve, select any point 'p' and give a geometrical proof of measurement of elasticity at this point.
   (c) When the price of commodity X was Rs. 10 per unit, people consumed 3,000 units. With a fall in price to Rs. 9, they consumed 3,150 units. State the formula and measure the elasticity of demand for X.
4. What is point elasticity of demand? How is it measured?
5. (a) Define cross elasticity of demand.
   (b) Would you except the cross elasticity of demand to be positive, negative or zero for each of the following pairs of products:
      (i) Kelvinator and Godrej refrigerators.
      (ii) Tables and chairs,
      (iii) Maruti car and railway tickets.

   What general rule can you give to base your answers?

6. Explain the concept of cross elasticity of demand. How would you measure such elasticity?
7. Define cross elasticity of demand and state its formula. How does such elasticity differ in case substitutes and complementary goods?

Problems

1. Calculate price elasticity of demand for different years from the following data:

Year	*Percentage Change in Price*	*Percentage Change in Quantity*
1981	5.0	–3.2
1982	–2.5	5.6
1983	Zero	1.2
1984	6.5	–2.5

2. Investigating the demand for textile in a country *X*, a researcher observed that the demand for textiles tend to rise by 1.5 per cent with one per cent decrease in the prices of textiles; with the rise in one per cent of per capita GDP, the demand for textiles rise by 0.45 per cent and when food prices increased by one per cent, the demand for textiles contracts by 0.93 per cent.

   (a) Identify the type of demand elasticities in this case and define them.

   (b) Which type of elasticity the textile mills should consider significant for business development?

   (c) How much rise in sales is expected during a festival season by offering 20 per cent discount by textile mills showrooms?

3. Oldfield and Tyler in the TRRL study (1981) measured mean fare demand elasticities for rail travel between London and several other stations up to a distance of 120 kilometres, as under:

	Season Ticket	*Cheap Day Fare*	*Full Fare*
I Class:	– 0.20	– 0.11	– 0.13
II Class:	– 0.56	– 0.50	0.20

Give your comment in this context.

[Hints:

- The low elasticity for full fare travel and Ist class passenger may be attributed to the large element of business travel.
- The relatively high elasticity of demand for cheap day tickets is due to its high optional nature.
- Class season ticket has higher elasticity than that of the Ist class because of poor and richer income groups of passengers.]

4. The Serpell Report (1983) on Railway finances in England, for instance, measured price elasticity of demand for rail services on some routes to be fairly inelastic (– 0.15); hence, suggested fares rise of 40 per cent for London commuters. In this case, workout the revenue effect if fare is raised from £-10 to £-14 and daily 1,000 passengers are travelling on this route. Should the authorities accept this suggestion? Give your comment.

[Hints:

$$e = \frac{\%\Delta Q}{\%\Delta P}$$

$$\therefore -0.15 = \frac{\Delta Q}{40\%} \quad \therefore \Delta Q = 6\%$$

$TR = P.Q$

Initially: $TR = 10 \times 1000 = £\ 10{,}000$

DQ = 6%

$\therefore$ with the rise in fare new $Q = 940$

$\therefore$ At new price £ 14

$TR = 14 \times 940 = £\ 13{,}160$

Comment: Since demand is fairly inelastic, with the increase in fare, its revenue effect is positive and substantially high; therefor e, the railway authorities should accept the suggestion made by the Serpell Report.]

5. Suppose the sales for bicycles in Pune at various prices are as follows:

Price of a Bicycle (Rs.)	*Quantity Demand per Month ('000 of bicycle)*
500	25
700	22
1,000	15

Calculate the Arc price elasticity of demand between:

(i) Price Rs. 500 and Rs. 1,000

(ii) Price Rs. 500 and Rs. 700

(iii) Price Rs. 1,000 and Rs. 700.

6. A firm increases its advertising expenditure from Rs. 60,000 to Rs. 75,000. Its sales increase by 20% from the initial volume of 90,000 units. Measure the promotional elasticity of demand.

7. Assume that the average price of a new model of Maruti car in Mumbai is Rs.4,60,000 and 90,000 cars are sold at this price in a year. If the price elasticity of demand for

new cars is 1.7 what will be the effect on annual sales when the average price of this new model declines to Rs. 4,15,000.

8. A firm increased its advertising expenditure from Rs. 1,20,000 to Rs. 1,60,000 last year. This year its sales increased by 40% from the initial volume of 80,000 units. Measure the promotional elasticity of demand.

Project Work

In the context of demand elasticity:

- Review the phone call charges — Rate structure of MTNL and Tata Indicom.
- Review the tariffs of Taj, Hilton, Orchid, Leela and Hayyat.
- Review the airfare seasonwise of Air India, Jet Airways.

❒ ❒ ❒

Demand Estimation: Analysis for Various Products and Situations

7

CHAPTER

1. ESTIMATING THE DEMAND FUNCTION

For all practical purposes, a business firm may seek to estimate the demand function for its product. In the process an attempt is made to quantify the relationship between the demand for a product and its determinant variables, such as price, national income, *i.e.,* Gross National Product (GNP) or Gross Domestic Product (GDP), advertising expenditure, price of substitute and complements, population, etc. The demand estimation is a first step to demand forecasting. Demand estimation can be useful in certain business decision-making. For example:

> Knowledge about market demand is vital for the business manager in creating price, sales and output strategies against dynamic changes in the determinants of demand.
>
> Several business decisions in this regard can be aided by information and empirical measures regarding consumer demand behaviour, such as demand function and elasticity of demand.

- A computer dealer would like to know the implications of a reduction in excise duties, lower prices and rising GNP on the demand for personal computers.
- A cigarette manufacturer may be interested in knowing the impact of increase in excise duties on cigarettes on its sales.
- An electricity company (such as Dabhol Power Company) while planning to construct a new power station should know the likely growth of demand for electricity over the decade of time.
- An electronics manufacturer might be interested in estimating changing proportion of demand for domestic and imported electronic items when the import policy of the government is liberalised.

- A firm would like to know how much would its sales decline when the rival producer reduces the price.
- An automobile manufacturer wants to know how much increase in his sales of cars is possible by advertising more.

2. MAJOR STEPS IN DEMAND ESTIMATION

The following are the major steps involved in estimating the demand function for a product:

- Specification of the demand function
- Adopting the form of demand function
- Choice of statistical technique
- Data collection
- Empirical process
- Result reporting
- Interpretation
- Evaluation.

Specification of the Demand Function

Identify the determinant variables of the demand for the given product. State the demand function in econometric terms. For example, a demand function of general form may be stated as under:

$$Qx = b_0 + b_1 Px + b_2 Y + b_3 Ps + b_4 Pc + b_5 Z + u$$

Where:

Qx = quantity demanded of product X

Px = price of X

Y = income or GDP

Ps = price of substitute

Pc = price of complement

Z = any other determinant variable

u = error term representing random or unspecified factors.

In empirical measurement of a demand function one should notice that all the determinants might not be directly or readily quantifiable. Attributes or qualitative variables such as race, religion, sex, strikes, government policy, urban-rural, etc., may need to be quantified by constructing artificial variables called 'dummy' or 'binary' variables. Dummy variables may take on values of 0 or 1, where 0 indicating the absence of an attribute and 1 indicating the presence of that attribute. For example, 1 may show that a person is a male and 0 implies a female.

Adopting the Form of Demand Function

After specification the functional form of demand function is to be decided: whether it will be linear, quadratic, log-linear, double-log, etc.,

Choice of Statistical Technique

For computation choose the appropriate statistical technique: regression analysis, descriptive statistics, etc. Ordinarily least square method is a widely adopted technique in demand estimation.

Data Collection

Collect the required data for the variables identified in the demand function.

Regression and correlation analysis are basically used for the empirical measurement of relationship/the degree of association of determinant variables to demand.

Empirical Process: Estimation of the Parameters of the Demand Model

Derive the parameter values (beta: 'b' coefficients) for the each variable by running the regression equation. A suitable computer software programe such as SAS or SPSS may be used for this.

Result Reporting

The empirical results: value of parameters and other statistical characteristics and test details such as R^2, D-W test, standard errors or t-values should be reported in a systematic order. Often parameters ('b' coefficients) are reported as short-term and long-term elasticities, using log-linear model.

Interpretation

The empirical findings may be interpreted for the decision-making purpose.

Evaluation

The empirical results should be evaluated and cross-checked by means of market surveys, customer interviews, marketing tests, and expert manager's opinions.

3. FUNCTIONAL FORMS IN ESTIMATION

Usually, demand functions are estimated through regression methods in either of the following functional forms: *(i)* linear function and *(ii)* double-log function.

Linear Function Form

(a) Simple Regression (Two Variables) Model

$$Dx = b_0 + b_l Px + u$$

where, Dx = Quantity demanded of commodity x

Px = Price of commodity x

u = Unknown determinant of demand/mis-specification/error terms

b_0 and b_l are the intercept and slope coefficients, respectively. These are unknown parameter values which need to be estimated on the basis of some dates which may be time series or cross-sectional data. Usually, time series data about demand are obtained through sales records over a period of time and the demand function is estimated for a concerned firm or industry, for the use in managerial/business decision-making. When time element is to be denoted for the empirical demand function, it is stated as follows:

$$Dx_t = b_0 + b_l Px_t + u_t$$

When a linear function is represented graphically it shows a straight-line, usually downward sloping as in Figure 7.1.

The coefficients in the linear demand function (for that matter any linear function) represent the multiplier value.

Suppose, we have an estimated demand function for shirts in a Departmental Store as follows:

$$Q = 300 - 1.5\ P$$

(***Note*:** Mathematically, one is free to choose any notation in stating a function. Here, instead of *D* we have preferred to use *Q* for the quantity demanded. One can even write *Ds* or *Qs* to represent the demand for shirt. For price *P*, one can even put *X*. A suitable notation should be used, what it represents need to be specified.)

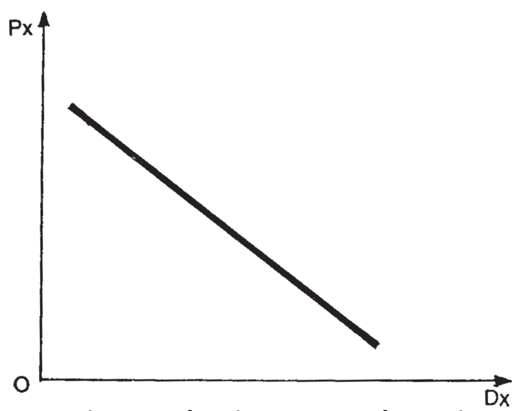


Fig. 7.1: The Linear Demand Function

The above equation (3) indicates that when the price falls by Rupee 1, other things being unchanged, the demand for shirts rises by 1.5 units. In other words, 1.5 is the demand multiplier value for the change in demand corresponding to a unit change in price.

The intercept coefficient (b_0) is 300. It represents the demand owing to other factors which is constant assuming other determinants (other than price) are given.

Furthermore, demand quantity from such a demand function can be estimated in relation to a given price. In the above illustration, at price Rs. 90, the demand for shirt is estimated to be:

$$Q = 300 - 1.5\ (90)$$
$$= 300 - 135 = 165 \text{ shirts}$$

Now, suppose the price is raised to Rs. 100. Then, the demand would be:

$$Q = 300 - 1.5\ (100)$$
$$= 300 - 150 = 150 \text{ shirts}$$

The minus sign of coefficient for the price variable, thus, implies a contraction of demand with the rise in price. Evidently, it shows an inverse relationship of demand with price. Hence, a fall in price would imply a rise in demand.

(b) Multiple Regression (Many Variables) Model

$$Dx = b_0 + b_1Px + b_2M + U$$

Where,

M is an additional variable to the price variable (P) in the earlier case. M refers to the money income.

Suppose, in our illustration, the demand function for shirts is estimated to be:

$$Q = 200 - 1.2P + 0.7M$$

This suggests that when the price rises by Rupee 1 the demand falls by 1.2 units. The coefficient of income variable M, however, has +ve sign which implies that when income rises by a Rupee, the demand for shirts increases by 0.7 units, assuming price and other determinants remaining unchanged.

In empirical demand estimation, thus, one can go on adding more and more variables (determinants) into the demand function, and each coefficient (parameter value) to each variable (determinant) should be interpreted on the basis of its algebraic sign. When the demand model is appropriately formed, the signs to each explanatory variable (determinant) will be correctly found in estimation, as per the theoretically expected relationship/logically true behaviour as per the reality.

To work out elasticity of demand from such a liner function, one needs to adopt mathematical method of elasticity formula based on: slope X point.

Thus:

The price elasticity of demand is measured as:

$$e_p = b_1\left(\frac{P}{Q}\right)$$

where, b_1 is slope coefficient relating to the price variable.

Similarly, income elasticity of demand is measured as:

$$e_m = b_2\left(\frac{M}{Q}\right)$$

In the above examples, for instance, with respect to equation (4)

$$e_p = 1.5\left(\frac{90}{165}\right) = 0.82$$

Whereas in the case of equation (6):

$Q = 200 - 1.2P + 0.7M$

We can workout the demand elasticities at a given price and given income, as under:

Suppose:

$P = 100$, assuming $M = 0$

$Q = 200 - 1.2\ (100) = 200 - 120 = 80$

$$e_p = 1.2\left(\frac{100}{80}\right) = 1.5$$

Suppose:

$M = 1000$, assuming $P = 0$

$Q = 200 + 0.7\ (1000) = 200 + 700 = 900$

$$\boxed{e_m = 0.7\left(\frac{1000}{900}\right) = 0.78}$$

Double-Log or Log-Linear Form

To capture demand elasticities directly, the demand function in empirical estimation is expressed in double-log or log-linear or constant elasticity form as follows:

Log $Qd = b_0 + b_1 P$ for two variables are in the case of multivariables:

Log $Dx = b_0 + b_1 \log Px + u$
Here, b_1 coefficient directly represents the price elasticity of demand.

For example, if an estimated demand function is reported as under:

Log Dx = 10.3 – 2.4 Log Px

Then, price elasticity of demand is 2.4 as suggested by b_1 coefficient. It means that when price rises by 1%, the demand for x falls by 2.4%.

In case of multiple regression model thus:

Log Dx = 5.2 – 1.33 Log Px + 0.92 Log M + 0.85 Log Py

(Where Px = price of substitute/complementary product.

Price elasticity of demand is 1.33

Income-elasticity of demand is 0.92.

and cross elasticity of demand is 0.85)

It should be noted that +ve sign to the variable Py implies that the commodity Y is a substitute for commodity X. A negative (–) sign would in this case suggest Y to be complementary product.

4. PROPERTIES OF EMPIRICAL RESULTS

In empirical studies usually regression equation is measured by adopting Ordinary Least Square (OLS) method in estimating the demand function. Normally, the estimated demand function in a case study is reported with the following details:

- **Parameters.** Demand equation with estimated values of parameters coefficients such as b_1, b_2, etc.
- **Coefficient of determination.** The R^2 indicates the degree of fitness of the regression, *i.e.*, how good or well the sample regression line fit the data. sometimes R^{-2} is also used. It refers to adjusted R^2. A high value of R^2, which is nearer to 0.99, or 1.0 indicates that the fit is very good. In fact, the value of R^2 implies the extent to which the variation in explanatory variable can explain the variation in dependent variable. For instance, in a demand function:

  Dx = 30 – 1.5Px;

  R^2 = 0.876

  Implies that 88 per cent cases of change in demand are explained by the change of price in the given set of data on the basis of which the demand function is estimated.

  Usually the higher value of R^2, the estimated equation is regarded to be a better one on the goodness of it.
- **Test of Significance.** It is conducted through *t*-test. *t*-statistics are generally reported in parenthesis below the parameter coefficients, such as b_0, b_1, etc., estimated *t*-values indicate the statistical significance of the particular coefficient at 1%, 5% or 10% level of significance (or 99% or 90% of probability confidence internal). A high value (above 2 as a rule of thumb at 5% level of significance) of estimated *t* implies

that the particular variable is statistically significant in the model. A lower value would mean that it is statistically insignificant or less influential as a determinant. The estimated *t*-value is usually compared with critical *t*-value obtained from the student t-distribution table. When estimated t > critical t, it is statistically significant, otherwise not.

All these above-mentioned statistical econometric characteristics are automatically measured and reported in computer software programes for estimating the regression equation. The manager needs to learn the art of interpretation and develop his logic of choice decision-making power through grasping this technique.

Some case studies, illustration and problem regarding the empirical demand function and their significance in managerial decision-making discussed below, would be useful in better understanding the practical application of demand analysis.

5. DEMAND FUNCTION ILLUSTRATION/PROBLEM

The demand function for beer in a city is:

$Qd = 400 - 4P$

Where,

Qd = the quality demand of beer (in '000 bottles per week).

P = the price of beer per bottle.

Construct a demand curve assuming price Rs. 10, 12, 15, 20 and 25 per bottle.

Solution:

(a) $P = 10$: $Qd = 400 - 4 \times 10 = 360$

(b) $P = 12$: $Qd = 400 - 4 \times 12 = 352$

(c) $P = 15$: $Qd = 400 - 4 \times 15 = 340$

(d) $P = 20$: $Qd = 400 - 4 \times 20 = 320$

(e) $P = 25$: $Qd = 400 - 4 \times 25 = 300$

With a suitable scale plot this data on a graph.

Such as:

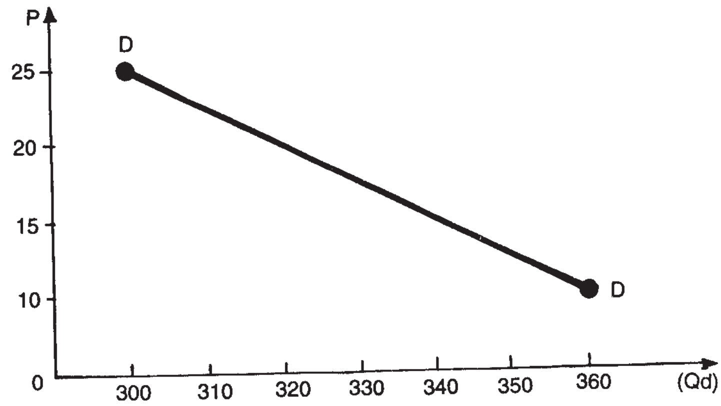


Fig. 7.2: The Demand Function for Beer

Scale : *Y*-axis : 2cm = 10

X-axis : 1cm = 10

(***Note***: For convenience there is a break in the scale from origin on X-axis).

DD is the linear demand curve derived on the basis of the given function and given the alternative price.

Demand Curve Equation

Raj Kumar & Co. the cabinetmaker has estimated the following demand function for the steel cabinets produced by them:

$Qd = 1{,}500 - 0.03P + 0.09AE$

Where,

Qd = quantity demanded of steel cabinets

P = average price of the steel cabinet

AE = the firm's advertising expenditure.

All data are on a quarterly basis. The firm currently spends Rs. 10,000 per quarter on advertising.

State the demand curve equation for the price-demand relationship. Give graphical representation assuming price variable values to be Rs. 10,000, Rs. 9,000, Rs. 8,000, Rs.7,000, and Rs. 6,000.

Solution:

Substituting the value for AE variable in the above equation, we have simplified price-demand equation as follows:

$Qd = 1{,}500 + 900 - 0.03P$

Thus:

P1 = Rs. 10,000 $\quad$ Q1 = $2{,}400 - 0.03 \times 10{,}000 = 2{,}400 - 300 = 2{,}100$

P2 = Rs. 9,000 $\quad$ Q2 = $2{,}400 - 0.03 \times 9{,}000 = 2{,}400 - 270 = 2{,}130$

P3 = Rs. 8,000 Q3 = 2,400 – 0.03 × 8,000 = 2,400 – 240 = 2,160

P4 = Rs. 7,000 Q4 = 2,400 – 0.03 × 7,000 = 2,400 – 210 = 2,190

P5 = Rs. 6,000 Q5 = 2,400 – 0.03 × 6,000 = 2,400 – 180 = 2,200

Case Study: Demand for Sweet Potatoes in the US

Using data for the period 1949-1972, Schrionper and Mathia (1975) estimated the demand for sweet potatoes in the United States as follows:

$$Ds = 7{,}609 - 1606\,Ps + 479\,Pw + 59\,PN + 947\,PCI - 271\,t$$

Where,

Ds = the Quantity of sweet potatoes sold annually per 1,000 hundred weight (cwt) in the country.

Ps = the farm price of sweet potatoes per **cmt. (real-dollar price)**

PN = the population number – two-yearly moving average, in millions

PCI = the real per capita personal disposable income **('000 USA).**

Pw = the real dollar price of white potatoes per cwt.

t = time trend (t = 1 for 1949...**up to t = 24 for 1972).**

The Managerial Interpretation:

- For each one dollar increase in the price of sweet potatoes (Ps), its demand contracts by 1,606 annually.
- For each one dollar increase in the real price of white potatoes the substitution effect causes the annual demand for sweet potatoes to rise by **479,** but it falls by **271** with each passing year (as per the coefficients of time trend variable *t*).
- For each population number increases by one million the demand for sweet potatoes increases by 59.
- For each increase in per capita real income by US $1,000, the demand for sweet potatoes increases **by 947.**
- Given the actual values of the determinants for the year 1972, as under:

PN = 208.78, *PCI* = 3.19, *Pw* = 2.41 and *t* = 24, we can obtain the price-demand function as follows:

$$\begin{aligned} Ds &= 7{,}609 - 1{,}606Ps + \mathbf{479}\,(2.41) + 59\,(208.78) + 947\,(3.19) - 271\,(24) \\ &= 7{,}609 - 1{,}606Ps + 1{,}149.6 + 12{,}318.02 + 3{,}020.93 - 6{,}504 \\ &= 17{,}594 - 1{,}606Ps \end{aligned}$$

At *Ps* = 5 US $ per **9**'000 cwt in 1972, total demand is:

$$Ds = 17{,}594 - 1{,}606\,(5) = 9{,}564$$

Price elasticity of demand in this case is worked out as:

$ep = b\ (P/Q)$

$= 1{,}606\ (5/9{,}564)$

$= 0.84$

This suggests the demand for sweet potatoes to be price inelastic. Elasticity is less than unity.

6. HYPOTHETICAL CASES OF DEMAND ESTIMATION

Demand Function for Passenger Cars

An automobile firm specified the following linear demand function (*Dc*) for the domestic car market:

$$Dc = b_0 + b_1\ Pc + b_2\ Yd + b_3\ Pm + b_4\ MIG + b_5\ Ri + u$$

where, the terms b_0 ....b_5 are the parameters of the demand function/equation — which are to be estimated on the basis of the sample data.

Pc = Average price of the new domestic cars (measured in '0000)

Yd = Disposable per capita income (in Rs.)

Pm = Average price for the imported cars (in Rs.)

MIG = The number of people in the middle income group.

Ri = Average rate (%) of interest charged by the banks on car loans.

The demand function is estimated by collecting time series data on yearly basis, as under:

$$Dc = -21 - 0.000003\ Pc + 0.000002\ Yd + 0.000004\ Pm + 0.0005\ MIG - 0.63\ Ri$$

$$R^2 = 0.95$$

(Here, *Dc* is measured in '000 units).

Managerial Interpretation

$R^2 = 0.95$ suggests that the fit is good, indicating that 95% of the total variation in demand for domestic cars can be explained by the variations in the specified determinants.

Intercept coefficient — 21 has no economic meaning.

Parameter values estimated implies that:

- The demand for domestic cars falls by 0.000003 units (*i.e.,* 0.03) cars for each increase in its price by Rupee 1.
- The demand increases by 0.000002 units (*i.e.,* 0.02 cars) with each Rupee 1 increase of the disposable per capita income.

- The demand for domestic car increases by 0.00004 units (*i.e.,* 0.04 cars) with every Rupee 1 rise in the price of imported cars.
- With every additional million persons in the middle income group in urban areas, the demand for domestic cars increases by 0.0005 units (*i.e.,* 50 cars).
- With each 1% increase in the interest rates on car loans, the demand for car decreases by 0.63 units (*i.e.,* 6,300 cars).

To measure the total annual demand for the domestic cars, thus, each parameter in the above demand equation is to be multiplied by the given value of the related determinant and the product is summed up.

Suppose:

Pc = Rs. 1,25,000

Yd = Rs. 13,000

Pm = Rs. 2,10,000

MIG = 2,00,000 in a city

Ri = 10%

Thus, $Dc = -21 - (0.000003 \times 125{,}000) + (0.000002 \times 13{,}000) + (0.000004 \times 2{,}10{,}000) + (0.005 \times 2{,}0{,}000) - (0.63 \times 0.10) = 973.191$

Thus, Annual demand for domestic cars estimated to be 97,319 passenger cars.

Demand Function for Cheese

Suppose a market survey has identified the multi-variate demand function for Amul Cheese in Mumbai, as follows:

$$Qx = 2 - 5Px + 6Py - 15Pz + 0.001\ Yd$$

Where,

Qx = Annual consumption per family of Amul Cheese, in kgs

Pc = Price per kg of Amul Cheese

Py = Price per kg of Vijaya Cheese

Pz = Price per kg of Britannia Bread

Yd = Median annual family disposable income.

Managerial Interpretation

The parameters of the above stated demand equation show the effect of each upon the overall demand when all other determinants (variables) are kept constant, as follows:

- Intercept value 2 indicates autonomous demand for cheese — irrespective of the influence of the identified determinants.

- $5Px$ indicates that a Re. 1 increase in the price of Amul Cheese will lead to 5 kg decrease in its annual demand per family.
- $6Py$ indicates that a Re. 1 increase in the price of Vijaya Cheese (substitute product) will cause a 6 kg increase in demand for Amul Cheese.
- $-15\ Pz$ implies that a Re. 1 increase in the price of Britannia Bread (complementary product) will lead to 15 kg decrease in the demand for Amul Cheese.
- $0.001\ Yd$ suggest that a Rs.1,000 increase in median family disposable income will lead to a one kg increase in demand for Amul Cheese.

Let,

Px = Rs. 100

Py = Rs. 90

Pz = Rs. 5

Yd = Rs. 50,000

then, we may workout the demand/sales of Amul Cheese as:

$$Qx = 2 - (5 \times 100) + (6 \times 90) - (15 \times 5) + (0.001 \times 50{,}000)$$
$$= 2 - 500 + 540 - 75 + 50$$
$$= 63$$

that is to say, the annual demand on expected sale of Amul Cheese is 63 kg per family.

If we take the demand (Qx) as a function of price (Px), other things being equal, we may estimate

$$Qx = (2 + 540 - 75 + 50) - 5Px$$
$$Qx = 517 - 5Px$$

At price, Px = Rs. 100, the demand for Amul Cheese is measured to be:

$$Qx = 570 - 5(100) = 17 \text{ kg}$$

If Amul Cheese price is raised by 2 per cent, the demand would be:

$$Qx = 517 - 5(102) = 7 \text{ kg}$$

Demand Function in Decision-making

Demand function for the educational books published by the Himalaya Publishing House (HPH) is estimated as under:

$$Q_a = 20000 - 50P_a + 60P_b + 0.5PCI$$

Where, P_a = the average price charged for the educational books by the HPH

P_b = the average price charged by the rival publishers.

PCI = per capita income of the average buyers:

Given that P_a = Rs. 100, P_b = Rs. 110, and PCI = Rs. 15,000.

In this situation, the manager of the HPH seeks to determine:

(a) The effect of price increase on the total revenue;

(b) The probable impact of lowering prices by rival publishers; and

(c) The effect of rising per capita income on the sales volume.

Solution:

(a) To assume the effect of a price rise on total revenue in this case, the manager has to compute the price elasticity of demand. The demand function is simplified, thus:

$$Q_a = 20{,}000 + 110(60) + 0.5(15{,}000) - 50P_a$$

$$Q_a = 34{,}100 - 50P_a$$

$$\therefore Q_a = 34{,}100 - 5{,}000 = 29{,}100$$

Since $b = \dfrac{\Delta Q_a}{\Delta P_a} = -50$

$$\therefore e = \frac{\Delta Q_a}{\Delta P_a} \times \frac{P_a}{Q_a} \text{ or } e = b\left(\frac{P_a}{Q_a}\right)$$

$$= -50 \times 100/29{,}100 = -0.17$$

Decision: The demand for educational books being inelastic (0.17): ($e < 1$), total revenue would increase with the increase in price.

(b) To know the effect of rival publishers' pricing policy, the manager should workout cross-price elasticity of demand:

$$\therefore e_c = \frac{\Delta Q_a}{\Delta P_b} \times \frac{P_b}{Q_a} \text{ or } e_c = b\left(\frac{P_b}{Q_a}\right)$$

In this case: $DQ_a/DP_b = 60$, at $P_b = 110$ and $Q_a = 29100$

$\therefore e_c = 60 \times 110/29100 = 0.23$

The cross price elasticity coefficient 0.23 suggests that a 10% decrease in the price of rival publishers' books would result in a 2.3% decrease in demand for HPH books and *vice versa*.

(c) To trace the impact of change in income, the manager should workout income elasticity of demand, thus:

$$\therefore e_m = \frac{\Delta Q_a}{\Delta m} \times \frac{m}{Q_a} \text{ or } e_m = b\left(\frac{m}{Q_a}\right)$$

Here, slope coefficient (b):

$$\frac{\Delta Q_a}{\Delta m} = 0.5$$

At given per capita income $= 15{,}000$, $Q_a = 29{,}100$

$\therefore e_m = 0.5 \times 15{,}000/29{,}100 = 0.26$

Since $e_m < 1$, the educational books are a necessary good. Demand being income inelastic, when income rises by 10%, the rise in demand for the HPH books will be less than proportionate — only 2.6%.

7. A REVIEW OF SELECT CASE STUDIES ON DEMAND ESTIMATION

A manager needs to recognise important determinants of demand for his firm's product as well as the total market demand. Some of the determining variables such as price, sales promotion policy, *i.e.*, advertisement expenditure, quality of product are to an extent controllable by the firm. Quantitative estimates of demand function, thus, provide a scientific base to managerial decision-making in business. Below a few selected case studies available from the literature are reviewed briefly, so as to provide some idea of actual demand analysis in practice.

In empirical measurement of a demand function one should notice that all the determinants may not be directly or readily quantifiable. Attributes or qualitative variables such as race, religion, sex, strikes, government policy, urban-rural, etc., may need to be quantified by constructing artificial variables called 'dummy' or 'binary' variables which may take on values of 0 or 1, where 0 indicating the absence of an attribute and 1 indicating the presence of that attribute. *For example,* 1 may show that a person is a male and 0 implies a female.

Case Study 1: Demand Function for Chicken

The demand function for chicken in the United States for the period 1960 to 1992 is estimated by Gujarati (1992) as under:

$$\text{Log } Y = 2.033 + 0.452 \log X^2 - 0.372 \log X^3$$

$$t = (17.597) \ (18.284) \ (-5.864)$$

$$R^2 = 0.98$$

Where Y = per capita consumption of chicken (Lbs.)

X^2 = the real disposable in come per capita

X^3 = the real retail price (in cents) of chicken per pound.

As seen from the R^2, the model is a good fit explaining 98 per cent of variation in dependent variable by the determinant variables. The parameter coefficients are also significant as estimated t-values are high. The demand equation suggests that income elasticity of demand for chicken in the US is 0.45, which is less than unity. Thus, demand is inelastic to income variable. Similarly, the price elasticity of demand for chicken in the US is less than unity (0.37).

What can we say about business implication of such a demand function?

Demand for chicken being price inelastic, an increase in price of chicken will lead to increase in the sales revenue. Similarly, a decrease in price of chicken will lead to decrease in the sales revenue. If average growth rate of per capita income in the country is 3 per cent, demand for chicken will rise annually by 1.2 per cent only.

An increase in the number of poultry farms and the growth of their size leading to an increase in the supply of chicken in the market would cause a decrease in the market price of chicken leading to a fall in sales revenue of each seller and a decline in their profit margin. This means there is no large scope for the new entrants in the poultry farming business, unless there is an export market for chicken, through growth of frozen chicken processing industry exploited and expanded.

Case Study 2: The Demand for Air Travel

Cigliano (1980) estimated the price and income elasticities for Airline Travel in the North Atlantic Market on the basis of 1965-1978 data. He worked out the demand function for air travel between the US and Europe as under:

$$\text{Log } Qt = 2.74 - \underset{(-5.07)}{1.25} \log Pt + \underset{(7.29)}{1.91} \log GNPt$$

$$\bar{R}^2 = 0.97$$

Where,

Q = number of passengers (in '000) on planes run by the International Air Transport Association (IATA).

P = average annual air fair between New York and London.

GNP = gross national product of the U.S.

t = time element (yearly basis)

(Parentheses represent t-stastics value.)

Managerial Interpretation

The coefficient of determination: $\bar{R}^2 = 0.97$ suggests that the model is a good fit explaining 97% of the variations. T-stastics values being high imply that price and income variable (parameter coefficients) are significant in carrying their influence on demand behaviour. This being double-log function, the price and income elasticities are directly captured from the slope parameters. As such, price elasticity of demand for air travel in this sector is 1.25 and income elasticity of demand is 1.91. This means, with a 10% rise in air fare, the travel demand falls by 12.5 per cent and *vice versa*. On the other hand if GNP of the country increases by 10% the demand increases by 19.1%. This also suggests that the air travel is a luxury and price elastic. Hence, during off-season when flights are going almost half-empty at regular price, a lower off-season price would benefit the air lines increasing their sales revenues without increasing their operational expenses.

In this investigation, Cigliano also observed great difference of price elasticities for different classes of air-travel, such as economy DW-class 1.83 and business class/1st class 0.45. This justifies price discrimination, *i.e.,* charging much higher fare to the business class and lower fare to the economy class passengers in order to maximise sales revenue and profits by the airlines.

Case Study 3: Imports Demand Function

Patra and Ranjan (1992) have developed the following import demand for select sectors of India:

$$QM = f\ (GDPfc,\ Pm,\ DWP,\ DP,\ RFA)$$

Where,

QM = Quantity of imports

$GDPfc$ = Gross domestic product at factor cost

Pm = Unit value of imports

DWP = Domestic wholesale price

DP = Domestic production

RFA = Real foreign assets

In log-linear form, this demand function can be expressed as:

$$\text{Log } Qm = b_0 + b_1 \log GDPfc + b_2 \log Pm + b_3 \log DWP + b_4 \log DP + \log RFA.$$

Using 1970-71 to 1988-89 data for the India's imports, Patra and Ranjan (1992) have estimated the aggregate price elasticity of imports to be –0.42 and aggregate income elasticity of imports to 1.57, suggesting that India's imports are price inelastic and income elastic. This implies that even if import prices due to fall in exchange rates (external value) of rupee or rising prices in the world economy, India's imports are less likely to decline significantly. Besides, economic growth rate when accelerates and the country income is rising, imports will also rise. This means, imports have a good scope for business under globalising liberalised Indian economy in recent years.

Case Study 4: Demand Function for Handloom Textiles in Kolkata

Dasgupta (1996) estimated a demand function for Handloom Textiles in Kolkata in the year 1987-88 based on cross-sectional data from households obtained through two stage systematic random sampling method. On theoretical plane, the following model of demand function for handlooms was formulated:

$$\text{Log } PCEH = b_0 + b_1 PHC + b_2 PMC + b_3 FI + b_4 IG + b_5 TI + b_6 EDU + b_7 OC + b_8 MT$$

Where,

$PCEH$ = Per capita household expenditure on handloom

PHC = Price per meter of handloom cloth

PMC = Price per meter of mill cloth

FI = Family income

IG = Income group of the household (whether low income, middle income or high income)

TI = Total individuals in the household

EDU = Level of education of the householder (whether primary, secondary or university level)

OC = Occupation of the householder

MT = mother tongue of the householder

Price and family income and number of individuals in a household are quantitative variables, other determinants are qualitative. The effect of qualitative variables is taken into considerations by dummy variables.

A prior expected sign of the *PHC* variable is positive while that in the case of *PMC* should be negative. Positive signs are also expected in the case of family income and economic group. Negative sign is expected in the case of *TI*.

The log-linear model was fitted to the data of handloom buyers through the step write method with household per capita expenditure on handloom or dependent variable. The author has reported the final equation showing that in the log form the household per capita expenditure on handloom is positively related with price of Handloom (*PHC*), University education of head of household (*EDU*) and affluence of household (*IGH*) and negatively related to total number of members in the household (*TI*).

$$\text{Log } PCEH = \underset{(20.242)}{1.6926} + \underset{(13.494)}{0.0216}\, PHC + \underset{(2.460)}{0.1366}\, EDU + \underset{(3.824)}{0.2877}\, IGH - \underset{(-5.635)}{0.0982}\, TI$$

$$R^2 = 0.6264$$

(Figures in the parenthesis refer to *t*-statistics.)

Where,

PCEH = Per capita expenditure on handloom in each household

PHC = Average price of handloom clothing

EDU = Dummy variable for education of head of household — university level

(1 = University degree, 0 = otherwise)

GH = Income group – high level

Dummy variable for income group

(1 = high, 0 = otherwise)

TI = Total number of members in a household.

Managerial Interpretation

The above stated demand function may be interpreted as follows:

Other things being given, a one rupee increase in the handloom cloth price leads to 2.16 per cent rise in per capita expenditure on handloom. With every unit rise in household size the per capita expenditure falls by 9.82 per cent. The price is, however, the least important variable in deciding the per head amount of expenditure on handloom; the average price of handloom cloth has the smallest coefficient. On the other hand, the affluence of the household is the most important variable in deciding per capita expenditure, thus, demand for handloom followed by the university education of the head of household.

This suggests that non-price factors are more important than the price in determining the demand for handloom textiles in Kolkata. Handloom is more in demand with the improved economic status (higher income level) among the residents in the city. Weavers should, therefore, be encouraged to cater to the needs of the wealthier section and highly-educated people in the city.

The author thus, suggests that Bengal handloom industry for its betterment should shift its focus and expand the market in this segment (*i.e.,* educated high income group of buyers), catering to their special needs and choice. With this kind of approach it can hope to survive and counter the attacks from the mill sector in textile markets. This will also help in improving the earnings and welfare of the weaver clan in the city.

Case Study 5: Demand Function for Automobiles

Using the US data for 1921-1953, Chow (1957) estimated the following demand function for new automobiles in the country.

$$Qd = 0.075 - \underset{(0.047)}{0.231\, S_{t-1}} - \underset{(0.0026)}{0.0201\, P_t} + \underset{(0.0011)}{0.0117\, Yd_t}$$

$$R^2 = 0.86$$

Where, Qd = the annual purchase of new automobiles per capita

S_{t-1} = the stock of automobiles per capita at the end of the previous year

P_t = the price of automobiles relative to the consumer price index (*CPI*)

Yd_t = per capita disposable income at constant prices

Managerial Interpretation

The model fit is good as revealed by the high R^2. It explains 86 per cent of the variations. Further, the long-run price and income elasticities of demand for new automobiles, at average values, are worked out to be –0.63 and 3.0, respectively.

This result suggests that the demand for new automobiles is price inelastic, whereas it is highly income elastic.

Case Study 6: Demand Function for Tobacco

Koutsoyiannis (1963) identified the following demand function in general for Tobacco:

$$D = aM^{b}P^{c}\pi^{d}N^{k}e^{rt}$$

where,

D = Quantity of tobacco demanded

M = Money Income

P = Price of Tobacco goods

π = Index of prices of other goods

N = Adult population number

e = Base of natural logarithms

t = Time element — years

The above equation is related in double-log form, thus:

$$\text{Log } D = \log a + b \log M + c \log P + d \log \pi + k \log N + rt \log e$$

Further, parameters b, c, d and k represent constant elasticities. That means the elasticities of demand for tobacco with respect to income, price of tobacco, price of other goods and population number are taken as constant over time.

Moreover, the trend takes two forms of a constant rate of change per unit of time.

Taking data for the period 1950-1959, Koutsoyiannis estimated the following demand function for the USA.

$$\text{Log } D = \log - \underset{(-2.13)}{11.84419} - \underset{(-5.63)}{0.93726} \log P + \underset{(1.18)}{0.33698} \log M + \underset{(3.20)}{2.18760} \log N$$

$R^{-2} = 0.722 \quad DW = 1.134$

(Parentheses represent t-statistics)

The equation suggests that demand for tobacco is price inelastic. It is highly elastic with number of people. That means, tobacco consumption is influenced mainly by changes in the number of smokers in the country with increasing population.

Similarly, a demand function for tobacco is also measured for Australia during 1950-1959 and reported as under:

$$\text{Log } D = \log \underset{(-2.54)}{-32.48263} - \underset{(-3.43)}{0.36186} \log P + \underset{(0.81)}{0.42580} \log M + \underset{(2.08)}{0.042323} \log t$$

$R^2 = 0.971$

$DW = 1.445$

This equation also suggests price and income inelasticities of demand for tobacco. In fact, t-test shows that income is insignificant variable in this case.

Case Study 7: Demand Function for Cigarettes in India

Dholakia (1996) estimated the demand function for cigarettes in India based on data for the period 1982-83 to 1994-95 as follows:

$$DC = \underset{(5.61)}{23782} - \underset{(-3.73)}{20.239}\ PC + \underset{(3.66)}{138.390}\ PB - \underset{(-4.34)}{347.61}\ N + \underset{(2.78)}{39.712}\ CPI + \underset{(1.65)}{1.703}\ Yd$$

$$R^2 = 0.8727 \quad F = 9.60$$

(Parantheses represent *t*-value at 5 per cent level of significance).

Where, DC = demand for cigarettes

PC = price of cigarettes (in Rs. per 1,000)

PB = price of *Biris* (in Rs. per 1,000)

N = population number

CPI = consumer price index

Yd = real per capita disposal income (in Rs.)

Managerial Interpretation

The above stated estimated function suggests that the data fits well since R = 0.8727. Demand curve for cigarettes in relation to its price has a negative slope (since *PC*'s coefficient value is negative: –20.239).

Further, *t*-test suggest that price is also a significant determinant. The positive sign of coefficient for *Biris*, as equation further shows that disposable income has a positive influence on the demand for cigarettes. But, the income variable is insignificant as implied by the low value of *t*-statistics.

In short, the above demand function implies that demand for cigarettes in India is highly price elastic but relatively less income elastic. Dholakia also compares price elasticity of demand for cigarettes in India with that of the United States as measured by Gary Becker (1994). Gary Becker estimated the US price elasticity of demand for cigarettes to –0.4 in the short-run and –0.75 in the long-run. This suggests demand for cigarettes in the US to be price inelastic. Again, thus in India it is estimated to be highly elastic (at around –2). Dholakia argues that this difference is obvious, since cigarettes form only 16 per cent of the total consumption of tobacco in India, whereas in the US, it is the main form of tobacco consumption.

In India's case, therefore, when government tends to impose high taxes on cigarettes for revenue consideration, it may not be a paying proposition, as contrary to common belief cigarettes are not price inlastic in India, so when demand contracts in a greater proposition, revenues may not rise so sharply, and in all probability of decline in revenue from increased excise in cigarettes. This is a matter of detailed investigation through further research. Dholakia, however, observes that only 12 per cent of the tobacco users who consume cigarettes contribute almost 87 per cent of the excise revenue from the tobacco estate. This means incidence of tax on cigarettes is very high compared to other use of tobacco. Dholakia, therefore, infers the need to bring down the excise rates on cigarettes for the growth and exports potential of the Indian cigarettes industry. Incidentally, Gary Becker had also argued for a case against raising tax rates beyond its optimal limit on the cigarettes on the US, despite its price inelasticity beyond 95 cents (the optimal limit) on cigarettes, the tax revenue will tend to decline from this item.

Case Study 8: Demand Functions for Pizza

The Market Research Consultants of India at Mumbai compiled the data on sales (Q), price (P), advertising expenditure (A) and disposable income (Y) per households for the Sardar Pizza Ltd's 20 outlets in Maharashtra. A multiplicating demand model in double log-linear form [Log Q = b_0 + b_1 Log P + b_2 Log A + b_3 Log Y] was estimated. The computer-results are obtained as under:

Predictor	*Coefficient*	*t-Ratio*
Constant	– 12.6481	– 4.24
Log P	– 0.6802	– 3.36
Log A	1.2944	9.19
Log Y	1.1567	3.18
	R^2 = 98.9%	
	R^q = 94.5%	F static = 63.86

(a) Write the result in a suitable equation form, stating the demand model for empirical investigation.

(b) Indicate whether the demand for Pizza is price elastic, income elastic and advertising elastic. What are its policy implications for increasing the sales.

(c) Is the model a good fit? How?

Solutions

(a) Demand Model for Empirical Estimation:

$$\text{Log } Q = b_0 + b_1 \text{ Log } P + b_2 \text{ Log } A + b_3 \text{ Log } Y$$

Estimated demand function:

$$\text{Log } Q = -\ 12.6481 - 0.6802 \text{ Log } P + 1.2944 \text{ Log } A + 1.1567 \text{ log } Y$$

$$(-4.24) \qquad (-3.36) \qquad\qquad (9.19) \qquad\qquad (3.18)$$

(Parenthesis represent t-statistics.)

(b) Double-log model beta coefficients capture demand elasticities directly.

Thus,

- Price elasticity = 0.68
- Advertising elasticity = 1.29
- Income elasticity = 1.16

It follows that the demand for Pizza in this case is price inelastic ($e < 1$), while it is advertising and income elastic ($e > 1$). Advertising elasticity is higher than income elasticity.

In business policy, therefore, the firm should resort to more advertising to increase its sales.

(c) The model is a good fit. It explains almost 99% of variations in the dependent variable demand for pizza caused by the charges in the determinants (price, advertising and income).

Mini Case: Southwest Airlines CEO's Business View on Demand for Air-Travel

Usually air-travel is considered to be luxury for the comman people. The CEO of Southwest Airline, Herb Kelleher, long time back in 1972, held the view contrary to the belief that the air-travels are meant mostly for the well-to-do people and executive class rather.

Kelleher sought to make air travels affordable and accessible to ordinary people.

The U.S. Civil Aeronautic Board (CAB) had prescribed regulations for all inter-state fares for airlines in the USA. The Southwest Airline came out as inter-states airlines with a bargain fare in Texas, covering Dallas, Huston and San Antonio. Only one-class seatings were provided without any frills services. Simple cash receipts and reasonable plastic boarding passes were used for the cost economy. The consumers responded remarketably well to the low price air-travel.

Jet Blue a new airline, in 2000 entered into the US air travel market. It also followed the Southwest business model, but with a larger aircraft. Within two-year time, it had 27 Airbus A320 planes for the travel network covering 19 cities.

Recently in Malaysia, as against well established and government supported Malaysia Airlines (MAS), the new private Airline company called Air Asia, came out on the Southwest model, offering budget fare in selected centres and gradually extended up to Bangkok, in Thailand and Jakarta, Surabaya and other destinations in Indonesia. Air Asia's advertising slogan is – 'Now Every One Can Fly.'

Demand Chain Management

Often Supply Chain Management (SCM) is looked upon as a core component of global competitiveness, usually undermining the significance of Demand Chain Management (DCM). However, DCM can also be a source of core competitiveness of a global firm. For instance, retailers like Seven-Eleven of Japan and Longs Drug Stores of the United States have gained much through Demand Chain Management (DCM).

Demand knowledge is utterly important. The firm should know who are the customers for its products, what are their preferences, how do they make their purchases, where do they go for shopping, how frequent they order, what are their buying capacities and so on. DCM relates to gathering and using market demand information to respond to actual customer needs quickly and accurately by driving a replenishment system for the just-in-time of the reliable delivery of goods and services to customers.

Seven-Eleven Japan (SEJ)'s business consists convenience store chain numbering to more than 8,200 store in Japan. Retail stores of the SEJ are linked with the central headquarters through an Integrated Service Digital Network (ISDN). The firm collects demand information through point-of-sale data and analyses them region-wise, product-wise, and time-wise. The information is made available to all stage and suppliers for the effective Demand Chain Management.

Similarly, Longs Drug Stores in the United State uses DCM for the cost effective inventory management. The firm is using the NON-STOP solutions technology involving state-of-the-art methodology for optimisation of demand chain activities involving forecasting, inventory control, material handling, transportation and warehousing.

In short, DCM — the smart use of demand data — is crucial as the key to continuing success in modern business.

(***Source****:* Han L. Lee and S. Whang (2001): *"Demand Chain Excellence: The Tale of Two Retailers", Supply Chain Management Review,* March, pp. 21-26)

Case Study: Pricing Admission in a Tourist Spot: Kankaria Carnival at Maninagar in Ahmedabad

Ahmedabad is a capital city of Gujarat. It is now also clarified and characterised to be Mega-City in the Urbanisation development of the State.

Kankaria Talao (Lake) is a famous tourist spot in Ahmedabad. The government authorities have developed this place of recreation for the public with a carnival of zoo, children park with games and so on. Assume that you are an advisor to the Governing Board of the Kakaria Talao. The Governing Board is seeking your advice and suggestions to increase its revenue at this spot to adequately meet the maintenance costs.

Presently, the Admission Rate for Adult is Rs. 10 and for child under 11 years is Rs. 5.

The Chairman of the Governing Board has asked you to determine a suitable admission price strategy to improve the revenue from this source.

- What do you think?
- Would you suggest a rise in price of admission?
- Or a cut in price?
- Give reason.
- Prepare a brief report.

Hints:

- For a proper perception of the situation you need to collect details from the daily office records about the admission flows on weekdays and weekends and other public holidays and the number of adults and children visitors and the amount of revenue received by selling the admission tickets.
- Prepare a time-series of detail for two groups: *(I.)* Holidays *(II.)* Weekdays pertaining to the four variables:
    - Admission Price Adult (PA)
    - Admission Price Child (PC)
    - Adult Revenue (AR)
    - Child Revenue (CR)
- Take double-log model equations

Hints: Log AR (t) = bo + bi Log PA(t) ... (1)

Where,

AR = Adult Revenue

PA = Admission price adult

t = time element

Hints: Log CR(t) = bo + bi Log PC(t) ... (2)

Where,

CR = Child Revenue

PC = Admission price child

- In each equation as above, Hints represents the price elasticity coefficient.
- Workout these models for both the groups: Adult and child and for week-day and holidays.
- Obtain the value of Hints from regressions result in each case.
- Compare the elasticity coefficients in each case.
- If elasticity coefficients suggest that demand is more prices inelastic on holidays then raise the admission rates for adult and child, say from Rs. 10 to Rs. 12 and Rs. 5 to Rs. 6.

If elasticity coefficient shows that demand is highly price elastic, then better to reduce the admission price.

- Think of giving conventional admission price on weekdays to attract more people.
- Likewise, obtain data about the carnival items: Boating, zoo, etc., and workout demand elasticity and give suggestion about price strategy.
- For sake of practice and assignment, the student may workout the models with some imaginary data, produce result, give interpretation and write a professional report on consultancy.

MODEL QUESTIONS

1. Describe major steps involved in estimating the demand function for a product?
2. Illustrate citing hypothetical case study how demand function is useful in decision-making.

Problems

1. A Japanese firm developed a new compact camera. After one year, the following demand function is estimated:

   $Qx = -\ 190.14 - 1.05\ Px + 3.62\ Yd + 1.88\ Py + 3.98\ A$

   (32.11) (0.18) (1.92) (0.63) (1.25)

   $R^2 = 0.94$

   (Parentheses represent the standard errors of the coefficients)

   Where,

   Qx = The quantity demanded in thousands, Px = The price per unit in Rs., Yd = Per capita disposable income in Rs., Py = The price of competitive brand of camera, A = The monthly advertising budget

   The camera is currently sold at Rs. 2,000. The current values of the other variables are Yd = Rs. 20,000 per month.

   Interpret the demand function

   (i) Estimate the current monthly demand

   (ii) Work out price, income and cross elasticities

   (iii) Calculate promotional elasticity of demand

   (iv) Forecast the change in demand if the price of the camera in lowered to Rs. 1,800

2. Sawant Footwear has estimated the demand function for its 'Hero' shoes as under:

   $Qx = 250.68 - 410.31Pa + 1.24Y + 240.23Pb$

   (150.11) (0.47) (65.58)

Where,

Qx = Quantity demanded per month, Pa = The price of Hero Shoes, Y = Per capita income (GDP), Pb = The price of competitor's shoes, $R^2 = 0.933$

Figures in the parentheses are the standard errors of the coefficients

The current (1988) values of the determinants are:

Pa = Rs. 279.99 Pb = Rs. 274.99

GDP per capita = Rs. 15,000

1. Estimate the current demand for the Hero shoes.
2. Workout price elasticity of demand for the Hero shoes.
3. Workout cost elasticity of demand for the Hero shoes.
4. If GDP per capita income is expected to be Rs. 20,000 by the year 2000, predict the sales of Hero shoes.

3. Suppose the demand function for Amul butter in a town is estimated to be:

$Qd = 600 - 5P$

Where Qd is the quantity demand of butter (in, 000 kgs. per week) and P stands for the price.

(a) Estimate at what price demand would be zero? [Rs. 120]

(b) Draw a demand curve, at alternative price: Rs. 25, Rs. 35, Rs. 50, Rs. 60, and Rs. 80 per kg. [475, 425, 350, 300, 200]

(c) What is the statistical characteristic of these demand curves? [downward sloping]

4. Investigating the demand for textile in a country X, a researcher observed that the demand for textiles tends to rise by 1.5 per cent with one per cent decrease in the prices of textiles; with the rise in one per cent of per capita GDP, the demand for textiles rises by 0.45 per cent and when food prices increase by one per cent the demand for textiles contract by 0.93 per cent.

(a) Identify the types of demand elasticity in this case and define them.

(b) Which type of elasticity the textile mills should consider significant for the business development?

(c) How much rise in sales is expected, during a festival season by offering 20 per cent discount by textile mills show rooms?

5. Give your managerial comments on the following. Demand function for cigarettes in country X.

$$Qd = 2.033 - \underset{(-3.711)}{0.633 \log P} + \underset{(2.855)}{1.987 \log PN} + \underset{(1.235)}{1.123 \log PCI}$$

❒ ❒ ❒

8

CHAPTER

Demand Analysis in Business Forecasting

1. THE MEANING OF DEMAND FORECASTING

In modern business, production is often made in anticipation of demand. Anticipation of demand implies demand forecasting. Forecasting means expectations about the future course of development. The future is uncertain. But, not entirely so. Hence, one can hopefully predict the future event and reasonably gain. Demand forecasting means expectation about the future course of the market demand for a product. Demand forecasting is based on the statistical data about past behaviour and empirical relationships of the demand determinants.

> Demand forecasting is not a speculative exercise into the unknown. It is essentially a reasonable judgement of future probabilities of the market events based on scientific background. Demand forecasting is an estimate of the future demand. It cannot be hundred per cent precise. But, it gives a reliable approximation regarding the possible outcome, with a reasonable accuracy. It is based on the mathematical laws of probability.

Demand forecasting may be undertaken at the following levels:

- **Micro level.** It refers to the demand forecasting by the individual business firm for estimating the demand for its product.
- **Industry level.** It refers to the demand estimate for the product of the industry as a whole. It is undertaken by an Industrial or Trade Association. It relates to the market demand as a whole.
- **Macro level.** It refers to the aggregate demand for the industrial output by the nation as a whole. It is based on the national income or aggregate expenditure of the country. Country's consumption function provides an estimate for the demand

forecasting at macro level. Consumption function refers to the functional relationship between the disposable income[1] and consumption. It shows the propensity to consume or different levels of consumption expenditure by the community at the varying levels of income. With the growth of national income, consumption expenditure increases, as such, overall demand for goods and services in general may tend to rise.

2. THE SIGNIFICANCE OF DEMAND FORECASTING IN BUSINESS

Demand forecasting is very essential in the course of business decision-making. Its significance may be traced as under:

- **Production Planning.** Demand forecasting is a prerequisite for the production planning of a business firm. Expansion of output of the firm should be based on the estimates of likely demand, otherwise there may be overproduction and consequent losses may have to be faced.
- **Sales Forecasting.** Sales forecasting is based on the demand forecasting. Promotional efforts of the firm should be based on sales forecasting.
- **Control of Business.** For controlling the business on a sound footing, it is essential to have a well conceived budgeting of costs and profits that is based on the forecast of annual demand/sales and prices.
- **Inventory Control.** A satisfactory control of business inventories, raw materials, intermediate goods, semi-finished product, finished product, spare parts, etc., requires satisfactory estimates of the future requirements which can be traced through demand forecasting.
- **Growth and Long-term Investment Programmes.** Demand forecasting is necessary for determining the growth rate of the firm and its long-term investment programmes and planning.
- **Stability.** Stability in production and employment over a period of time can be made effective by the management in the light of the suitable forecasting about market demand and other business variables and smoothening of the business operations through counter-cyclical and seasonally adjusted business programmes.
- **Economic Planning and Policy-Making.** Demand forecasting at macro level for the nation as a whole is of a great help to the planners and policy-makers for a better planning and rational allocation of the country's productional resources. The government can determine its import and export policies in view of the long-term demand forecasting for various goods in the country.

1. Disposable income refers to net income after deduction of tax.

3. SHORT-TERM AND LONG-TERM FORECASTING

For business decision-making purposes, a firm may undertake short-term and long-term forecasting of demand and other variables.

Short-term Forecasting

Short-term forecasting normally relates to a period not exceeding a year. Some writers like Professor E. J. Douglas (1994) prefers to use the term demand estimation for short-term demand forecasting. To him demand estimation refers to the determination of the volume of current demand for a firm's product, for a short period say over a month or a year.

Short-term forecasts relate to the day-to-day particulars which are concerned with tactical decisions under the given resource constraints; as in the short-run, the available resources, scale of operations, etc., are fixed or unalterable, by and large. In short-term forecasting, a firm is primarily concerned with the optimum ulitisation of its existing production capacity.

Short-term forecasting may serve the following purposes:

- **Evolving a Sales Policy.** A short-term demand forecasting is useful in evolving a suitable sales policy in view of the seasonal variation of demand and so as to avoid the problem of short supply or overproduction of the firm's products in the market.
- **Determining Price Policy.** Short-term sales forecasting will help the firm in determination of a suitable price policy to clear off the stocks during off-season, and to take advantage in the peak season.
- **Evolving a Purchase Policy.** In view of the short-term forecasting of material prices, a firm can evolve a rational purchase policy for buying raw materials and control its inventory stocks with a greater economy.
- **Fixation of Sales Targets.** Demand and sales forecasting in the short-term helps the business firm in setting sales targets and for establishing controls over the business. It is no use fixing high sales targets, when sales forecasting reveals a decline in a quarter.
- **Determining Short-term Financial Planning.** A firm's short-term financial policy and planning can be suitably determined on the basis of short-term demand forecasting. A firm's need for cash depends on its production and sales. Without sales forecasting, a rational financial planning is not possible.

Long-term Forecasting

Long-term forecasting refers to the forecasts prepared for long period during which the firm's scale of operations or the production capacity may be expanded or reduced.

Long-term forecasts are normally for the periods exceeding a year, usually 3-5 years or even a decade or more. Functionally, the long periods which permit alternations in the scale of production differ from industry to industry and firm to firm.

A long-term forecasting relates to those informations which are vital for undertaking strategic decisions of the business pertaining to its expansion or contraction over a period of time.

In business decision-making, long-term forecasting may serve the following purposes:

- **Business Planning.** Long-term forecasting is of great assistance to long-term business planning. Long-term demand potential will provide the required guidelines for planning of a new business unit or for the expansion of the existing one. Capital budgeting by a firm is based on the long-term demand forecasting.
- **Manpower Planning.** It is essential to determine long-term sales forecast for an appropriate manpower planning by the firm in view of its long-term growth and progress of the business.
- **Long-term Financial Planning.** Finance is the kingpin of the modern business. In view of the long-term demand and sales forecasting and the production planning, it becomes easier for the firm to determine its long-term financial planning and programmes for raising the funds from the capital market.

In this way, long-term forecasting may have several important implications for long-term planning of a business firm.

4. GENERAL APPROACH TO DEMAND FORECASTING

Following Professors Haynes, Mote and Paul (1970), we may spell out the important steps in dealing with any demand forecasting problem as under:

- **Specification of Objectives.** Identify and clearly lay down the objectives of forecasting, whether it is short-term forecasts, forecasts of market shares or a general industry forecast.
- **Identification of Demand Determinants.** Ascertain the determining variables of the demand function for the product.

There are three important categories of goods, *viz.*, consumers' durable goods, consumers' non-durable goods, and capital goods. Demand determinants of these categories are also different.

Demand for non-durable consumers' goods is largely affected by the factors like price (P), disposable personal income (y) and demographic characteristics (D) of the country. Thus, the demand function for customers' non-durables can be identified as:

$$Qd = f(P, y, D)$$

where, Qd refers to the quantity demanded.

For durable goods, total market demand is composed of new owner demand and replacement demand. Consumer credit facilities also play an important role in determining such demand. Recently, the payment facilities introduced by the car producers/dealers have augmented the demand for cars in India.

For estimating the demand for capital goods, we have to consider the growth prospects of the present product as well as the capital-output ratio.

- **Choice of Methods of Forecasting.** Another step is to select suitable methods of forecasting in view of the objectives, availability of data, etc. Business indicators may serve the purpose for short-term forecast. Regression analysis is essential for the long-term forecast.
- **Interpretation.** Once the data are collected and statistical estimates are made, their implications are to be judged for policy-making. Interpretation of demand/sales forecasting is an art. It is very significant for business decision-making.

Normally, forecasts are made on annual basis. They are also subdivided monthwise or weekwise for further analysis.

5. THE SOURCES OF DATA COLLECTION FOR BUSINESS FORECASTING

Through a market research, a variety of informations — qualitative and quantitative, called "data" have to be collected prior to the estimation of demand function and business forecasting. These informations may be pertaining to various aspects of the market and demand, such as effective demand in the past and present, nature of product, types of consumer — whether domestic consumers or industrial consumers, age, sex and income of the consumers and their attitude, preferences, tastes, habits, etc., price quotations in the retail and wholesale markets, market territories — whether urban, rural, local, national, international or global, nature of market structure on the basis of the degree of competition, methods used for sales promotion, *e.g.,* advertising, free samples, discounts, window display, and so on, as well as the expenditures so incurred or involved.

Primary and Secondary Data

The marker research may be based on two types of sources of data collection, *viz.,* primary sources and secondary sources, providing primary data and secondary data, respectively.

Primary data or informations are original in character which are collected for the first time for the purpose of analysis. Primary data are raw data and require statistical processing.

Secondary data or informations are those which are obtained from someone else's records. These data are already in existence in the recorded or published forms. Secondary data are like finished products since they have been processed statistically in some form or the other.

In a market research for the demand analysis, a beginning may be made with the collection of secondary data, which would provide clues for further inquiry.

Secondary Sources of Data

There are ample secondary sources for collecting the required information for market and demand analysis. The main source of such data are:

- Official publications of the Central, State and Local governments, such as *Plan documents, Census of India, Statistical Abstracts of the Indian Union, Annual Survey of Industries, Annual Bulletin of Statistics of Exports and Imports, Monthly Studies of Production of Selected Industries, Economic Survey, National Sample Survey Reports,* etc.
- Trade and technical or economic journals and publications like the Economic and Political Weekly, Indian Economic Journal, Stock Exchange *Directory, Basic Statistics* and other informations supplied by the Centre for Monitoring Indian Economy, etc.
- Official publications like the Reserve Bank of India, *e.g., Annual Report on Currency and Finance, Monthly Bulletin of Reserve Bank of India,* etc.
- Official publications of international bodies like the IMF, UNO, World Bank, etc.
- Market reports and trade bulletins published by stock exchange, trader associations, large business houses, chambers of commerce, etc.
- Publications brought out by research institutions, universities, associations, etc.
- Unpublished data such as firm's accountbooks showing data about sales, profits, etc.
- Secondary data should not be taken at their face value and are never to be used blindly. A careful and searching inquiry must be made as to the meaning and limitations of these data as well as their adoptability and relevance for the purpose of the present investigation. However, it must be emphasised that government publications and reports, surveys, etc., as also parliamentary papers, are most authentic. In India, we have a veritable treasure of such data.

Primary Sources/Methods

Secondary informations may not be sufficient for a meaningful and accurate market research. It is to be supported and supplemental by the primary data. Further, many a time, secondary data may not be available, or may not be suitable for a particular type of market and demand analysis. Then, there is no alternative, but to resort to the primary sources of data collection.

For demand forecasting purposes, usually, two primary methods are resorted to:

- Market Survey/Studies or the Survey method; and
- Market Experimentation.

6. MARKET SURVEY/STUDIES

The market survey is the most direct approach to demand forecasting in the short run. It may be a sample survey or a census inquiry.

A census market inquiry means the inquiry of the entire universe or population, *i.e.,* covering all units or items involved in the total market field. It may be adopted in capital goods market where number of buyer-firms is limited. In most of consumer goods items, however, it would be a costly affair and time consuming also.

In large cases, therefore, market survey is essentially a sample survey. In the same survey, only a few items are selected from the given field and their details are obtained. From the sample data, however, statistical inferences are drawn for the entire population (*i.e.,* totality of all units of the field under consideration).

For the purpose of demand analysis, the market surveys may be conducted to obtain one or more of the following types of information:

- Total market demand.
- Increase in demand.
- Firm's share in the market demand.
- Consumers' income levels.
- Elasticities of demand in relation to price and income change.
- Consumers' motives.
- Consumers' preferences, habits, tastes, etc.
- Consumers' intentions and expectations.
- Consumers' reactions towards product improvement.
- Consumers' attitudes towards substitutes and complementary products.
- Impact of sales promotion effort on demand.
- Social status of buyers.
- Buyers' age, sex and educational level.
- Impact of government policies on the market behaviour.

There are two variants of the survey method:

(i) the consumer survey; and

(ii) the survey of sales forces or the collective opinion.

The Consumer Survey

A sample survey of the consumers may be undertaken questioning them about what they are planning or intending to buy. A questionnaire may be prepared in this regard. This may be mailed to the consumers. Or, it may be sent through enumerators (*i.e.,* field investigators).

In the questionnaire, the respondents (the consumers) may be asked for their reactions to hypothetical changes in demand determinants such as price, income, prices of substitutes, advertising, etc.

The informations collected through questionnaires are to be thoroughly scrutinised and edited to check inconsistencies, inaccuracy and incorrectness of the data supplied. These data may be classified and tabulated for systematic presentation and analysis.

Sometime, personal observations or the personal interview method may also be adopted to collect informations when there is a small sample size of consumer survey.

On the basis of the data/informations collected in the consumer survey, the managerial economist can construct important demand relationships, such as, price-demand, income-demand, advertisement expenditure-demand, cross demand, etc.

There are certain drawbacks of the consumer survey method. These are:

1. This method is expensive.
2. It is time consuming.
3. It is likely that the consumers may not be able to give correct answers and may not also cooperate in providing the answers.
4. Information obtained through consumer survey is likely to be limited or incomplete.
5. The success of this method also depends on the designing of questionnaire. An ill-drafted questionnaire may lead to distortions in the answer and unreliable information.
6. Cheating on the part of enumerators may also vitiate the results of the survey.

Nonetheless, the consumer surveys made through personal interview, observation or questionnaire method, are essential for knowing consumer expectations regarding future prices, income, inflation, and product improvement having impact on their demand functions. Changes in tastes and preferences can be detected only through consumer survey.

Consumer survey is useful for knowing the demand for new products where no past sales data are available. It is also useful in the case of industrial products, engineering goods, consumer durables, housing, etc., where buyers usually plan their purchases much in advance.

In short, the consumer survey method is useful for obtaining short-term forecasts based on people's intentions/expectations. Consumer survey is useful for knowing the demand for new products where no past sales data are available. It is also useful in the case of industrial products, engineering goods, consumer durables, housing, etc., where buyers usually plan their purchases much in advance.

The Collective Opinion

It is also referred to as salesforce polling and experts' opinion survey. Under this method, the salesmen have to report to the head office their estimates of expectations of sales in their territories. Such information can also be obtained from the retailers and wholesalers by the company. By aggregating these forecasts a generalisation on an average is made, which is also based on the value judgement and collective wisdom of top sales executives, marketing manager, business/managerial economists all together. Sometimes even experts' opinion is obtained from the dealers, distributors, suppliers or from the executives of the trade associations, or marketing consultants.

The opinion method is cheaper and easy to handle. It is less time consuming also. Its main drawback, however, is that it is subjective and subject to a high element of bias of the reporting agency.

The opinion method is based on the value judgement of the salesmen. It can be used for forecasting the sales for new products. It is also regarded as "hunch" method of business forecasting since it is based on the hunches of experts. Its main drawback is that it is subjective. Its accuracy depends on the intelligence of the reporting salesman. It cannot be relied upon for long-term business planning.

Delphi Method

Olaf Helmer originated the Delphi method in the late 1940s. Delphi method is used for conducting opinion poll or survey. Under this method, a group of experts are repeatedly questioned for their opinions or comments on some issues and their agreements and disagreements are clearly identified. It is a time-saving device. It can be effectively used for the heterogeneous group of experts with different backgrounds. Its major drawback is that it presupposes that its conductors are objective in approach and possess great thinking ability and power of reasoning.

Market Experimentation

Sometimes market experiments may be conducted to make certain specific observations.

There may be two types of market experimentation: *(1)* experimentation in laboratory, and *(2)* test marketing.

Experimentation in Laboratory

It is also referred to as the consumer clinic method. In this method, a consumer clinic or small laboratory is formed by creating an artificial market situation. To study consumer reaction to a change in demand variables, in the controlled conditions of the consumer clinic, the selected consumers are given a small amount of money and asked to buy certain items. The consumer behaviour in the clinic is thus observed and inferences are drawn.

It is expensive and time consuming method. The stimulated market situation may not be fully representing the actual market situation.

Test Marketing

In this method, a market experiment is performed under actual market conditions. First, a choice of the market for experiments is made and is segregated from the rest. The business firm then conducts the experiment in this market, under controlled conditions, by varying one or more of demand determinants like price, advertisement, packaging, etc. Consumer behaviour in the market is then observed and recorded. This may help in assessing the effects of changes in the determining variable on the consumer demands for the product.

Unlike consumer survey, in the case of market experiments, demand is estimated on the basis of actual purchases (and not intentions or expectations) of the consumer under the given or partially known conditions.

To ensure valid results, it is necessary that market experiments be conducted on sufficiently large-scale.

The following are the major drawbacks of market testing experimentation:

- It is a very expensive method.
- It is also quite a risky method, as experiments may be reacted upon by the consumers as well as dealers. There are all possibilities that the consumer may be driven away by price increase in the segmented market subject to experimentation.

It is also difficult to plan market experimentation under heterogeneous market conditions.

Further, when experiments are directly conducted in the field or market and not in the consumer clinic or laboratory, it is difficult to derive even one price elasticity of demand from the observations made, as other relevant demand determinants are also likely to change along with the price change.

In fact, survey and experimentation methods at the most give arc rather than point elasticities. Hence, coefficients in demand functions are not obtainable under these methods. These methods are, thus, not directly useful for prediction purposes.

Direct market experimentation are, however, very significant to provide best guidance for pricing the new product in the absence of statistical data. These are also useful in determining a suitable marketing strategy by verifying the results of statistical studies.

Market experimentations are, often conducted in advanced countries like the United States. In India, however, a market experimentation is hardly tried.

7. STATISTICAL METHODS OF FORECASTING DEMAND

Once market demand data are collected by the market survey or from the sales records of the firm, demand forecasting can be possible from such information.

There are various methods adopted to estimate potential demand. Some people do rely on personal judgement and experience. Some depend on statistical techniques. Statistical methods are, obviously, more scientific against crude value judgement used to estimate future demand.

It is, however, dangerous to rely solely either on value judgement or regard statistical calculations to be hundred per cent perfect. One must take a mid-way by combining statistical results with the value judgement. Again, different statistical forecasting methods are not mutually exclusive. They are to be used in combination for accuracy and cross-checking purposes.

For forecasting purposes, it is essential to estimate the structural form and parameters of the demand function empirically. In modern times, however, for demand forecasting purpose, statistical methods are preferred and commonly adopted. They are economical as well as more reliable.

In statistical analysis, economists usually resort to two types of data for demand estimation: *(i)* time series data and *(ii)* cross-sectional data.

Time Series Data

Time series data refer to data collected over a period of time recording historical changes in price, income, and other relevant variables influencing demand for a commodity. Time series analysis relate to the determination of change in a variable in relation to time. Usually, trend projections are important in this regard.

Cross-sectional Data

Cross-sectional analysis is undertaken to determine the effects of changes in determining variables like price, income, etc., on the demand for a commodity, at a point of time.

In time series analysis, for instance, for measuring income elasticity of demand, a sales income relationship may be established from the historical data and their past variations. In cross-sectional analysis, however, different levels of sales among different income groups may be compared at a specific point of time. The income elasticity is then estimated on the bases of differences so measured.

Sometimes, pooled data are also used. Pooled data implies a combination of time and cross-sectional data.

The important demand forecasting methods are:

- Consumption Level Method.
- Trend Projection Method.
- Regression Analysis and Econometric Method.

8. CONSUMPTION LEVEL METHOD

Consumption level demand may be estimated on the basis of the coefficients of income elasticity and price elasticity of demand.

Viewing, projected income level and income elasticity of demand relationship, demand forecasting may be made as under:

$$D^* = D\,(1 + M^* \cdot e_m)$$

where, D^* = Projected per capita demand

D = Per capita demand

M^* = Projected relative/percentage change in per capita income

e_m = Income elasticity of demand

Illustration: Suppose, the income elasticity of demand for chocolates is 3. In the year 1995, per capita income is $ 500 and per capita annual demand for chocolates is 10 million in a city. It is expected that in the year 2000 per capita income will be increased by 20 per cent. Then, the projected per capita demand for chocolates in 2000 will be:

$$D^* = (10)\ (1 + 0.5 \times 3)$$
$$= 10 \times 2.5 = 25$$

Similarly, price elasticity coefficient can be an easy method of demand estimation in view of the change in price, as follows:

$$D^* = D\ (1 + P^*.e)$$

where, D^* = Projected demand

D = Present demand

P^* = expected relative or percentage change in price

e = Price elasticity of demand.

Illustration: Present markets demand for commodity X is 2,000 kg. at Rs. 10 per kg. Its price-elasticity is 2. Suppose, if price declines to Rs. 5, then expected change in demand is:

$$D^* = (2{,}000)\ (1 + 0.5 \times 2)$$
$$= 4{,}000$$

9. TREND PROJECTIONS

A time series analysis of sales data over a period of time is considered to serve as a good guide for sales or demand forecasting.

For long-term demand forecasting, trend is computed from the time based demand function data.

Trends refer to the long-term persistent movement of data in one direction — upward or downward.

There are two important methods used for trend projections: *(i)* the method as moving averages, *(ii)* the least square method.

The Method of Moving Averages

A moving average forecast is based on the average of a certain number of most recent periods. One can select the number of months or years or other period units in the moving average according to how far back the data is relevant to future observations.

Under this method either 3-yearly, 4-yearly or 5-yearly, etc., moving average is calculated. First, moving total of the values in group of years (3, 4 or 5) is calculated, each time giving up the first preceding year from the group. Then, it is divided by the number of years in the group. This is evident from the following illustration:

Year	Demand ('000)	3-Yearly Moving Total	3-Yearly Moving Average (Trend) ('000)
1991	10	—	—
1992	12	36	12
1993	14	42	14
1994	16	45	15
1995	15	51	17
1996	20	54	18
1997	19	60	20
1998	21	—	—

The moving average (trend) so obtained is plotted on a graph and from graphical presentation forecasting is projected through the extension of the curve for the years ahead, measured on the x-axis.

The method of least squares is more scientific as compared to the method of moving averages. It uses the straight-line equation $Y = a + bX$, to fit the trend to the data.

Regression Analysis and Econometric Model Building

Most commonly for demand forecasting purposes, the parameters of the demand function are estimated with regression analysis. In demand regression, equations relevant variables have to be included with practical considerations and relevant data have to be obtained. To illustrate the point, we may cite a few examples: *(i)* Personal disposable income towards demand for consumer product, *(ii)* Agricultural or farm incomes towards demand for the agricultural equipments, fertilisers, etc., *(iii)* Construction contracts for demand towards building material such as cement, bricks, steel, tiles, etc., and *(iv)* Automobile registry over a period towards demand for car spare parts, petrol, etc.

Collecting such informations, demand parameters may be computed with the help of regression analysis.

Econometric models are very useful in this regard. Econometric models identify functional relationship between variables.

To illustrate such an econometric model in practice, Professors Haynes, Mote and Paul (1970) used the following equation for predicting the demand for passenger transport in a large city in India:

$$Y = 2.9 + 0.57X$$

where, Y = average number (lakh) of passengers carried per day in the city

X = mid-year population estimate (lakh) for the city.

Thus, to predict the demand for passenger transport (Y) for 1990, we have to put the value of mid-year population estimate for 1990 (*i.e.,* X).

Suppose, $X = 100$ lakh (for 1990)

Then, $Y = -2.9 + 5.7(100)$

$= -2.9 + 57 = 54.1$ lakh

There are various limitations to regression analysis of economic indicator. First of all, it is not easy to locate an appropriate economic indicator for demand forecasting of a particular product. Secondly, it is inapplicable for the new product as no past data are available in this case. However, the method is useful when there are time lags involved in demand data.

PRACTICAL PROBLEMS

P: 1. A departmental store conducted a study of the demand for men's shirts. It found that the average daily demand (D) in terms of price (P) is given by the equation:

$D = 700 - 5\ P$

(i) How many shirts per day can the store expect to sell at a price of Rs. 100 per shirt?

(ii) If the store wants to sell 100 shirts per day, what price should it charge?

(iii) What is the highest price anyone would be willing to pay?

Solution:

(i) $D = 700 - 5P$

Since $P = 100$

$\therefore\ D = 700 - 5\ (100) = 700 - 500 = 200$ **Ans. 200 Shirts**

(ii) $100 - 700 = 5P$

$\therefore\ 5P = 700 - 100$

$\therefore\ 5P = 700 - 100$

$\therefore\ P = \frac{600}{5} = 120$ **Ans. Rs. 120 Price**

(iii) $D = 700 - 5P$

Here $D = 1$

$\therefore\ 1 = 700 - 5P$

$\therefore 5P = 700 - 1$

$\therefore\ P = \frac{699}{5} = 139.8$ **Ans. 139.80**

P: 2. The annual sales of a company are as follows:

Year:	1991	1992	1993	1994	1995
Sales:	45	56	58	46	75

(Rs. 1,000)

Using the method of least squares, fit a straight-line trend and estimate the annual sales of 1987.

Solution:

Year	*Sales* y	*(1990 = 0) time-dev.* x	x^2	xy	*Estimated Trend* $Y = 45 + 5X$ *(Rs. '000)*
1991	45	1	1	45	56
1992	56	1	1	112	55
1993	78	3	9	234	60
1994	46	4	16	184	65
1995	75	5	25	375	70
$n = 5$	$\Sigma x = 300$	$\Sigma x = 15$	$\Sigma x^2 = 55$		Σxy — 950

Take normal equations:

$\Sigma y = n.a. + b\Sigma x$ ... (1)

$\Sigma xy = a\Sigma x + b\Sigma x^2$ ... (2)

Substituting the computed values, we have:

$300 = 5a + 15b$ ... (3)

$950 = 15a + 55b$ ... (4)

For solving them, thus:

Let us multiply equation (3) with 5

$\therefore 950 = 15a + 45b$

Thus, $950 = 15a + 55b$

$- 900 = - 15a - 45b$

$50 = 10b$

$$\therefore b = \frac{50}{10} = 5.$$

In $300 = 5a + 15b$, substituting $b = 5$

Thus, $300 = 5a + 15 \times 5$

$\therefore 5a = 300 - 75$

$\therefore 300 = 5a + 75$

$\therefore 5a = 225$

$\therefore\ a = \dfrac{225}{5} = 45$

Now, straight-line equation is: $Y = a + bX$

$\therefore\ Y - 45 + 5X$

$\therefore\ Y$ 1981 + 45 + 5 (1) = 50

Y 1982 = 45 + 5 (2) = 55

Y 1983 = 45 + 5 (3) = 60

Y 1984 = 45 + 5 (4) = 65

Y 1984 = 45 + 5 (5) = 70

Forecast for the year 1987

Y 1987 = 45 + 5 (7) = 80 $\therefore$ Rs. 80,000

P: 3 In order to predict the demand for passenger transport in Hyderabad, the following equation was used:

$Y = -2.9 + 0.57X$

The population is estimated to be 1,85,000 on January 1, 1977. Find out the demand for passenger transport.

Solution:

Y = –2.9 + 0.57 (1,85,000)

= –2.9 + 1,054,500

= 1,954,497

Ans. The demand for passenger transport is 1,954,497.

10. CRITERIA OF A GOOD FORECASTING METHOD

Joel Dean (1976) lays down the following criteria of a good forecasting method:

- **Accuracy.** Forecast should be accurate as far as possible. Its accuracy must be judged by examining the past forecasts in the light of the present situation.
- **Plausibility.** It implies management's understanding of the method used for forecasting. It is essential for a correct interpretation of the results.
- **Simplicity.** A simpler method is always more comprehensive than a complicated one.
- **Economy.** It should involve lesser costs as far as possible. Its costs must be compared against the benefits of forecasts.
- **Quickness.** It should yield quick results. A time consuming method may delay the decision-making process.

- **Flexibility.** Not only the forecast is to be maintained up to date, there should be possibility of changes to be incorporated in the relationships entailed in forecast procedure, time-to-time.

Demand Function for Oil and Demand Forecasting

Prof. Dermot Gately (1986) presented a model for the demand function for oil as follows:

$D(t) = b_0 + b_1 M(t) + b_2 P(t) + b_3 D(t - 1)$

Where, D = demand for oil; M = income; P = price; t = time element – current year; and $t - 1$ = previous year.

Applying lagged double log model of demand function towards time series data for the period 1950-1982, Gately estimated the demand for oil in the UK as under:

$LnDt = - 3.83 + 0.81\ LnMt - 0.15\ LnPt + 0.72\ LnDt - 1$

It follows that, current income has positive effect on demand for oil. Oil price carries a negative effect.

Forecasting Demand for Oil in 2000

Suppose daily demand for oil in the UK in 1999 is 2.1 million barrels and predicted income of the country for 2000 is pound sterling 110 billion. Current oil price in 2000 is pound sterling 30 per barrel. On the basis of this information, the demand for oil for 2000 is estimated as under:

$LnD(2000) = - 3.83 = 0.81\ Ln\ 11000000000 - 0.15\ Ln\ 30 + 0.72\ Ln\ 2100000$

$LnD(2000) = Ln\ 7.3786$

By anti-log:

$D(2000)$ = 2.39 million barrels per day

11. SALES GROWTH TREND ANALYSIS

For this analysis, a constant period by period percentage overtime is assumed. On the basis of annual compounding, the constant annual rate of sales growth model is stated as:

$St = S_0(1 + G\ )t$

where,

S = sales annuity (value/volume)

G = constant annual growth rate

0 = current period

t = time element

Log model in this case is: $\log St = \log S_0 + \log (1 + G)t$

For example:

Using a firm's sales data for 10 years, the following result is obtained:

$\log St = \log 1.78 + \log 0.21t$

$\therefore St = (\text{Anti-log } 1.78) \times (\text{Anti-log } 0.21)t$

12. BUSINESS FORECASTING FUNCTION: SOME REFLECTIONS ON PRACTICAL CONSIDERATIONS

Significance of Forecasting

In modern management, forecasts serve as the base for many business decisions and action plans.

Often, a forecast tends to provide a reasonable base upon which strategies and goals of a business firm can be established. A manager should know the market and sales forecasting relevant to the concerned business as well as the factors leading to the forecasts — which ultimately are to be played on in the decision-making and action plans.

Market and sales forecasting is actually a process which involves predicting consumer behaviour, understanding channel activities relating to a business, the comparative and competitive environment and advantages and, above all the concerned products.

Forecasting Philosophy

Forecasting philosophy can have several dimensions. According to Gordon-Rich (1997), the following four facets of the forecasting philosophy are crucial:

- Shipment is urged by consumption.
- Market is always dynamic.
- Forecast axioms are more important.
- A single forecast should link all planning activities.

Shipment Function

Consumption impels shipment. As such, shipments of a product are a function of retail sell. A conceptual formula in this context may be used as:

$S = (RM \times BS) + (RI)$

where,

S = shipments

RM = retail market

BS = brand share

RI = the change in retail inventories

This consumption view of the market can be used in a simple formula of consumption model, as mentioned below in Table 8.1, to explain forecasts to the management of a firm.

Table 8.1: The Consumption Model

(a) Market size Year	Change (%) (unit)	(b) Market share (%)	Change (%) (units)	(c) Retail market	Change (%)	(d) Retail inventory change (units)	Shipment	(e) Change (units)	(%)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1998	1000	—	48.0	—	480	—	0	480	—
1999	1100	10.0	49.0	2.0	539	12.3	16	555	15.6
2000	1210	11.0	51.0	4.1	617	14.5	13	630	13.5

In this consumption model, percentage change over price year for the size of market, market share, retail consumption and shipments provides a simple but useful cross validation forecast to serve as the base for decision-making. The management can look upon the key factors which influence sales and the assumptions involved that can be manipulated through action plans.

Market size and its growth serve as the foundation stone of the business forecasting. Different statistical models may be used and evaluated to determine the market size of a product.

A firm can manipulate its market share in several ways such as: through advertising, product improvement, pricing, discount policy, distribution strategies and so on.

A different job is to identify the degree of share change that can be achieved through marketing activity historically, and forecasted in practice. So also, it is not an easy task to estimate the changes in retail inventories. If this is not accurately measured shipments cannot be precisely forecasted, since shipments are measured as the net consumption resulted after the retail inventory change, (Gordon-Rich, 1997, p. 4).

Dynamic Condition of the Market

A modern business cannot be steady because the markets are never steady. Consumer behaviour, thus, always demands a change over a period of time. The marketing channels are, therefore, dynamically changing. In this context, demand forecasting serves as the basis of sales forecasting. This requires a correct signification and estimation of market demand function for a given product.

Forecast Axioms

It is the forecast axioms rather than the estimates which are more important for the management decisions. In shipment forecasting model, illustrated above, dynamics such as market growth and share goals tend to be more important in the decision-making. Without market parameters one cannot evaluate a forecast for a reasonable decision-making.

Single Forecast Approach

In coordinated business planning activities such as marketing, finance and production the same forecast should serve the base.

Forecasting Data and Model Building

Forecasting has to be obtained from various sources: order bookings, shipments records, cash registers of the retailers, market surveys conducted by the specialised organisations and so on.

The market research team of the firm plays an important role. They may also provide information on advertising effectiveness, brand awareness and consumer usage studies along with other relevant data (Gordon-Rich, 1997, p. 6).

The business research teams on practical consideration needs to construct and evaluate a multitude of forecasting models such as judgemental, time series and causal models. Judgemental forecasting involves qualitative and quantitative methods. Time series forecasting requires historical data — choice is to be made from several time series models such as seasonal decomposition, least-squares, moving averages, Box-Jenkins and ARIMAs. Causal models have to be developed for the forecasts of explanatory variables. Linear and non-linear multiple regressions may be used in this context.

What is required is that forecasting models should be reliably explaining market factors using similar methodologies relating to business decisions. The management is ultimately interested in the action plan generated from the forecasting process rather than sophistication of methodologies and diagnostic approach used to generate a forecast: the decision-makers "steer the corporate ship using the information given by the forecasting company, thereby adjusting the forecast to meet objectives." (Gordon-Rich, 1997, p. 7).

13. CHOOSING A FORECASTING MODEL

There are three kinds of forecasting models conceived:

- Time Series Model
- Cause-and-effect Model
- Judgemental Model

Time Series Model refers to data based on time element such as daily, weekly, monthly, quarterly, or yearly data also called as historical data. The time series model of demand forecasting in mathematical terms may be specified as:

$Dt = f(t)$, or

$St = f(t)$

Where, D = demand quantity

S = sales volume or value

t = time period

In statistical analysis of time series, trend is usually worked out to prepare a forecast. The forecast is based on the assumption that the past data (trend) pattern will follow into the future.

Cause-and-Effect Model. In this case, a demand function is specified with its concerned determinants. The model reflects that there is a cause and there is an effect. For example, it may be observed that sales depend on advertising expenses on a product. In this case, demand model would be:

$$Dx = f(A)$$

where, Dx = demand for product x

A = advertising expenditure of the firm

Usually, a policy variable such as advertising expenditure at micro level is used for sales forecasting of the concerned product by the firm. Sometimes, uncontrollable or non-policy variable is also used as a determinant for forecasting the future demand in the market in general to know the business prospects in a growing economy. For example:

$$Dx = f(GNP, Px)$$

where, GNP = gross national product of the country

Px = price of product x

For forecasting telecommunications demand, for instance, price and income are the most commonly used explanatory variables. This kind of econometric modelling for forecast assumes that relationship between demand/sales and the determinant (independent variable) is significant and stable.

Data for this kind of model may be historical, cross-sectional or pooled. Regression is mostly preferred in business forecasting in practice.

Judgemental Model. It is used in the absence of inapplicability of historical data. For example, in the case of new product or fad items. A survey technique is used to collect information from the relevant and reliable sources and inferences are made through judgement. Important judgemental models include Analog, Bayesian, Delphi and Pert techniques.

No single model ever can serve all purposes and all situations in practical business. Right choice of model is essential for a correct/reliable forecasting. For choosing a right/appropriate model, one should consider:

- Objective
- Data characteristics
- Forecast horizon
- Analysis

Objective

Objective of forecast is the prime deciding factor in choosing a right type of forecasting model. For instance, policy decision-making is the object of forecasting then the model should be specified with the controllable policy variable as the determinant and regression may be used. That is to say, cause-and-effect model would be appropriate in the case of forecasting sales based on advertising when policy decision is required for an amount of advertising budget in future.

Data Characteristics

Quantum and pattern of business data are important in knowing its characteristic fitness for forecasting purpose. The pattern of data can be known through its graphical presentation. If the curve is smooth and consistent, time series/regression model would be appropriate. Sometimes, in time series extreme values have to be adjusted by dampening the high values and inflating the low values for normal consideration.

In adopting regression models usually in business data linear regression techniques are preferred. Business data are often subject to seasonal variation. This must be accounted for in the case of short-term forecasting. Besides, cause-and-effect relationship of data should be carefully traced and examined. The functional relationship involved should be strong and stable. The forecasting should not be based on spurious correlation between the forecast variables. The correlation should be theoretically supported.

Forecast Horizon

In forecasting, accurate time horizon is important. Short-term forecasting is usually more accurate than the long-term projection. Regression models are more appropriate in short-term forecasting. Trend analysis is better for the long-term projection of data.

Analysis

Analysis reveals useful information such as forecasting errors that can improve forecasts. If the forecast appears to be consistently above or below the actual, one needs to upgrade or dampen the forecasts accordingly. Expertise and experience both are required for a correct choice of forecasting model.

Concluding Remarks

Forecasting is not an easy task. There is no universally applicable model. Forecaster should seek to fit a model correctly to a situation and not the other way round. Quite often simple model proves to be better and more appropriate than the sophisticated model in real business. Models need to be revised from time-to-time to cope with dynamic changes.

In an industry which is subject to frequent and significant trend changes thus, having no stable historical forecasting methods such as time series and econometric modelling have become less accurate. Developments of new or advanced forecasting techniques are required to cope up with the dynamism of the new millennium.

A Mini Case: China's Demand Pattern and Unilever's Business Approach

In recent years, Unilever China in its business strategy responded very closely to the complex needs of the consumers in China. The Chinese consumers have typical preferences with typical tastes and local needs. Modern buyers have also become quality conscious. By studying the demand pattern in the Chinese economy, the Unilever developed a portfolio of brands of its products — considering traditional Chinese outlook and trend of technological improvements in the country. With its joint ventures and large-scale consolidation in 1999, the company's brand folio contained a 'mix' of global and local brands. Dove, Lux, Lipton and Ponds are the global brands of the Unilever promoted and managed in China by the local professionals. Unilever's expertise and resources are extended to the development of local brands such as Hazeline and Lao Cai Soy Sauce. In short, the Unilever China sought to balance the global and local market segments in satisfying the distinct demand composition of the consumers.

14. BUSINESS FORECASTING: SUMMING UP

A right choice of forecasting method is essential for a business manager. There is no single method or solution that can work in all cases. Appropriateness of the business forecasting process and method depends on these goal, constraints and capabilities.

Business forecasting involves major steps such as:

- Identification and formulation of problem.
- Goals decisions
- Constraints consideration
- Data collection through samples within a domain
- Data Manipulation
- Workable Forecasting Model building
- Evaluation of the model
- Actual forecast: Model exemption.
- Evaluation of the resulting outcome.

Business forecasting is facilitated by the 'Computer Forecasting Packages':

(i) Statistical Packages – for, time series analysis, regression analysis, etc. and

(ii) Forecasting packages available for direct application.

Minitab, SAS and SPSS are the popular sophisticated packages available in the market. Forecast-X, Crystal Ball Predictor and Tulpak add-in are also available for comprehensive forecasting purposes.

The main purpose of business forecasting is to predict by reducing the range of uncertainty in the course of decision and action undertaken by the manager.

In big concern, there is a special cell run by the staff for business/demand forecasting purpose. Marketing managers are greatly helped by the demand forecasting.

MODEL QUESTIONS

1. What are the important methods of demand forecasting?
2. Spell out the general approach to demand forecasting?
3. What are the criteria of a good forecasting method?
4. Examine the 'Trend Projection' method and collective opinion method of demand forecasting.
5. (a) Discuss the utility of demand forecasting.

   (b) What are the criteria of a good forecasting method?
6. Write notes on:

   (a) Market Survey

   (b) Market Experiments

   (c) Secondary Sources
7. Distinguish between:

   (a) Short-term and long-term demand forecasting (or demand estimation and demand forecasting)

   (b) Market survey and experiments
8. What is the significance of demand forecasting in business decisions? Critically examine the various methods of demand forecasting.
9. How would you approach to demand/sales forecasting in the following cases?

   (a) Samsung 29″ TV set in Mumbai.

   (b) Health Resort Scheme in Bangalore.

   (c) Shares of Infosys (an IT organisation)

   (d) Exports of Diamond.

   (e) Bajaj Scooters in Delhi.

Problems

1. The price per purchase and the market share of Monkey Brand Cigarettes in a region are obtained as under:

Price (Paise)	82	80	78	76	74	72	70
Market Percentage share	5	7	10	15	20	25	30

Establish a linear demand function on the basis of this information.

What demand do you expect at price paise 60?

2. Given data:

Year	1990	1991	1992	1993	1994	1995	1996
Sales	10	12	15	18	24	25	30

Project the sales in future for the year 1999.

3. By the method of least squares, compute trends values:

Year	1981	1982	1983	1984	1985
Sales	50	62	78	48	74

(Rs. in lakh)

4. Forecast the annual sales for 1988.

Project the trends of sales for the next three years:

Years	*Sales (Rs. in lakh)*
1981	120
1982	140
1983	150
1984	170
1985	190

5. The following series show the sales of fertilisers in A.P. during 1980-85.

Years	*Sales (Rs. in lakh)*
1980	83
1981	92
1982	71
1983	90
1984	169
1985	200

Using the method of least squares, find the trend values and estimate the sales for the year 1986.

Using the following demand equation:

$Y = -3.2 + 0.62x$

estimate the demand for road transport in 1985, if the population is 2,044,000 in a city.

6. Project the trend of sales for the next four years

Year	1995	1996	1997	1998	1999
Sales	120	140	130	145	160

(in Rs. '00000)

7. Using the method of least squares, estimate demand for the years 2000 and 20001.

Year	1995	1996	1997	1998	1999
Sales of water pumps:	91	99	95	101	120

❒ ❒ ❒

Unit IV

Cost and Production Analysis

Cost: Concepts and Cost-Output Relationship

9
CHAPTER

1. INTRODUCTION

In managerial economics, cost is normally considered from the producer's or firm's point of view. In producing a commodity (or service), a firm has to employ an aggregate of various factors of production such as land, labour, capital and entrepreneurship. These factors are to be compensated by the firm for their efforts or contribution made in producing the commodity. This compensation (usually in terms of factor price) is the cost. Thus, the cost of production of a commodity is the aggregate of price paid for the factors of production used in producing that commodity. Cost of production, therefore, denotes the value of the factors of production employed. In short, thus, the value of inputs required in the production of a good determines its cost of output. The term "cost" has various concepts. These are: *(i)* Real Cost; *(ii)* Opportunity Cost; and *(iii)* Money Cost.

2. REAL COST

The term "real cost of production" refers to the physical quantities of various factors used in producing a commodity. For example, real cost of a table is composed of a carpenter's labour, two cubic feet of wood, a dozen of nails, half a bottle of varnish paint, depreciation of carpenter's tools, etc., which go into the making of the table. Real cost, thus, signifies the aggregate of real productive resources absorbed in the production of a commodity (or a service).

> **Definition.** The real cost of production of a commodity refers to the exertion of labour, sacrifice involved in the abstinence from present consumption by the savers to supply capital, and social effects of pollution, congestion, and environmental distortions.

In a much philosophical way, Marshall (1920), describes "real cost" as follows: "The production of a commodity generally requires many different kinds of labour and the use of capital in many forms. The exertions of all the different kinds of labour that are directly or indirectly involved in making it together with the abstinences or rather the waiting required for saving the capital used in making it — all these efforts and sacrifices together will be called the real cost of production of commodity."

According to Marshall, thus, the real cost of production signifies toils, troubles, sacrifice on account of loss of consumption for savings, social effects of pollution caused by factory smoke, automobiles, etc.

Evidently, the concept of real cost is an abstract idea. Its exact measurement is not possible.

3. OPPORTUNITY COST OR ALTERNATIVE COST

Since the real production cost cannot be measured in an absolute sense, the concept of opportunity cost is evolved to measure it in an objective sense. The concept of opportunity cost is based on the scarcity and versatility (alternative applicabilities) characteristics of productive resources. It is the most fundamental concept in economics.

It is a known economic fact that our wants are multiple, while our resources are scarce but capable of alternative uses. So, the problem of choice is involved. We have to choose the use of a given resource for a particular purpose out of its alternative applicabilities. When we choose the resource in one use to have one commodity for satisfying a particular want, it is obvious that its other use as some other commodity that can be produced by it cannot be available simultaneously. This means, the second alternative use of the resources (or another commodity) is to be sacrificed to have the resource employed in one particular way, *i.e.*, to get a particular commodity because the same resource cannot be employed in two ways at the same time. Apparently, the employment of factors in producing a commodity always involves the loss of opportunity of production of some other commodity. The sacrifice or loss of alternative use of a given resource is termed as "opportunity cost."

Thus, the opportunity cost is measured in terms of the forgone benefits from the next best alternative use of a given resource. In other words, the opportunity cost of producing a certain commodity is the value of the other commodity that the resources used in its production could have produced instead. It should be noted that opportunity cost of anything is just the next best alternative (the most valuable other commodity) foregone in the use of productive resources and not all alternative possible uses.

> The real cost of production of something using a given resource in an objective sense is the benefit foregone (or opportunity lost) of some other thing by not using that resource in its best alternative use. Some economists, therefore, describe it as alternative cost of production. "The alternative or opportunity cost of one unit of product A is the amount of product B that has been sacrificed by allocating the resources to produce A rather than B."

Importance of the Concept of Opportunity Cost

The concept of opportunity cost has a great economic significance.

- **Determination of Relative Prices of Goods.** The concept of opportunity cost is useful in explaining the determination of relative prices of different goods. For instance, if the same group of factors can produce either one car or six scooters, then the price of one car will tend to be at least six times more than that of one scooter.
- **Determination of Normal Remuneration to a Factor.** The opportunity cost sets the value of a productive factor for its best alternative use. It implies that if a productive factor is to be retained in its next best alternative use, it must be compensated for or paid at least what it can earn from its next best alternative use. For instance, if a college professor can get an alternative employment in a bank as an officer at a salary of Rs. 20,000 per month, the college has to pay at least Rs. 20,000 salary to retain him in the college.
- **Decision-making and Efficient Resource Allocation.** The concept of opportunity cost is essential in rational decision-making by the producer. This can be explained with the help of an example. Suppose, a producer in the automobile industry has to decide as to whether he should produce motor cars or scooters out of his given resources. He can arrive at a rational decision by measuring the opportunity costs of producing cars and scooters and making a comparison with the prevailing market prices of these goods. Suppose, opportunity cost of 1 motor car is 6 scooters. The price of scooter is Rs. 30,000, while the price of car is Rs. 2,00,000. In this case, it is worthwhile to produce cars rather than scooters. Because, if he produces 6 scooters, he will get only Rs. 1,80,000, whereas a car fetches him Rs. 2,00,000, that is, Rs. 20,000 more. This would also mean an efficient resource allocation. Likewise, a factor agent or owner will decide about the use of the economic resources in that occupation where its opportunity cost is high. For instance, if an Economics Professor can get a job in a bank as an economist on a monthly salary of Rs. 20,000 against Rs. 12,000 in a college, then it is quite likely that he would resign from the college and join the bank. It would also mean a more efficient use of his knowledge and talent. It follows that a resource will always tend to move or will be used in an occupation where it has a high opportunity cost. Thus, the concept of opportunity cost serves as a useful economic tool in analysing optimum resource allocation and rational decision-making.

4. MONEY COST

Cost of production measured in terms of money is called the money cost.

"Money cost" is the monetary expenditure on inputs of various kinds — raw materials, labour, etc., required for the output. It is the money spent on purchasing the different units of factors of production needed for producing a commodity. Money cost is, obviously the payment made for the factors in terms of money. Money cost is the outlay cost, *i.e.*, actual financial expenditure of the firm.

Explicit and Implicit Costs

While analysing total money costs, the economists speak of explicit and implicit money costs. To determine total costs, they include both explicit as well as implicit money costs.

Definition. Explicit costs are direct contractual monetary payments incurred through market transactions.

Explicit costs refer to the actual money outlay or out of pocket expenditure of the firm to buy or hire the productive resources it needs in the process of production. It is referred to as out-of-pocket costs.

The following items of a firm's expenditure are explicit money costs:

- Costs of raw materials;
- Wages and salaries;
- Power charges;
- Rent of business or factory premises;
- Interest payments of capital invested;
- Insurance premiums;
- Taxes like property tax, duties, licence fees, etc.;
- Miscellaneous business expenses like marketing and advertising expenses (selling costs), transport cost, etc.

The above list of items included in money cost is an explicit payment made by the firm. These are recorded expenditures during the process of production. It is, thus, known as accounting cost or explicit money costs, as these are actual monetary expenditures incurred by the firm.

To an economist, however, this is not enough for consideration. In the economic sense, there are certain costs which are implicit in nature, such as when there is an imputed value of goods and services used by the firm, but no direct payment is made for such use. Thus, from an economist's point of view, apart from explicit costs, there are implicit money costs (which are generally not considered by the accountant unless some special provision is made for it).

Definition. Implicit costs are the opportunity costs of the use of factors which a firm does not buy or hire but already owns.

Implicit costs are not directly incurred by the firm through market transactions, but nevertheless are to be reckoned in the measurement of total money costs of production. These are to be imputed or estimated on the bases of the opportunity costs, *i.e.,* from what the factors owned by the firm itself could earn in their next best alternative employment.

Implicit money costs are imputed payment which are not directly or actually paid out by the firm as no contractual disbursement is fixed for them. Such implicit money costs arise when the firm or entrepreneur supplies certain factors owned by himself. For instance, the entrepreneur may have his own land in production, for which no rent is to be paid in the actual sense. But this, however, is to be reckoned as a cost, assuming that if the entrepreneur had rented this land to somebody, he would have definitely earned some rent. Hence, such rent is to be imputed and regarded as implicit money cost. Thus, implicit money costs are as follows:

- Wages of labour rendered by the entrepreneur himself.
- Interest on capital supplied by him.
- Rent of land and premises belonging to the entrepreneur himself and used in his production.
- Normal returns (profits) of entrepreneur, a compensation needed for his management and organisational activity.

These items are to be valued at current market rates for estimating the implicit money cost. These are implicit money costs, because these go to the entrepreneur himself. These are self-recipient payments. And they are, in practice, unrecorded expenditure of production. Implicit costs, unlike out-of-pocket costs, do not require current cash expenditures. As such, they are also referred to as book costs. In economic analysis, however, we need to determine total money costs as both are composed of explicit and implicit expenses. For, the distinction between explicit and implicit money costs is important in analysing the concept of profit. In the accounting sense, profit is calculated as the residual of total sales receipts minus total costs (in an explicit sense). In the economic sense, however, normal profit is included in total cost of production which consists of explicit and implicit expenses all taken together. Under implicit costs, normal profit — a return to the entrepreneur management function — is included.

But in the economic sense, real business or economic profit is the surplus of total revenue over total economic cost.

Economic cost = Accounting costs (or explicit cost) + Implicit cost.

Money cost is also regarded as the supply price of the factors needed for producing a commodity. To some economists, thus, the money cost of production of a commodity is the money fund required to induce the factors of production to be allocated to this production, rather than to seek employment in alternate uses.

5. ACCOUNTING AND ECONOMIC COSTS

An economist's idea of cost of production differs from that of an accountant. In economics, the cost of production consists of remuneration to all the factors of production, *viz*., wages to labour, rent to land, interest to capital and normal profits to the entrepreneur. An accountant on the other hand would include in the cost of production only the cash payments to the factors of production, made by the entrepreneur, for the services rendered by these factors in the productive process. These cash payments are called the explicit costs. Thus, an accountant will include only explicit costs in his cost calculations. Thus, the accountant's concept of cost includes wage, interest and rent payment but not the profits made by the entrepreneur because no entrepreneur even makes cash payment to himself. In common practice also, we do not tend to regard profits as part of a firm's cost of production. But in economic theory, however, normal profits form a part of business firm's cost of production.

Again in the calculation of normal profits which are in economics part of a firm's cost, implicit costs must be included. Implicit costs are totally disregarded by an accountant. These costs include rent on land owned by the entrepreneur himself since he would have received rent on his land if he had rented it out to someone. Similarly, implicit costs also include wages of management. If the entrepreneur had worked as a manager elsewhere, he would have received wages. So, these wages must also form a part of a firm's cost of production. Thirdly, an entrepreneur might have invested his own capital in his business. Had he lent out this capital to someone, he would have received interest on it. So the interest on entrepreneur's own capital must also be included in cost calculations. All these are implicit costs and while an economist takes them into consideration in his cost calculations, an accountant does not.

In sum, while an accountant includes only explicit costs in his cost calculations, an economist includes in it explicit and implicit costs.

6. FIXED AND VARIABLE COSTS

(Prime and Supplementary Costs)

It may be recalled that the short-run period refers to the time interval during which some factor units cannot be adjusted. The factors of production which cannot be adjusted during the short period are together referred to as plant and include capital equipment, top managerial personnel and minimum of subordinate staff such as watch and ward, maintenance technicians, etc. In other words, short period is the period during which the plant of a firm cannot be changed.

The short-run cost function relates to the short-run production function. A short-run production function $Q = f(a, b, c, d...n)$, stated in general, implies two sets of input component: *(i)* fixed inputs, and *(ii)* variable inputs. Thus, factors of production employed, in the short run, are classified as fixed factors and variable factors.

Fixed factors are unalterable. These factors are, for instance, machineries, factory building, managerial staff, etc., which remain unchanged over a period of time. Variable factors are labour, raw materials, power, etc., the inputs or which are varied to vary the output in the short run.

Since costs refer to the prices paid to the factors of production, prices paid for fixed factors and those paid for variable factors are termed as fixed costs and variable costs respectively.

Fixed Costs (Or Supplementary Costs)

Fixed costs are the amount spent by the firm on fixed inputs in the short-run. Fixed costs are, thus, those costs which remain constant, irrespective of the level of output. These costs remain unchanged even if the output of the firm is nil. Fixed costs, therefore, are known as "supplementary costs" or "overhead costs."

> **Definition.** Fixed costs are those costs that are incurred as a result of the use of fixed factor inputs. They remain fixed at any level of output in the short-run.

Fixed costs, in the short-run, remain fixed because the firm does not change its size and amount of fixed factors employed. Fixed or supplementary costs usually include:

- Payments of rent for building.
- Interest paid on capital.
- Insurance premiums.
- Depreciation and maintenance allowances.
- Administrative expenses — salaries of managerial and office staff, etc.
- Property and business taxes, licence fees, etc.

These costs are overhead costs in the sense that they are to be incurred even if the firm is shut down temporarily and the current production may be nil. Further, they do not change as the output increases. Thus, fixed costs are also referred to as "unavoidable contractual costs" which occur even if there is no output. In brief, the costs incurred on the business plant are called fixed costs.

Fixed costs may be classified into two categories: *(i)* Recurrent, and *(ii)* Allocable.

Recurrent fixed costs are those which give rise to cash output as certain explicit payments like rent, interest on capital, general insurance premiums, salaries of permanent irreducible staff, etc., are to be made at a regular time-interval by the firm. The **allocable fixed costs** refer to implicit money costs like depreciation charges which involve no direct cash outlays but are to be reckoned on the basis of time rather than usage.

Variable Costs (Or Prime Costs)

Variable costs are those costs that are incurred on variable factors. These costs vary directly with the level of output. In other words, variable costs are those costs which rise when output expands and fall when output contracts. When output is nil, they are reduced to zero.

> **Definition.** Variable costs are those costs that are incurred by the firm as a result of the use of variable factor inputs. They are dependent upon the level of output.

Variable costs are frequently referred to as direct costs or prime costs. Briefly, variable costs or prime costs represent all those costs which can be altered in the short-run as the output alters. These are regarded as "avoidable contractual costs" (when output is nil).

The short-run variable costs include:

- Prices of raw materials,
- Wages of labour,

- Fuel and power charges,
- Excise duties, sales tax,
- Transport expenditure, etc.

Besides, user costs are included in variable costs for analytical purposes. User cost is the depreciation caused by the actual use of capital assets like machinery. It is linked with the rate of output.

Variable costs may be classified into: *(i)* fully variable costs, and *(ii)* semi-variable costs. The former vary more or less at the same rate of output, *e.g.*, cost of raw materials, power, etc. Semi-variable costs are, however, those costs which do not change with output, but they will be completely eliminated when output is nil.

The distinction between prime costs (variable costs) and supplementary costs (fixed costs) is, however, not always significant. In fact, the difference between fixed and variable costs is meaningful and relevant only in the short period. In the long run, all costs are variable because all factors of production become adjustable in the long run. In the short period, only those costs are variable which are incurred on the factors which are adjustable in the short period. In the short run, however, the distinction between prime and supplementary costs is very significant because it influences the average cost behaviour of the product of the firm. Thus, it has a significant bearing on the theory of firm. In specific terms, the significance of making this distinction between fixed and variable costs is that in the short period a firm must cover at least its variable or prime costs if it is to continue in production. Even if a firm is closed down, it will have to incur fixed or supplementary costs. The firm will suffer no great loss in continuing production if it can cover at least its variable costs under the prevailing price.

7. TYPES OF PRODUCTION COSTS AND THEIR MEASUREMENT

In economic analysis, the following types of costs are considered in studying cost data of a firm:

- Total Cost (TC),
- Total Fixed Cost (TFC),
- Total Variable Cost (TVC),
- Average Fixed Cost (AFC),
- Average Variable Cost (AVC),
- Average Total Cost (ATC), and
- Marginal Cost (MC).

Total Cost (TC)

Total cost is the aggregate of expenditures incurred by the firm in producing a given level of output. Total cost is measured in relation to the production function by multiplying factor prices with their quantities.

If the production function is: $Q = f(a, b, c...n)$, then total cost is $TC = f(Q)$ which means total cost varies with output.

For measuring the total cost of a given level of output, thus, we have to aggregate the product of factor quantities multiplied by their respective prices.

Conceptually, total cost includes all kinds of money costs, explicit as well as implicit. Thus, normal profit is also included in total cost. Normal profit is an implicit cost. It is a normal reward made to the entrepreneur for his organisational services. It is just a minimum payment essential to retain the entrepreneur in a given line of production. If this normal return is not realised by the entrepreneur in the long-run, he will stop his present business and will shift his resources to some other industry.

Now, an entrepreneur himself being the paymaster, he cannot pay himself, so he treats normal profit as implicit costs and adds to the total cost.

In the short-run, total cost may be bifurcated into total fixed cost and total variable cost. Thus, total cost may be viewed as the sum of total fixed cost and total variable cost at each level of output. Symbolically, $TC = TFC + TVC$.

Total Fixed Cost (TFC)

Total fixed cost corresponds to fixed inputs in the short-run production function. It is obtained by summing up the product of quantities of the fixed factors multiplied by their respective unit prices. *TFC* remains the same at all levels of output in the short run.

Suppose a small furniture shop proprietor starts his business by hiring a shop at a monthly rent of Rs. 1,000 borrowing Rs. 50,000 from a bank at an interest rate of 10% and buys capital equipment worth Rs. 2,000. Then his monthly total fixed cost is estimated to be:

Rs. 1,000	+	Rs. 2,000	+	Rs. 500	=	Rs. 3,500
(Rent)		(Equipment cost)		(Monthly interest on the loan)		

Total Variable Cost (TVC)

Corresponding to variable inputs in the short-run production, is the total variable cost. It is obtained by summing up the product of quantities of input multiplied by their prices.

Again, $TVC = F(Q)$ which means, total variable cost is an increasing function of output.

Suppose, in our illustration of the furniture shop proprietor, if he were to start with the production of chairs he employs a carpenter on a wage of Rs. 200 per chair. He buys wood worth Rs. 2,000 rexine sheets worth Rs. 1,500, spends Rs. 400 for other requirements to produce 3 chairs. Then his total variable cost for producing 3 chairs is measured as Rs. 2,000 (wood price) + Rs. 1,500 (rexine cost) + Rs. 400 (allied cost) + Rs. 600 (labour charges) Rs. 4,500.

Average Fixed Cost (AFC)

Average fixed cost is total fixed cost divided by total units of output.

$$AFC = \frac{TFC}{Q},$$

where Q stands for the number of units of the product.

Thus, average fixed costs is the fixed cost per unit of output.

In the above example, thus, when TFC = Rs. 3,500 and Q = 3.

$$\therefore \text{AFC} = \frac{3{,}500}{3} = \text{Rs. } 1{,}166.67$$

Average Variable Cost (AVC)

Average variable cost is total variable cost divided by total units of output.

$$\boxed{\therefore \text{ AVC } = \frac{\text{TVC}}{\text{Q}} \text{ where, AVC means average variable cost}}$$

Thus, average variable cost is variable cost per unit of output. In the above example, TVC = Rs. 4,500 for Q = 3

$$\therefore \text{AVC} = \frac{4{,}500}{3} = \text{Rs. } 1{,}500$$

Average Total Cost (ATC)

Average total cost or average cost is total cost divided by total units of output. Thus:

$$\boxed{\text{ATC or AC} = \frac{\text{TC}}{\text{Q}}}$$

In the short run, since

TC = TFC + TVC

$$\text{ATC } = \frac{\text{TC}}{\text{Q}} = \frac{\text{TFC + TVC}}{\text{Q}} = \text{(TFC/Q) + (TVC/Q)}$$

Since = $\frac{\text{TFC}}{\text{Q}}$ = AFC and $\frac{\text{TVC}}{\text{Q}}$ = AVC,

$\therefore$ ATC = AFC + AVC.

Hence, average total cost can be computed simply by adding average fixed cost and average variable cost at each level of output. To take the above example, thus:

ATC = Rs. 1,166.67 + Rs. 1,500 = Rs. 2,666.67 per chair.

Marginal Cost (MC)

The marginal cost is also a per unit cost of production. It is the addition made to the total cost by producing one more unit of output. Symbolically, $MCn = TCn - TCn - 1$, that is, the marginal cost of the n^{th} unit of output is the total cost of producing n units minus the total cost of producing $n - 1$ (*i.e.*, one less in the total) units of output.

Suppose, the total cost of producing 4 chairs (*i.e., n* = 4) is Rs. 10,000 while that for 3 chairs (*i.e., n* – 1 is Rs. 8,000. Marginal cost of producing the 4th chair, therefore, works out as under:

$MC_4 = TC_4 - TC_3$ = Rs. 10,000 – Rs. 8,000 = Rs. 2,000.

> **Definition.** Marginal cost is the cost of producing an extra unit of output.

In other words, marginal cost may be defined as the change in total cost associated with a one unit change in output. It is also an "extra-unit cost" or incremental cost, as it measures the amount by which total cost increases when output is expanded by one unit. It can also be calculated by dividing the change in total cost by the one unit change in output.

Symbolically, thus, $MC = \frac{\Delta TC}{\Delta_1 Q}$ where, D denote change in output assumed to change by 1 unit only.

Therefore, output change is denoted by D_1.

It must be remembered that marginal cost is the cost of producing an additional unit of output and not of average product. It indicates the change in total cost of producing an additional unit.

8. SHORT-RUN TOTAL COSTS SCHEDULE OF A FIRM

Functionally, the cost behaviour, *i.e.,* cost-output relationship, is observed in the short run as well as long-run. We have, thus, short-run cost function which states cost-output relationship or the behaviour of costs under a given scale of output in the short-run. Similarly, there is the long-run cost function which states cost-output relationship or the behaviour of costs with the changing scale of output in the long run. The short-run and long-run cost functions are important for a firm to consider the price or equilibrium level of output determination.

Cost function of a firm can be expressed statistically as cost schedule or graphically in the form of a cost curve. A cost schedule is a statement of variations in costs resulting from variations in the level of output. It shows the response of costs to changes in output. Cost schedules depend upon the length of the time interval. So they vary from short period to long period.

Short-run Total Costs

To examine the cost behaviour in the short-run, we may begin our analysis with consideration of the following three total cost concepts:

- **Total Fixed Cost (TFC).** It is the cost pertaining to all fixed inputs like machinery, etc., at any given level of output.
- **Total Variable Cost (TVC).** It is the cost pertaining to all variable inputs like raw materials, etc., at any given level of output.

- **Total Cost (TC).** It is the cost pertaining to the entire factor inputs at any given level of output. It is the total cost of production derived by aggregating total fixed and variable costs together.

Thus, *TC* = *TFC* + *TVC*.

Table 9.1 contains a much simplified hypothetical production schedule with total costs of an illustrative firm. Data in the table show the behaviour of *TFC, TVC and TC* in the short-run.

The data are based on the following assumptions:

- Labour and capital are the two factor inputs.
- Labour is the variable factor.
- Capital is the fixed factor.
- Price of labour is Rs. 10 per unit. Price of capital is Rs. 25 per unit.
- Since 4 units of capital are used as fixed factors, the total fixed cost (*TFC*), Rs. 100 remains constant throughout (See column 4 in Table 9.1).
- The total variable cost (*TVC*) varies with the variation in labour units (See column 5).
- Column 6 measures the total cost. It is *TFC* and *TVC* at all levels of output.

Table 9.1: The Short-run Total Costs Schedule of a Firm (Hypothetical Data)

Units of Capital (Fixed Factor) (1)	*Units of Labour (Variable Factor) (2)*	*Total Product (TP) (3)*	*TFC (Rs.) (4)*	*TVC (Rs.) (5)*	*TC (Rs.) (6)*
4	0	0	100	—	100
4	1	2	100	10	110
4	2	5	100	20	120
4	3	10	100	30	130
4	4	15	100	40	140
4	5	18	100	50	150
4	6	20	100	60	160
4	7	21	100	70	170

Behaviour of Total Costs

Examining cost schedules in Table 9.1, we may observe the following interesting points about the behaviour of various total costs:

- **TFC remains constant at all levels of output.** It is the same even when the output is nil. Fixed costs are thus independent of output.
- **TVC varies with the output.** It is nil when there is no output. Variable costs are, thus, direct costs of the output.

- **TVC does not change in the same proportion.** Initially, it is increasing at a decreasing rate, but after a point, it increases at an increasing rate. This is due to the operation of the law of variable proportions or non-proportional output, which suggests that initially to obtain a given amount of output relatively, variations in factors are needed in less proportion, but after a point when the diminishing phase operates, variable factors, are to be employed in a greater proportion to increase the same 'level' of output.
- **TC varies in the same proportion as the TVC.** Thus, in the short period, the changes in total cost are entirely due to changes in the total variable costs, as fixed costs, the other component of total costs, remain constant.

9. TFC, TVC AND TC CURVES

Total cost curves are derived by plotting the total cost schedules graphically. The cost curves depict cost output behaviour of the firm in an explicit manner. In Figure 9.1 we, however, presented generalised smooth out types of total fixed, total variable and total cost curves to explain the short-run cost behaviour from the constant.

A careful observation of Figure 9.1 reveals the following important characteristics of cost behaviour:

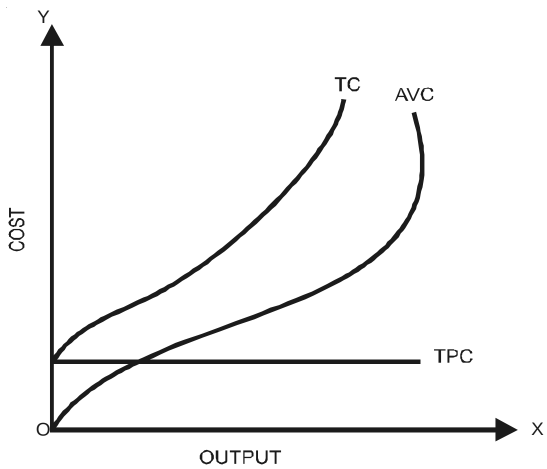


Fig. 9.1: Short-run Total Cost Curves

The *TFC* curve is horizontal indicating constant total fixed cost at each output level. The *TVC* curve rises at a decreasing rate up to a point and at an increasing rate thereafter. It reflects the operation of the law of diminishing returns. *TC* is drawn by vertical adding up of *TFC* and *TVC*.

- **The Curve TFC is the Curve of Total Fixed Costs.** It is a straight horizontal line, parallel to the X-axis, denoting characteristics of fixed costs at all levels of output.
- **The Curve TVC Represents Total Variable Costs.** It reflects a typical behaviour of total variable costs, as it initially rises gradually, but eventually becomes steeper

denoting a sharp rise in total variable costs. The upward rising total variable costs are related to the size of the output.

- **The Curve TC Represents Total Costs.** It is derived by vertically adding up *TVC* and *TFC* curves. It is easy to see that the shape of *TC* is largely influenced by the shape of *TVC*. When the *TVC* curve becomes steeper, *TC* also becomes steeper. Further, the vertical distance between *TVC* curve and *TC* curve is equal to *TFC* and is constant throughout because *TFC* is constant. Evidently, the vertical distance between *TVC* and *TC* curves represents the amount of total fixed costs.

10. SHORT-RUN PER UNIT COST

Per unit cost is the average cost. It refers to the cost per unit of output.

Following are the four important per unit costs in which a firm is always interested in the short period:

- Average Fixed Cost = Total Fixed Cost, Output ($AFC = TFC/Q$)
- Average Variable Cost = $\frac{\text{Total Variable Cost}}{\text{Output}}$, Output ($AVC = TVC/Q$)
- Average Total Cost = Average Fixed Cost + Average Variable Cost ($ATC = AFC + AVC$).
- Marginal Cost = (Total cost associated with a certain quantity of output)

  Alternatively (Total cost associated with the quantity of output of one less)

  Marginal Cost = Change in Total Cost ¸ One Unit Change in Output ($MC = DTC/DQ$)

It must be noted that abbreviations *TVC, TFC, TC, AFC, AVC, ATC* and *MC* respectively, are frequently used by economists to represent total variable cost, total fixed cost, total cost, average fixed cost, average variable cost, average total cost and marginal cost. Hence, as we have also used these abbreviations in the following sections so often without qualifications, the reader should memorize the connotations of these abbreviations.

The computation of *AFC, AVC, ATC* and *MC* has been illustrated in Table 9.2. Here, we have purposely taken some new data (rather than repeating those from Table 9.1) for taking the product variation unit-wise and without going into the details of factor components and factor prices, in order to make the computation simple and straightforward.

From the cost schedules given in Table 9.2, it is apparent that costs per unit are derived from the total costs. It is obvious that the firm will have four short period categories of unit costs: *(i)* Average Fixed Cost (*AFC*), *(ii)* Average Variable Cost (*AVC*), *(iii)* Average Total Cost (*ATC*), *(iv)* Marginal Cost (*MC*).

Table 9.2: Output, Total Costs and Average or Unit Costs of a Firm (Hypothetical Data)

$T(Q)$	TFC	TVC	TC	$AFC\left(\frac{TFC}{Q}\right)$	$AVC\left(\frac{TVC}{Q}\right)$	$ATC\left(\frac{TC}{Q}\right)$	MC
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
0	100	0	100	—	—	—	—
1	100	25	125	100	25	125	25(125–100)
2	100	40	140	50	20	70	15(140–125)
3	100	50	150	33.3	16.6	50	10(150–140)
4	100	60	160	25	15	40	10(160–150)
5	100	80	180	20	16	36	20(180–160)
6	100	110	210	16.3	18.3	35	30(210–180)
7	100	150	250	14.2	21.4	35.7	40(250–210)
8	100	300	400	12.5	37.5	50	150(400–250)
9	100	500	600	11.1	55.6	66.7	200(600–400)
10	100	900	1000	10	90	100	400(1000–600)

Analysing the various cost data, economists have generalised the following characteristic features:

- *AFC* decreases as the output increases. Since the total fixed costs remain the same, average fixed costs decline continuously. It is the outcome of "spreading the overhead over more units." Since *AFC* = *TFC/Q,* it is the pure arithmetical result that the numerator remaining unchanged, the increasing denomination causes a diminishing product. *TFC* thus spreads over each unit of output with an increase in output (*Q*). Hence, *AFC* diminishes continuously.
- *AVC* first decreases and then increases as the output increases.
- *ATC* decreases initially. It remains constant at a point for a while, but then goes on increasing as output increases.
- Marginal Cost (*MC*) decreases initially but then increases as the output is increased.
- The *MC* is determined by the rate of increase in the total variable cost (*TVC*). In the beginning, for the very first unit, thus average variable cost and marginal cost are the same (because *AVC* = *TVC* for the first unit).
- When the average cost is minimum, *MC* = *AC*.

11. THE BEHAVIOUR OF SHORT-RUN AVERAGE COST CURVES

The behaviour patterns and relations of short-run unit costs become more explicit when we plot the cost data on a graph and draw the respective cost curves.

Figure 9.2, however, depicts a generalised form of cost behaviour in the short-run. Here, the cost curves are drawn as the idealised or smoothed out versions of the cost data.

Figure 9.2 illustrates four short period cost curves, namely:

- *AFC* curve,
- *AVC* curve,
- *ATC* curve, and
- *MC* curve.

A curve representing such data is always a rectangular hyperbola. Hence, the *AFC* curve is a rectangular hyperbola. It, thus, implies that any point on the curve gives the same total cost as the product of multiplication of average fixed cost by the units of output. This property of the curve signifies the fact that total fixed cost is constant throughout. A curve representing such data is always a rectangular hyperbola. Hence, the *AFC* curve is a rectangular hyperbola. It, thus, implies that any point on the curve gives the same total cost as the product of multiplication of average fixed cost by the units of output. This property of the curve signifies the fact that total fixed cost is constant throughout.

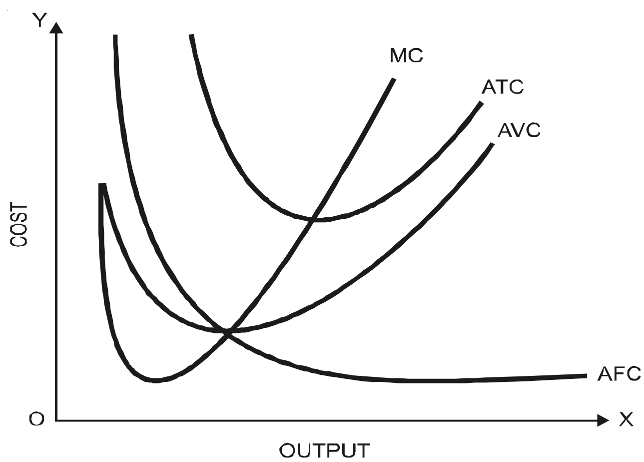


Fig. 9.2: Short-run Average Cost Curves

The *AFC* curve is rectangular hyperbola curve indicating that overheads costs are spread out when output is increased. The *AVC* is a U-shaped curve indicating that *AVC* initially falls and then rises with increased output. It reflects the law of diminishing returns. *ATC* curve is viewed as the sum of the *AFC* and *AVC* curves. The *ATC* curve is U-shaped. *MC* curve is also U-shaped. It is derived from the *TVC* curve. Average Variable Cost Curve (AVC Curve).

The average variable cost generally declines in the initial stages as the firm expands and approaches the optimum level of output. After the plant capacity output is reached, the average variable cost begins to rise sharply. Thus, usually, the average variable cost curve declines initially, reaches the minimum and then goes on rising. The *AVC* curve is, thus, slightly U-shaped, indicating that as the output increases initially, the average variable cost is decreasing, then it remains constant for a while and again starts increasing. There are, thus, three phases of *AVC* curve: *(i)* decreasing phase, *(ii)* constant phase, and *(iii)* increasing phase. These stages in the *AVC* curves correspond to the stages of increasing, constant and decreasing average product (returns to the variable factors) underlying the law of variable proportions.

Average Total Cost Curve (ATC Curve)

Since the average total cost is the sum of average fixed and average variable costs, the *ATC* curve is also a vertical summation of the *AFC* and *AVC* curves. Hence, the curve *ATC* is derived by the superimposition of the *AVC* curve over the *AFC* curve. As such, the *ATC* curve is U-shaped, indicating that if the output of the firm is increased, initially the average total cost decreases up to a point, then it remains constant for a while and thereafter, it starts rising.

12. EXPLANATION OF THE U-SHAPE OF ATC CURVE

The reasons why the *ATC* curve is U-shaped are not far to seek. Since, $ATC = AFC + ATC$, it follows that the behaviour of the *ATC* curve is determined by the *AVC* curve and *AFC* curve. The *AFC* curve is a rectangular hyperbola, which implies that the average fixed cost diminishes continuously as output expands. In the initial stage, the *AVC* curve also slopes downward. As such, in the beginning the *ATC* curve tends to fall when output expands. At a certain point, however, the *AVC* starts rising, so the *AVC* curve has a positive slope, yet the *ATC* curve continues to fall. This is due to the predominant influence of the falling *AFC* curve. Since the falling effect of *AFC* curve is stronger than the rising effect of *AVC* curve at this stage, the net effect causes *ATC* to fall. But, as the output expands further to a higher level, the *AVC* curve tends to rise sharply due to the operation of the law of diminishing returns. Now, the rising effect of *AVC* being predominant, it more than discounts the falling effect of *AFC* curve, so the net effect is that the *ATC* starts rising. Indeed, at the point where that rise of *AVC* exactly nullifies the fall of *AFC*, the balancing effect causes *ATC* to remain constant first and then when the rising effect of *AVC* becomes more pronounced the *ATC* starts rising. As such the overall *ATC* curve assumes U-shape. The falling path of *ATC* is largely due to the falling *AFC* curve, while its rising path is largely influenced by the rising *AVC* curve. It may be noted that the distance between *ATC* and *AVC* curve becomes narrow as the curves move upward. This is a clear indication of the increasing influence of *AVC* on *ATC* in the later stage. In this way, the slopes of the *ATC* curve, initially negative and thereafter positive, reflect the combined influence of fixed and variable cost curves. The economic reason underlying the U-shape of the average cost curve is that there is greater importance of fixed costs in any firm till the normal capacity is exhausted and the normal point or the point of least cost combination of various factors (fixed and variable) is reached. The average cost, therefore, declines in the beginning. But once the normal output of the plant is reached, more and more variable factors are to be employed due to the diminishing returns so that the variable cost rises sharply to increase the output further which outweighs the effect of falling average fixed cost so that the *ATC* starts moving with *AVC*. In fact, the combination of increasing and diminishing marginal product makes the *AVC* curve U-shaped. This is how the *ATC* curve assumes U-shape in the short-run period.

Again, as we have already seen, the *ATC* curve is the reciprocal of the *AP* curve. The *AP* curve is formed by the operation of the law of diminishing returns in the short-run. The occurrence of non-proportional output is basically due to the indivisibility of fixed factors and imperfect substitutability between fixed and variable factors.

13. MARGINAL COST CURVE (MC CURVE)

The marginal cost curve also assumes U-shape indicating that in the beginning, the marginal cost declines as output expands, thereafter, it remains constant for a while and then starts rising upward.

Marginal cost is the rate of change in total costs when output is increased by one unit. In a geometrical sense, marginal cost at any output is the slope of the total cost curve at the corresponding point.

Apparently, the slope of the *MC* curve also reflects the law of diminishing returns.

In the short run, the marginal cost is dependent of fixed cost and is directly related to the variable cost. Hence, the *MC* curve can also be derived from the *TVC* curve. In fact, the *TC* and *TVC* curves have an identical slope at each level of output, because *TC* curve is derived just by shifting *TVC* curve at *TFC* level. Thus, *MC* can be derived from the *TVC* curve and *AVC* curve is also derived from the *TVC* curve. However, *MC* will not be the same as *AVC*. As a matter of fact, *AVC* curve and *MC* curve are the reflection and the consequence of the law of non-proportional output operating in the short-run.

Thus, the *AVC* curve is exactly the reverse of *AP*, whereas *MC* curve is exactly the reverse of *MP* curve.

14. THE RELATIONSHIP BETWEEN MARGINAL COST AND AVERAGE ~ COST

Focusing their attention on average and marginal costs data, economists have observed a unique relationship between the two as follows:

- When *AC* is minimum, the *MC* is equal to *AC*. Thus, *MC* curve must intersect at the minimum point of *ATC* curve.
- When *AC* is falling, *MC* is also falling initially, after a point *MC* may start rising but *AC* continues to fall. However, *AC* is greater than *MC* (*AC* > *MC*). Hence, ultimately at a point both costs will be equal. Thus, when *MC* and *AC* are failing, *MC* curve lies below the *AC* curve.
- Once *MC* is equal to *AC*, then as the output increases *AC* will start rising and *MC* continues to rise further but now *MC* will be greater than *AC*. Therefore, when both the costs are rising, *MC* curve will always lie above the *AC* curve.

The above stated relationship is easy to see through geometry of *AC* and *MC* curves, as shown in Figure 9.3.

It can be seen that:

- Initially, both *MC* and *AC* curves are sloping downward. When *AC* curve is falling *MC* curve lies below it.
- When *AC* curve is rising, after the point of intersection, *MC* curve lies above it.
- It follows thus that when *MC* is less than *AC*, it exerts a downward pull on the *AC* curve. When *MC* is more than *AC* it exerts an upward pull on the *AC* curve. Consequently, *MC* must equal *AC*, while *AC* is at the minimum. Hence, *MC* curve intersects at the lowest point of *AC* curve. It may be recalled that *MC* curve also intersects the lowest point of *AVC* curve. Thus, it is a significant mathematical property of *MC* curve that it always cuts both the *AVC* and *ATC* curves at their minimum points.

In Figure 9.3, thus, *MC* curve crosses the *AC* curve at point *P*. At this point *P*, for *OQ* level of output the average cost is *PQ* which is the minimum.

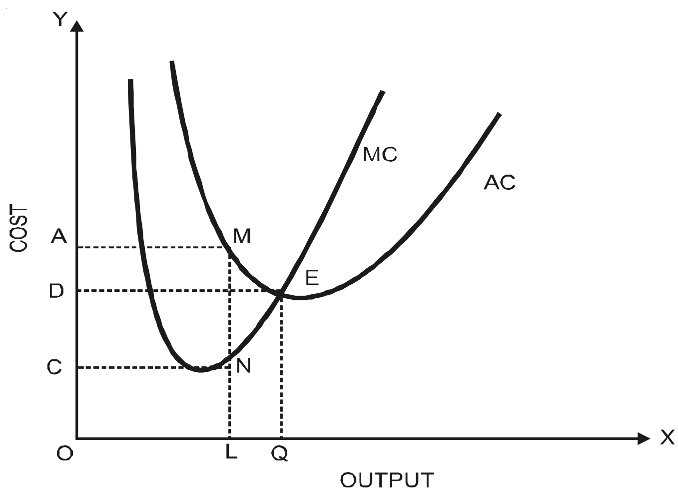


Fig. 9.3: Relationship between *AC* and *MC*

The *MC* curve intersects the *AC* curve at its minimum point from below.

It should be noted that no such relationship can ever be traced between the *MC* curve and the *AFC* curve simply because by definition, the *MC* curve is independent.

Further, the area underlying the *MC* curve is equal to the total variable cost of a given output.

In fact, the point on each average cost curve measures the average cost but the area underlying them denote total costs as under:

- Total, area underlying the *AFC* curve measures the total fixed cost.
- The area underlying the *AVC* curve measures the total variable cost.
- The area underlying the *MC* curve measures the total variable cost.
- The area underlying the *ATC* curve measures the total cost.

Finally, the *MC* curve is important because it is the cost concept relevant to rational decision-making. It has greater significance in determining the equilibrium of the firm. In fact, the increasing *MC* due to diminishing returns sets a limit to the expansion of a firm during the period. Further, it is the *MC* curve which acts on the supply curve of the firm.

From the above discussion of cost behaviour, we may conclude that short run average cost curves (*AVC*, *ATC* and *MC* curves) are U-shaped, except the *AFC* curve, which is an asymptotic and downward sloping curve.

ESTIMATION OF COST FUNCTIONS

Cost-output functional relationship is expressed by the cost function. Thus:

$TC = f(Q)$

Where,

TC = total cost

Q = output quantity

In mathematical terms, there are three variants of cost function:

- Linear
- Quadratic, and
- Cubic

Linear Cost Function

A linear short-run cost function is stated as:

$$TC = a + bQ$$

Where,

a and *b* are constant parameters, *a* is intercept, *b* is slope coefficient. Here, '*a*' represents total fixed cost and '*bQ*' represents total variable cost. Thus:

- $\text{AFC} = \dfrac{\text{TFC}}{\text{Q}} = \dfrac{\text{a}}{\text{Q}}$
- $\text{AFC} = \dfrac{\text{TTC}}{\text{Q}} = \text{b}$
- $\text{ATC} = \dfrac{\text{TC}}{\text{Q}} = \dfrac{\text{a}+\text{bQ}}{\text{Q}} = \dfrac{\text{a}}{\text{Q}} + \text{b}$
- $\text{MC} = \dfrac{\text{dTC}}{\text{dQ}} = \text{b}$

When plotted graphically linear cost function depicts *TC, AC* and *MC* curves as illustrated in Fig. 9.4.

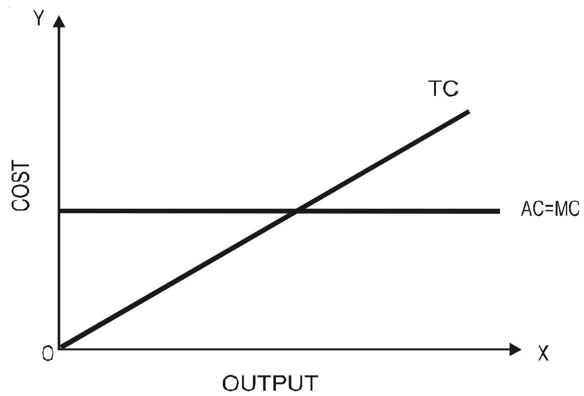


Fig. 9.4: Linear Cost Function

Illustration:

$TC = 100 + 0.5Q$

$\therefore TFC = 100$

$TVC = 0.5Q$

At $Q = 10$

$TVC = 0.5 \times 10 = 5$

$TC = 100 + 5 = 105$

$$AC = \frac{a}{Q} + b = \frac{100}{10} + 0.5 = 10.5$$

$MC = b = 0.5$

Quadratic Cost Function

$TC = a + bQ + cQ^2$

In this case:

$$AC = \frac{a}{Q} + b + cQ$$

$MC = b + 2cQ$

Graphical representation as in Fig. 9.5.

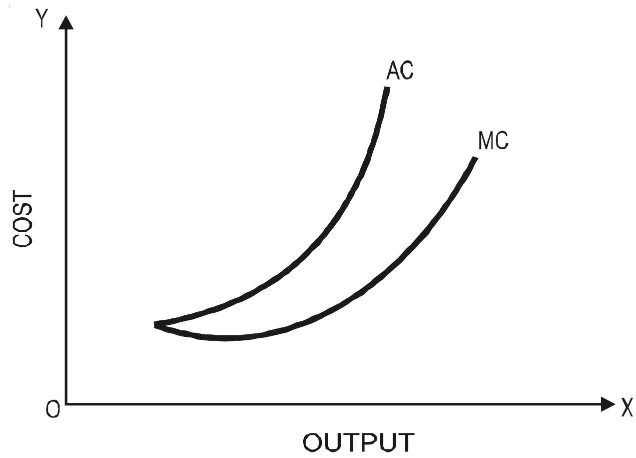


Fig. 9.5: Quadratic Cost Function

Quadratic cost function indicates only law of diminishing returns.

Illustration:

$$TC = 100 + 60Q + 3Q^2$$

$$AFC = \frac{a}{Q} = \frac{100}{Q}$$

$$AC = \frac{100}{Q} + 60 + 3Q$$

$$MC = 60 + 6Q$$

If Q = 10, then

$$AFC = \frac{100}{Q} + 60 + 30 = 100$$

$$MC = 60 + 60 = 120$$

Cubic Cost Function

$$TC = a + bQ - cQ^2 + dQ^3$$

Alternatively, one can also write:

$$TC = b_0 + b_1Q - b_2Q^2 + b_3Q^3$$

(or may choose any symbolic notation)

$$AC = \frac{a}{Q} + b - cQ + dQ^2$$

$$MC = b - 2cQ + 3dQ^2$$

When plotted graphically, cost lines are as illustrated in Fig. 9.6.

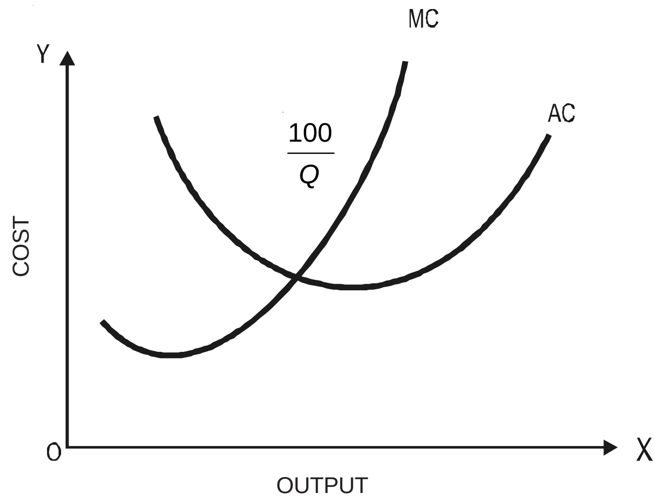


Fig. 9.6: Cubic Cost Function

Illustration:

$TC = 100 + 60Q - 5Q^2 + 0.7Q^3$

$\therefore AFC = \dfrac{100}{Q}$

$AC = \dfrac{100}{Q} + 60 - 5Q + 0.7Q^2$

$AVC = 60 - 5Q + 0.7Q^2$

$MC = 60 - 10Q + 2.1Q^2$

If $Q = 10$, then

$AC = 10 + 60 - 50 + 70 = 90$

$AVC = 60 - 50 + 70 = 80$

$MC = 60 - 100 + 210 = 170$

Case Study

A case in service sector, hospitals play a central role in providing health services. Francisco (1970) made a study of the cost curves for short-term (in the sense of the average length of stay of a patient in the hospital — not to be confused with short-run behaviour) in general hospitals. Using data of about 4,710 hospitals obtained from the American Hospital Association annual survey for 1966 and reported the following estimate:

$$AC = 46 - 0.25U + 0.98F + 10.62D$$
$$(0.014) \quad (0.063) \quad (0.46)$$

$R^2 = 0.23$

Where, AC = The average cost per patient day.

U = The percentage occupancy or utilisation rate.

F = Facilities and services unweighted index.

D = Urban dummy variable.

The fit is poor as R^2 is very low, so the model is explaining only 23% of variations. Nonetheless, the results suggest that utilisation (–0.250) is a significant factor in lowering the average cost. On the other hand, facilities and services (+0.98 F) if increased AC will go up.

16. EMPIRICAL COST FUNCTIONS

The cost functions of business firms in reality from actual cost output data can be estimated by using certain statistical econometric techniques. Below certain empirical cost functions have been reviewed for the benefit of the reader.

Case 1: Cost Function of a Hosiery Mill

Joel Dean (1941) estimated the total cost behaviour of a hosiery knitting mill in the US by fitting a simple regression equation of the form: $TC = b_1 + b_2$ to the data, thus:

$$TC = 2{,}953.59 + 1.998Q$$
$$(6{,}109.83)$$

where,

TC = total cost in dollars

Q = output in dozens of pairs
(parenthesis represent the standard error of estimate)

For producing 1,000 dozen pairs, therefore, the total cost is worked out as:

$$TC = 2{,}935.59 + 1.998\ (1{,}000)$$
$$= 4{,}933.59 \text{ dollars}$$

Average cost is measured as: $\mathrm{AC} = \dfrac{\mathrm{TC}}{\mathrm{Q}}$

$$\mathrm{AC} = 1.998 + \frac{2935.59}{\mathrm{Q}}$$

Hence, average cost in this case, for producing 1,000 dozen pairs is:

$$AC = 1.998 + \frac{2935.59}{1000} = 4.93 \text{ dollars}$$

Case 2: A Road Passenger Transport Firm's Cost Function

Jack Johnson (1960) estimated the cost function of a road passenger transport firm in the U.K., by dividing the firm's expenses into six major groups: *(i)* vehicle operating expenses (national insurance of drivers and conductors, gasoline, fuel oil, tyres and lubricants), *(ii)* maintenance (*i.e.*, expenditure of labour consisting wages, clothing and materials) and depreciation of vehicles and equipment, *(iii)* other traffic (*i.e.*, the wages of traffic staff, bus cleaning costs, *(iv)* maintenance and tickets, tolls, insurance, etc., renewal of structures, *(v)* vehicle licences, and *(vi)* general expenses.

Johnson estimated the firm's total cost function as:

$TC = 0.6558 + 0.4433\ Q$

where,

TC = total cost (measured in tens of thousands of British pounds)

Q = car miles (in million)

Average cost in this case measured as:

$$AC = 0.4433 + \frac{0.6558}{Q}$$

Thus,

For a car miles (Q) 4 million:

$$TC = 0.6558 + 0.4433\ (4)$$
$$= 2.429$$

Hence, total cost is £ 24,290

Average cost is,

$$AC = 0.4433 + \frac{0.6558}{4}$$
$$= 0.60725$$

Hence, average cost is £6,072.50

Comment:

Following Dean's approach, several empirical studies in manufacturing sector have measured cost-output relationship as linear. Linear cost function implies that total cost curve is an upward sloping straight-line and the marginal cost curve tends to be horizontal straight-line.

In some studies cubic cost function is also worked out. For instance, Nordin (1947) measured light fuel cost curve for the electric light and power plant as follows:

$Y = 16.68 + 0.125\ x + 0.00439\ x^2$

[For details, see Nordin, J.A. (1947): 'Note on a Light Plant' Cost Curves' *Econometrics*, July pp. 231-35].

In short, linearity suggests constant marginal cost; while non-linearity suggest rising marginal cost in estimation. In practice, therefore, manager should use his rational judgement in selecting the approach to estimation. The linear model is simple, though it may not be exact to reality. It is, however, an approximation. Non-linear function is more accurate. One should see that there is no large error that destroys the usefulness of the estimation.

17. CHARACTERISTICS OF LONG-RUN COSTS

The long-run period is long enough to enable a firm to vary all its factor inputs. In the long-run, a firm is not tied to a particular plant capacity. It can move from one plant capacity to another whenever it is obliged to do so in the light of changes in demand for its products.

The firm can expand its plant in order to meet the long-term increase in demand or reduce plant capacity if there is a drop in demand.

In the long-run, thus, there are only the variable costs or direct costs as total cost. There is no dichotomy of total cost into fixed and variable costs as we see in the short-run analysis.

In the long-run, when we examine the unit cost of a firm, we come across only the average marginal costs. Hence, we have only to study the shape and relationships of the long-run average cost curve and the long-run marginal cost curve.

As a matter of fact, the long-run is a 'planning horizon.' All economic activity actually operates in the short-run, the long-run is only a perspective view for the future course of action. Thus, an economic entity — entrepreneur or consumer — can plan his course of action in the long-run, but in the real course of operation chooses actually numerous aspects of the short-run. This means, the long-run comprises all possible short-run situations from which a choice is made for the actual course of operation.

In reality, thus, the long-run consists of perspective planning for the expansion of the firm; hence, it involves various short-run adjustments visualised over a period of time.

Derivation of the LAC Curve

Methodologically, the long-run average cost curve (*LAC*) is the envelope of the various short run average cost curves. It is drawn as tangent to the *SAC*s as depicted in Figure 9.7.

In Figure 9.7, the *LAC* is derived as tangent to SAC_1, SAC_2 and SAC_3. The *MC* is, thus, a flatter U-shaped curve.

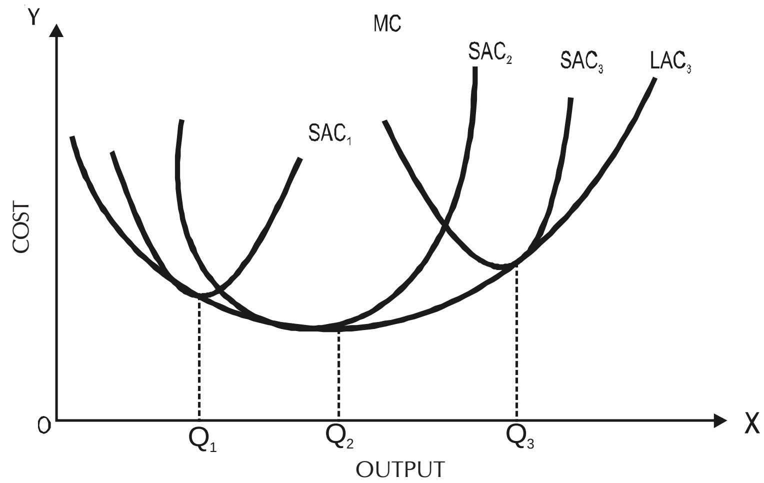


Fig. 9.7: Derivation of the *LAC* Curve

Features of the LAC Curve

Following are the main features of the *LAC* curve:

- **Tangent Curve.** By joining the loci of various plant curves relating to different operational short-run phases, the *LAC* curve is drawn as a tangent curve.

The *LAC* approximates a smooth curve, if the plant sizes can be varied by infinitely small capacities and there are numerous short-run average cost curves to each of which the *MC* is a tangent. In other words, the long-run average cost curve is the locus of all these points of tangency (See Fig. 9.7 and 9.8).

- **Envelope Curve.** The *LAC* curve is also referred to as the 'envelope curve', because it is the envelope of a group of short-run average cost curves appropriate to different levels of output.

In Figure 9.8, the *LAC* curve is enveloping or tangential to a number of plant sizes and the related *SACs*.

In Figure 9.8 the *LAC* curve is drawn on the basis of three possible plant sizes. This is a much simplified assumption. Normally, however, the firm may come across with a choice among a large variety of plants. Thus, more realistically, the *LAC* is to be drawn with reference to a large number of possible plant sizes, as shown in Figure 9.8.

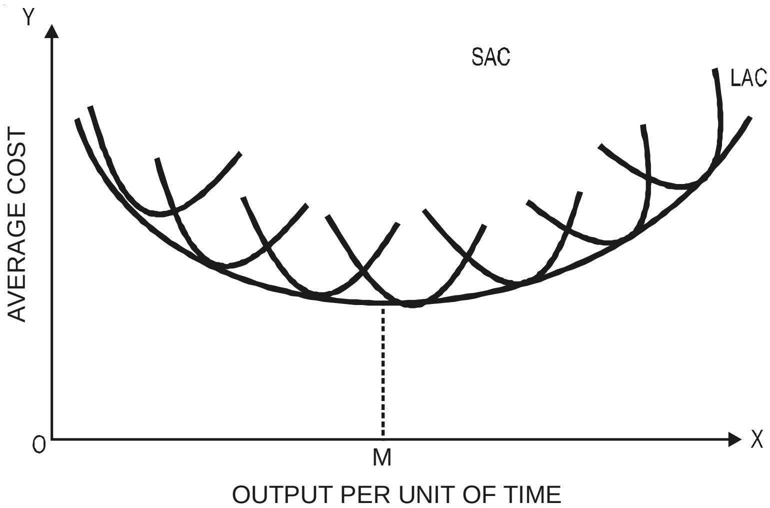


Fig. 9.8: The *LAC* Curve drawn from Many Plant Sizes

- **Planning Curve.** *LAC* curve is regarded as the long-run planning device, as it denotes the least unit cost of producing each possible level output and the size of the plant in relation to the *LAC* curve. A rational entrepreneur would select the optimum scale of plant. The optimum scale of plant is that plant size at which a *SAC* is tangent to the *LAC*, such that both the curves have the minimum point of tangency.

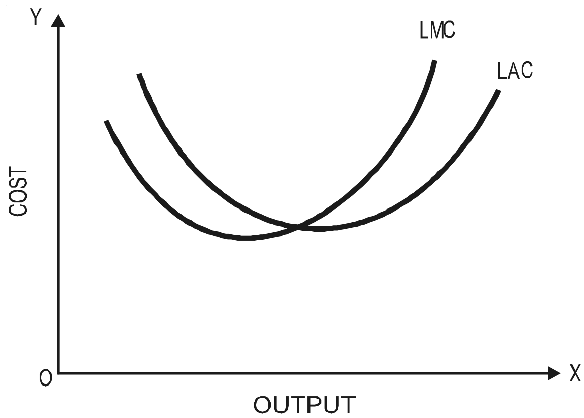


Fig. 9.9: The *LMC* and the *LAC* curves

In Fig. 9.9, at OQ_2 level of output, *SAC* is tangent to *LAC* at both the minimum points. Thus, OQ_2 is regarded as the optimum scale of output, as it has the minimum per unit cost. It should be noted that, there will be only one such point on the *LAC* curve to which a *SAC* curve is tangent as well as both have the minimum points at the point of tangency. And as such this particular *SAC* phase is regarded as the most efficient one. All other *SAC* curves are tangent to the *LAC* but at the point of tangency neither *LAC* nor *SAC* curve has the minimum point. In fact, at all these points *SAC* curves are either rising nor falling, showing a higher cost.

Anyway, the optimum scale of plant will inevitably be adopted in the long-run by the firm under perfect competition. But the firms under monopoly and monopolistic competition are less likely to select the optimum plant size.

- **Minimum Cost Combinations.** Since *LAC* is derived as the tangent to various *SAC* curves under consideration, the cost levels be presented by the *LAC* curve for different levels of output reflect minimum cost combinations of resource inputs to be adopted by the firm at each long-run level of output.
- **Flatter U-Shaped.** The *LAC* curve is less U-shaped or rather dish-shaped. This means that in the beginning it gradually slopes downwards and then, after reaching a certain point, it gradually begins to slope upwards. This implies that in the long-run when the firm adopts a larger scale of output, its long-run average cost in the beginning tends to decrease. At a certain point, it remains constant, and then rises. This behaviour of long-run average costs is attributed to the operation of laws of returns to scale. Increasing returns in the beginning cause decreasing costs, constant returns, constant costs, and then decreasing returns, increasing costs.

18. ECONOMIES OF SCALE AND THE LAC

The *LAC* curve is the mirror image of the returns to the scale in the long-run.

It is apparent that since returns to the scale are based on the internal economies and diseconomies of scale, the long-run average cost curve traces these economies of scale. As a matter of fact, increasing returns to scale can be largely traced to the economies which become available to a firm when it expands its scale of operations. As a result of these economies, the firm enjoys a number of cost advantages and return in terms of total output. Thus, economies of scale explain the falling segment of the *LAC* curve. This shows that the declining average cost of output in the long-run is due to economies of large-scale enjoyed by the firm.

Increasing *LAC* is attributed to the diseconomies of scale after a certain point of further expansion.

In short, economies and diseconomies of large scale play a significant role in determining the shape of the *LAC* curve. Again the structure of an industry is also affected by the cost consideration which is conditioned by the economies and diseconomies of scale. Of the many determinants of the number and size of firms in an industry, the cost consideration and relevant economies and diseconomies are a significant determining factor.

Increasing average costs in the long run, attributed to the growing diseconomies of scale, set a limit to the further expansion of the firm.

Economies and diseconomies of scale reflect upon the behaviour of the *LAC* curve. Analytically speaking the downward slope of the *LAC* curve may be attributed to the internal economies of scale. Similarly, the upward slope of the *LAC* curve is caused by the internal diseconomies of scale. And, the horizontal slope of the *LAC* curve may be explained in terms of the balance between internal economies and diseconomies (See Fig. 9.10).

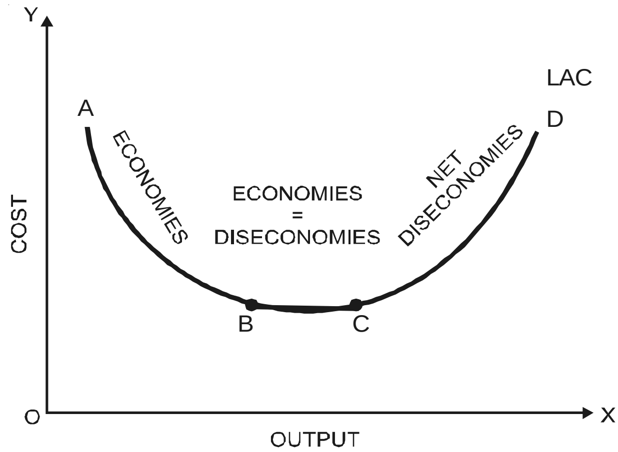


Fig. 9.10: Internal Economies — Diseconomies and the *LAC* curve

Internal economies cause *LAC* curve to fall. It remains constant when economies equal diseconomies of scale. Net diseconomies cause *LAC* to rise.

In short, the internal economies and diseconomies have their significance in determining the shape of the *LAC* curve of a firm. However, the shift in the *LAC* curve may be attributed to the external economies and diseconomies. External economies reflect in reducing the overall cost function of the firm. Thus, a downward shift in the *LAC* may be caused by external economies as shown in Fig. 9.11.

In Figure 9.10, *ABCD* is the *LAC* curve. Its *AB* portion — the downward slope — is subject to the internal economies. Its *BC* portion — the horizontal slope — is due to the balance between economies and diseconomies. Its *CD* portion — the upward slope — is subject to internal diseconomies.

In Figure 9.11, the original LAC_1 curve shifts downwards as LAC_2 on account of external economies.

Similarly, an upward shift in the *LAC* curve may be attributed to the external diseconomies, as shown in Figure 9.12.

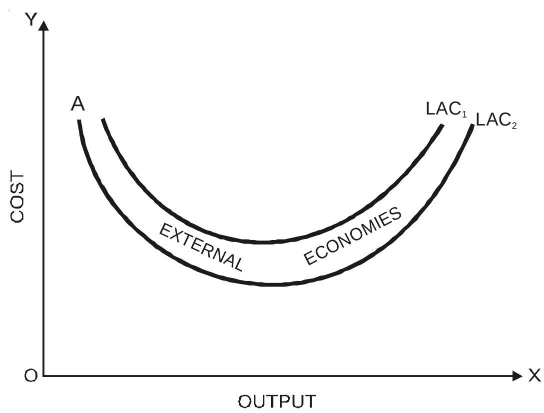


Fig. 9.11: The Effect of External Economies on the *LAC* Curve

In Figure 9.12, the original LAC_1 curve shifts up as LAC_2 owing to the external diseconomies.

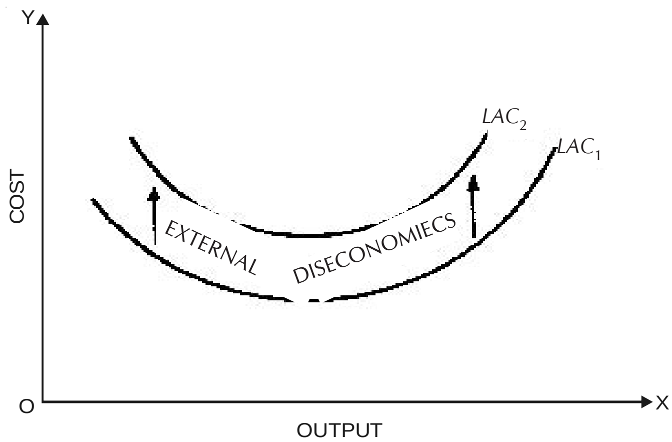


Fig. 9.12: The Effect of External Diseconomies on the *LAC* Curve

19. TECHNOLOGICAL CHANGE AND LONG-RUN COST

Christensen and Greene (1976) examined the economies of scale in the case of U.S. Electric Power generation during 1955 to 1970. They found that the main reason for the cost reduction in the long-run was technological improvement rather than economies of scale. There has been a downward shift of the *LRAC* curve as *LRAC'* due to technological change, as shown in Figure 9.13.

As in Figure 9.13, the long run average cost (*LRAC*) curve is drawn tangent to the short run average cost (*SRAC*) curves at every level of production corresponding to several plant sizes. The *LARC* is referred to as an envelope curve. In many industrial situations, the *LRAC* is constructed by using the envelope curve technique. Using this technique, Rogers and Bardwell (1959) have derived the *LRAC* and demonstrated the economies of scale in chickens processing taking ten plant sizes.

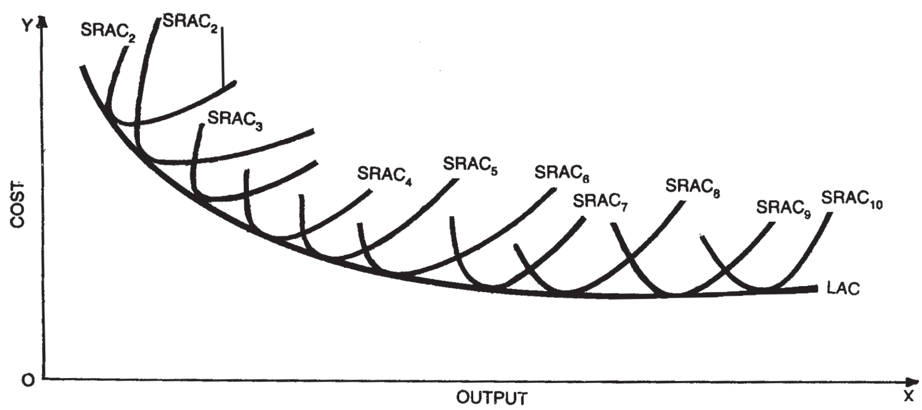


Fig. 9.13: Technical Progress and *LRAC* Curve: *LARC* Curve tends to be L-shaped

and their *SRAC* to $SRAC_2$ respectively into account. Their study depict a gradually downward sloping *LRAC* (as in Figure 9.14) indicating the economic benefit of the large-scale output of broilers at the New Hampshire Agricultural Experiment Station (See Rogers G.B. and E.T. Bardwell: 1959).

The *LRAC* curve implies that average processing cost of chicken is reducing with the rising scale of output per hour (on account of economies of scale).

When China's demand for import of wheat from the US is expected to increase in the years to follow, on the one hand, and the US farmers may shift their land use to alternative crops, on the other hand, the supply of wheat in the US market may decline. Consequently, the flour prices may tend to rise which may lead to an increase in costs of bakery products. This may result in rise in prices of bakery goods. To determine its impact on future demand then the bakeries should estimate the price elasticity of demand for their products. Usually, demand for common bakery items will be inelastic; hence, there is less chance of severe impact on this industry. It is also observed that the innovative gesture helps the firm in capturing a better market. Tasty Baking Company in the United States, for instance, automated the production systems at its Hunting Park plant which cut its product operations time significantly from 12 hours to 45 minutes. By 1990, it renovated and upgraded production process further. In 1989, for instance, it introduced 3.5 megawalt cogeneration system to minimise the use of petroleum-based products which become more cost effective. In 1995, it acquired Ducth Mill Baking Company and expanded its product lines as well as distribution. It also used a special film developed by Mobil to maintain the freshness of the products for a longer time without using preservatives. This implied a higher cost. This was, however, compensated by the rising sales. In 1997, the Tasty, Baking Company upgraded its use of computer technology in operating performance.

In practice, LRAC is more common than the theoretical LRAC curve, as in Figure 9.14.

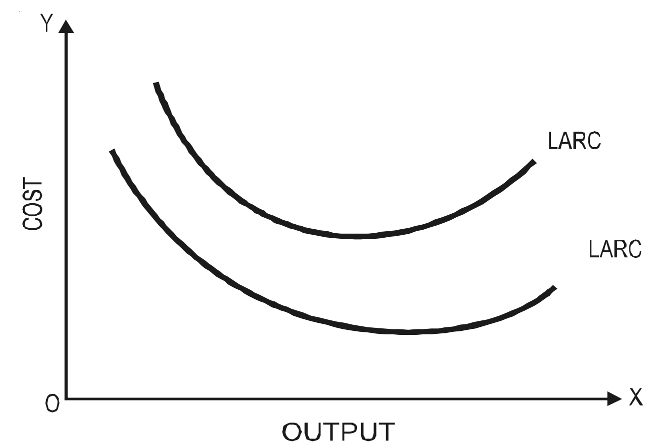


Fig. 9.14: Typical *LARC* Curve

20. LONG-RUN MARGINAL COST CURVE (LMC)

Like the short-run marginal cost curve, the long-run marginal cost curve is also derived from the slope of total cost curve at the various points relating to the given output each time.

The shape of *LMC* curve has also a flatter U-shape, indicating that initially as output expands in the long-run with the increasing scale of production tends to decline. At a certain stage, however *LMC* tends to increase. The behaviour of the curve is shown in Figure 9.15.

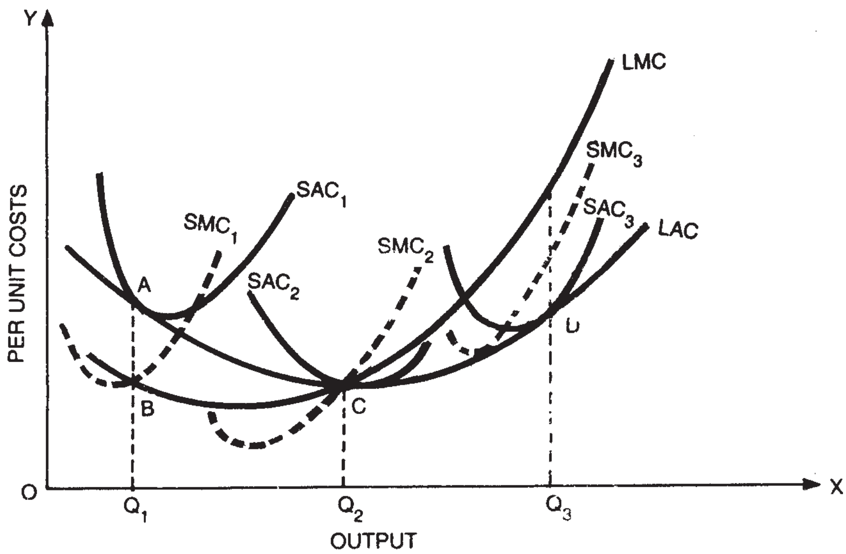


Fig. 9.15: Derivation of LAC Curve

In Figure 9.15, the *LAC* refers to the long-run average cost curve. And the *LMC* refers to the long-run marginal cost curve.

From Figure 9.15, the relationship between *LAC* and *LMC* may be traced as follows:

- When *LAC* curve decreases, *LMC* curve also decreases and $LMC < LAC$.
- At a certain stage, *LMC* tends to rise, though *LAC* continues to fall. Indeed, *LMC* is still less than *LAC*.
- When *LAC* is the minimum, *LMC-LAC*. Thus, the *LMC* curve intersects, at the lowest point of the *LAC* curve.
- Thereafter both the *LAC* and *LMC* curves slope upwards. Now $LMC > LAC$. So, the *LMC* curve lies above the *LAC* curve.

21. ESTIMATION OF LONG-RUN COST FUNCTION

In long run, there is no fixed cost component, all are variable costs. Thus:

$$TC = bQ - cQ^2 + dQ^3$$

Example:

$$TC = 160Q - 20Q^2 + 1.2Q^3$$

$$AC = 160 - 20Q + 1.2Q^2$$

$$MC = 160 - 40Q + 3.6Q^2$$

In the above illustrated cost function, put the given value of Q and estimate the cost function for each output (Q) level.

Problem: Illustration

$$TC = 250Q - 10Q^2 + 2Q^3$$

Estimate TC, MC and AC if output is 100 units.

Solution:

(1) $TC = (250 \times 100) - (10 \times 100 \times 100) + (2 \times 100 \times 100 \times 100)$

$= 25{,}000 - 1{,}00{,}000 + 20{,}00{,}000$

$= 19{,}25{,}000.$

(2) $MC = 250 - 20Q + 6Q^2$

$= 250 - (20 \times 100) + (6 \times 100 \times 100)$

$= 250 - 2{,}000 + 60{,}000$

$= 58{,}250$

(3) $AC = 250 - 10Q + 2Q^2$

$= 250 - (10 \times 100) + (2 \times 100 \times 100) = 19{,}250$

Case Study Estimation

Gupta (1968) estimated the long-run cost functions (*LAC*) for select manufacturing industries in India, as follows:

• **Cement** $LAC = 65.6 + \frac{5622}{Q} + 0.005Q$	• **Iron and Steel** $LAC = 92.6 - 0.003Q$
• **Chemicals** $LAC = 73.9 - 0.0002Q$	• **Paper** $LAC = 73.6 + \frac{963}{Q}$
• **Cotton Textiles** $LAC = 89.7 + \frac{273}{Q}$	• **Sugar** $LAC = 85.0 + \frac{124}{Q} + 0.001Q$

22. COST ELASTICITY

Cost elasticity refers to the ratio percentage change in total cost in relation to a 1% change in output. Thus:

e cost = % D*TC*

% D*Q*

where, % D*Q* = 1%

Proportionate cost elasticity:

$$e\ \text{cost} = \frac{\Delta TC}{\Delta Q} \times \frac{Q}{TC}$$

where, TC = Total cost

Q = Quantity of output

- e cost = 1

  implies constant *AC* (zero economies of scale/constant return of scale)
- e cost < 1

  implies decreasing *AC* (economies of scale/increasing return of scale)
- e cost > 1

  implies increasing *AC* (diseconomies of scale/decreasing returns to scale)

23. MINIMUM EFFICIENT SCALE

The minimum efficient scale (*MES*) of production corresponds to the minimum long-run *ATC*. To find MES, using calculus method, take the first derivative of the *LRAC* function and set the results equal to zero, and solve for *Q*.

Illustration:

A firm's long-run total cost (*LRTC*) function is:

$LRTC = 5{,}005Q - 6Q^2 + 0.005\ Q^3$

(i) Measure the average cost in the long-run

(ii) Find minimum efficient scale (*MES*) of production.

Solution:

(i) Long-run Average Cost:

$$LRAC = \frac{LRAC}{Q}$$

$$\therefore LRAC = \frac{5{,}000 - 6Q^2 + 0.005Q^3}{Q}$$

$$= 5{,}000 - 6Q + 0.005Q^3$$

(ii) Minimum Efficient Scale:

$$\frac{dLRAC}{dQ} = -6 + 0.01Q = 0$$

$\therefore \quad Q = 600$

The minimum efficient scale of production is 600 units.

24. COST LEADERSHIP

The concept of cost leadership is coined by Michael Porter as an element of business strategy towards competitive advantage. Fundamentally, cost leadership implies the lowest cost of operation in the business by the firm. It reflects the scale and soul efficiency of the firm. By and large, cost leadership is a business strategy of doing the business at the lowest possible cost in a market. It is the outcome of the learning curve effect caused by cumulative experience in handling the business by the cost leadership firm. In Aviation industry in Malaysia, for instance, Air-Asia has turned out as the successful low-cost yet profit-making airline. Air-Asia supplies the air travel flights operations that are basic in serving the need of the people with no-frills product. Air-Asia operation is at a relatively much lower cost and the flights are made available to large number of customer base. For this, the firm is always innovative in searching the ways of cost reductions and also making more money. Its promotional strategy is quite appealing it the air travellers.

Cost leadership position in the industry is acquired by a competitive firm through:

- Cost control measures
- Avoiding wastages
- Better supervision on the workers
- Access to cheaper source of capital and required finance. Financial management at low-cost.
- Focus on quantitative targets for the business expansion while ensuring that the cost is maintained at the minimum level.

Dell, for instance, in computer industry is identified as the cost lender. Similarly, Wal-Mart has earned its cost leadership reputation in retail trade. Wal-Mart could achieve this owing to the various innovative methods adopted in the process of cost-reduction and remaining much ahead of its competitors.

Porter argues that there are two generic level strategies found in the modern business:

- Product differentiation
- Cost leadership

In a certain markets, such as commodity market, there is no much choice left except cost leadership for the operating firm.

In fact, cost leadership strategy is adopted by the firm in order to generate competitive advantage by creating more economic value at the lowest costs in comparison to the competitors.

Cost leadership, however, is not a synonym of low price. Though, it is quite likely that the lowest priced can be charged by the cost leader firm and still can make a higher profit.

Sources of Cost Leadership

To develop cost leadership business strategy, it's essential for the managers to understand the fundamentals of cost analysis.

The following are the major sources of cost advantage to be realised under the cost leadership strategy in business:

Economies of Scale

- Cost economy arising due to fixed overhead costs, when level of output increases
- Reaching to a level of minimum efficient scale much earlier than the competing firms in the market

Learning Curve Effect

- This is the outcome of cumulative experience gained by the expanding firms operating in different market territories.

Internationalisation

- The firm that expands business in overseas markets gaining more experience in comparison to firms confined to the domestic business only.

Technological Acquisition and Improvement

- In these days of K-economy, the firm can hope to bring down costs through acquisition and improvements of the available technology. Extensive and effective use of information technology is remarkable in this context.

Access to Low Cost Inputs

- The firm that can acquire the required business resources at a lower price in comparison to the rivals can easily come out with cost leadership business strategy in the market. Wal-Mart, for instance, manage its provisions for its stores at lower costs through its efficient distribution centres besides its locational advantages.

Knowledge Management

- The firm needs to acquire knowledge of cost minimisation and effectively use it to develop its cost competitive edge in the market.

Cost Conscious Organisational Culture

- The industrial organisation of the firm has to be efficiency-driven and always be cost conscious. The organisational culture has to be focused on cost-effectiveness in business operations. Wal-Mart, for example, has succeeded well in this direction.

According to Hooley *et. al*. (2004)[1], Cost leadership business strategy yields competitive advantage for the firm in the market by conferring the value of return on investment owning to the neutralising effect on the competitive threats of five forces indicated by Porter, such as:

- Threat of New Entry
- Threat of Rivalry
- Threat of Substitutes
- Threat of Suppliers
- Threat of Buyers.

Source: Hooley, Saunders and Piery (2004). Marketing Strategy and Competitive Positioning, Prentice-Hall.

MODEL QUESTIONS

1. Distinguish between:
   (a) Prime costs and supplementary costs.
   (b) Explicit costs and Implicit costs.
   (c) Real cost and opportunity cost.
2. Explain briefly the following concepts:
   (a) Opportunity Cost.
   (b) Money Cost.
   (c) Real Cost.
   (d) Marginal Cost.
   (e) Average Fixed Cost.
   (f) Average Variable Cost.
3. (a) What is meant by opportunity cost?
   (b) What is its economic significance?
4. Do you agree with the following statements? Give reasons.
   (a) The distinction between prime and supplementary cost is invalid in the long run.
   (b) In the short run, there is a distinction between fixed and variable costs.

(c) Opportunity cost is a useful concept in decision-making and efficient allocation of resources.

(d) Economists consider only explicit costs of production.

(e) Marginal cost is an incremental cost.

5. Write notes on:

(a) Opportunity Cost.

(b) Prime and Supplementary Costs.

6. Explain briefly the following statements:

(a) Marginal fixed cost tends to be zero in the short run.

(b) Marginal costs are variable costs.

(c) Marginal cost is independent of the fixed cost.

(d) The marginal cost curve intersects the average cost curve.

(e) When *MC* is zero, *TC* is maximum, while *AC* is minimum.

(f) Fixed costs are independent of the level of output.

(g) *AVC* initially falls, thereafter rises.

(h) The shape of the *LAC* curve is determined by economies of scale.

(i) The *AFC* curve is symptotic to the axes.

(j) *MC* is given by the slope of either the *TC* or the *TUC* curve.

7. What are the relations between returns to scale and the long run average cost ?

8. Why is short run average cost curve U-shaped ?

9. Explain the concepts of average fixed cost, average variable cost, average cost and marginal cost and show their interrelationship.

10. Discuss the cost output relationship in the long run.

11. Mention the salient features of the long run average cost curve. What is its significance in managerial decision-making.

12. Why, in practice, the *LAC* curve is likely to be L-shaped?

Problems

1. From the following data, measure the Total Cost, Average Cost and Marginal Cost.

Manufacturer of X product X incurred fixed costs of Rs. 300/-:

Variable cost:	500	640	720	740	800	900
Output unit:	1	2	3	4	5	6

[**Hints:** 1. Add Rs. 300 fixed to variable costs at all stages to final total cost.

Thus, Total Cost = 500 + 300 = 800, 640 + 300 = 940 etc.]

Total Cost

2. Average Cost $= \dfrac{\text{Total Cost}}{\text{No. of Units Produced}}$ Thus : $\dfrac{800}{100} = 8; \dfrac{940}{200} = 4.7$, etc.

3. Marginal cost is addition to total cost 50, 140, 80, 20, 60, 100.

2. Estimate average and marginal cost from the following cost function:

   $TC = 150Q - 8Q^2 + 3Q^3$

3. Explain the concepts of average fixed cost, average variable cost, average total cost and marginal cost. Show their interrelationship through cost functions and diagrammatic presentation.

4. Explain the laws of returns to scale.

5. Complete the following table:

Units of Output	*TFC*	*TVC*	*TC*	*MC*	*AC*
1.		20		30	
2.				45	
3.				70	
4.				95	
5.				150	
6.				220	

6. You are given the following short run cost function:

   $TC: 100 + 60Q + 3Q^2 + 0.1Q^3$

   Measure Marginal Cost and Average Cost, if $Q = 1000$.

7. Based on your knowledge of the definition of the various measures of short run cost, complete the following table:

Q	*TC*	*TFC*	*TVC*	*AC*	*AFC*	*AVC*	*MC*
0	1200	—	—	X	X	X	X
1	—	—	—	265	—	—	—
2	—	—	204	—	—	—	—
3	—	—	—	161	—	—	—
4	—	—	—	—	—	—	86
5	—	—	525	—	—	—	—
6	—	—	—	120	—	—	—
7	—	—	—	—	—	97	
8	—	—	768	—	—	—	—
9	—	—	—	—	—	97	—
10	—	—	—	—	—	—	127

8. On the basis of the following cost function:

   $TC = 100 + 60Q + 3Q^2$

   (i) Compute the average cost, and marginal cost.

   (ii) Indicate the point at which diminishing returns occur.

9. $TC = 600Q - 20Q^2 + 1.2Q^3$

   On the basis of above cost function calculate the long run average cost and marginal cost. Plot them graphically.

10. Estimate average and marginal cost from the following cost function:

    $TC = 150Q - 8Q^2 + 3Q^3$

❒ ❒ ❒

Economies of Scale and Scope

10
CHAPTER

1. LARG-SCALE OF PRODUCTION

The scale of production means the size of the production unit of a firm or a business establishment. The scale of production can vary from very small to very large, depending on the quantity of output per unit of time of the firm. Thus, the scale of production positively varies with the size of the firm.

Large-scale production refers to the production of a commodity on a large-scale, with a large plant size firm. Large-scale production or output requires large-scale input, *i.e.*, the use of the efforts of the factors of production on a large-scale. On the other hand, production of a commodity with a small plant size firm will have the production of a commodity on a small scale.

Motives Behind Large-scale Production

A notable feature of production in the modern industrial economy is that production takes place on a large-scale. The growing large-scale of production in the modern economy is due to the expansion of large firms producing commodities. The principal motives leading to the expansion of the size of a firm are:

- **Desire for Economy.** Generally, a large-scale of output is more economical.
- **Desire for Large Profit.** Business on a large-scale certainly yields more profits.
- **Desire for Economic Power and Prestige.** A large firm can command and control a large section of the business in general and has a high reputation in the market.
- **Desire for Increase of Demand.** When the demand for a product increases and the size of its market expands, the firm will have to increase its scale of production to

adjust its supply to demand. Alternatively, by increasing the scale of output and by resorting to greater specialisation and division of labour, the firm can increase its productivity as a whole and lower its cost of production so that it can supply more at a lower price as a result of which the demand for its product increases.

- **Desire for Self-Defence in a Competitive Market.** Owing to cut-throat competition in business, the firm may be forced to enlarge its scale of production for its very survival.

2. THE SIZE OF FIRM AND INDUSTRY

Production in modern economy is carried on by a large number of firms of different types and sizes. The firm may be defined as an independently administered enterprise — a business unit, whether a sole proprietor, partnership, or a joint stock company — producing a particular commodity. All such firms taken together constitute the industry. Thus, an industry is composed of all the firms — individual business units producing similar commodities. For example, Sony is a firm, Samsung is also a firm producing electronic goods. Likewise, there are several electronic goods manufacturers in India. All of them together constitute the electronic industry.

A firm or a business establishment may be large or small. Usually, the size of an establishment is measured by the value of its output or by the number of labourers it employs, or by the amount and value of its fixed capital such as buildings, plant and equipment. The size of a firm increases when it uses more and more of capital, labour and other factors of production.

An industry may consist of both large and small firms at a time. Like firms, the size of an industry also may be large or small. The size of an industry depends on the size of firms it constitutes and their number. Thus, the size of an industry increases when:

- There is an increase in the number of firms in it; or
- There is an increase in the size of firms comprising it.

3. ECONOMIES OF SCALE

Large scale production is economical in the sense that the cost of production is low. The low cost is a result of what is called "economies of scale."

The concept "economies of scale" may be viewed in two senses: broad and narrow.

> **Definition**. In a broad sense, anything which serves to minimise average cost of production in the long-run as the scale of output increases is referred to as "economies of scale." It is measured in money terms.

In a narrow sense, however, the term 'economies of scale' relates to the characteristics of the production process by which average productivity is enhanced with the expanding scale of output. Real economies are measured in physical terms. Increasing returns to scale are caused by these real economies.

The economies of scale may be classified as: *(i)* internal economies, and *(ii)* external economies.

Internal Economies

Internal economies are those economies which are open to an individual firm when its size expands. They emerge within the firm itself as its scale of production increases. Internal economies in the scale of its output cannot be realised unless the firm increases its output, *i.e.*, expands its size. Thus, internal economies are the function of the size of a firm. These are solely enjoyable by the firm itself when its scale of production increases, independently of the actions of other firms.

External Economies

External economies are those economies which are shared by all the firms in an industry or in a group of industries when their size expands. They are available to all firms from outside, irrespective of their size and scale of production. They are the result of the growth and expansion of any particular industry or a group of industries as a whole. Thus, external economies are the function of the size of the industry. They are not confined to one or two firms, but shared by all the firms (irrespective of their size) in an industry when its size expands. Thus, external economies can never be monopolised by any one firm in an industry.

In fact, external economies arise mainly due to the localisation of industries. Thus, external economies are enjoyed by a firm when some other firms grow larger; these arise as a result of the cost reducing effects of expansion and growth elsewhere.

Briefly, thus, economies of size of a firm are "internal economies" and those of the size of industry are "external economies."

In pecuniary sense, both internal and external economies imply cost reduction. It is, however, difficult to draw a line of demarcation between internal and external economies because of their overlapping nature. When the size of a firm increases, it enjoys internal economies, but its expanding size also causes the growth of industry which, in turn, leads to some external economies. External economies, in turn, reduce the cost of production simultaneously with the cost economies caused by the increasing scale of output in the firm. In practice, internal and external economies arise in an overlapping or interwoven manner, so the distinction between the two cannot be easily measured from a given cost function of a firm.

4. FORMS OF INTERNAL ECONOMIES

The principal types of internal economies of scale can broadly be grouped under six headings: labour, technical, managerial, marketing, financial and risk-spreading.

Labour Economies

Increased division of labour is a major source of labour economies. The extent of division of labour is preconditioned by the scale of output. As output increases and the labour force grows, a more and more complex division of labour with a greater degree of specialisation, with all its advantages, may become possible. Moreover, a large firm can attract more efficient labour, as it can offer a wide vertical mobility, better prospects of promotion, as a result of increasing specialisation in the production processes. As such, the skill, efficiency and productivity of labour as a whole in such large firms rise, reducing the cost per unit of output.

Technical Economies

Technical economies refer to reductions in the cost of the manufacturing process itself. These relate to the methods and techniques of production, specially to the nature and forms of capital employed.

Following Prof. Cairncross, we may classify the various kinds of technical economies as follows:

- **Economies of Superior Technique.** As a firm expands, it can use superior techniques and capital goods. A small firm cannot install a high quality machine or other capital goods which a big firm can. Small firms generally make increasing use of ordinary machines operated by hand while large firms make a synchronised application of big automatic machines worked by steam or electricity. Such automatic machines are quicker and more efficient, and their output is large as compared to the ordinary machines. Thus, for instance, an automatic loom is more economical than a handloom. But a village weaver cannot afford to have an automatic loom, which a textile mill obviously can. Similarly, a rotary printing press, linotype machine, etc., are more economical than hand composing. But a small job printer cannot afford to have such big machines which only a well-established newspaper organisation like "*The Times of India*" can.
- **Economies of Increased Dimension.** Certain technical economies may become available just on account of increased dimensions. This is purely a mechanical advantage of using large machines. Large pieces of equipment are relatively more economical than smaller ones and usually there is an optimal minimum to the size of any piece of equipment. The reason for this lies in the laws of physical universe which govern the rate of increase of the various properties of inanimate bodies with an increase in their size. For example, as we increase the size of a cube, its surface increases by the square of its sides, whereas its inner capacity rises by the cube of its sides. Thus, the carrying capacity of a ship increases in proportion to the cube of its dimensions. As such, a big ship is more economical than a small one, because a big ship can be run by a crew of sailors just as large as required for a small one. Similarly, a double decker bus is more economical than a single decker. For only one driver is needed, whether it is a double decker or a single decker bus. Similarly, a big lorry does not need more drivers than a small station wagon, and so on. Moreover, the size of a unit of machine can usually be doubled without doubling labour and other material costs.
- **Economies of Linked Process.** A large plant usually enjoys the advantage of the linking of processes, *i.e.*, by arranging production activities in a continuous sequence without any loss of time. Prof. Cairncross points out, "There is generally saving in

time and saving in transport costs, since two departments of the same factory are closer together than two separate factories." For the same reason, processes of editing and printing of newspapers are generally carried out in the same premises.

Similarly, in the iron and steel industry, the main production stages like melting iron ore into pig iron, converting pig iron into mild steel, rolling steel into sheet plate, etc., are linked together to avoid waste of power, heating process, etc., and, thus, to achieve economies.

- **Economies in Power.** Large units of machines and their continuous running by a large firm are often more economical in their power consumption as compared to a small machine.
- **Economies of By-products.** Large firms can make a more economical use of their raw materials. A large firm can avoid waste of its raw materials, which it can economically use for manufacturing certain by-products. Large chemical companies are, for instance, constantly developing new varieties of by-products in this way. Similarly, cane pulp and molasses of big sugar factories can be effectively used by the paper industry and liquor distilleries.
- **Economies of Continuation.** Technical economy is also realised due to long run continuation of the process of production. For instance, in the printing press industry, there is an apparent economy to be realised by printing more copies of a composed sheet. Thus, if composing and printing cost of 1,000 copies per page is Rs. 12, for 2,000 copies it would cost only Rs. 14, that is, just Rs. 2 more for the extra 1,000 copies, because the same sheet plate which is composed once will remain in use for printing extra copies. Hence, there is only additional printing cost involved, while the composing cost remains the same.

Managerial Economies

As a result of the indivisibility of managerial factors, the cost per unit of management will fall as output increases, thus, with the increasing scale of output, greater managerial economies are enjoyed by an expanding firm. For a good manager can organise a large output with the same efficiency as he can organise a small output. And his remuneration normally remains the same whether the output is large or small. Morever, a large firm can hire a first-rate manager by paying a handsome salary, so its overall administration will be more efficient as well as economical. An entrepreneur can delegate some of his functions to trained and specialised personnel in his various departments and can get better and more efficient productive management with scientific business administration. But economies in management can be realised only when production is on a large scale. A small producer cannot afford to have all such personnel with knowledge of scientific business administration.

Marketing Economies

Marketing economies are economies of buying (of raw materials) and selling (goods produced). A large firm can generally buy more cheaply than a small one, because it can purchase its raw materials on a large scale at a low cost (paying wholesale price). Further, a big firm also employs purchasing experts to purchase the required raw materials more economically and in time.

Similarly, on the sales side, a big firm can reap advantages of large scale marketing. Selling is generally less expensive per unit when large quantities are distributed, because a selling organisation should be of an optimum size whatever be the volume of sales handled.

Financial Economies

In financial matters, a large firm has relatively greater advantages than a smaller one. Usually, it has a wider reputation and greater influence in the money market. Big firms are usually regarded less risky by investors, hence, they may be willing to lend capital to such firms even at a lower rate of interest than to small firms. Thus, the cost of obtaining credit and capital is lower to a large concern than to a smaller one. Further, big firms can easily raise their capital by issuing shares and debentures. The shares of a big concern number in millions and are held by thousands of people. But a small firm having no recognition in the capital market cannot command such capital.

It can only raise a modest capital from the personal resources or loans from relatives or a bank or from moneylenders. And it cannot procure money from the general public by offering shares for sale on the stock exchange. Briefly, thus, the important financial advantage enjoyed by a large firm is the existence of a ready market for its shares and its sound reputation in the capital market.

Risk-Minimising Economies

A large firm by producing a wide range of products is in a position to eliminate or minimise business risks by spreading them over. Risk-spreading advantages are sought by a big firm in the following ways:

- **By Diversification of Output.** As a big firm can produce a number of items and in different varieties, the loss in one can be compensated by gain in others, *e.g.*, Godrej Soaps Ltd. is producing soap, talcum powder, shaving cream, etc., various types of cosmetic products and thereby spreading its business risks.
- **By Diversification of Market.** When a product is produced on a large-scale, it can have an extended market throughout the country so that the danger of fluctuations in demand is reduced to the minimum. Thus, demand for nationwide popular product is more stable than a locally supplied article.
- **By Diversification of Sources of Supply as well as of Process of Manufacturing.** In a large firm, there are less chances of disruption of output as a result of scarcity of raw materials or break down of a particular process.

5. FORMS OF EXTERNAL ECONOMIES

By external economies we mean gains accruing to all the firms in an industry from the growth of that industry. External economies are enjoyable by all the firms in the industry, irrespective of their size. External economies are, in essence, the advantages of localisation.

An industry expands when the number of firms increases or their size expands in a particular region; thus, localisation of industry takes place and all the advantages of localisation accrue to firms in that industry.

The chief types of external economies are: *(1)* Economies of localisation; *(2)* Economies of information; *(3)* Economies of disintegration; *and (4)* Economies of by-products.

Economies of Localisation

When a number of firms are located in one place, all of them derive mutual advantages through the training of skilled labour, provision of better transport facilities, stimulation of improvements, etc. These are in fact the benefits of localisation. Concentration of a particular industry in one area, in course of time, results in the development of conditions helpful to the industry. And all the firms in that area reap mutual benefits. Moreover, when there is an increasing concentration of firms, arrangement can be made for repairs and maintenance and special services required by the industry. The cost of production is thereby reduced.

Economies of Information or Technical and Market Intelligence

A large and growing industry can bring out trade and technical publications to which every firm can have access. Producers are, thus, saved from independent research which is very costly. In a large industry, research work is done jointly. There can be a research association of the industry as a whole. And each firm enjoys the benefits of research. Statistical, technical and other market information becomes more readily available to all firms in a growing industry. As such when the industry progresses, the cost of production falls.

Economies of Vertical Disintegration

The growth of industry will make it possible to split up production and some subsidiary jobs can be left to be done more efficiently by specialised firms. New subsidiary industries may grow up to serve the needs of the main industry, e.g., in the textile industry, the colour manufacturing process may be taken up by a specialised chemical firm and the mills may get better products at low cost. When a particular process is split up and performed on a large scale by a specialised firm, it can yield all the internal economies of large scale production. Hence, all firms in the industry will be able to get this process done at a lower cost instead of attempting to meet their own needs by carrying it out themselves on a small scale at a high cost. But the subsidiary industry or specialised firm in a particular process may spring up only when the industry is large enough to support it.

Economies of By-products

A large industry can make use of waste materials for manufacturing by-products. The firm using it can flourish when waste material available in the industry is converted into by-products. For example, in a sugar factory belt, sugarcane pulp can be used by the paper mill in producing paper. Sugar factory will get some return for the sugarcane pulp by selling it to the paper mill in the vicinity. This means an indirect economy in cost.

A Case Study of New Zealand

Electricity Distribution: Economies of Scale

Gills and Wyatt (1993) observed 'L' shape average cost curve using a translog cost model to estimate economies of scale in electricity distribution in New Zealand. Their case study is based on 60 Electricity Supply Authorities (ESAs) in the country. The ESAs are statutorily obliged to supply electricity and are price takers in the bulk purchase of electricity from the Electricity Corporation of New Zealand (ECNZ). Their study is based on cross-section data for the 1986-87 financial year. To estimate the economies of scale they considered that cost, rather than production, is a better measure as the firms usually intends cost minimization. They described the following cost model for the firms in the electricity industry:

$TC = f(Y, P, I)$

Where,

TC = total cost,

Y = output,

P = a vector of n input prices, and

I = a vector of an additional industry-specific variables.

The model assumes that output and input prices are exogenous. Further, for a given technology, firms adjust input levels so as to minimise costs of production scale economies is defined in terms of the relationship between cost and output along the expansion path. That means, with given input prices and industry-specific variables, costs minimised at each level of output. It is defined as the ratio of average to marginal costs, thus:

SCALE = $(\text{Dlog } C/(\text{Dlog } Y)^{-1}$

If SCALE >1 implies economies of scale, SCALE <1 implies diseconomies.

For empirical consideration, input prices are defined as follows:

The prices of labour and other inputs are the associated expenditures divided by the number of employees.

1. Price of capital inputs were measured — *(a)* total capital value/circuit kilometres of distribution line; *(b)* the value of capital/the combined amount of circuit kilometres of distribution line plus KVA transformer capacity; *and (c)* a constant capital price across ESAs, and
2. The price of electricity purchased — alternatively measured: *(a)* total electricity cost divided by total electricity purchased and generated (cents/kWh); *(b)* constant values of 2.8084 cents/kWh for South Island ESAs and 3.4318 cents/kWh for North Island ESAs in order to consider the average energy components in the wholesale electricity tariff. Besides, they include five industry-specific variables including load factor and density and three dummy variables for the type of ESA, ESA location and regional (urban, rural) consideration.

Their results show that there are significant scale economies in New Zealand Electricity Distribution and the average cost (AC) move implied by their estimated Translog Model is L-shape as shown in Figure 10.1.

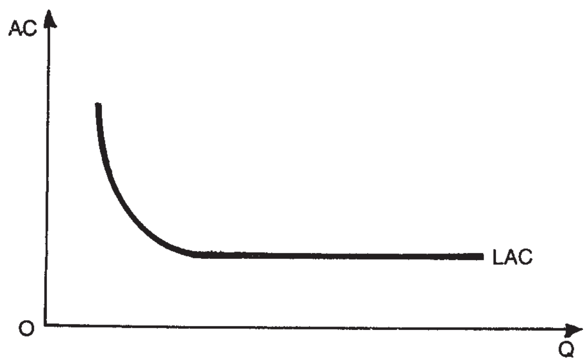


Fig. 10.1

6. DISECONOMIES AS LIMITS TO LARGE-SCALE PRODUCTION

Beyond a particular limit, however, certain disadvantages of large-scale production emerge. When there is an expansion of the firm beyond an optimum limit, the very internal and external economies turn out to be diseconomies. These diseconomies, by raising the average cost of production, act as a limiting factor on the further expansion of the firm. Since economies of large-scale are not available beyond a certain point, a firm cannot expand its size indefinitely.

Generally, the following factors of diseconomies of scale limit the size of a firm:

Difficulties of Management

As a firm expands, complexities and problems of management increase. Thus, after a point, the manager finds it difficult to control the whole production organisation. The entrepreneur and management will not be able to maintain contact with each other and check on all the departments of a very large concern. The problem of supervision becomes complex and intractable, thus leading to increasing possibilities of mistakes and mismanagement. All these prove to be uneconomical, for the defects in organisation will lead to waste and result in rising average costs.

Difficulties of Coordination

The tasks of organisation and coordination become progressively more and more difficult with the increasing size of the firm. The management of the firm will gradually face numerous problems of decision-making and organisation. It may, therefore, not find enough time to give careful thought to individual problems. Decisions so taken in a hurry result in inefficiency and increase in the cost of goods.

Difficulties in Decision-making

A large firm cannot take quick decisions and make quick changes as and when they are needed, for it has to consult various departments for making any decisions and so urgent matters requiring timely decisions are inevitably delayed. This may sometimes cause loss to the firm.

Increased Risks

As the scale of production increases, investment also increases, so too the risks of business. The larger the output, obviously the greater will be the loss. To bear greater risks is an important limitation to the expansion of the size of a firm from an error of judgement or misfortune in business. Therefore, unwillingness to bear greater risks is an important limitation to the expansion of the size of a firm.

Labour Diseconomies

Extreme division of labour with a growing scale of output results in lack of initiative and drive in the executive personnel. Thus, a large firm becomes more impersonal and contact between management and workers becomes less. As such there are more chances of occurrence of grievances, and industrial disputes which prove to be costly to the large firm.

Scarcity of Factor Supplies

Due to the increase in the concentration of firms in a particular locality, each firm will find scarcity of available factors. Hence, competition among firms in purchasing labour, raw materials, etc., will result in increased factor prices. Thus, extreme concentration of external economies becomes a sort of diseconomy in the form of high factor prices.

Financial Difficulties

A big concern needs huge capital which cannot always be easily obtainable. Hence, the difficulty in obtaining sufficient capital frequently prevents the further expansion of such firms.

Marketing Diseconomies

When the industry expands and the firm grows, competition in the market tends to become stiff. Thus, firms under monopolistic competition (which is the most realistic market situation in many lines of production) will have to undertake extensive advertising and sales promotion efforts and expenditure which ultimately lead to higher costs.

7. SCALE ECONOMIES INDEX

Scale Economies Index (SEI) is a measurement to trace the relationship between cost and economics of scale.

$SEI = (1 - COE)\ 100$

Where,

SEI = Scale Economics Index

EC = Cost-Output Elasticity

Cost-Output Elasticity (*COE*) is derived as the ratio of percentage change in output. Thus,

$$COE = \frac{\%\Delta C}{\%\Delta Q}$$

Where,

C = Cost

Q = Output

- $COE > 1$; $SEI < 0$.
  At suggests decreasing returns.
- $COE = 1$; $SEI = 0$.
  At suggests constant returns.
- $COE < 1$; $SEI > 0$.
  At suggests increasing returns.

COE can also be measured as the ratio of *MC* to *AC*. Thus: $COE = \frac{MC}{AC}$

Since,

$$COE = \frac{\%\Delta C}{\%\Delta Q} \text{ or}$$

$$COE = \frac{\Delta C}{\Delta Q} \times \frac{Q}{C}$$

Thus: $\frac{\Delta C}{\Delta Q} = MC$ and $= \frac{Q}{C} = AC$

$$MC = \frac{1}{AC} \quad (\therefore AC = \frac{C}{Q} = \frac{1/Q}{C}) \therefore COE = MC \times \frac{1}{AC} = \frac{MC}{AC}$$

Practical Illustration

A firm has $MC = 100$ and $AC = 120$. Measure its scale economies index and comment on the returns to scale.

Solution:

$$COE = \frac{MC}{AC}$$

$$\therefore COE = \frac{100}{120} = 0.83$$

Scale economies index:

$SEI = 1 - COE$

$\therefore SEI = 1 - 0.83 = 0.17$

Since *SEI* is positive, the firm is operating under the increasing returns to scale.

8. X-EFFICIENCY

Cost economy is the major goal of a business firm. Efficiency in production implies cost economy. An efficient firm will tend to experience a lower cost function. When efficiency improves, cost function of the firm tends to shift downwards. In practice, a major way of cost reduction is seen through minimisation of the wastage of resources. More wastage implies higher costs. Low wastage means low costs. X-efficiency refers to the phenomenon of the firm's ability to monitor and control the production unit to minimize the wastage of resources. X-efficiency is a function of management to reduce or minimize the waste of resources in operations. New managerial approaches such as 'Six Sigma Methodology' [as adopted by Motorola, General Electrics (GE) and many other organisations] are essentially meant towards attainment of X-efficiency (*i.e.* waste minimisation as well as zero defect level) of the business firm.

9. MANAGERS PER OPERATIVE RATIO (MOR)

Empirical evidences usually show that unit costs tend to decrease with the increasing scale of output, thus, supporting the hypothesis of economies of scale. The empirical evidence of diseconomies of scale may not be easy to detect on account of changing state of technology. Existence of managerial diseconomies, however, can be inferred by comparing the 'managers per operative ratios' (MORs) in different organisations with different sizes. It is observed that the larger the firm the great number of managerial staff relative to the number of employees is an indication of possible managerial diseconomies. Table 10.1 presents such MORs.

Table 10.1: The Managers per Operative by Firm Size

Firm Size (No. of Employees)	*Managers per* Operative (MOR) Ratio
1-100	0.39
100-200	0.42
200-500	0.44
500-700	0.47
700-1500	0.51
1500-2500	0.60
2500-3000	0.67

Business Monitor (1988), suggests that with bigger firms the number of managerial/office staff (administrative, technical and clerical) is higher in a relative sense than with the smaller size firms. A bigger firm is top heavy (Dunnett; 1992, p. 51).

10. ECONOMIES OF SCOPE

In business parlance, the concept of economies of scope is often used somewhat differently than the concept of economies of scale. It refers to the reduction in unit cost realised when the firm produces two or more products jointly rather than separately. That is to say, a multi-product firm often experiences economies of scope leading to the lowering of costs.

Economies of scope exist when a firm produces two products together under the same production facilities as against producing them under separate facilities. It is reflected in the lesser cost or cost economy. Thus:

$TC(Q_x, Q_y) < TC(Q_x, 0) + TC(0, Q_y)$

where, TC = total cost, Qx = output quantity of product X and Qy = output quantity of product Y.

For example, it may prove to be less expensive or more economical, for Phillips to produce TV set and DVD Players by more intensively utilising a single assembly plant than to produce these goods at two separate, less intensively used, plants. The economy of scope is thus realised by avoiding duplication of the factor inputs in certain ways under a joint operation as compared to separate operations.

In short, economies of score is attributed to the multi-product cost function. the multiproduct cost function of a firm refer to the cost of producing a given quantity of two of more products simultaneously (Say Q1 units of output of product X and Q2 units of product Y) under the same process of plants operations, assuming all factor-inputs are used optimally (Efficiently). Today, one may come across several multi-product firms domestically as well as internationally. HalvaH Packard (HP), for examples, produces computer as well as printers of various types. So is the case with International Business Machines (IBM) Inc. Likewise, Honda produces both cars and motorbikes, and so on.

Empirical Illustration: Economies of Scope

A firm's total cost function is:

$TC = 200 - Q_x Q_y + Q_x^2 + Q_y^2$

where Q_x and Q_y represent the number of units of product x and y, respectively.

Question: Do economies of scope exist, when the firm produces 2 units of x and 4 units of y?

Solution:

$TC(Q_x, Q_y) < TC(Q_x, 0) + TC(0, Q_y)$

$$TC(Q_x, Q_y) = 200 - (2)(4) + (2)^2 + (4)^2$$
$$= 200 - 8 + 4 + 16 = 212$$
$$TC(Q_x, 0) = 200 - Q_x(0) + Q_x^2 + (0)^2$$
$$= 200 + Q_x^2 = 200 + (2)^2 = 204$$
$$TC(0, Q_y) = 200 - (0)Q_y + (0)^2 + (Q_y)^2$$
$$= 200 + Q_y^2 = 200 + (4)^2 = 216$$

Since:

(212) < (204 + 216)

It follows that economies of scope exist in this case.

Degree of Economies of Scope

The degree of economies of scope can be measured in terms of the difference in the costs of production jointly and separately. The following formula is used to measure the degree of economies of scope.

$$DES = \frac{TC\,(An) + TC\,(Bn) - TC\,(An + Bn)}{TC\,(An + Bn)}$$

Where,

DES = degree of economies of scope.

TC(An) = total cost of producing *An* units of product *A* separately

TC(Bn) = total cost of producing *Bn* units of product *B* separately

TC(An+Bn) = total cost of producing products *A* and *B* jointly, i.e., producing *An* units of product *A* and *Bn* units of product *B* together.

Illustration

To illustrate the application of the above formula, let us assume that when a firm produces two goods *A* and *B* jointly: 10 units of *A* and 20 units of *B* per day its total cost is Rs. 1,500. On the other hand, when *A* and *B* products are separately produced by two individual firms, total cost of producing 10 units of *A* by firm No. 1 is Rs. 8,000, and that by firm No. 2 is Rs. 12,000 for producing 20 units of *B*.

In this case:

TC (*A*10) = Rs. 8,000

TC (*B*20) = Rs. 12,000

TC (*A*10 + *B*20) = Rs. 15,000

$$DES = \frac{8{,}000 + 12{,}000 - 15{,}000}{15{,}000} = 0.33$$

A positive value of *DES* indicates existence of economies of scope. A negative value of *DES* implies diseconomies of scope. Diseconomies of scope or negative *DES* suggests that it is better or more economical to produce two goods separately than jointly.

The economies of scope, has a close relationship with the economies of scale. A multi-product firm usually tends to have a scale of operation than a single product firm. So, the former reaps the benefits of the economies of scale. This may be attributed to the fact that a multi-product firm uses common infrastructure such as business office, factory plant, vehicles, managerial staff, etc. Furthermore, a multi-product firm can reap the economy of by-product under the economies of scope. For instance, a sugar factory can use its molasses — (by-product) for producing liquor by starting its own distillery units.

In practice, Motorola may be cited as a multi-product firm — producing two-way radios, cellular phones, pagers, semi-conductors and other electronic gadgets — experiencing economies of scope and economies of scale to the limit.

Cost Complementarity

In multi-cost function, cost complementary exists. Its refers to the decrease in the marginal cost of producing one type of product, in the joint production operations with the increase in the other complementary products. Suppose, in the case of cost function:

TC (Qx,Qy) for producing *X* and *Y* by the multi-produced firm we take, *MC (Qx,Qy)* as the marginal cost of producing *X*.

Then,

Cost complementary is traced, when: d*MCx (Qx, Qy)* < 0 *d Qy*

It follows that when dQy is increased by 1 unit, the marginal costs of producing X (by one unit, more) decreases.

Illustration:

To illustrate then point, let us assume a multi-product firm's costs function to be:

TC = 200 – 0.4 x *QX QY* + *(Qx)2* + *(Qy)*2

Suppose, the firm produces 1 units of product X and 3 units of product Y.

The presence of cost complementarity is indicated as:

'Beta' coefficiency "b" –0.4 represent the marginal cost. Thus –0.4 being negative, in this case suggests cost complementarity.

11. THE LEARNING CURVE

The cost structure of a long established or a global firm tends to be influenced by the business experience as well as learning effects. The managers/operators of the firm and employees may be able to carry on their functions more efficiently due to the increased experience and learning. The time involved in completing the tasks will tend to reduce as the workers have become accustomed to the jobs and easily carry on the routine work without causing wastages. Usually, experienced people perform well. Fig. 10.2 indicates the firm's unit cost reduction of total cumulative output resulting on account of learning/experience effect.

The learning curve initially has a steeper slope, but then it becomes flatter indicating that it would be increasingly harder to realise cost advantage once most of the learning opportunities are already exploited.

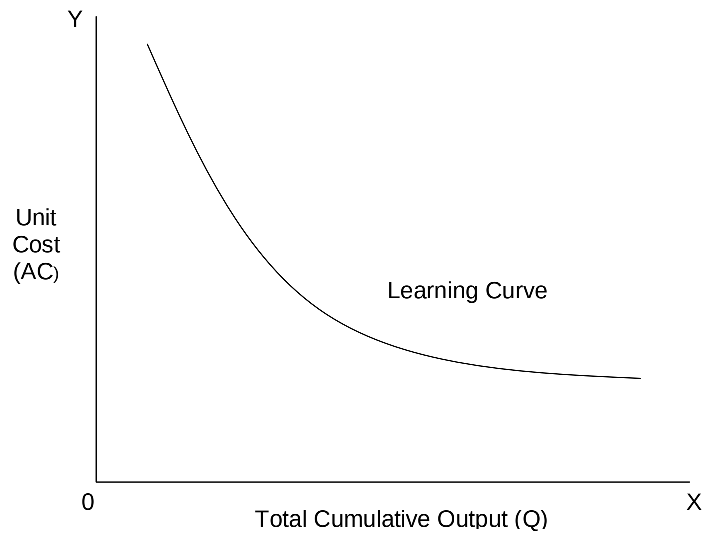


Fig. 10.2: The Learning Curve

Experience is the best teacher in business. Over a time when a firm accumulates its business experience it may tend to improve its production/organisation methods with improved knowledge and experience of management and labour used in the production process. The firm's learning experience would pay in terms of cost reduction. In long-run, these tends to the downward shifts in the average cost curves of the firm on account of learning on experience here it should be effect that improves productive efficiency of the firm in its operations over time. This is depicted in Figure 10.3.

The long-run average cost curve shifts downward in each time period t_0, t_1, and t_2, correspondingly as $LACt_0$, $LACt_1$ and $LACt_2$.

The downward shift of *LAC* is parallel for the learning by experience enhances the firm's efficiency at all levels of production.

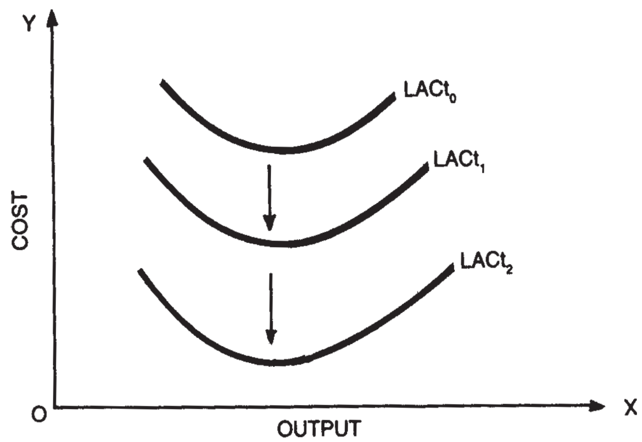


Fig. 10.3: Learning Effect on LAC

Learning Effect

At managerial level, the learning effect manifests in several ways of experience factor, such as:

- Perfection and precision reached due to constant practice of managerial decision-making.
- Finding more efficient production and business procedure.
- Knowing better ways to use tools and equipments.
- On account of familiarisation with the production activity it becomes easy and quick to give required instructions to workers in handling the jobs, thus, reducing waste from defects and disruptions.
- Right placement of right people.
- Better co-ordination and control.
- Improved operation sequences facilitating more skilful movements of workers in completing the assigned jobs with proven integration.
- Better quality control methods leading to lesser rejection and re-doing of the job process.
- Better project management and time scheduling taught by experience enables to have more time-savings and less chances of disruption in the integrated stages of production process.

Learning effect is different from the scale economy effect. Learning curve effect is seen assuming periodic scale of output, technology projection, and input prices being constant. The learning effect is measured as the difference between actual average costs and estimated average costs. It implies saving in costs. In a technical way, economies of scale are measured through the given *LAC* as a change in level of output per time period. The learning effect is measured by the shift in the *LAC* with respect to cumulative output change.

Empirically, the learning or experience effect rate can be measured by using the formula:

$$LER = \left[1 - \frac{ACt_1}{ACt_0}\right] \times 100$$

Where,

LER = Learning effect rate

ACt_0 = Average cost in initial period (t_0) increment

ACt_1 = Average cost in next period (t_1) increment.

Incidentally, the ratio ACt_1/ACt_0 *is referred to as "experience factor."*

Illustration

Suppose a firm develops a new PC model in 1995 with an average costs of Rs. 30,000 per unit. In 1996, however, its average costs declined to Rs. 24,000 when other things being given and output is doubled. This may be simply attributed to learning effect. The learning effect rate (*LER*) in this case is worked out, thus:

$$LER = \left[1 - \frac{24,000}{30,000}\right] \times 100$$

$$= 20\%$$

If we project to double the output again in 1998, the existence of learning effect would imply the reduction in average costs further by 20%. That is, to Rs. 19,200 (*i.e.,* by Rs. 4,800 less which is 20% of Rs. 24,000).

The learning curve effect is usually measured in terms of the percentage decrease in additional cost with respect to a 100 per cent increase in output each time (*i.e.,* cumulative output is doubled each time). A numerical example of learning curve is presented by the data in Table 10.2, assuming a "20 per cent" learning effect rate, so that as per the experience factor the labour cost of production each time tends to be 80 per cent of the previous level with doubling of cumulative output each time in this case.

Table 10.2: Learning Curve Data

Unit of Output Cost (Q)	*Unit of Cumulative Labour Hours (C)*	*Cumulative Labour Hours (CC)*	*Cumulative Average Labour Hour (CC′) col. 3 ÷ col 1*	*Unit Labour Cost (AC) col. 2 × Rs. 10*	*Average Labour (AC′) col. 4 × Rs. 10*
1	*2*	*3*	*4*	*5*	*6*
1	100	100	100	1000	1000
2	80	180	90	800	900
4	64	244	61	640	610
8	51	295	37	510	370
16	41	336	21	410	210

Note: Figures have been rounded off @ wage rate is given as Rs. 10 per hour.

In the above schedule, reduction is measured in real terms (*i.e.,* labour hours) and assuming wage rate at Rs. 10 per labour hour the money cost is worked out.

The learning curve (*LC*) reflects the percentage decline in average cost (unit labour cost) as total cumulative output increases by 100 per cent (or doubled) each time.

Learning curve effect is observed in several industries — ranging from aircraft manufacturing, ship building, oil refineries, power plants to semi-conductor memorychip production and its rate varies between 20% to 30%.

The knowledge of learning effect rate is useful to a manager in production cost forecasting and pricing strategies. For instance, Texas Instruments in the US adopted an aggressive price strategy in view of the learning curve effect. It is important in determining the firm's competitive advantage in the market and assuming its dominant position.

Learning effect is to be realised by the firm through integrated information system and zeal for improvement with gaining of experience. Team work, incentives and total quality management are crucial in this regard. Learning effect benefit is enjoyable by the firm or at the most industry specific, but cannot be considered to be economy wide, because the phenomenon is important in new industries producing undifferentiated products but many sectors of the economy rarely fit into this pattern.

11.9.2 Learning Curve Hypothesis

Nonetheless, the learning curve has its strategic importance in those industries where experience factor has its marked influence — for the learning process implies an improvement in production efficiency and quality of output at no additional cost. This may enhance the firm's competitive advantage and enable it to acquire and maintain leadership or dominating position in the concerned market by increasing its market share, time and again.

Needless to say that skilful management is required to capture the learning curve as a part of corporate strategy of a modern business firm in the development of new products, such as semi-conductor, generic drugs, etc. Using experience factor skilfully in improving productivity and establishing cost price reduction strategy is oft-noted attribute of the Japanese style of management. (K.K. Seo: 1991, p. 378). Similarly, Texas Instruments, today's big business firm in chip production in earlier stages of its growth, had well documented the learning curve in adopting an aggressive price strategy — by keeping unit prices very low with a view to expand its cumulative output very fast and capture the advantage of experience factor successfully in order to acquire a greater market share and dominance in computer industry. (See, Salvatore: 1996, p. 291).

Mathematically, the following formula serves the purpose of determining the pattern of cost reduction of the learning curve.

$AC = aQ^b$

Where,

AC = average factor/input cost for producing x^{th} unit of a product

a = average cost for producing the first unit of output

b = shore parameter coefficient which is negative.

The above quadratic equation can be expressed by translating it as a linear function in terms of double log form, Thus:

Log $AC = \log a + b \log Q$

The parameters a and b can be estimated by using regression method on time series data pertaining to average cost and cumulative output.

Illustration:

Suppose in a case study, the following estimates are obtained for *a* and *b* parameters of the above given cost function:

Log AC = 5 – 0.5 log Q

If we take, Q = 20

Log AC = 5 – 0.5 log 20

(Log AC = 5 – 0.5 (1.3010)

= 5 – 0.6506

= 4.3495

Antilog of 4.3495 is

Therefore, the average input cost of 20th unit of output is Rs. 22,370.

In an analogous way, we can determine AC for different output Units (Q), with the given cost function.

The learning curve hypothesis is also proved by Liberaman (1984)'s study of 37 Chemical Processing Units. Cost reductions (5.5 per cent per annum) observed by the industry were attributed to the learning effect of the growth of cumulative industry output and investment in improved capital equipment. The study revealed that the average cost declined by 27 per cent each time corresponding to doubling of cumulative output. This learning effect had exceeded the 11 per cent reduction caused by the economies of scale.

A successful modern business firm has a tendency to expand in size. An enterprise may grow for a variety of reasons.

The main motives for its growth are:

- Gaining the economies of large-scale of output.
- Acquiring larger market share, thus, dominance or leadership in the market with a degree of monopoly power.
- Diversification of products with a view to minimize risks. For example, Imperial Tobacco Company is producing more than 60 types of products ranging from cigarettes to cardboard cartons. (Fuller 1997: pp. 64). It is also referred to as lateral integration.

Internal Expansion. There are several approaches to expand the size of the firm internally, such as:

- Increasing the output with a larger scale of current production field.
- Exploiting new market territories.
- Producing different varieties and types of the goods — i.e., diversification of products.

External Expansion. The business firm can also expand its size *externally* through merger or acquisition. Under the merger, two firms join together as a single business unit. The mergered firms lose their one. Sometimes a smaller or weaker commercial bank is merged with a bigger or stronger bank to avoid liquidation and acquire sustainability.

Acquisition implies take-over. A firm may take over the plants of another firm. For example, a holding company may be formed to acquire a controlling interest in other firms. The taken over firm, tends to retain its separate identity. Its main policy decisions are, however, governed by the holding company.

> Under the merger or acquisition, a firm grows either by horizontal or vertical integration. Horizontal integration implies the merging of two firms engaged in the same stage of production. Merger of two commercial banks or two cotton textile mills under a single control implies horizontal integration.
>
> Vertical integration implies mergers of two firms operating at different stages of production. There is backward vertical integration when a firm joins another firm which is at an earlier stage of process of production. For example, a textile mill acquires a weaving firm. There is a forward vertical integration when a firm acquires another firm at a later stage of production process. For example, an automobile manufacturing company acquiring a chain of dealership networks run by another firm.
>
> There is a conglomerate merger when two firms join together but their products are not directly related. For example, merger of the Imperial Tobacco Company and United Biscuits Company in 1986 is a case of conglomerate merger.
>
> Vertical integration is undertaken with a view to ensure security and enhance efficiency. Efficiency may result in cost reductions on account of administrative or managerial economies, technical or engineering economies, financial and marketing economies achievable in an integrated business firm.

Similarly, Irwin and Klenow (1994), have observed the significance of learning curve in the semi-conductor industry. The industry was measured to have learning rates around 20 per cent on an average. That means, a 10 per cent increase in cumulative production in the semi-conductor industry could lead to a 2 per cent reduction in cost.

12. A CASE STUDY: COSTS MATTER

These days airlines are becoming more competitive. Due to distinct business strategies adopted by the airlines, in many countries, two competitive market segments have precisely emerged:

(i) the traditional full-service airlines and

(ii) the 'no-frills service' [Budget] airlines.

Main Features of Full-Service Airlines

- They offer varieties of services to different classes of the passengers such as First Class Business/Executive Class, one economy class.
- These are relatively high-cost airlines
- They resort to price discrimination policy: Higher fares are charged to business class and low fares to the economy class.
- They operate domestically as well as internationally.
- They operate on different kinds of aircraft.
- They have a wide network.
- They are more resourceful.
- They have a long establishment with huge investment.
- They have large staff.

- They compete on providing better and improved services to the passengers. For example, Singapore Airlines has earned worldwide reputation for its better services and customer case.
- Though these airlines may enjoy a degree of economies of scale, after a point, they do experience a rising operating costs due to rising factor costs an other related causes.
- Some Airlines provide extra facilities, such as 'business lounges' which imply additional costs.
- To encourage customer loyalty they resort to free milage scheme to frequent flyers. Provision of free tickets, thus, implies extra costs and no revenue.

Main Features of 'No-frills' Budget Airlines

- Budget Airlines are specifically 'Low-cost Airlines' meant to provide airline services at the lowest possible cost.
- These airlines are 'no-frills' airlines which tend to compete with traditional full service airlines by seeking core competency through cost minimisation at the bottom level.
- These 'low-cost airlines' usually operate only on one kind of aircraft, *e.g.,* Airbus or Boeing 737.
- They have single class only.
- They offer common standardised treatment to all the passengers.
- They do not serve any drinks or meals. It is a cost saving device on food items as well as crew for the services.
- They may sell some food items at a high price and make some money.
- Usually they do not provide seat allocation. Passengers can choose any vacant seat.
- By not providing normal forms of tickets they economise further.
- Unlike 20 kg. norm for the luggage, these airlines mostly permit 15 kg. Any excess luggage weight is charged heavily to make additional revenue.
- These airlines operate on point-to-point routes. Services transfer of luggage is not provided. It saves their operational costs further.
- They often use low traffic, secondary airport and save costs.
- They book a large part of tickets on Internet thus, economise on ticketing staff and travel agents' commission.
- To augment their business revenue, some low-cost airlines also offer ancillary products such as holiday tour packages, hotel bookings etc.
- They do not offer any extra facilities such as lounges; hence, no such additional costs.

- Relatively, they operate with much less staff than the traditional airlines.
- They seek to minimise costs and maximise revenue through faster turnaround of the aircrafts.

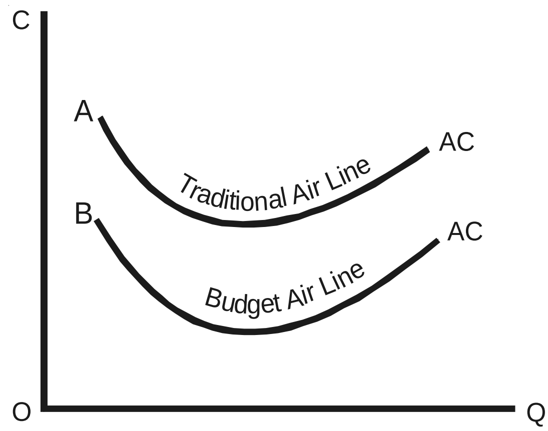


Fig. 10.4: Comparative Cost Functions

Figure 10.4 theoretically portrays the relative cost functions differential of these two categories of the airlines.

In Fig. 10.4, one can see that Budget Airline has a lower cost function (B) than the Traditional Airline Cost function (A).

In the United States, the Southwest Airlines was the pioneer of the concept of low-cost airline services. Recently in Malaysia, Air Asia has come up as a budget airline on the same ground.

Discussion and Concluding Remarks

The main lesson of the above discussion is that cost is one of the important factors from which budget airlines such as Southwest, Air Asia, etc. derive their competitive advantage and business core competency in the highly competitive Airline industry today. The budget airlines can keep its low fares by maintaining costs at the minimum level and faster turnaround of the aircrafts. It is observed that in the United States, the low-cost airlines tend to have captured atleast one-third of the market share in airline industry.

Some of the pioneers low-cost airlines have acquired dominant position in this segment of the market. e.g., Southwest in the United States. However, with the entry of several low-cost competitors gradually the dominating position of the lending airline is being threatened. For instance, in the United States, Jet Blue, Air Tran and Song have appeared as a tough competitors to the Southwest.

Another phenomenon is that in recent years, the 'cost-function gap' between the free service airlines and budget-airline is becoming borrower. On the one hand, there is a rising cost pressures owing to rising fuel prices, competition compelling to deviate from no frills approach, providing television sets, etc. In short, low-cost airlines may gradually be moving on rising costs. On the other hand, full-service: high-cost airlines are seeking cost economy. They slowly cut down their services range, thus, save on expenses.

Ultimate result of such a trend on cost functions can be captured as in Fig. 10.5.

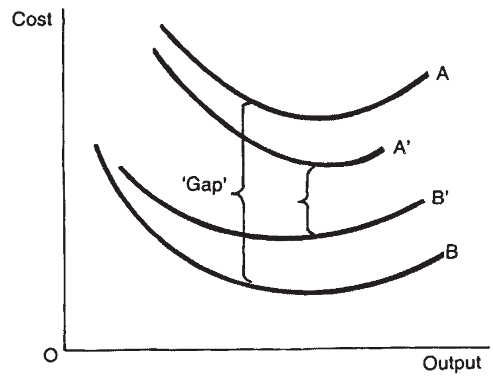


Fig. 10.5: Changing Trends of Cost Functions

In Fig. 10.5, a persistent competitive trend on cost function is seen. For Budget Airlines, the cost function is seen. For Budget Airlines, the cost function is shifting upward from B to B′. In case of traditional airline, the cost function is shifting from A to A′.

The 'costgap' between A′ and B′ is much narrower than between A and B. How can a budget-line retain its success in this situation? Answer is not so simple in practice. But, we may suggest: Stick to providing best services at the lowest fares.

QUESTIONS FOR DISCUSSION

1. Indicate the main features of a traditional airline service.
2. Indicate the main features of a budget airline service.
3. Show diagrammatically the cost differentials between the full-service airline and low-cost airline.
4. Can you suggest that an airline can have a 'mix' of traditional and low-cost approach:

Mini Case Study: High Costs Problem of Delta Airlines

I Introduction

Delta Airlines is one of the biggest airlines in the United States of America.

The airline industry in the USA has witnessed a severe decline in the post September 11, 2001 period. The Delta also experienced a downward trend in its business revenue against rising costs and consequently negative business income yield. Refer to data in Table 10.3.

Table 10.3: Delta Business — Financial Data

(US$) Million

Year end December	*Revenue (TR)*	*Costs (TC)*	*Income Yield Before Tax*
2001	13879	15743	– 1864
2002	13035	15307	– 2002
2003	13303	14492	– 1189

Source: www.hoovers.com

In mid-2004, Delta had the biggest quarter loss of US$ 2 billion. Delta's CEO, Grinstein, chalked out a Restructuring Plan in order to set the things right for its business and restoring profitability by 2006.

Analysis of Delta's Major Problem

Analysts observed that Delta's main problem was rising costs against falling yields. Like other major airlines in the US, Delta too had very high operational costs. The company's bloated cost structure and high cost of labour are the root of the problem.

- Deltas's labour cost — as a percentage of operational cost in 2004 was estimated to be 43.4%. Against this Jet-Blue had 30.9% and America West 27.3%. [See, Boyd Group/ASRC Inc. www.sfgate.com and Exhibit V in Regani S. and Dutta S. (2005): 'Problems at Delta Airlines,' Case Folio: February - www.icfaipress.org for more details]
- Delta's contribution to pension funds was one of the main reason for high labour cost, as in 2004 many of its pilots opted for early retirement. Delta's 50% of revenue was siphoned-off in salary payments. Besides, perquisites and benefits to the employees claimed on its revenue.
- Rising prices of fuel was another critical cost factor. In 2003, fuel prices were US $26 a barrel, it jumped to US $31 in 2003, and further to US $47 in 2004.
- Delta being an oldest airline it also carried the burden of high legacy costs' such as pensions, free flight passes, etc. New Airlines have a competitive edge against this as they do not carry such liabilities.
- The low-cost airlines such as South-West, Jet-Blue, etc., posed another threat of competition.
- Delta's work culture is more rigid. It stresses more on confirmity. It gives no flexibility to the employees. It resulted into lower productivity. New competitive airlines are found to be more flexible and informal.
- Delta did not establish strong relations with its partners: travel agents. Travel agents charged high booking charges.

The Delta Solution: Cornerstones of Restructuring Plan

The 'Delta Solution' aimed at improving its business performance with the following key initiatives:

- Updating and upgrading customer products and services, including cabins and online functionality.
- Adding more flights.
- Reducing congestion.
- Elimination of 6000-7000 jobs in next 18 months.
- Lowering management overhead costs by 15%.
- Reducing pay and park benefits.
- Employee reward program.
- Profit sharing.
- Performance-based incentive payouts.
- Profit-sharing and performance-related pay scheme implied lowering of labour cost burden.
- Restructuring of over 50% of the airline's operations.

- Improvements in services, fleet and networks to eliminate operational inefficiencies and enhance productivity.
- Calling to work harder for less.
- Elimination of unnecessary costs.
- Creation of fun culture. Delta launched ‘Song’ — a new low-cost subsidiary as budget-airline.

QUESTIONS FOR DISCUSSION

1. Trace the major problems of Delta Airline in 2004.
2. Indicate cornerstones of Delta Solution.
3. Do you think ‘Song’ can succeed?
4. What lessons can you draw for Air-India from the Delta’s experience?

To Decision-making

- Scale economies are ubiquitous. Scale economy effects can exist in all kinds of business activities: production, marketing, distribution as well as R&D.
- Cost economy is a boon to the firms operating and expanding on a large-scale of production.
- Scale Economies Index (*SEI*) = 100 [1 = *EC*]

$$EC = \frac{\%\Delta C}{\%\Delta Q}$$

$$EC = \frac{MC}{AC}$$

- Increasing returns caused by the economies of scale tend to imply decreasing cost condition.
- Increasing cost is the result of diseconomies of scale.
- Technological change is essential to avoid the situation of increasing costs.
- Learning through experience is a common tradition in business.

MODEL QUESTIONS

1. What is meant by economies of scale? Give examples.
2. What are the types of internal economies?
3. What are the major types of external economies?
4. Write brief notes on:
   (a) Diseconomies.
   (b) Internal Economies.
   (c) External Economies.

5. Distinguish between:
   (a) Internal economies and external economies.
   (b) Labour economies and managerial economies.
   (c) Economies of disintegration and economies of by-products.
   (d) Marketing economies and financial economies.
6. Are the following statements true or false? Give reasons.
   (a) Economies of scale persist limitlessly.
   (b) Managerial economies arise when the scale of output expands.
   (c) Technical economies emerge when the size of firm expands.
   (d) A large firm can reap the advantages of financial and marketing economies.
   (e) A reasonable concentration is beneficial to the existing firms.
   (f) It is difficult to draw a line of demarcation between internal and external economies of scale in a firm's cost function.
   (g) Internal and external economies are overlapping.
7. (a) What is meant by internal and external economies of scale?
   (b) Discuss various types of internal economies available to a firm.
8. Discuss the economies of scale into an expanding software firm in Bangalore.

Problems

1. Total cost of producing 10 X is Rs. 75,000 and that of 20 Y is Rs. 95,000 separately. If both are produced jointly then the cost is Rs. 1,60,000. Workout the degree of economies of scope in this case.
2. In a case study, the cost function is estimated as follows:

   $\text{Log } AC = 150 - 0.6 \log Q$

   Measure the average input cost of 50^{th} unit of output.
3. If MC = 900, AC = 1,100, measure the scale economy index and give your managerial comment.

Project Work

- Write a brief cse study of Indian Airlines/Air India, especially focussing on the cost structure. Collect relevant information from the airlines annual reports or website or from the head office. Would you recommend Air India to adopt a low-cost budget airline model.

❒ ❒ ❒

Production Functions

11

CHAPTER

1. INTRODUCTION

Production implies provision of goods and services, often described as 'commodities.' In technical sense, production is the transformation of resources into commodities overtime and/or space. To put it simply, production is the act of converting or transforming input into output. The act of production is technically carried out by a firm. A firm is a business unit which undertakes the activity of transforming inputs into outputs of goods and services. In the production process, a firm combines various inputs in different quantities and proportions to produce different levels of outputs. Production is a flow concept. It is measured as a rate of output per unit of time.

2. THE CONCEPT OF PRODUCTION FUNCTION

The rate of output of a commodity functionally depends on the quantity of inputs used per unit of time. The technological-physical relationship between inputs and outputs is referred to as the production function. Basically, production function is an engineering concept, but it is widely used in business economics for studying production behaviour. "The production function is the name given to the relationship between rates of input of productive services and the rate of output of product. It is the economist's summary of technical knowledge" (Stigler, 1966: p. 136).

> **Definition.** A production function refers to the functional relationship, under the given technology, between physical rates of input and output of a firm, per unit of time.

The concept of production function is a summarised description of technological possibilities. It shows for a given technique of production output that can be obtained from various levels of factor inputs.

Westbrook and Tybout (1993: p. 87) states that "the relationship between input and output flows in manufacturing is determined by the technology employed and by the economic behaviour of the producers."

Algebraic Statement of Production Function

In algebraic terms, the production function may be written as:

$Q = f(a, b, c, d, \ldots, n, T-)$

Q represents the physical quantity of output (commodity produced) per unit of time.

f denotes functional relationship. a, b, c, d, n represent the quantities of various inputs (productive factors) per employed time period. $T-$ refers to the prevailing state of technology or 'know-how.'

The bar (–) is placed on $T-$ just to indicate that technology is assumed to be constant.

The expression implies that the output or the quantity (Q) of the product depends on the quantities, a, b, c, d, n of the various inputs used with the given state of technology in the production process per period of time. Often economists present a simple production function, assuming a two-factor model, as under:

$Qx = f(K, L)$

where, Qx is the rate of output of commodity X per unit of time. K refers the units of capital used per unit of time, and L is the labour units employed per unit of time. The production function can be expressed in terms of a mathematical equation, a table, or geometric curves specifying the maximum output that can be obtained for the given combination of factor inputs.

Attributes of Production Function

For a clear understanding of the concept of production function, its following attributes should be carefully noted:

- **Flow Concept.** A production function is a flow concept. It relates to the flow of inputs and the resulting flows of output of a commodity during a period of time. Here, time is taken to be functional or operational time period.
- **Physical Concept.** A production function is a technical relationship between inputs and outputs expressed in physical terms and not in terms of a monetary unit, such as rupee or dollar.
- **State of Technology and Inputs.** It implies that the production of a firm depends on the state of technology and inputs. Technology refers to the sum total of knowledge of the means and methods of producing goods and services. It is the society's knowledge concerning the industrial and agricultural arts. It includes methods of organisation and techniques of production. Input refers to anything that is used by the firm in the process of production. Thus, inputs include every type of productive resource — land, labour, capital, etc., also time and human energy as well as knowledge which are employed by the firm for producing a commodity. The set of factor inputs in a production function has the following important characteristics.

- **Inputs** (*a, b, c, d...n*) are complementary in nature as their combined productive services are transformed into production of a specific commodity.
- **Some inputs are substitutes to one another.** Thus, for example, if *a* and *b* are substitutable factors, *a* may be increased instead of *b*. The *a* is fixed while *b* is variable at a time. In practice, however, factors like labour and capital, are not perfectly substitutable, but there may be sufficiently high degree of substitutability.
- **Some inputs may be specific.** Particularly, highly specialised factors are of specific use, as they have least degree of substitutability.
- **Factors Combination for the Maximum Output.** The concept of a production function in economic analysis is viewed to indicate something more than just a technical relationship. It is taken to be the technical relationship showing the maximum output that can be produced by a specific set of combination of factor inputs. From the economic point of view, the rational firm is interested not in all the numerous possible levels of output corresponding to the different combinations of factor inputs, but only that combination which yields maximum output.
- **Short-run and Long-run Production Function.** Fixity or variability of factors depends on the functional time period under consideration. On functional criteria, there are short period and long period. Correspondingly, we have a short-run and long-run production functions. Short-run production function pertains to the given scale of production. Long-run production function pertains to the changing scale of production.

3. TIME ELEMENT AND PRODUCTION FUNCTIONS

The functional relationship between changes in input and consequent changes in output depends on the time element short-run and long-run time periods. This time element considered here is the functional or operational time period.

The Short-run

The term "short-run" is defined as a period of time over which the inputs of some factors of production cannot be varied. Factors which cannot be altered in the short-run are called fixed factors. Thus, by definition, in the short period, some factors are fixed and some are variable. Elements of capital such as plant, machinery and equipment are generally fixed in the short-run. But a fixed factor can also be land or the manager or administrative staff. In the short period, thus, the output is produced with a given scale of production, *i.e.*, the size of plant or firm remaining unchanged.

Again, short-run production implies a restricted set of choices open to the firm on account of inelasticity of fixed factors. Hence, in the short-run period, output can be varied only by varying the variable factors combined with the given set of fixed factor inputs.

Short-run Production Function

By definition, in the short period, the production function includes fixed and variable components of inputs. At least one significant factor is fixed over the short period. Algebraically, thus, short-run production function may be stated as under:

$$Q_s = f(a/p^0,\ c^0, \ldots\ n^0,\ T)$$

where, stroke (/) divides between variable and fixed components. Subscript *0* at the top is used to denote fixed factors. Thus, *a, b, c* are quantities of fixed factors. Technology (*T*–) is, obviously, held constant.

The Long-run

The term "long-run" is defined as a period of time long enough to permit variations in the inputs of all factors of production employed by a firm. In other words, the long period is such a time period over which all factors become variable. Thus, there is no distinction between fixed and variable factors in the long-run, as all factors become variable factors. Adjustment between factors can be easily brought about in the long-run. The size of plant which is usually fixed in the short period can be varied in the long-run; hence, the scale of production can be varied only in the long-run. Thus, in the long-run, there is a full scope for adjustment between factors in the production process.

Long-run (normal period) is associated with the change in the scale of production, assuming the basic technology of production to be constant. Again, the long-run being related to operational time involved in altering the fixed factors (of short period), does not correspond to a specific period of time.

Long-run Production Function

In the long-run, the firm operates with the changing scale of output and its size as a whole is varied. Thus, long-run production can be stated as under:

$$Q = f(a,\ b,\ c,\ \ldots\ldots,\ n,\ T)$$

It is evident that there is no dichotomy of inputs in the long-run, as all factors are denoted as variable components in production. However, for analytical convenience, *T*, the state of technology, is held constant.

There is no fixity or uniformity in the duration of the short-run or the long-run period. The duration varies from industry to industry. In industries like steel or heavy electricals, the capital equipment used is complex and sophisticated. Several years are taken to erect their plants. A sudden rise in demand for their products can be met only by the more intensive use of their existing plant capacities. In other industries such as light machine tools, electrical goods, etc., capital equipment is simple. It can be manufactured and installed in a few months only. For such industries, the long period is of a few months. A demand for their products can be met by expanding plant capacity within a short time, say, about a couple of months.

4. COBB-DOUGLAS PRODUCTION FUNCTION

C.W. Cobb, and P.H. Douglas made a statistical inquiry into some manufacturing industries in America and other countries to trace the empirical relations between changes in physical inputs and the resulting output. From their studies, a generalised form of production function with two variable inputs, *viz.*, labour and capital, has been evolved which is as follows:

$$Q = a\ [L^b K^{1-b}]$$

where, Q is the quantity of output, L and K stand for the quantities of labour and capital, respectively while a and b are positive constants.

The above stated production function is a linear and homogeneous function of degree, one which establishes constant returns to the scale.

5. LAWS OF PRODUCTION

Production process involves the transformation of all inputs into output. In production function, we study different combinations of inputs producing various quantities of output under different technical conditions. The production function expresses such relationship between inputs and outputs. The production function has been explained by different economists in different ways to formulate laws relating to the relationship between inputs and outputs. These can be studied in the following ways:

1. Output can be produced by keeping one factor or some factors fixed while other factors are varied. This is the traditional production function which held sway over the economist's mind for well over two centuries. The law of diminishing marginal returns is based upon this type of production function, which was originally explained by British classical economists like Thomas Robert Malthus, David Ricardo and John Stuart Mill. It was refined and elaborated at the hands of Alfred Marshall, leaders of the Neoclassical school.
2. Another type of production function is one in which only one factor is variable while other factors are kept constant. Prof. Benham explained this type of production function which has been described as the law of variable proportions. This is considered as the modem version of the law of diminishing marginal returns.
3. In another type of production function, the quantities of every input in the combination of inputs can be varied to produce different quantities of output. This is known as the law of returns to scale. Since it is not possible to change the scale of operations in a short period, the law of returns to scale is associated with the long period production process.

6. THE LAW OF DIMINISHING MARGINAL RETURNS

The law of diminishing marginal returns was originally explained by the classical economists with reference to agriculture. It was studied in relation to the land which was kept constant while other factors were increased. The output did not increase proportionately. It is the experience of every farmer that the output of land cannot be doubled by doubling the labour and capital on a given piece of land. If this is possible all the foodgrains required for the entire world population could have been produced only on one piece of land by increasing the variable factors. As this is not possible on a given piece of land, additional land is brought under the plough. Marshall stated this law as follows:

"An increase in capital and labour applied in the cultivation of land causes in general a less than proportionate increase in the amount of produce raised, unless it happens to coincide with an improvement in the arts of agriculture."

In the initial stages of cultivation of a given piece of land, perhaps due to undercultivation of land, when additional units of capital and labour are invested, additional output may be more than proportionate. But after a certain extent when the land is cultivated with some more investment, the additional output will be less than proportionate under all normal circumstances, unless some improvements take place in the methods or techniques of cultivation.

Although the law was originally explained in connection with land and agriculture, it is not peculiar to land only. It is applicable in all fields of production like industry, mining, fishing, house construction, etc., along with agriculture. In agriculture, it is applicable in both intensive and extensive cultivation of land. In the case of intensive cultivation, when additional investment is made on a given piece of land, the marginal returns would diminish. Even in the case of extensive cultivation when additional land is brought under cultivation, marginal returns would diminish when the additional land is of inferior grade. David Ricardo explained this in his famous theory "The Ricardian Theory of Rent" which is based upon the spirit of this law. Similarly, Malthusian theory of population explained by the famous classical economist T.R. Malthus, made use of the essence of this law in explaining the changes in food production in any country.

The law is applicable in mining and fishing. As the depth of a mine increases, the additional quantity of mineral per unit of investment may decrease after a certain point of production. The cost of production of raw material may increase due to diminishing marginal returns.

7. THE LAW OF VARIABLE PROPORTIONS

This is the modem version of the law of diminishing marginal returns. Under this law, it is assumed that only one factor of production is variable while other factors are fixed. As we increase the quantity of variable factor while keeping other factors constant, the output of variable factor may increase more than proportionately in the initial stages of production but finally it will not increase proportionately. Prof. Benham states the law as follows:

"As the proportion of one factor in a combination of factors is increased after a point, the average and marginal production of that factor will diminish."

The conditions underlying the law are as follows:

- Only one factor is varied and all other factors should remain constant.
- The scale of output is unchanged, and the production plant or the size efficiency of the firm remain constant.
- The technique of production does not change.
- All units of the factor input varied are homogeneous, *i.e.,* all the units have identical characteristics and equal efficiencies.

Under such circumstances, the physical relationship between input (variable factor proportions) and output is described by the Law of Variable Factor Proportion or the Law of Non-Proportional Output.

The law of non-proportional output states that in the short-run, the returns variable factors will be more than proportionate initially, and after a point, returns will be less than proportionate. This is what the law describes about the behaviour in total output resulting from increased application of variable factors to fixed factors.

The law of variable proportions is based upon the fact that all factors of production cannot be substituted for one another. And it is a noted economic fact that "the elasticity of substitution between different factors is not infinite."

We shall once again state the law more elaborately thus: "In the short-run, as the amount of variable factors increases, other things remaining equal, output (or the returns to the factors varied) will increase more than proportionately to the amount of variable inputs in the beginning, that it may increase in the same proportion and ultimately it will increase less proportionately."

To clarify the relationship further, we may adopt the following measurements of product:

- **Total Product (TP).** Total number of units of output produced per unit of time by all factor inputs is referred to as total product. In the short run however, the total output obviously increases with an increase in the variable factor input. Thus, $TP = F(QVF)$, where TP denotes total produce and QVF denotes the quantity of the variable factor.
- **Average Product (AP).** The average product refers to the total product per unit of a given variable factor. Thus, by dividing the total product by the quantity of the variable factor, we get average product. Symbolically:

$$\boxed{AP = \frac{TP}{QVF}}$$

  Suppose, the total product of a commodity is 400 units per day with 25 workers employed, then:

  $AP = 400/25 = 16$ units per worker.

- **Marginal Product (MP).** Owing to the addition of a unit to a variable factor, all other factors being held constant, the addition realised in the total product is technically referred to as the marginal product. In formalised terms, the marginal product may be defined thus: ($MP_n = TP_n - TP_{n-1}$,) where, MP_n stands for the marginal product when n units of a variable factor are employed. TP refers to total output and refers to the number of units of variable factor employed ($n = QVF$).

Suppose, when 26 workers are employed, the total product is increased to 440 units from 400 units but when 25 workers are employed, the marginal product of the twenty-sixth workers is measured as:

$$MP = TP_{26} - Tp_{25} = 440 - 400 = 40 \text{ units.}$$

It may be stated that the marginal product is the rate of measuring the change in the total product in relation to a unit-wise change in the employment of the variable factor. Thus, in mathematical terms:

$$MP = \frac{\Delta TP}{\Delta QVF}$$

This ratio is, in fact, termed as 'incremental product.'

In graphical terms, in terms of calculus, however, the marginal product is defined as *MP* = *dTP/dVF* where *d* = a unit change measured by the derivative of the related variable.

Statement. Using the concept of marginal product, the law may be stated as follows:

During the short period, under the given state of technology and other conditions remaining unchanged, with the given fixed factors, when the units of a variable factor are increased in the production function in order to increase the total product, the total product initially may rise at an increasing rate and, after a point, it tends to increase at a decreasing rate because the marginal product of the variable factor in the beginning may tend to rise but eventually tends to diminish.

To illustrate the working of this law, let us take a hypothetical production schedule of a firm as given in Table 11.1.

Table 11.1: Production Schedule

Units of Variable Input *(Labour) (n)*	*Total* Product (TP)	*Average* Product *(AP) (TP_n)*	*Marginal* Product (MP) *($TP_n - TP_{n-1}$)*	
1	20	20	20	
2	50	25	30	Stage I
3	90	30	40	
4	120	30	30	
5	135	27	15	
6	144	24	9	Stage II
7	147	21	3	
8	148	18.5	1	
9	148	16.4	0	
10	145	14.5	– 3	Stage III

It is assumed that the amount of fixed factors, land and capital, is given and held constant throughout. To this, labour — the variable factor — is added unit-wise in order to increase the production of commodity X. The rate of technology remains unchanged. The input output relationship is thus observed in Table 11.1.

From Table 11.1, we may note the following interesting points:

- The law of diminishing returns becomes evident in the marginal product column. Initially, the marginal product of the variable input (labour) rises. The total product rises at an increasing rate (= marginal product). Average product also rises. This is analytically described as the stage of increasing returns (Stage I).

- Reaching a certain point (in our illustration when the 4^{th} unit of labour is employed) the marginal product begins to diminish. Thus, the rate of increase in the total product slows down. This is the stage of diminishing returns (Stage II).
- When the average product is maximum, the marginal product is equal to the average product. In our illustration, when the 4^{th} labour unit is employed, the average product is 30 and the marginal product is also 30.
- As the marginal product tends to diminish, it ultimately becomes zero and negative thereafter (Stage III).
- When the marginal product becomes zero, the total product is the maximum. In our illustration 148 is the highest amount of total product, when the marginal product is zero when 9 units of labour are employed. Further, when the marginal product becomes negative, the total product begins to decline in the same proportion. Even though the average product is decreasing at this stage, it remains positive up to a certain point.

These points would be more explicit when the given production schedule is plotted graphically. We represent a graphic illustration of the product curves and the law of diminishing returns in its generalised form, as in Figure 11.1, so that smooth curves are drawn.

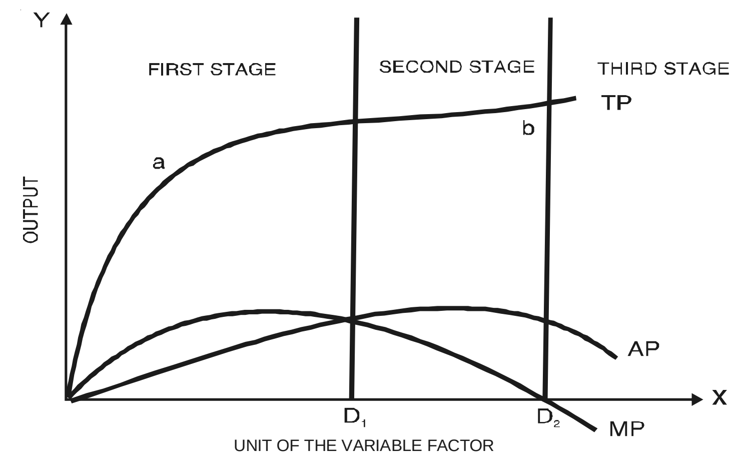


Fig. 11.1: The Product Curves

In Figure 11.1, the X-axis measures the units of a variable factor employed, the Y-axis measures the output. The total produce curve (*TP*) shows a similar information about the behaviour or total output as in the production schedule in Table 11.1. The total product curve has an upward slope up to point *b*, and then it moves downward. However, the slope of *TP* curve changes at each point. The curve (*TP*), however, becomes steeper up to point n_2. After this point, *TP* curve's slope becomes negative.

Evidently, *TP* moves through three stages: *(i)* the first stage of increase in the rate of total output; *(ii)* the second stage of a decrease the increase in the rate of total output; *(iii)* the third stage of decline in total output.

These three stages are: basically confined to the behaviour of the marginal product. The marginal product is rising, diminishing and eventually it becomes negative. Hence, the marginal product curve *MP* has an 'upside down' U shape. That means the *MP* curve is rising upward up to a point and then it falls downward. The rate of change of slope of the *TP* curve has a bearing to the formation of the *MP* curve, When the *MP* curve intercepts at point n_2 on the X-axis, it corresponds to point *b* on the *TP* curve, which signifies that when $MP = 0$, TP = maximum. Again, the declining part of the *TP* curve is in proportion to the negative part of *MP* curve.

Further, stages I and II pertaining to increasing and diminishing returns are regarded as rational or practicable phases in the production process. Stage III of negative returns is, however, considered as the irrational phase of production. Nevertheless, it is quite likely that a firm lacking perfect knowledge may be operating in this stage. In agriculture, this may be very common. For instance, evidences of overcrowding of broilers and layers in poultry farms have been recorded by some economists.

Explanation of the Stages

The operation of the law of diminishing returns in three stages is attributed to two fundamental characteristics of factors of production:

(i) Indivisibility of certain fixed factors, and

(ii) Imperfect substitutability between factors.

Indivisibility of fixed factors implies that initially when a smaller quantity of variable factor inputs are employed along with a given set of factors, there is a bit of disproportionality between the two sets of factor components. On technical grounds, thus, the fixed factors are not very effectively exploited. For instance, a factor like machinery, on account of its lumpiness, will be grossly underutilised when only a very few units of a variable input like labour are applied.

Increasing Returns

When the employment of variable inputs increased, a combination of fixed and variable factors tends to be nearer the optimum. Thus, when the short run production function is adjusted to optimisation, the resulting output tends to be in greater proportion to the increase in the variable factor units. This phenomenon is also attributable to certain internal economies* such as managerial and technical economies as the productive services of indivisible factors like manager and machines will be used more efficiently when greater inputs of variable factors like labour and raw materials are applied. In short, the stage of increasing marginal product of the variable factor is due to the greater inefficiency in the use of certain divisible fixed factors when larger units of the variable factors are combined with them. For example, a set of machines may require a minimum number of workers for its full and efficient operation. So, when the number of workers is increased, the machine is brought into efficient running, hence, the marginal product of die workers increases steeply. Similarly, an increase in the units of variable factors like labour may lead to a better utilisation of their services on account of growing specialisation.

It must be noted that increasing returns in the short run will be noticeable only if fixed factors are indivisible, while the variable factors are obtainable in very small units. In some lines of production, however, the firm may not visualise a stage of increasing returns very clearly if the variable factor units are not obtainable small units, say, for instance, a worker cannot be hired for less than a day or a month. Similarly, if the fixed factor units are not perfectly divisible into small units, it is difficult to achieve increasing returns.

Diminishing Returns

The reason for diminishing returns is not far to seek. As in the short period, fixed factors cannot be changed, the firm seeks to increase output by employing more and more units of variable factors, thereby trying to substitute fixed factors by variable factors. But due to imperfect substitutability of factors, when the fixed factor is overutilised, there emerge internal diseconomies, and the diminishing returns (decrease in marginal product) follow. The marginal product decreases because a given quantity of fixed factors, is combined with larger and larger amounts of variable factors. So, there is disproportionality of factor inputs in the crucial factor causing diminishing returns. Indeed, the nature of the production function determines the exact course of output behaviour in the short run. If the fixed factors involved are of very big size and indivisible, on technical grounds, being unadaptable to the factors with a small amount of variable input, the marginal product of the variable input will initially rise sharply, and it will decline also very fast soon after the required units of variable factors are employed for their efficient use.

Negative Returns

Stage III is the stage of negative returns, when the input of a variable factor is much excessive in relation to the fixed components in the production function. For instance, an excessive use of chemical fertilisers on a farm may eventually spoil the farm output. Similarly, say, overstaffing of salesmen in a departmental store may create a situation that may hamper each other while attending to the customers, hence the sales may tend to decline. In such a case, sales could be increased effectively just by reducing the number of salesmen in the shop.

Stage III of negative returns is obviously an irrational stage. Similarly, stage I is also irrational from the profitability point of view. Stage II is the only rational stage of production in the short run. It is the area of operation in which the firm can maximise its profits.

Assumptions of the Law of DMR

It must be noted that the law of diminishing marginal returns (DMR) or the law of variable factor proportions is valid only in those situations in which factor proportions are variable, *i.e.*, in situations where some factors are increased in a quantity relative to the quantities of other factors. If all factor inputs are variable in the same proportion, the law of diminishing returns will not operate.

* The term 'internal economies' is used here in a very loose sense, because actually the term is associated with increase in the size of a firm and increasing scale of output.

The law of diminishing returns holds good, subject to the following two conditions:

1. A given technology is used throughout the process of production and it remains unchanged. Whatever change takes place in the proportion of factor inputs is within the scope of available methods and techniques.
2. The law assumes that the units of different factor inputs are perfectly homogeneous. Every unit of a factor input is of equal efficiency and, therefore, interchangeable with any other factor input in the production function.

The classical economists held the view that the law of diminishing returns operated widely in the field of agriculture. Usually, therefore, the working of the law is illustrated with land produce in most textbooks. However, the law holds equally true in the case of industrial sector too. Marshall, in fact, stressed the universal applicability of this law. It is applicable in manufacturing, fisheries, mining, trading, commerce, transport and even services. Wherever one factor input is varied and other factors are held constant, the law will ultimately tend to operate, if the basic technology is not changed. In industries, quick improvement in technology may postpone its operation from time-to-time. But, if conditions remain unchanged, the stage of diminishing returns occurs sooner or later.

Significance of the Law

The economic significance of the law of non-proportional output is obvious. It is useful to businessmen in their short-run production planning at the micro-level. A careful producer will not move into the third stage of negative returns. Rationally, the ideal combination of factor proportion (fixed plus variable inputs) will be when the average product is at its maximum and it is the maximum cost combination of factors. Moreover, the law implies that when, under the given technology, the stage of diminishing returns takes place, we should change the technology to avoid its occurrence.

8. THE LAWS OF RETURNS TO SCALE: THE TRADITIONAL APPROACH

Adjustment among different factors can be brought about in the long period. Thus, all factors become variable in the long-run. That means, in the long-run, the size of a firm can be expanded as the scale of production is enhanced. Economists use the phrase "returns to scale" to describe the output behaviour in the long-run in relation to the variations in factor inputs.

In the short-run, thus, we have returns to variable factor. In the long-run, we have returns to scale. The long run production function $Q = f(a_1, b_1, c_1, ...n, T)$ implies that all components of inputs are varied to increase production.

We may, thus, state the principle of returns to scale as follows:

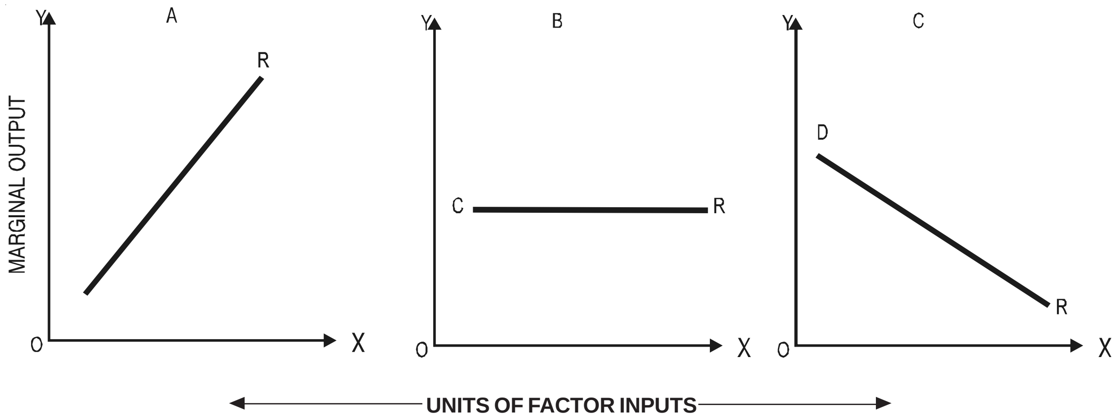


Fig. 11.2: Returns to Scale

> **Statement.** "As a firm in the long run increases the quantities of all factors employed, other things being equal, the output may rise initially at a more rapid rate than the rate of increase in inputs, then output may increase in the same proportion of input, and ultimately, output increases less proportionately."

Assumptions. The law, however, assumes that:

1. Technique of production is unchanged.
2. All units of factors are homogeneous.
3. Returns are measured in physical terms.

There are three phases of returns in the long run which may be separately described as: *(1)* the law of increasing returns; *(2)* the law of constant returns; and *(3)* the law of decreasing returns.

Let us briefly describe these laws.

The Law of Increasing Returns

The law of increasing returns describes increasing returns to scale. There are increasing returns to scale when a given percentage increase in input will lead to a greater relative percentage increase in the resultant output.

Algebraically, $\frac{\Delta Q}{Q} > \frac{\Delta F}{F}$,

Where $\frac{\Delta Q}{Q}$ = Proportionate change in output and

$\frac{\Delta F}{F}$ = Proportionate change in inputs (factors).

The production function coefficient (*PFC*) in the long run is, thus, measured by the ratio of the proportionate change in output to a given proportionate change in input. In symbolic terms:

$$PFC = \frac{(\Delta Q / Q)}{(\Delta F / F)} \text{ or } = \frac{\Delta Q}{Q} \times \frac{F}{\Delta F}$$

If $PFC > 1$, it means increasing returns to scale.

Diagrammatically, the law of increasing returns may be represented as in Fig. 11.2. In Fig. 11.2(A), the curve *IR* is an upward sloping curve denoting increasing returns to scale. The increasing returns to scale are attributed to the realisation of internal economies of scale such as labour economies, managerial economies, technical economies, etc., with the expansion of the size of the firm.

Marshall explains increasing returns in terms of 'increased efficiency' of labour and capital in the improved organisation with the expanding scale of output and employment of factor input. It is referred to as 'the economy of organisation' in the earlier stages of expansion.

In short, increasing returns may be attributed to improvements in large scale operation, division of labour, use of sophisticated machinery, better technology, etc. Thus, increasing returns to scale are due to indivisibilities and economies of scale and technological advancement.

The Law of Constant Returns

The process of increasing returns to scale, however, cannot go on forever. It may be followed by constant returns to scale. As the firm continues to expand its scale of operations, it gradually exhausts the economies responsible for the increasing returns. Then, the constant returns may occur. There are constant returns to scale when a given percentage increase in inputs leads to the same percentage increase in output.

Algebraically, $\frac{\Delta Q}{Q} = \frac{\Delta F}{F}$. It implies that the doubling of factor inputs doubles the output. Thus, $PFC = 1$ under constant returns to scale.

Diagrammatically, the law of constant returns may be represented as in Figure 11.2(B).

In Figure 11.2(B), the curve *CR* is a horizontal straight-line depicting constant returns to scale. The operation of the law of constant returns to scale implies that the effect of internal economies emerging in certain factors is neutralised by internal economies that may result in some other factors, so that the output increases in the same proportion as input. It must be noted that constant returns to scale are relevant only for the time periods in which adjustment of all factors is possible.

According to Marshall, the law of constant returns tends to operate when the actions of the laws of increasing returns and decreasing returns are balanced out; or in other words, economies and diseconomies of scale are exactly in balance over a range of output.

Constant returns to scale are quite often assumed in economic theoretical models for simplification. Such an assumption is based on the following conditions:

1. All factors are homogeneous.
2. All factors are perfectly substitutable.
3. All factors are infinitely divisible.
4. The supply of all factors is perfectly elastic at the given prices.

The Law of Decreasing Returns

As the firm expands, it may encounter growing diseconomies of the factors employed. As such when powerful diseconomies are met by feeble economies of certain factors, decreasing returns to scale set in. There are decreasing returns to scale when the percentage increase in output is less than the percentage increase in input.

Algebraically, $\frac{\Delta Q}{Q} < \frac{\Delta F}{F}$. Thus, *PFC* < 1 under decreasing returns to scale.

Diagrammatically, the law of decreasing returns may be presented as in Figure 11.2(C).

In Figure 11.2 (C), the curve DR is a downward sloping curve denoting decreasing returns to scale.

Decreasing returns to scale are usually attributed to increased problems of organisation and complexities of large-scale management which may be physically very difficult to handle.

Economists generally consider the following causes for the decreasing returns to scale:

1. Though all physical factor inputs are increased proportionately, organisation and management as a factor cannot be increased in equal proportion.
2. Business risk increases more than proportionately when the scale of production is enhanced. An entrepreneurial efficiency has its own physical limitations.
3. When scale of production increases beyond a limit, growing diseconomies of large-scale production set in.
4. The increasing difficulties of managing a big enterprise. The problem of supervision and coordination becomes complex and intractable in a large-scale of production. A very large enterprise may become unwieldy to manage.
5. Imperfect substitutability of factors of production causes diseconomies resulting in a declining marginal output.

9. ESTIMATION OF PRODUCTION FUNCTIONS

On operational basics, there are two kinds of production functions:

- Short-run production function
- Long-run production function

In a simplified economic model, short run production function is stated as follows:

$Q = f\ (V,\ F)$

Where,

Q = The quantity of resulting output

f = Function of

V = Variable factor input quantity

F = Fixed factor input quantity

In long-run, since all factors tend to be variable, the long-run production function is stated as:

$Q = f\ (V)$

For empirical measurement various mathematical relationships such as linear, quadratic, cubic, and power are used as the availability or data and the purpose of inquiry. As such, there are following five types of linear and non-linear models of production functions applied in empirical studies:

- Linear Production Function
- Quadratic Production Function
- Cubic Production Function
- Power Production Function
- Cobb-Douglas Production Function.

Liner Production Function

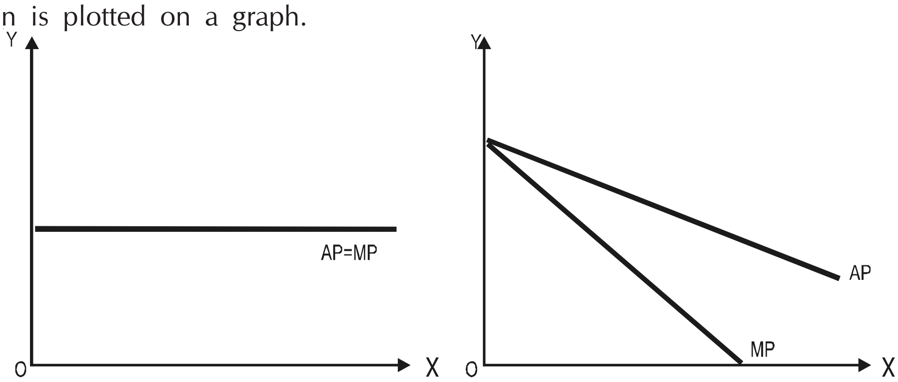
A much simple linear production function for the short run is stated as:

$Q = b_0 + b_1V$

If variable factor V is taken to be labour (L), then it can also be stated as:

$Q = b_0 + b_1L$

The linear equation represents straight-line for the production curve, when the production function is plotted on a graph.



(I) NEAR PRODUCTION FUNCTION (II) QUADRATIC PRODUCTION FUNCTION

Fig. 11.3: Production Functions

The value of "b_0" intercept parameter in short run production function refers to the fixed factor input quantity. "b_1" is the slope coefficient. It represents the marginal product (*MP*) the variable factor.

It being constant also represents the average product (*AP*). As such, $AP = MP$ when *MP* is constant. In such a case, the marginal and average product curves are horizontal straighter-lines, which tend to coincide. See Figure 11.3. Panel (I).

Quadratic Production Function

It is stated as follows:

$$Q = b_0 + b_1 V - b_2 V^2$$

This equation measures downward slopes of the *AP* and *AP* curves. See, Figure 11.3, panel (B). It is useful to know the quantum of diminishing returns.

Cubic Production Function

It is stated as:

$$Q = b_0 + b_1 V + b_2 V^2 - b_3 V^3$$

This function highlights the operation of the law of non-proportional returns to the variable factors. When its estimated value is presented graphically, it shows initially the marginal product (*MP*) curve is rising and then falling. It also shows that the *MP* curve intercepts the *AP* curve at its maximun point. See Figure 11.4.

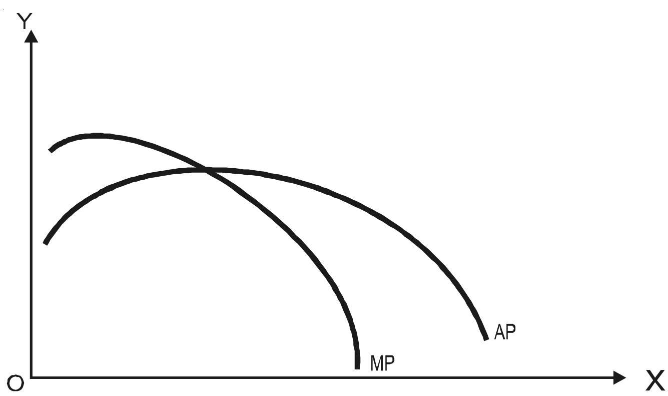


Fig. 11.4: Cubic Production Function's Graph

It is obviously a non-linear form.

Power Function

It is stated as follows:

$Q = a V$

Where, *a* is the constant parameter and *b* is the power. When it is expressed in logarithmic terms, it is transformed into linear function:

Log $Q = \log a + b \log V$

10. COBB-DOUGLAS PRODUCTION FUNCTION

The above stated forms of production functions considered only a single variable factor at a time. To be more realistic in approach, Cobb-Douglas production function considers two variable factor inputs. Thus:

$Q = f(L, K, \text{F})$

Where,

L = Labour

K = Capital

F = Refers to fixed factor component of input.

For empirical measurement, the Cobb-Douglas production function is presented with power terms as:

$Q = aL^b K^c$

Q = Total output

L = Labour units-input

K = Capital units-input

Stated in double log form it is transformed into a linear function:

$\text{Log } Q = \log a + b \log L + c \log K$

It is widely used in empirical research on production. In estimating regression of a Cobb-Douglas production, it showed transformed into a linear form by using double-log terms.

Data to estimate production function can be obtained from relevant sources such as company records and accounts on employment, purchases, output, etc. For using regression methods, time series or cross-sectional data may be collected.

11. MEASUREMENT OF AP AND MP

In short-run production function, we ignore b_0 value given for fixed factor. And, focus on variable factor's parameters: b_1, b_2 and b_3. In long run function, there is no fixed factors parameter.

- **Linear function:**

$Q = 100 + 4L$

Ignore 100, *i.e.*, b_0

$APL = Q/L = 4L/L = 4$

$MPL = dQ/dL = b_1 = 4$

- **Quadratic function:**

$$Q = 100 + 20L - 3L^2$$
$$AP = Q/L = (20L - 3L^2)/L$$
$$= 20 - 3L$$
$$MP = dQ/dL = 20 - 6L$$

Suppose, $L = 3$

Then, $APL = 20 - 3L = 20 - (3 \times 3) = 6$

$MPL = 20 - 6L = 20 - (6 \times 3) = 2$

- **Cubic function:**

$$Q = 50L + 8L^2 - 2L^3$$

Therefore, $AP = Q/L = (50L + 8L^2 - 2L^3) / L$

$= 50 + 8L - 2L^2$

$MP = dQ/dL = 50 + 16L - 6L^2$

- **Power function:**

$Q = aL^b K^c$

(Here, L = labour units, K = capital units)

APL = Q/L

MPL = b(Q/L)

APK = Q/K

$MPK = c(Q/K)$

Suppose,

$Q = 1.3\ L^{0.7}\ K^{0..3}$

If $L = 120$, $K = 60$

$Q = 1.3\ (120)^{0.7}\ (60)^{0.3}$

$= 1.3 \times 28.5 \times 3.4 = 126$

$APL = Q/L = 126/120 = 1.05$

$APK = Q/K = Q/K = 126/60 = 2.1$

$MPL = 0.7 \times 1.05 = 0.74$

$MPK = 0.3 \times 2.1 = 0.63$

12. EMPIRICAL ILLUSTRATIONS

Below some empirical measures of some cases of short-run production are given:

Case 1: Agricultural Production Function

$Q = 200 + 4L$

Where, L = Labour units

If $L = 100$ units, then:

$Q = 200 + 4\ (100) = 600$

Suppose, labour inputs is increased in agricultural operation by 2 per unit.

Therefore, $L = 102$ units.

So, $Q_1 = 200 + 4\ (102)$

$= 608$

$Q_1/Q = 608/600 = 1.013$

It follows that, there is 1.3% increase in output against 2% increase in labour input. This implies diminishing returns to scale.

Case 2: Mumbai Garage has estimated the following Production Function for Car-wash Service

$Q = 6L - 0.5L^2$

Q = Number of car washes per hour

L = Number of workers

Price per car wash is Rs. 50. Hourly wage rate paid to the workers is Rs. 40.

Using this information, prepare a production schedule measuring total product (*TP*), average product (*AP*), average and marginal revenue product and advice the firm how many workers should it employ in this case.

In this case, we assume employment of the number of workers adding one worker each time into the production function and work on the resulting total product (*Q*). Thereafter, *MP, AP, MRP* and *ARP* to be measured, as in Table 11.2.

$AP = TP/Q$

$MP = TP_n - TP_{n-1}$

$MRP = MP \times \text{Price}$

$ARP = AP \times \text{Price}$

Table 10.2: Production Schedule of Car Washes

No. of Workers	Total Product (TP)	Marginal Product	Average Product	MRP (Rs.)	ARP (Rs.)
(*L*)	$Q = 6L - 0.5L^2$	(*MP*)	(*AP*)		
1	6 – 0.5 = 5.5	5.5	5.5	275	275
2	12 – 2 = 10.0	4.5	5.0	225	250
3	18 – 4.5 = 13.5	3.5	4.5	175	225
4	24 – 8 = 16.0	2.5	4.0	125	200
5	30 – 12.5 = 17.5	1.5	3.5	75	175
6	36 – 18 = 18.0	0.5	3.0	30	150
7	42 – 24.5 = 17.5	– 0.5	2.5	– 25	125

The production schedule shows that there is operation of the law of diminishing marginal product with the increase in the number of workers. The marginal product of each additional worker tends to decline, whereas the garage has to pay the wage at a constant rate. The production theory suggests that the firm should compare *MRP* of workers with the wage rate (*W*). It should employ additional workers till *MRP* is greater than wage rate.

An equilibrium as near equilibrium position is reached when *MRP* = *W* or *MRP W*. In this case, when five workers are employed *MRP* = Rs. 75 which is higher by closer to wage rate Rs. 40. If the sixth worker is employed *MRP* = Rs. 30, which is less than the wage rate (*W*) Rs. 40. Therefore, the sixth worker should not be employed under the present business condition.

Case 3:

A researcher estimated Cobb-Douglas production function for soft drinks industry by collecting information on number of workers and plant size for the 25 soft drink bottling plants in a country.

He applied the following function:

$$Q = aL^b K^c$$

where,

Q = Soft drinks bottles

L = Number of workers

K = Plants size

By transformation into double log form:

$$\text{Log } Q = \log a + b \log L + c \log K$$

The result of estimation:

$$\text{Log } Q = \log 1.36 + 0.64 \log L + 0.33 \log K$$

Anti-log of log 1.36 = 18.21

Therefore, $Q = 18.21\ L^{0.64}\ K^{0.32}$

It is observed that both inputs in this case exhibit decreasing marginal product since each power coefficient is less than 1.

Case 4:

Moroney (1967) used the following form of Cobb-Douglas production function for application in US manufacturing

Log V: log I' + b_1 log X_1 + b_2 log X_2 + b_3 log X_3 + e

where,

V = output measure

I' and the *bs* are parameter efficients to the estimated

X_1 = capital

X_2 = production workers

X_3 = non-production workers

e = random variable

13. OUTPUT ELASTICITY

Output elasticity is defined as the ratio of the percentage change in quantity produced to the percentage change in factor input. Thus:

$$e_Q = \frac{\%\ \Delta Q}{\%\ \Delta F}$$

where, e_Q = output elasticity

Q = quantity of product

F = quantity of factors employed.

Output elasticity (e_Q) is greater than 1, when (%DQ) > (%F)

It suggests increasing returns to scale.

Output elasticity (e_Q) is equal to 1, when (%DQ) = (%DF). It suggests constant returns to scale.

Output elasticity (e_Q) is less than 1, when (%DQ) < (%DF). It suggests decreasing returns to scale.

Returns to Scale in Chilean Manufacturing Industries

Westbrook and Tybout (1993) for estimating returns to scale in Chilean Manufacturing Industries used a simple Cobb-Douglas production function for a particular industry:

Yit = aLit + bKit + eit

Here, i = the firm subscript

t = the time element

Y = the logarithm of real value added

L = the logarithm of labour (measured in efficiency units)

K = the logarithm of the true capital stock

e = an error term

Using Chilean Panel data for the period 1979-86, the authors have reported the various estimates in their study.

It is interesting to note the following Cobb-Douglas production functions in their estimations.

(1) Textiles

$Y = L^{0.51} K^{0.30}$

Return to Scale: 0.81

(2) Furniture

$Y = L^{0.40} K^{0.77}$

Returns to Scale: 1.17

(3) Bakeries

$Y = L^{0.78} K^{0.34}$

Return to Scale: 1.12

(4) Plastic

Y = L0.99 K0.02

Returns to scale: 1.01

Lessons to Policy-Makers

- Increases in safe cause improvements in efficiency.
- There are productivity gains associated with policies that promote business in an industry.
- Mexico's dramatic trade liberalisation was associated with modest increases in scale efficiency.
- External returns to scale can be derived from information spillovers, infrastructure, induced expansion of the intermediate goods menu, or other forces.
- Positive correlation between size and profitability need not constitute a case for anti-trust activity.

[For details refer to Westbranch M.D. and J.R. Tybout (1993). Estimating Returns to Scale with Large, Imperfect Panels: an Application to Chilean Manufacturing Industries". *The World Bank, Economic Review*, Vol. 7, No. 1, January 1993.

14. PRODUCTION FUNCTION THROUGH ISO-QUANT CURVE

In the long-run, as all factors are variable, the firm has a wider choice of adopting productive techniques and factor proportions, in relation to employed technology. Again, the basic characteristic of productive resources is that they are substitutable, though imperfectly, by another one to a certain extent. Thus, in a given production function, the variability of different factor inputs also implies their substitutability. In fact, one factor can be substituted for another in a particular manner; so that a constant level of output may be maintained. To elucidate the point, let us assume a production function with two variable inputs, say, labour (L), and capital (K); thus: $Q = F(L, K)$.

Now, the firm can combine labour and capital in different proportions and can maintain specified level of output; say, 10 units of output of a product X, under the prevailing state of technology and given organisational ability of the entrepreneur units of labour (L) and capital (K) may combine alternatively, as follows:

$2L + 9K$

$3L + 6K$

$4L + 4K$

$5L + 3K$

The first combination implies greater use of capital and less of labour to have a given level of output (say 10 units of X as we assumed). In this factor combination, we have relative capital intensity, while even by the last combination, by using more labour and less capital we can produce the same level of output. We have illustrated only four alternative combinations of labour and capital. However, there can be innumerable such combinations for producing the same quantity of output. If we plot all these combinations graphically and join the loci of their points, we derive a curve, as shown in Figure 11.5.

Equal Product Curve (Iso-Quant)

The equal product curve is also called production iso-quant. (Iso-quant means equal quantity). The concept of production iso-quant is, thus, similar to the concept of indifference curve. It represents all these combinations of two-factor inputs which produce a given quantity of product. Unlike an indifference curve, the equal product curve, however, signifies a definite measurable quantity of output, so the units of output can be labelled to the given iso-quant. In Figure 11.5 (A) thus, we have labelled IQ curve as X 10, as it represents 10 units of commodity X.

Iso-quant measures a quantum of production resulting from alternative combination of two variable inputs. Iso-quant map represents a set of iso-quants describing production function of a firm. A higher iso-quant represents a larger quantity of output than the lower one.

Like an indifference map, we can have an iso-quant map or production map showing a set of iso-quants, each iso-quant representing a specified volume of output. See Figure 11.5 (B).

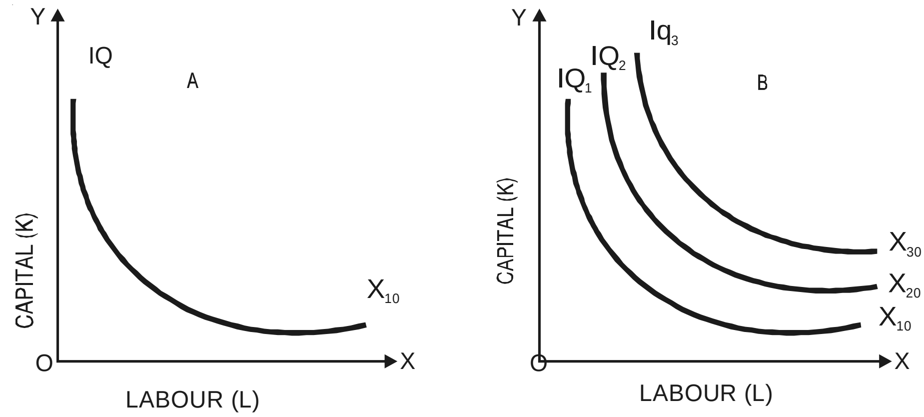


Fig. 11.5: Equal Product Curves

Difference Between Equal Product Curve and Indifference Curve

Equal product curves, however, may be distinguished from indifference curves as follows:

- Indifference curves indicate level of satisfaction. Equal product curves indicate quantity of output.
- Indifference curves relate to combinations between two commodities. Equal product curves relate to combinations between two factors of production.
- Indifference curves cannot be easily labelled as there is no numerical measurement of the satisfaction involved. Equal product curves can be easily labelled as physical units of output represented by it are measurable.
- On indifference map, between higher and lower indifference curve, the extent of difference in the satisfaction is not quantifiable. On equal product map, we can measure the exact difference between the output represented by one iso-quant and the other iso-quant. Thus, unlike indifference maps and their levels of satisfaction, the size of physical output at various points on equal product maps are quantifiable and comparable.

15. PROPERTIES OF ISO-QUANT

Following are the important properties (characteristic features) of iso-quants:

- **Iso-quants have a negative slope.** This means that in order to maintain a given level of output, when the amount of one factor input is increased that of the other must be decreased. At each point on a iso-quant term, we get factor combination which produces the same level of output.
- **Iso-quants are convex to origin.** The slope of the iso-quant measures, the marginal rate of technical substitution of one factor input (say labour) for the other factor input (say, capital).

Symbolically,

$MRTS_{LK} = DK/DL$

where, $AIRTS_{LK}$ = the marginal rate of technical substitution of factor L (labour) for factor K (capital)

DK = Change in capital, and

DL = Change in labour

The marginal rate of technical substitution measures the rate of reduction in one factor for an additional unit of another factor in the combination. This is just sufficient to produce the same quantity of output. The convexity of iso-quant suggests that *MRTS* is diminishing which means that as quantities of one factor labour is increased, the less of another factor capital will be given up, if output level is to be kept constant.

Elasticity of factor substitution (*EFS*) is measured as follows:

$$\text{EFS} = \frac{\% \, \Delta \left[\dfrac{K}{L}\right]}{\% \, \Delta \text{MRTS}_{\text{LK}}}$$

- **Iso-quants do not intersect.** This is necessary because by definition each iso-quant represents a specific quantum of output. Therefore, if two iso-quants intersect each other it would involve logical contradiction as a particular iso-quant at a time may be representing a small as well as a large quantity of output. To avoid such logical contradiction, care is taken that no two or more iso-quants (equal product curves) should cut each other.

  Iso-quants do not intercept either axis. If an iso-quant is touching the x-axis, it means output is possible even by using a factor (e.g., labour alone without using capital). But, this is unrealistic from the production function point of view. Both (labour and capital) are essential in some proportion to produce a commodity. Similarly, if an iso-quant touches y-axis, that is only capital, can produce output. This is unrealistic.

- ***The iso-quant is an oval shape curve.*** It must be noted that one iso-quant may have a positive upward slope at its ends, when with relatively small amount of a factor, relatively large amount of another factor is combined, in such a manner that the marginal productivity of this abundant factor tends to be negative and as such resulting in a decline in a total output. In such cases, the end portions of the curves are regarded as uneconomical.

16. ECONOMIC REGION

The economic region of the iso-quant is determined by drawing tangents to the curves parallel to the two axes, and the points of tangency indicate zero marginal productivity of the abundant factor. See Figure 11.6.

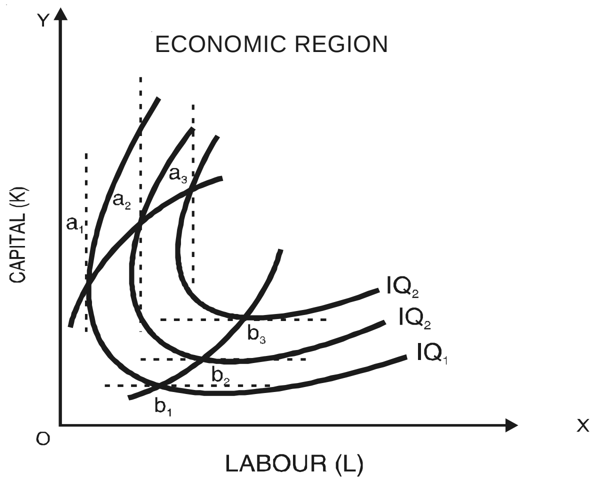


Fig. 11.6: Economic Region

a_1 and b_1 are tangency points on $1Q_1$. Similarly, a_2 and b_2 points are on $1Q_2$. Thus, points a_1, a_2, a_3, etc., represent zero marginal productivities of capital. While, b_1, b_2, b_3, etc., represent zero marginal productivities of labour. Joining these points, we derive 'ridge lines.' The economic region is constrained by these ridge lines.

Isocost Line

The concept of isocost line is similar to budget line discussed in the theory of consumer demand in chapter 4 section 4.8.

Isocost line is a graphical device — a line showing all of the combinations of the two factors (say, labour and capital) that can be purchased for a given expenditure outlay by the firm.

To draw an isocost line, we require the information about unit prices of the two factors and total outlay. Suppose total outlay is Rs. 100. Labour cost is Rs. 10 per unit. Capital cost is Rs. 30 per unit. Some alternative factor combinations are assumed as follows:

Combination	*Capital (K)*	*Labour (L)*
A	3	1
B	2	4
C	1	7

Plotting these values on a graph, joining the loci of points *a, b,* and *c* we have to draw the isocost line as shown in Fig. 11.7.

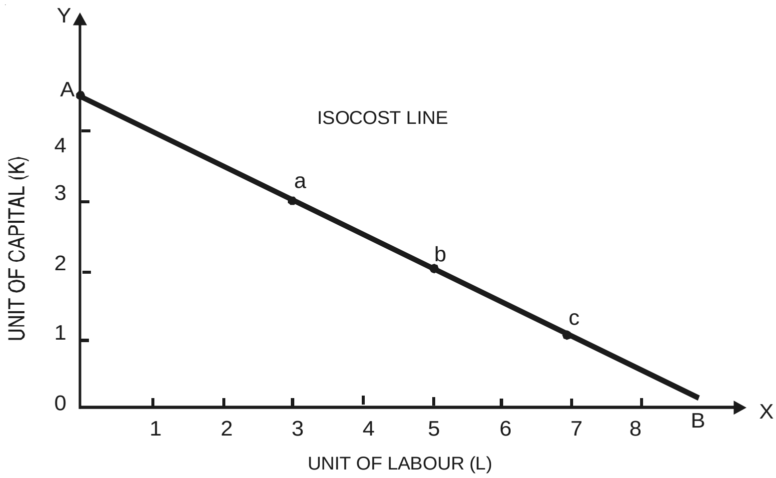


Fig. 11.7: Isocost Line

In Fig. 11.7, *AB* represents the Isocost line.

The Isocost line *AB* is derived by joining the loci of points *a, b, a* and *c* representing alternative factor combinations.

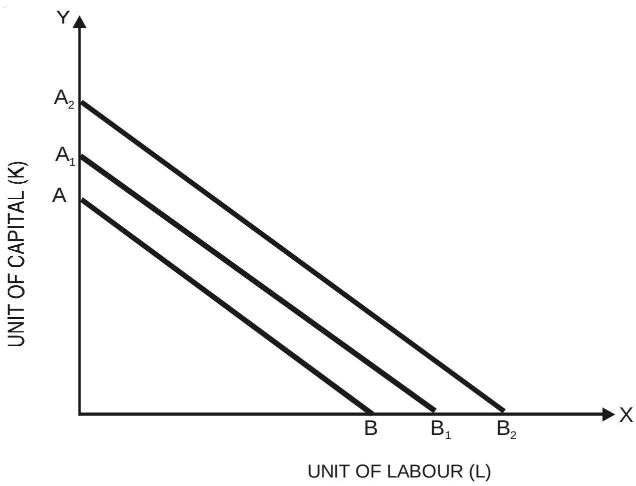


Fig. 11.8: Isocost Line

When outlay is increased, price of factors remaining unchanged factor combination will change with more quantities of factors being purchased. For each increase in total outlay, thus, the isocost lines will be different and shifted upward. Prices of factors remaining unchanged, the isocost lines will have parallel shifts as demonstrated in Figure 11.8.

AB, A_1B_1, A_2B_2 are the cost lines. They are drawn with parallel shifts to reflect alternative levels of firm's outlays on factors when their prices are unchanged.

The slopes of isocost line vary when factor prices vary. Fig. 11.9 clarifies this point.

Fig. 11.9: Changes in shapes of isocost lines

AB, A_1B and AB_1 are alternative cost lines corresponding to varying factor prices.

In Figure 11.9, *AB* is the original isocost line. Total outlay remaining the same, when capital price is lowered, labour price remaining unchanged, the new isocost line A_1B is drawn. Similarly, B_1A represents new isocost line when labour price is reduced, capital price being unchanged.

It follows that the slope of the isocost line depends on the ratio of the prices of two given factors.

17. LEAST-COST FACTOR COMBINATION: PRODUCER'S EQUILIBRIUM

Equal product curves indicate various possibilities of combining two factors. A rational firm is, however, interested in selecting an optimum combination, which yields maximum benefit or production, *i.e.*, the firm is interested in least-cost combination of factors.

The least-cost combination of factors can be determined by comparing a production map in relation to a given cost line. The cost line is determined by the ratio of prices of two factors, assuming a given investment fund with the firm and given prices of factors. The firm's outlay is then translated into real terms through the factor price ratio. The cost line is the cost constraint (the firm's budget). In our illustration, the slope of cost line measures.

$\frac{PL}{PK}$ (where, *PL* = price of labour, *PK* = price of capital).

Point of tangency between cost line and the iso-quant determines producer's equilibrium.

Fig. 11.10 (A) shows superimposition of production map on cost line *AB*. At point *a*, the iso-quant JQ_1 interests the cost line. If the firm moves to point *b*, it gets more output represented by IQ_2. Similarly, point *e* give IQ_3. IQ_3 is the highest attainable iso-quant in relation to the given line. Fig. 11.10 (B) refers to the equilibrium position: cost line is a tangent to the iso-quant at point *e*.

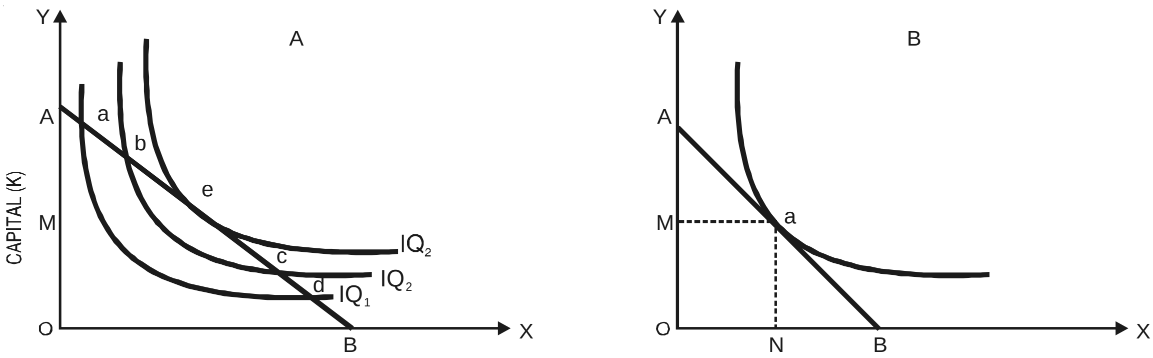


Fig. 11.10: Least-Cost Combination

18. RETURNS TO SCALE EXPLAINED THROUGH ISQ-QUANTS

Laws of returns to scale can be explained with the help of equal product curves or iso-quants.

Assuming that a rational firm tries to produce each quantum of output at the least possible costs, we may draw various alternatives.

OZ is the scale line. It shows different quantities of output at minimum costs.

Equilibrium points at which different cost lines or firm's budget lines are tangent to different equal product curves as shown in Figure 11.11.

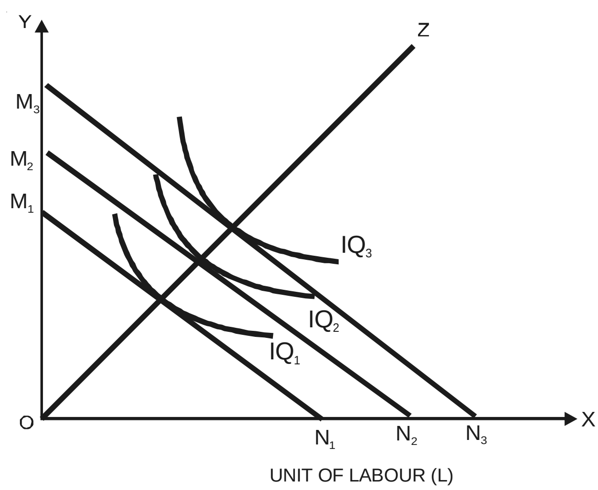


Fig. 11.11: Scale Line

In Fig. 11.11, factor-price or cost lines M_1N_1, M_2N_2, etc., are tangent to iso-quants at points *A, B, C,* and so on. Joining the loci of these points, scale line *OZ* is drawn. It indicates the manner in which the firm adjusts the scale of operation of output in relation to each relative factor price consideration. It is, therefore, also described as the expansion path of the concerned firm. Scale line, in fact, represents alterations in factor combinations and the respective equilibrium of the firm. It shows different quantities of output produced by the firm at minimum costs under the situation of two variable factor inputs with their fixed price ratio.

The nature of scale line is affected by two factors: *(i)* returns to scale, and *(ii)* constancy or variability in factor proportions, *i.e.*, the nature of production functions. The returns to the scale can be shown on an iso-quant map as in Fig. 11.12.

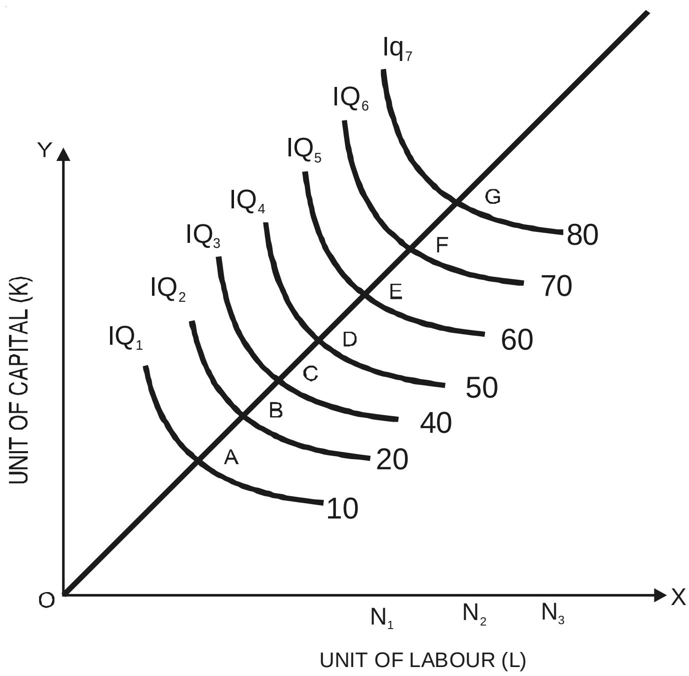


Fig. 11.12: Returns to Scale

Figure 11.12 shows that initially there are increasing returns with an increase in outlay on factors as there is a narrowing distance between successive iso-quants in the beginning: $AB > BC > CD$. After point D, the distance between successive iso-quants remains the same. Thus:

$CD = DE$, which means constant returns to scale. Finally, after point B there is operation of the law of decreasing return. The distance between successive iso-quants tend to get widened. Thus,

$EF < FG$.

The narrowing distance between successive IQs suggests increasing returns to scale. The widening distance suggests decreasing returns.

19. TECHNICAL CHANGE

Sometimes, technical change is analysed and estimated in production function. The technical change may embody with improvement in factor efficiency. It is embodied with factor inputs. There is disembodied technical change when a shift in production function overtime resulting into improved efficiency in combining factor inputs. It is disembodied since it is not embodied in factor inputs, but it is the result of reorganisation or renovation in activities.

Intrilligator (1965) estimated, using Cobb-Douglas model, a production function incorporating both embodied and disembodied technical change for aggregate U.S. manufacturing output for the period 1929-1958. In doing this exercise he considered various time series for labour input, involving alternative adjustments: *(i)* in the effectiveness of the labour force, and *(ii)* for the changes in working hours, education and age, sex ratios of the workers. In the case of capital input, he considered alternative rates of embodied technical change and improvements in the technical efficiencies.

He reported the following best estimate:

$$Q = 0.869\, e^{0.0167t} \quad L^{0.862t} \quad K^{0.138}$$

$$(0.0026) \qquad (0.044)$$

$$R^2 = 0.993 \qquad DW = 2.159$$

(parentheses refer to S.E.)

where, L = labour inputs of unchanging quality, and

K = capital inputs for embodied technical change of 4% annually.

In this model $R^2 = 0.99$ suggesting that fit is very good. *DW* test rules on the possibility of auto-correlation. the estimate suggests that disembodied technical change (e) is 1.67% annually, whereas technical change embodied in capital amount is mentioned to be 4%. No technical change is embodied in labour.

Solved Problem

The short run production function of a hosiery mill is:

$$Qx = 12L + 6L^2 - 0.1L^3$$

where, Qx = daily output of banians

L = the number of workers employed

(i) How many workers are employed when the average output of banians is maximised?

(ii) How many workers are employed when the marginal output of banians is maximised?

(iii) If the daily wage rate is Rs. 30 and the selling price of banian is Rs. 40 per piece, how many banians should be produced to maximise profits in this business?

Solution:

(i) From the production function $Qx = 12L + 6L^2 - 0.1L^3$ derive Qx/L as follows:

$$\frac{d\,(Qx\ /\ L)}{dL} = \frac{6L - 0.2L^2}{L}$$

APL (*i.e.*, Qx/L) $= 12 + 6L - 0.1L^2$

First derivative of the function is obtained as:

$$= 6 - 0.2L$$

Assuming:

$6 - 0.2L = 0$

we have, $L = \dfrac{6}{0.2} = 30$

Answer: When APL is maximised, 30 workers are employed.

(ii) From the production funtion take:

$$\frac{dQ}{dL} = 1L + 12L - 0.3L^2$$

Take second derivative:

$$\frac{dQ}{dL} = 12 - 0.6L$$

Therefore, setting second derivative, as follows:

Setting $\dfrac{d^2x}{dL^2} = 0$

thus:

$12 - 0.6L = 0$

therefore, $L = \dfrac{12}{0.6} = 20$

Answer: When MPL are maximised, 20 workers are employed.

(iii) The profit maximising condition is:

$$VMP = P \times MPP = W$$

therefore, $MPP = W/P$

$$= 12 + 12L - 0.3L^2 = 12$$

$$\text{therefore, } 0.3L = 12$$
$$L = 40$$

Here, $APP > MPP$ when $L > 30$.

$$\text{If } L = 40,$$
$$Qx = 12L + 6L^2 - 0.1L^3$$
$$\text{Therefore, } Qx = (12 \times 40) + (6 \times 40 \times 40) - (0.1 \times 40 \times 40 \times 40)$$
$$= 3{,}680$$

Answer: Profits are maximised when 3,680 banians are produced.

MODEL QUESTIONS

1. Write notes on:
   (a) Production Function.
   (b) The Laws of Returns to Scale.
   (c) Equal Product Curves.
   (d) Producer's Equilibrium.
2. (a) What is iso-quant?
   (b) What are the properties of iso-quants?
3. Define the following:
   (a) Production function.
   (b) Iso-quant.
4. State whether the following statements are true or false giving reasons in brief:
   (i) The iso-quants are concave to the origin.
   (ii) Two iso-quants can intersect each other.
   [**Hints:** *(i)* False, *(ii)* False]
5. What is a production function? How does a long run production function differ from a short-run production function?
6. Explain the laws of returns to scale. Describe them using the Iso-quants.
7. Explain the difference between a short-run and long-run production function. Cite one example of this difference in a business situation.
8. Explain the concepts of average product and marginal product of a variable factor. Show their behavioural relationship giving a hypothetical production schedule and diagrammatic representation.

Problems

1. If, short-run production function is:

   $Q = 30L + 4L^2 - 0.6L^3$

   Where, Q = Quantity or output per weeks

   L = Number of workers

   Estimate average and marginal productivity when 6 workers are employed.

2. If $Q = 1.01L^{0.75} K^{0.25}$

   Estimate TP, average and marginal products of labour and capital when 10 workers are employed with 4 machines.

3. Following data relate to the amount of tuna that could be caught with different crew sizes.

No. of Fishermen	3	4	5	6	7	8	0
Daily Tuna Catch (Kg.)	300	450	590	665	700	725	710

   (i) Determine the point at which diminishing returns occur.

   (ii) Indicate the points that delineate the three stages of production.

   (iii) If the market price of tuna is Rs. 13.5 per kg. determine how many fishermen should the company use if the daily wage rate is Rs. 100.

4. The owner of a car wash measures the following short-run production function:

   $Q = 6L - 0.5L^2$

   where Q = no. of car washes per hour

   L = no. of workers

   (i) Generate a schedule showing total product, average product, and marginal product.

   (ii) Plot this schedule on a graph.

   (iii) If the price of car wash is Rs. 15, how many workers should the owner employ if he pays hourly wage rate Rs. 6 to each workers?

   (iv) Suppose he gets students to work in the evening at Rs. 4 per hour. Should he employ more workers then?

5. Cobb-Douglas production function is adopted by the consulting firm for estimating production function of bus service in a city:

   $Q = b_0 L^{b1} K^{b2}$

   where, Q = Output in millions of passenger miles L = Labour input in working hours,

   K = Capital input in bus transit hours.

Regression results:

$b_0 = 1.3, \quad b_1 = 0.27, \quad b_2 = 0.75$

State Cobb-Douglas estimated production function in this case.

6. Diamond Foot Ware (DFW) is a producer of gents' shoes. The following Cobb-Douglas production function has been estimated for its new brand of shoes called 'Executives'.

   $Q = 10 \ K^{0.6} \ L^{0.7}$

   where, Q is total output (hundreds of pairs), K is capital input (hundreds of machie-hours), L is labour input (hundreds of labour hours). In the year 2003, DFW spent Rs. 20 lakh on factor inputs for the production of new brand shoes. The unit prices of K and L are Rs. 200 and Rs. 100. The firm allocated 10 lakh on each of these two factor inputs. How many pairs of the 'Executive' shoes did DFW produce?

[**Hints:** $K = \dfrac{10,00,000}{200} = 5,000$ machine-hours

$$L = \frac{10,00,000}{100} = 10,00,000 \text{ man-hours}$$

$$Q = 10(50)^{0.6} \ (100)^{0.7}$$

In log model:

$$Q = \log 10 + 0.6 \log 50 + 0.7 \log 100]$$

❒ ❒ ❒

12

CHAPTER

Cost and Profit Forecasting: Break-even Analysis

1. THE MEANING OF BREAK-EVEN ANALYSIS (BEA)

The break-even analysis (*BEA*) has considerable significance for economic research, business decision-making, company management, investment analysis and public policy.

The *BEA* is an important technique to trace the relationship between costs, revenue and profits at the varying levels of output or sales.

As Joel Dean (1976) puts it, the *BEA* presents flexible projections of the impact of the volume of output upon cost, revenue and profits. As such, it provides an important bridge between business behaviour and economic theory of the firm.

In *BEA*, the break-even point is located at that level of output or sales at which the net income or profit is zero. At this point, total cost is equal to total revenue. Hence, the break-even point is the no-profit-no-loss zone.

However, the object of the *BEA* is not just to determine the break-even point (*BEP*), but to understand the functional relationship among cost, revenue and the rate of output.

The BEA is essentially related to cost and profit forecasting exercise conducted in business decision making.

2. THE BREAK-EVEN CHART

In recent years, the break-even charts have been widely used by business economists, company executives, investment analysts, government agencies and even trade unions.

A break-even chart (*BEC*) is a group of the short-run relation of total cost and of total revenue to the rate of output and sales.

The *BEC* graphically shows cost and revenue relation to the volume of output. It thus depicts profit output relationship. Hence, the *BEC* is also called profit group.

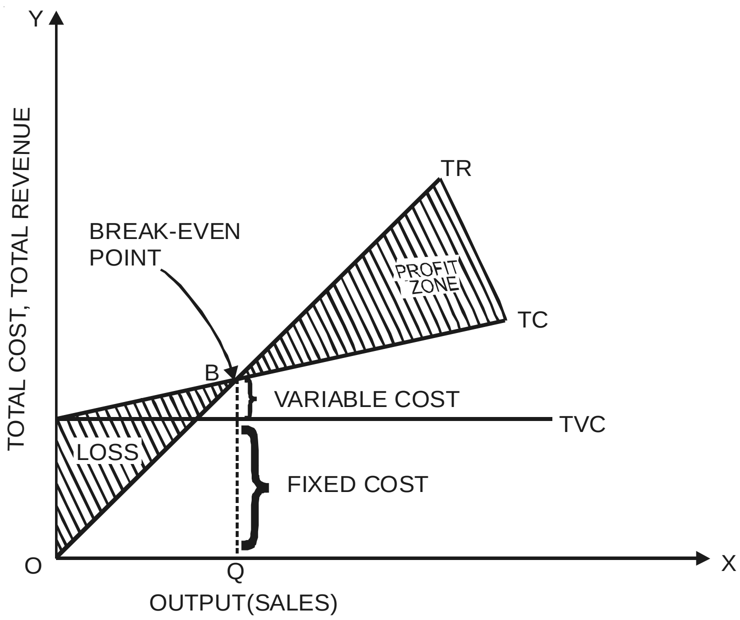


Fig. 12.1: The Break-even Chart

Figure 12.1 illustrates a typical break-even chart.

In Figure 12.1, the volume of output is measured along the X-axis; cost and revenue are measured along the Y-axis.

For the sake of simplicity, assuming constant factors, a linear revenue function is drawn. Similarly, a linear total cost function is assumed. It is composed of the fixed cost which is represented by the horizontal curve (*TFC*) on the chart. The variable cost function is also assumed to change linearly in a constant proportion to the change in output rate.

In the chart, the break-even point (*B*) is the point at which total revenue equals total cost, so net profit is zero at *OQ* level of output.

The area between the *TR* curve and *TC* curve depicts the profit function. It follows that the firm incurs loss, when it produces output below *OQ* level. *OQ* level of output is at break-even point of no profit, no loss. When it expands further output, it makes profit.

The break-even chart is an excellent instrument panel for guidance of the business manager or businessman in determining the profitable output and controlling the business.

An Alternative Form of the Break-Even Chart

Sometimes, an alternative form of the break-even chart is drawn by starting with the variable cost function from the horizontal axis and then adding total fixed cost to determine the total cost function or curve, as shown in Figure 12.2.

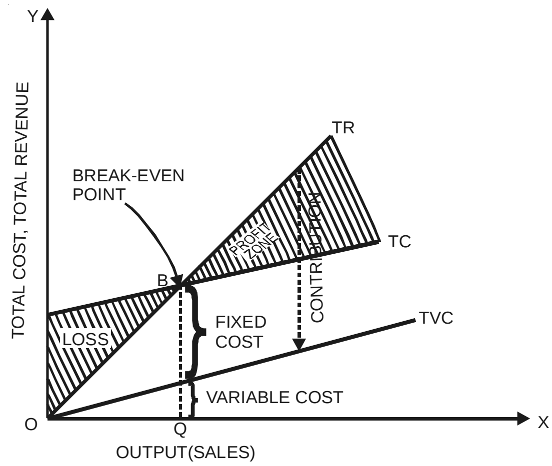


Fig. 12.2: The Break-even Chart (Alternative Form)

We get similar information in Figure 12.2, as in the traditional Figure 12.1. However, this alternative form of *BEC* is better for providing a ready reference to the contribution to fixed (overhead) cost and profits.

3. FORMULA METHOD FOR DETERMINIG BEP

There are two ways of determining the break-even point (*BEP*) by means of a formula. It can be determined either in terms of physical units of output or in terms of sales value of the output, i.e., in money terms.

BREAK-EVEN ANALYSIS OF THE PC-BUILD, INC.

In a case study prepared by Remey and Timmons, the break-even chart of the PC-Build, Inc. (a manufacturing firm in the personal computer kit industry) is reported, as follows:

The firm intended to offer three main products, *viz:* B2000 Basic kit, SX3000 Super Kit, and SX4000 Deluxe kit priced at $699, $899 and $1500, respectively.

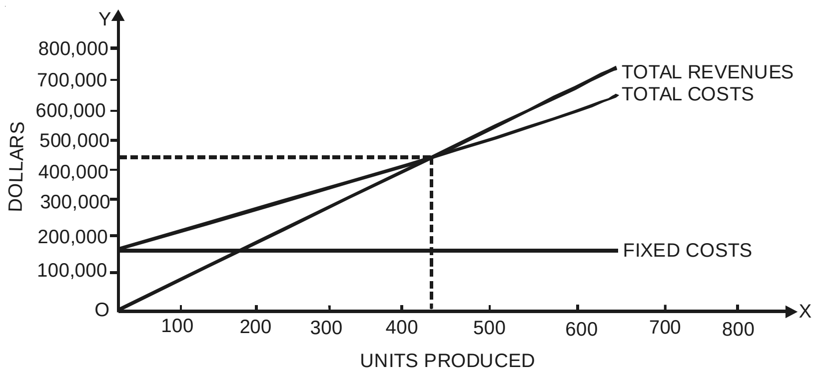


Fig. 12.3

The *BEA* Chart (Fig. 12.3) suggests that the firm reaches the break-even point at 521 units of product-sales mix.

BEP in Terms of Physical Units

Viewing in terms of per unit cost and revenue, the break-even point (*BEP*) is located at that level of output at which the price or average revenue (*AR*) is equal to the average cost (*AC*). Thus, the selling price should cover the average variable cost (*AVC*) in full as well as a part of the fixed cost. The price of the excess other (*AVC*) is regarded as contribution margin per unit, which contributes towards the fixed cost. Thus, the *BEP* is spotted at a point where a sufficient number of units of output are produced so that its total contribution margin becomes equal to the total fixed cost. Hence, we may give the formula as under:

$$BEP = \frac{TFC}{P - AVC}$$

where,

BEP = the break-even point

TFC = the total fixed cost

P = the selling price

AVC = the average variable cost

Obviously, *P–AVC* measures the contribution margin per unit.

The following examples illustrate the application of the formula:

Example 1. Given the following total cost and total revenue functions, determine the break-even point:

$TC = 48 + 10Q$

$TR = 50Q$

(Here, *Q* is the units of output sold).

Solution: From these linear cost functions, we have

Total Fixed Cost (*TFC*) = 48

Average Variable Cost (*AVC*) = 10 per unit

Since $TR = P.Q$

$TR = 50Q$

implies Rs. 50 as the selling price (*P*)

The formula for measuring *BEP* is

$$BEP = \frac{TFC}{P - AV}$$

$$BEP = \frac{480}{50 - 10} = \frac{480}{40} = 12 \text{ units.}$$

Answer: Break-even point is reached when 12 points are produced and sold. Because, when 12 units are produced, TC = 480 + Rs. 120 = Rs. 600 and TR = 50 × 12 = Rs. 600.

Thus, TR = TC, so no profit, no loss. Net profit is zero. Hence, the break-even point.

BEP in Terms of Sales Value

When the firm is a multi-product firm, the *BEP* is to be measured in terms of sales value, by expressing the contribution margin as a ratio to sales. Thus,

$$BEP = \frac{\text{Total Fixed Cost}}{\text{Contribution Ratio}}$$

Here, the contribution ratio is measured as:

$$\textbf{Contribution Ratio } (CR) = \frac{TR - TVC}{TR}$$

The following example illustrates the application of the formula:

Example 2. A firm incurs fixed cost of Rs. 4,000 and variable cost of Rs. 10,000 and its total sales receipts are Rs. 15,000. Determine the break-even point.

Solution:

$$CR = \frac{TR - TVC}{TR}$$

$$= \frac{15{,}000 - 1{,}000}{15{,}000} = \frac{1}{3}$$

$$BEP = \frac{TFC}{CR} = \frac{4{,}000}{{}^1/_3} = \frac{4{,}000 \times 3}{1} = 12{,}000$$

Answer: The break-even point is reached when the firm's sales value is Rs. 12,000. At Rs. 12,000 sales value, there is no profit, no loss. Because, variable cost at sales value of Rs. 12,000 is

$$\left(\frac{2 \times 12{,}000}{3}\right) = 8{,}000$$

TC = Rs. 8,000 + Rs. 4,000 = Rs. 12,000 is equal to TR = Rs. 12,000.

4. ASSUMPTIONS OF BREAK-EVEN ANALYSIS

The validity of the *BEA* is conditioned by a number of assumptions as follows:

1. The cost function and the revenue function are linear.
2. The total cost is divided into fixed and variable costs.
3. The selling price is constant.
4. The volume of sales and the volume of production are identical.
5. Average and marginal productivity of factors are constant.
6. The product-mix is stable in the case of a multi-product firm.
7. Factor price is constant.

In practice, all these assumptions are unlikely to be fulfilled.

5. LIMITATIONS OF BEA

The break-even analysis has certain major limitations as follows:

- **It is static.** In the *BEA*, everything is assumed to be constant. This implies a static condition. It is not suited to a dynamic situation.
- **It is unrealistic.** It is based on many assumptions which do not hold good in practice. Linearity of cost and revenue function are true only for a limited range of output.
- **It has many shortcomings.** The *BEA* regards profit as a function of output only. It fails to consider the impact of technological change, better management, division of labour, improved productivity and such other factors influencing profits.
- **Its scope is limited to the short-run only.** The *SEA* is not an effective tool for a long-run analysis.
- **It assumes horizontal demand curve with the given price of the product.** But this is not so in the case of a monopoly firm.
- **It is difficult to handle selling costs in the BEA.** Selling costs do not vary with output. They manipulate sales and affect the volume of output.
- **The traditional BEA is very simple.** It makes no provision for corporate income-tax, etc.

Despite these limitations, however, the *BEA* serves some useful purpose in business decision making. The *BEA* provides a rough guideline for the alternative possibilities and arriving at a better decision. Of course, the *BEA* is not a perfect substitute for judgement of commonsense and intuition possessed by the businessman. But, it can be a good supplement to the value judgement and logical deductions made with commonsense.

6. USEFULNESS OF BEA

The *BEA* is particularly useful for decision-making in regard to pricing, cost control, product-mix, channels of distribution, etc.

- The *BEA* provides microscopic view of the profit structure of the firm.
- Empirical cost functions required in *BEA* can be of great help for cost control in business.
- The *BEA* when it provides a flexible set of projections of costs and revenue under expected future conditions can serve the purpose of profit prediction and becomes a tool for profit making.
- The *BEA* can be used for determining the 'safety margin' regarding the extent to which the firm can permit a decline in sales without causing losses.

$$\text{Safety Margin} = \frac{Sales - BEP}{Sales} \times 100$$

- The *BEA* can be useful in determining the target profit sales volume.

$$\text{Target Sales Volume} = \frac{\text{TFC} - \text{Target Profit}}{\text{Contributi on Margin}}$$

- It is useful in arriving at make or buy decision.

In short, *BEA* is highly significant in business decision-making pertaining to pricing policy, sales projection, capital budgeting, etc. However, the technique is to be used cautiously.

7. PRACTICAL PROBLEM

A small firm incurs fixed expenses amounting to Rs. 12,000. Its variable cost of product *X* is Rs. 5 per unit. Its selling price is Rs. 8. Determine its break-even quantity (*BEQ*) and safety margin for the sales of 5000 units.

Solution:

(i) $$BEQ = \frac{TFC}{P - AVC}$$

$$= \frac{12{,}000}{8 - 5} = 4{,}000$$

(ii) $$\text{Safety Margin} = \frac{\text{Sales} - \text{BEQ}}{\text{Sales}} \times 100$$

$$= \frac{5000 - 4000}{5000} \times 100 = 20\%$$

Interpretation of the Result

P : 1. *BEQ* or *BEP* 4000 units of product *X* in this case implies that the firm would not have any loss or profit of selling this level of output at Rs. 8. In other words, this is a zero profit output level, because:

$\pi = TR — TC$

Solution:

In this case,

$TR = P.Q = 8 \times 4{,}000 = 32{,}000$

$TC = TFC + TVC$

$= 12{,}000 + 5 \times 4000 = 32{,}000$

$\therefore \pi = 32{,}000 - 32{,}000 = 0$

Answer: Furthermore, the safety margin 20% in this case suggests that the firm can afford to reduce its sales of product *X* upto 20 per cent of the present sales value of 5000 units (*i.e.,* 20% of Rs. 40,000) before incurring any loss.

P : 2. A firm starts its business with fixed expenses of Rs. 60,000 to produce commodity *X*. Its variable cost is Rs. 2 per unit. Prevailing market price of the product is Rs. 6. How much should the firm produce to earn profit of Rs. 20,000 at this price?

Solution:

In this case we have to determine target profit sales volume (*TPS*) by using the formula:

$$TPS = \frac{TFC - \text{Target Profit}}{\text{Contribution Margin}}$$

Contribution Margin = Price – *AVC*

$= 6 - 2 = \text{Rs. } 4$

$$\therefore \; TPS = \frac{60{,}000 - 20{,}000}{4} = \frac{40{,}000}{4} = 10{,}000$$

Answer: The firm should produce 10,000 units of *X* to earn targeted profit of Rs. 20,000 per unit of time.

A Hypothetical Case of Cost Volume Profit Analysis (CVPA)

Break-even Analysis (*BEA*) is essentially cost volume profit analysis (*CVPA*). It is an analytical technique for tracing relationships among key business variables such as costs, revenues and profits at different output levels. Needless to say that *BEA* chart is a basic *CVPA* chart. *CVPA* is useful for analysing a decision-making problem. Let us assume a hypothetical case of a publisher for publishing a textbook on Business Economics. Following particulars are available.

COST GROUP:		Amount
I.	Fixed costs:	(Rs.)
	Editing charges	10,000
	Artist: Design/Diagram charges	15,000
	Typesetting charges	25,000
	Total Fixed Costs (*TFC*)	50,000
II.	Variable cost items (per copy):	
	Paper costs	10
	Printing charges	20
	Binding costs	2
	Salesman commission	3
	Administrative overhead	10
	Wholesaler's discount	15
	Author's royalties	10
	Total Variable Cost (*AVC*):	70
	List Price (*P*):	85

Price contribution in this case is: $P - AVC = 85 - 70 = 15$

Break Even quantity is estimated as:

$QBE = TFC/(P - AVC) = 50{,}000/(85 - 70) = 3333$ copies.

The publisher should evaluate the size of the total market on the basis of number of students as potential buyers, other books in competition and other determinants.

If it is observed that the book cannot reach this break-even point within a reasonable time limit (say one year), the business decision should be made for cutting down the costs of production by reducing the number of diagrams, number of pages, author's royalties with convincing negotiations and so on. Suppose a 20% cut is effectuated, then:

$TFC = 40{,}000$, $AVC = 56$

Now price is also reduced to *Rs.* 80 to be more competitive. In this case:

$QBE = 40{,}000/(80 - 56) = 1667$ copies

If in one year the firm is expecting to sell at least 25000 copies and prints accordingly, its profit estimate is:

Profit = $TR - TC$

$TR = 2500 \times 80 = Rs.200{,}000$

$TC = TFC + TVC = 50000 + (56 \times 2500) = Rs.190{,}000$

Profit = $200{,}000 - 190{,}000 = 10{,}000$

Author in this case may get total royalty, assuming *Rs.* 8 per copy: 500 × 8 = Rs. 20,000

P : 3. A manufacturer buys certain components for producing *X* at Rs. 20 per unit. If he has to make these components it would require a fixed cost Rs. 15,000 and average variable cost Rs. 5. His present requirement is 1000 units of these components.

Advise him whether he should make or by them, if he intends to double the output.

Solution:

In this case, we need to measure the *BEP* of the components

Thus:

$$BEP = \frac{TFC}{P - AVC}$$

Here, for *P* we have to take the purchase price.

$$\therefore\ BEP = \frac{15{,}000}{20-2} = \frac{15{,}000}{15} = 100$$

Answer: At 1000 units requirement, it makes no difference whether the firm buys or makes the components. But, when requirement increases, it is profitable to make the components.

8. COST CONTROL

Profit maximisation is the major objective of a business firm. Even if profit is not maximised, in the long-run, the firm must be able to earn sustained profits.

Profit depends on the positive difference between the selling price and unit cost of output. When the price is determined by the market forces, the firm at a given price of the product can enjoy profits by minimising its cost of production. Cost control is thus essential for the cost minimisation.

Cost control implies a search for carrying the production in economic ways. It entails a programme of continuous improvement in cost standards. According to Prof. J. Batty, cost control refers to "the comparison of actual and standard costs and then taking action on any variations which have arisen."

A planned programme of cost reduction is essential for the effective cost control. It should be noted that cost control is not cost reduction. Cost control implies efforts to be made for achieving a target or goal or cost minimisation. Cost reduction means the actual achievement in reducing the cost. It is the real and permanent reduction in the unit costs of production achieved by reducing the expenditure and/or by raising the productivity. In cost reductions, standards are always challenged for further improvement. In cost control, however, standards are accepted as they are fixed and not challenged over a period of time. Thus, cost control, in practice, lacks dynamic approach.

For improving its profitability and competitiveness, however, the firm must resort to cost control.

It helps it in actual cost reduction and the lowering of price. In a high cost economy of India, therefore, cost control is very important for the industries.

In cost control activity, two important rules have great significance: *(i)* Keeping costs down is always easier than bringing them down and *(ii)* when business conditions are good, lesser efforts are involved in cost control than under bad business situation.

There should be a consortium approach, *i.e.,* all concerned, such as executives, foremen, supervisors and workers, should join hands to achieve a common goal of cost minimisation.

For controlling costs, it is not sufficient to have actual cost information. Though it relates to past performance, it does not show whether this performance was satisfactory or not. As such, the management has to lay down some cost standard norms for evaluation of the actual cost and measure its deviation from the norms. The planning and control function should be integrated with the estimated cost standards under given efficient working of the firm.

9. TECHNIQUES OF COST CONTROL

There are two methods of cost control, *viz., (i)* budgetary control, and *(ii)* standard costing,

Budgetary Control

The budgetary control relates to the cost of running different production departments in the factory or company. To control factory overhead costs, preparation of flexible budgets is of great use. Flexible or variable budgets serve as a basis for determining anticipated costs at various levels of production processes, *viz.,* selling and distribution costs, warehousing and transport costs, administration costs, accounts department's costs, labour and factory overhead costs, etc.

Similarly, capital expenditure budget is to be prepared covering a detailed planned expenditure on plant, machinery, tools, etc. Further, the company's cash budget must be prepared for the entire business organisation.

Finally, a master budget is to be prepared by aggregating departmental budgets. The master budget should reconcile the conflicts between the departmental budgets. The master budget should also incorporate a planned profit and cost account and the annual balance sheet.

When the period of budget commences, actual cost data should be collected and compared with the budgetary data for effecting cost control in a proper way.

Standard Costing

Standard costing is devised to form standards of performance for producing commodities. Standards serve as the norms or goals which are to be attained in actual cost performance. They also serve for evaluating the actual cost data and their deviation from the set norms. Statistical technique of variance is useful in this regard.

The major objective of setting standard costs is to induce cost consciousness in the firm's operation.

Standard costing implies estimate of what a product ought to cost reasonably, during a future period, under the efficient working of the firm.

Standard costing is formed by collecting all kinds of information like material costs, labour costs, overhead costs, selling costs, etc., from various sources.

After preparing the standard costs, actual cost data are collected on monthly basis and compared. Any deviation or variance of actual data from the standard costs may be attributed to factors like: *(i)* higher material prices; *(ii)* excess use of materials; *(iii)* low productivity of labour; *(iv)* higher wages; *(v)* less output than what is planned; *(vi)* high overhead charges; etc.

Standard costing can trace these causes and which department is responsible for high cost can be easily located.

10. AREAS OF COST CONTROL

In cost controlling efforts the following important areas may be carefully tackled:

- **Cost of materials.** For minimising the material cost buying should be done with proper care. A bulk purchase of materials at wholesale rates would imply a considerable savings in this regard.

  Use of materials can be economised and made more efficient through Research and Development (R&D).

  Through inventory controls, material costs may be reduced further. Packaging costs of materials should be minimised by reusing the containers, etc.

- **Labour costs.** Labour costs can be economised by improving the labour productivity through training, automation devices, etc. Through proper co-ordination in different job processes, wastage or labour-time can be minimised, which indirectly reduces the labour cost per unit of output. A sound HRM policy (to be a good employer) can be effective in causing better industrial harmony and workers' dedication. Early retirement offers, such as Voluntary Retirement Schemes (VRS) are also regarded as an effort of labour cost reduction approach in the corporate and public sector enterprises.

- **Overhead costs.** Overhead expenses of the firm can be minimised by proper maintenance of machinery, tools and equivalent, avoiding wastage of electricity, fuel, etc., proper checks costs can be saved by reduction of clerical and accounting work. Checking the misuse of telephones can save upon telephone bills. Saving in transport costs is possible by taking advantage of full-load of bigger vehicles or wagon loads. Outsourcing is the best method of cost minimisation in many areas of productive activity.

- **Selling costs.** Selling costs can be minimised by training of salesmen, proper supervision in the sales department, selecting cheaper or better media of effective advertisements, etc.

To Decision-making

- The break-even analysis is a guide post to firm's economic performance and expansion.
- Break-even point indicates zero profit position which is the start marching point towards profitability of the business venture.
- Break-even point is determined when total revenue equates total cost. At this point, Marginal cost = marginal revenue; however, the marginal cost is falling.

MODEL QUESTIONS

1. (a) What is break-even analysis?

   (b) What are the assumptions underlying break-even analysis?

   (c) What are the limitations of break-even analysis?
2. Explain and illustrate break-even chart. Point out the usefulness of break-even analysis.
3. (a) What is the difference between cost control and cost reduction?

   (b) What are the techniques of cost control?
4. Explain the concept of break-even point. What are its assumptions? Using hypothetical figures, determine break-even points in terms of physical units.
5. Discuss the importance of cost control in relation to profit planning with specific reference to the major areas of cost control and tools of such control.

Problems

1. Explain the term "Break-even Analysis" and discuss its usefulness. Calculate the break-even point from the following data:

   Sales : 550 units

   Sales Receipts: Rs. 28,875

   Total Fixed Costs : Rs. 16,000

   Total Variable Costs : Rs. 11,000
2. Explain the nature of break-even analysis. Given the following functions, find the break-even point:

   Total Cost = l00 + 5X

   Total Revenue = 10Y where X is the quantity sold.

[**Hints:** The reader should note that here 'X' is used, whereas in the text 'we have used 'Q' as the notation for the quantity.]

3. A firm purchases ball bearings at Rs. 12. Its monthly requirement is 1000 units. If it decides to make, its fixed cost would be Rs. 18,000 and variable cost Rs. 5 per unit. What is your advice?

4. The Sardar Manmohan Singh (SMS) Pvt. Ltd. has been manufacturing track suits for athletes. Currently its output is around 75% of its rated capacity of 20,000 units per year. Atal Exports Pvt. Ltd., has approved the sample and has offered to buy 5,000 units at a special price of Rs. 1,500 per suit, whereas the company's normal price is Rs. 2,100. The Company's cost function is analysed as under:

Per unit Costs	*Rs.*
— Labour	250
— Material	820
— Administration variable cost	130
— Fixed cost	400
	1,600

Decision Problems:

A. Should the SMS accept the offer?

B. As a consultant, what is your advice if the Atal Exporters offers to buy 10,000 units.

❒ ❒ ❒

Unit V

Market Analysis

13
CHAPTER

Market Analysis: Price Determination

1. MARKET ECONOMY

In a market economy pricing is basically conditioned by the market structure. There are many different market structures. Perfect competition is a very important type of market structure assumed by the classical and neo-classical economists as a theoretical model.

The market is a set of conditions in which buyers and sellers come in contact for the purpose of exchange. The market situations vary in their structure. Different market structures affect the behaviour of buyers and sellers (firms). Further, different prices and trade volumes are influenced by different market structures. Again, all kinds of markets are not equally efficient in the exploitation of resources and consumers' welfare also varies accordingly. Hence, the aspects of pricing process should be analysed in relation to the different types of market.

A market economy is the framework in which exchange is mediated through markets where prices play a decisive role through interaction of the forces of demand and supply.

Pure and Perfect Competition

A distinction is often made between pure competition and perfect competition. But this distinction is more a matter of degree and not of kind. For a market to be purely competitive, three fundamental conditions must prevail. These are: *(i)* a large number of buyers and sellers; *(ii)* a homogeneity of product, and *(iii)* the free entry or exit of firms. For the market to be perfectly competitive, four additional conditions must be fulfilled, *viz.*, *(a)* perfect knowledge of market, *(b)* perfect mobility of factors of production, *(c)* absolute government non-intervention, and *(d)* no transport cost difference.

Incidentally, the term 'perfect competition' is traditionally used by the British economists while discussing the price theory. American economists, however, prefer to construct a "pure competition" market model, realistically assuming that additional conditions for perfect competition, such as perfect mobility of labour, perfect knowledge, etc., may not be attainable.

Perfect competition, in fact, is just a concept, a suggestive norm or ideal for the market structure. Pure competition substantiates the norms of perfect competition without fully attaining it.

Perfect Competition in Practice

Perfect competition is an 'ideal concept' of market rather than an actual market reality. By and large, the perfect competition model fits into the market for farm products. For instance, in the markets for rice, wheat, cotton, jowar and other foodgrains, fruits, vegetables, eggs, milk, etc., there is a large number of buyers and sellers and for all practical purposes, the products are physically identical. But, outside of agriculture, perfect competition is a rare phenomenon. In fact, in present day economics, the competitive market is becoming less and less realistic even in agricultural products.

Imperfect Competition

Theoretically, perfect competition is the simplest market situation assumed by the economists. Modern economists like Mrs. Joan Robinson and Prof. Chamberlin have, however, challenged the very concept of perfect competition. They regard it as a totally unrealistic model, something imagined without any contact whatsoever with economic reality. All conditions of perfect competition do not exist simultaneously. So, in reality there is imperfect competition rather than perfect one.

In reality, competition is never perfect. So, there is imperfect competition when perfect form of competition among the sellers and the buyers fails to exist. This happens as the number of firms may be small or products may be differentiated by different sellers in actual practice. Similarly, there is no pure monopoly in reality.

Imperfect competition covers all other forms of market structures ranging from highly competitive to less competitive in nature. Traditionally, oligopoly and monopolistic competition are categorised as the most realistic forms of market structures under imperfect competition.

Theoretical Importance of the Perfect Competitive Market Model

Despite perfect competition being regarded as not a very realistic phenomenon, the beginning of economic analysis is usually made with the competitive market model for the following reasons:

- It is a simple and convenient form of market structure to understand.
- It is also a near abstraction of the market economy when capitalism ruled supreme.
- It provides us a clear insight into how a market economy works.
- It helps us to form a clear perception of the basic principles governing the functioning of the market economy.
- It serves as a first step in understanding the nature of more complex forms of market structures.

- It is regarded as an ideal form of market on normative grounds.
- In fact, perfect competition is honoured for its perfect efficiency and optimum allocation of resources. It leads to such rational price determination at which total demand supply are in the long run optimally adjusted.
- It provides a standard to judge the economic efficiency and welfare implication of less competitive types of markets.
- Competitive markets are not totally absent. Such markets are still found in some areas, *e.g.,* foodgrain markets in our country are highly competitive.

Perfect competition, though a limiting and much simplified model of market structure in theory, is a very useful concept for studying the laws of markets as well as for understanding the mechanics of business decision-making in practice.

2. PRICE DETERMINATION UNDER PERFECT COMPETITION

In a market, the exchange value of a product expressed in terms of money is called price. In a market economy, the equilibrium price is determined by the market forces.

Under perfect competition, there is a single ruling market price — the equilibrium price, determined by the interaction of forces of total demand (of all the buyers) and total supply (of all the sellers) in the market.

Thus, both the market or equilibrium price and the volume of production in a market under perfect competition are determined by the intersection of total demand and total supply. To elucidate the prices of intersection, let us consider hypothetical data on market demand for and market supply of wheat, as in Table 13.1.

Table 13.1: Market Demand and Supply Schedules for Wheat

Possible Price (Rs. per kg.)	*Total Demand (kg. per week)*	*Total Supply (kg. per week)*	*Pressure on Price*
20	1,000	10,000	Downward
19	3,000	8,000	Downward
18	4,000	6,000	Downward
17	5,000	5,000	Neutral
16	7,000	4,000	Upward
15	10,000	2,000	Upward

Comparing the market demand and supply position at alternative possible prices, we find that when the price is Rs. 20, supply of wheat is 10,000 kg., but demand for wheat is only 1,000 kg. Hence, 9,000 kg. of wheat supply remains unsold. This would bring a downward pressure on price, as the seller would compete and the force will push down the price. When the price falls to Rs. 19, demand rises to 3,000 kg., while the supply will contract to 8,000 kg. Still the supply is in excess of demand. Thus, the surplus of the supply causes a further downward pressure on price. Eventually, the price will tend to fall. This process continues till the price settles at Rs. 17 per kg. at which the same amount (5,000 kg.)

is demanded as well as supplied. This is termed as equilibrium price. Equilibrium price is the market clearing price. In this price, market demand tends to be equal to the maket supply.

If, however, we begin from a low price (Rs. 15 per kg.), we find that the demand (10,000 kg.) exceeds the supply (2,000 kg.). Thus, there is a shortage at Rs. 15 per kg. This causes an upward pressure on the price, so the price will tend to move up. When the price rises, the demand contracts and the supply expands. This process continues till the equilibrium price is reached, at which the demand becomes equal to the supply. At equilibrium price, there is neutral pressure of demand and supply forces as both are equal in quantity. In general, a pictorial depiction of price is determined at the intersection point of the demand curve and the supply curve.

In Figure 13.1, *PM* is the equilibrium price, at which *OM* is the quantity demanded as well as supplied. At point *P*, the demand curve intersects the supply curve. To understand the process of equilibrium, suppose the price is not at the equilibrium point. Now, if the price is higher than the equilibrium price, as OP_1, then at this price the supply is P_1b, while the demand is P_1a. Thus, there is a surplus amounting to *ab*. That is to say, more is offered for sale than what the people are willing to buy at the prevailing price. Hence, to clear the stock of unsold output, the competing sellers will be induced to reduce the price. Eventually, a downward movement and adjustment, as shown by the downward pointed arrows, will begin, which would lead to: *(i)* the contraction of supply, as the firms will be prompted to reduce their resources in the industry, and *(ii)* the expansion of demand, as the marginal buyers* and other potential buyers will be attracted to buy in the market and old buyers also may be induced to buy more at the falling price. Similarly, if the price is below the equilibrium level, the demand tends to exceed the supply.

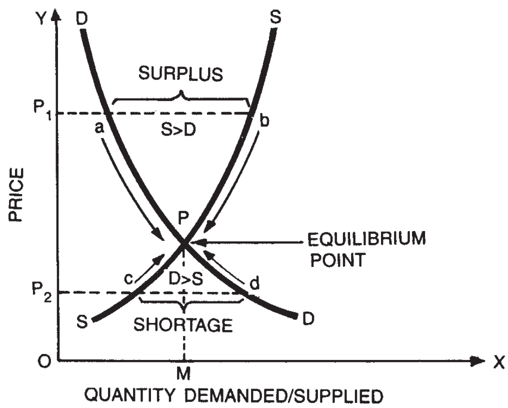


Fig. 13.1: Market Price Determination

At OP_2 price, for instance, the demand is P_2d, while the supply is P_2c. Thus, there is a shortfall of supply amounting to *cd*. That is to say, buyers want to purchase more than what is available in the market at the prevailing price. This induces the competing buyers to bid up the price. So, an upward push and adjustment will develop as shown by the arrows

* Marginal buyers are those who are on the margin of doubt and dilemma as to whether to buy this commodity at a given price or not, because marginal utility is estimated by them to be exactly equal to the price.

pointed upwards. Thus, the demand contracts as marginal buyers will be driven away from the market and some buyers will buy less than before. On the other hand, the supply expands as the existing firms will increase their output to which new firms will also add their output. Evidently, when the price is set at an equilibrium point at which the demand curve intersects the supply curve, shortages and surpluses, disappear, hence there is perfect adjustment between demand and supply under the given conditions. So long as demand and supply positions are unchanged, the ruling equilibrium price will prolong over a period of time.

3. SIGNIFICANCE OF TIME ELEMENT

The element of time occupies a pivotal place in the Marshallian theory of value. According to the traditional value theory, the forces of demand and supply determine the price. The position of supply is greatly influenced by the element of time taken into consideration. Here, time refers to the operational time period pertaining to economic action and force at work. Functionally, the supply of a commodity relates to this operational time involved regarding adaptation of firms in their production activity. Supply is thus adjusted in relation to the changing demand in view of the time span given for such adjustment.

According to Marshall, the time element may be distinguished by the following three time periods of varying durations, namely: *(i)* market period, *(ii)* short period, and *(iii)* long period. Price determination, in view of this time span, may be conceived as market period price, short period price and long period price.

Market Period Price

The market period is a very short period. During this period, it is practically impossible to alter output or increase stock. Thus, supply of the commodity tends to be perfectly inelastic. During the market period, potential supply (the stock) and actual supply tend to be identical. Thus, the market period or for brevity, the market price, is determined by the interaction of market period demand and supply as shown in Figure 13.2.

In panel (A) of Figure 13.2, the *SS* supply curve is a vertical straight-line, representing perfectly inelastic supply. *DD* is the demand curve.

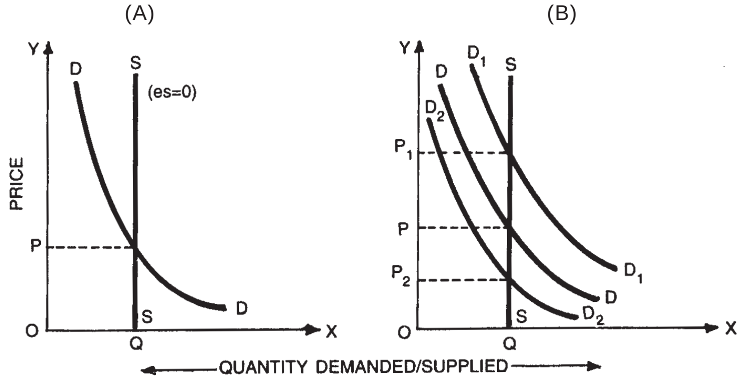


Fig. 13.2: Market Period Price

In Figure 13.2 (A), the intersection between demand curve (*DD*) and supply curve (*SS*) determines the equilibrium price *OP* at which demand is equal to supply (*OQ*).

Supply being fixed during the market period, the equilibrium price — the market period price — tends to be solely governed by the changes in demand condition. Evidently as demand increases, the market price rises correspondingly and when demand decreases, the price also decreases to that extent. The point is clarified in panel (B) of Figure 13.2. A shift in the demand curve from *DD* to D_1D_1 means an increase in demand, along with which the new equilibrium price rises from *OP to* OP_1. Similarly, if there is a decrease in demand as presented by the curve D_2 D_2, the new price is also set at OP_2 level.

Short Period Price

The short period is that functional time period during which the size of the firm and the scale of production remain unchanged. Hence, during the short period, the stock of a given commodity can be increased only to a limited extent. As such the supply curves of the existing firms will tend to be relatively inelastic. Therefore, the supply curve of industry or the market will also be relatively inelastic.

The short period price is determined by interaction of the forces of short-run demand and supply. In graphical terms, the short period equilibrium price is determined at the point of intersection between the short-run demand curve and short-run supply curve as shown in Fig. 13.3.

In Figure 13.3, *SS* is the short-run market demand curve which has a steeper slope, indicating relatively inelastic supply ($es < 1$). *DD* is the short-run market demand curve. *OP* is the equilibrium price, at which *OQ* is the quantity demanded as well as supplied.

Indeed, in short-run price determination also, demand forces tend to have greater impact as compared to the supply force. Thus, when the short-run demand increases, there is some variation in supply in the process of adjustment, but adjustment tends to be imperfect and much less than the market requirement. Short period price is also referred to as sub-normal price.

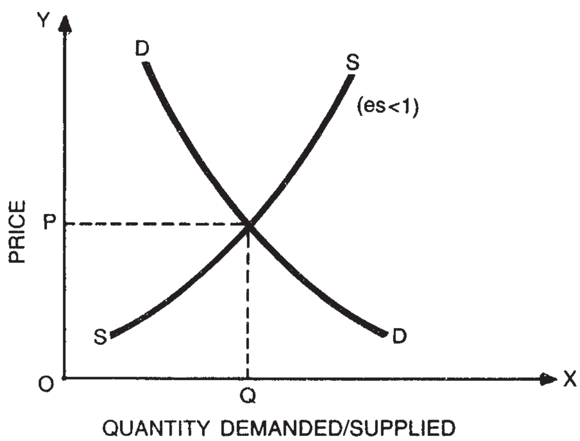


Fig. 13.3: Market Period Price

Long Period Price

Long period is the sufficient functional time period during which the firm can change its size and the scale of production. Thus, in the long-run, therefore, the supply curve of an industry tends to become relatively elastic.

Consequently, interaction between long-run supply and demand determines the long-period equilibrium price. Graphically, the long run price is determined at the point of intersection between the long-run demand and supply curves, as shown in Fig. 13.4.

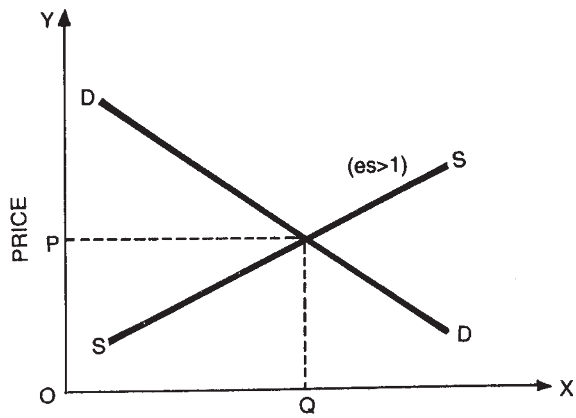


Fig. 13.4: Long Period Price

In Figure 13.4, *SS* is the long-run supply curve which is a flatter curve, indicating relatively elastic supply (*es* > 1). *DD* is the long run demand curve which is also more elastic. *OP* is the equilibrium price at which *OQ* is demand as well as supply.

In the long-run, as compared to the demand force, the supply force becomes a dominant factor in determining the equilibrium price. The long-run price is also described as normal price.

Concluding Remarks

The Marshallian time analysis suggests that the degree of elasticity of supply tends to vary in relation to time. The supply tends to be relatively inelastic in the short-run and relatively elastic in the long-run. Again, in the short period, the utility of the commodity concerned has greater significance in the determination of its value (*i.e.,* value in exchange or price). In the long-run, the supply factor bears greater influence upon the equilibrium price determination. The supply factor is based on the cost element. Thus, in the long-run, cost consideration has greater significance in the determination of value. In fine, we may quote Marshall: "Actual value at any time, the market value as it is often called, is often influenced by passing events and causes whose action is fitful and short-lived than by those which work persistently. But in long periods, these fitful and irregular causes, in a large measure, efface one another's influence so that in the long-run, persistent causes dominate values completely."

4. MARKET PRICE AND NORMAL PRICE

A distinction is often made between market price and normal price. The following points may be enumerated in this regard:

Market price, in its strict sense, refers to the market period price. It is the equilibrium price determined by the interaction of day-to-day demand and supply. Normal price, on the other hand, refers to the long period price. It is the equilibrium price determined by the forces of long run demand and supply.

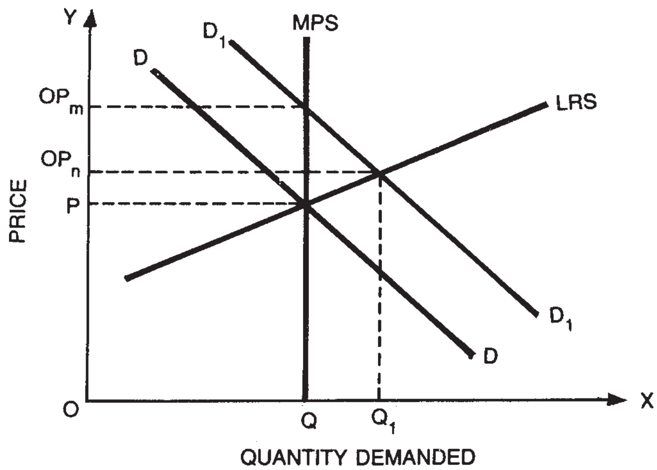


Fig. 13.5: Market Price and Normal Price

In Figure 13.5, the curve *MPS* refers to the market period supply. The market period price *OP* is determined corresponding to *DD* demand curve. When demand curve shifts to D_1D_1, supply is adjusted (up to OQ_1) in the long-run, so the normal price is determined as OP_n corresponding to the intersection point between the *LRS* curve and the D_1D_1 curve.

- In the case of market price, the supply tends to be fixed and perfectly inelastic. Thus, the demand factor has a greater influence in effecting a change in the equilibrium market price. While in the case of normal price, the supply tends to be fairly elastic, so it has relatively a greater impact in setting an equilibrium price.
- Market price is a fluctuating phenomenon. It represents unstable equilibrium positions of demand and supply. Normal price, on the other hand, is a stable phenomenon. It represents stable equilibrium conditions of demand and supply. In short, market price is a temporary equilibrium price, while the long-run or normal price is a permanent equilibrium price under a given situation.
- Market price is affected by changes in the short-run force of demand determinants. Normal price is affected by long-run dynamic forces of demand and supply determinants such as population growth, technological advancement, territorial expansion, innovation, changes in habits and preferences of consumers, pace of economic development, etc.

- Though the market price is continually fluctuating, it is related to the normal price. It tends to oscillate around the normal price and tends to be equal to it but momentarily. The relationship between market normal price may be described diagrammatically as in Fig. 13.6.

It may be seen that, from time to time, the market price tends to oscillate it, moves up and down around the normal price. That is, sometimes, it is higher than the normal price, at other times, it may be lower than the normal price.

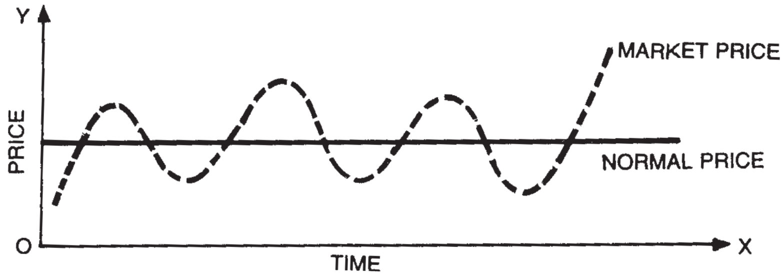


Fig. 13.6: Market Price and Normal Price Relationship

It must be noted that market price and normal price are eventually determined by the respective forces of demand and supply in the related periods — the market period (very short period) and the long period. One should never think of the normal price as an average of the market prices taken over a period of time.

Though the market price and the normal price are closely related, they have no statistical relationship; their relationship is functional, based on the time element. Market price represents the very short period equality between demand and supply. Normal price represents long run equality between demand and supply. However, market price is a reality, whereas the normal price is a myth. This is because the actual action and market behaviour of sellers and buyers are always seen in the very short period in the day-to-day transactions, whereas the long period is just an analytical concept.

Long run may be imagined but cannot be experienced in real life, whereas very short period is always actually being lived and experienced.

The laws of equilibrium economics do not rule the real business world. Usually, trading is taking place at disequilibria prices.

5. CHANGES IN EQUILIBRIUM PRICE

An equilibrium price is one at which demand and supply tend to be equal to each other. It thus follows that any change in the demand condition or the supply condition or a simultaneous change in the conditions of both demand and supply would imply a corresponding change in the equilibrium price.

Changes in demand may take place due to changes in the determinants of demand such as population, fashion, income of consumers, tastes, habits and preferences of consumers, price of substitutes, introduction of new goods, taxation level, etc. Similarly, changes in supply may be effected on account of changes in factor prices and cost conditions, technique of production, innovation, fiscal policy of the government, weather conditions in the case of agricultural and agro-based products, etc.

We may examine the various possible cases of changes in demand and supply and the equilibrium price as follows:

1. Assuming supply to be fixed, demand increases or decreases.
2. Assuming demand to be fixed, supply increases or decreases.
3. Supply and demand both increase or decrease in the same proportion.
4. Supply and demand both increase, but supply increases in a greater proportion than demand.
5. Supply and demand both increase, but demand increases in a greater proportion than supply.
6. Supply and demand both decrease, but supply decreases in a greater proportion than demand.
7. Supply and demand both decrease, but demand decreases in a greater proportion than supply.
8. Supply increases while demand decreases.
9. Supply decreases while demand increases.

Case 1: Supply being constant, when demand increases, the equilibrium price in a competitive market tends to rise. Similarly, a decrease in demand implies a fall in price. The graphical illustration in Figure 13.7 makes the point clear.

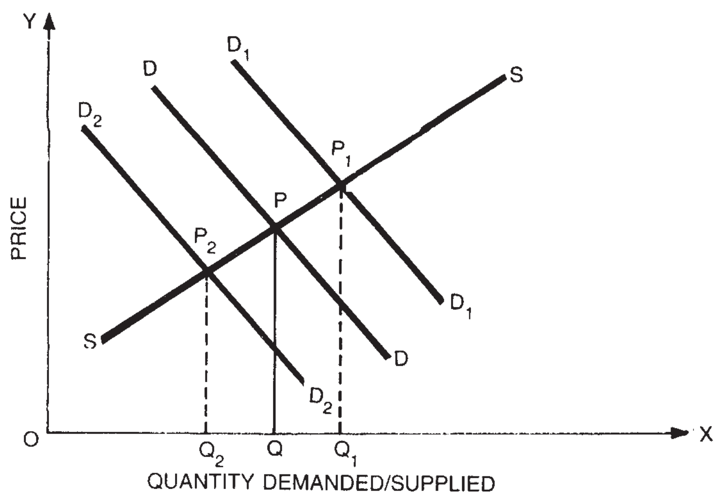


Fig. 13.7: Changes in Demand and Price

In Figure 13.7, the original equilibrium price is *PQ* corresponding to the original demand curve *DD* and the supply curve *SS*. When demand curve shifts to D_1D_1, representing an increase in demand, the equilibrium price rises to $P_1\ Q_1$, at which more quantity of (OQ_1) is demanded and supplied. Similarly, when the demand curve shifts to D_2D_2, representing a decrease in supply, the new equilibrium price is set at $P_2\ Q_2$ which is lower than the original price.

Case 2: Demand being constant, when supply increases, the equilibrium price tends to fall. When supply decreases, the price tends to rise. This is illustrated in Fig. 13.8.

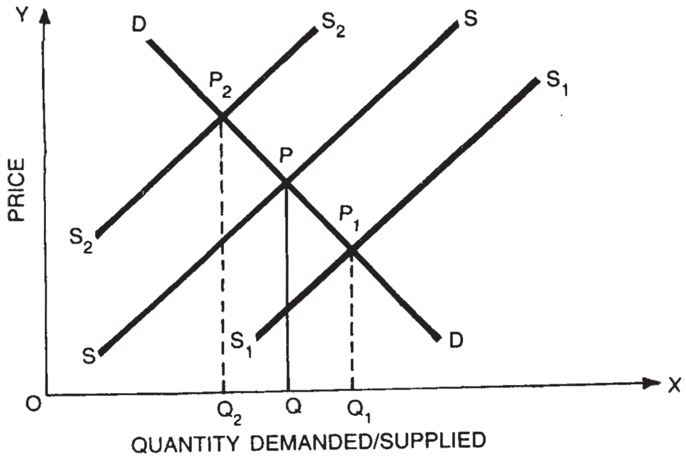


Fig. 13.8: Changes in Supply and the Price

In Figure 13.8, original price is PQ. When the supply curve shifts to S_1S_1, depicting an increase in supply, the price falls to P_1Q_1. Similarly, when the supply curve shifts to S_2S_2, representing a decrease in supply, the price rises to P_2Q_2.

Case 3: When supply and demand increase or decrease in the same proportion, the equilibrium price remains unchanged. This is illustrated in Figure 13.9.

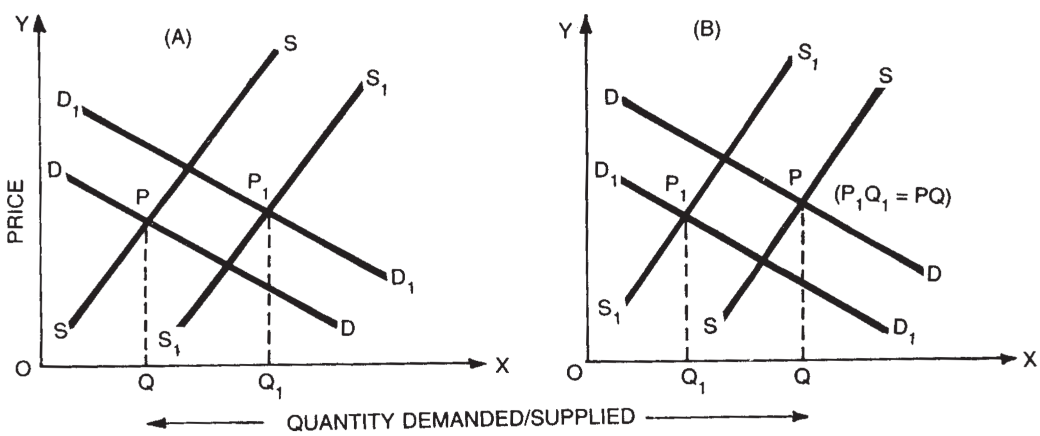


Fig. 13.9: Proportionate Change in the Demand and Supply

In Panel (A) of Figure 13.9, the original price is *PQ* but as demand and supply curves shift to D_1 D_1 and S_1S_1 representing an increase in equal proportion the new equilibrium price is P_1Q_1 which is of the same height as the original price *PQ*. It means at the same price more is bought and sold. Similarly, when demand and supply decrease in equal proportion, less is bought and sold at the original price level as shown in panel (B) in Figure 13.9.

Case 4: When supply increases in a greater proportion than the increase in demand, the equilibrium price tends to fall. In Figure 13.10 the original price is *PQ*. The new equilibrium price is P_1Q_1 which is lesser than the original price *PQ* but more amount (OQ_1) is bought and sold at this lower price.

Case 5: When demand increase in a greater proportion than the increase in supply, the equilibrium price rises as shown in Figure 13.11.

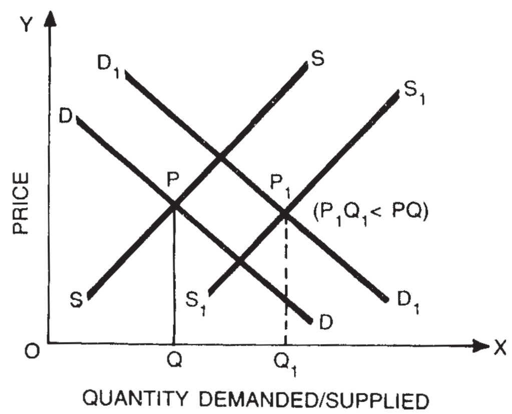


Fig. 13.10: Supply Increase exceeding the Demand Increase

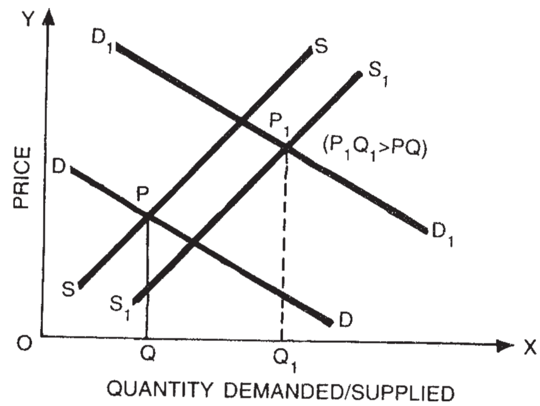


Fig. 13.11: Demand Increase exceeding the Supply Increase

The new equilibrium price tends to be P_1Q_1 as a result of shifts in the supply and demand curves.

Case 6: When supply decreases in greater proportion than the decrease in demand, the new equilibrium price tends to rise. In Figure 13.12, the new equilibrium price P_1 Q_1 is greater than the original price *PQ*.

Case 7: When demand decreases in a greater proportion than supply, the equilibrium price falls In Figure 13.13, the new equilibrium price is P_1Q_1 at which less amount is demanded as well as supplied than before. Indeed P_1Q_1 < *PQ*.

Case 8: When supply increases, while demand decreases, the market price or equilibrium price decreases to a greater extent.

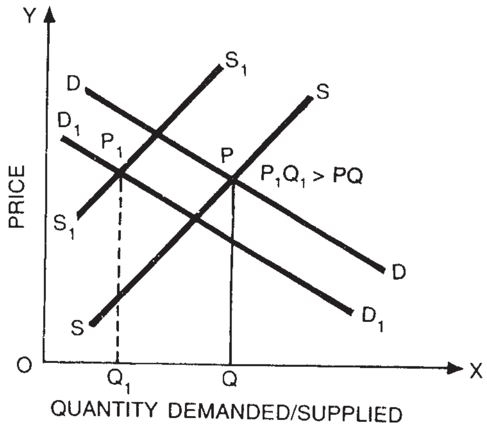


Fig. 13.12: Supply Decrease exceeding the Demand Decreases

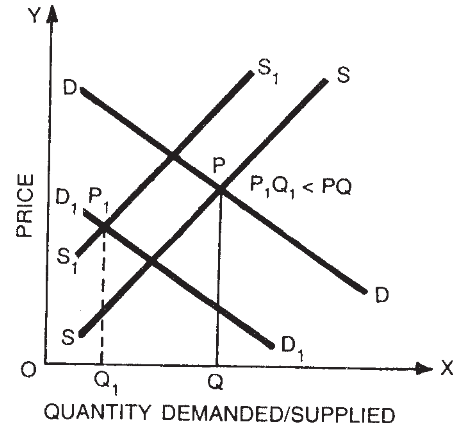


Fig. 13.13: Demand Decrease exceeding the Supply Increase

A Case Study: Price Ceiling

In a free market economy, market prices tend more toward equilibrium positions, such that market supply tends to be equal to the market demand. Often in case of certain essential goods in short supply, e.g., gasoline, oil, sugar, cement, even public transport and so on often people tend to feel that the market price is unduly high. A democratic government may relent to this public opinion and impose a legal price ceiling for the product.

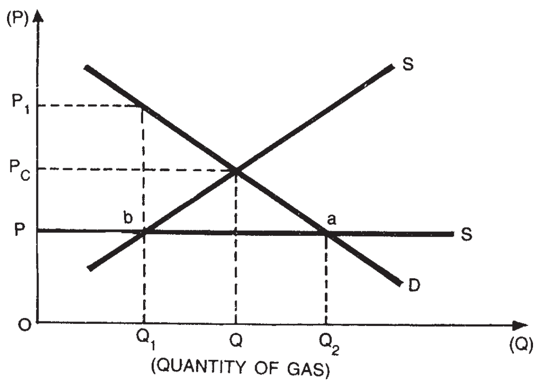


Fig. 13.14: Effect of Price Ceiling

When the price ceiling is imposed by the government buying or selling of that product for more than this price is regarded as illegal and punishable offence.

What happens to the course of market behaviour under price ceiling? The situation can be explained the help of the Figure 13.14.

Figure 13.14, say refers to a product such as gas. In this case the equilibrium price *P* is the result of interaction between demand (*D*) and supply (*S*) curves. *Q* is the equilibrium quantity of demand and supply in the market at this price *P*.

Suppose, assuming P to be unduly high, the government prescribes a ceiling price P–. At this price allowing market forces to operate, demand tends to be at point a, i.e., rising up to Q_2. On the other hand, the supply tends to contract at point b, i.e., falling up to Q_1. This results into a wider gap between demand and supply, causing frustration among the buyers that everybody will not be able to get the product since it is sold on the basis of first come first serve till the stock lasts. This may induce long queues and waits — causing waste of human energy and time — implying non-price cost. This may also lead to favouritism and black marketing. The dealers may supply to their friends and relations without waiting in queues or to the others who are ready to pay a premium price.

A cut in price creates a disincentive effect on the supplier of gas. It leads to reduction in production. This implies wastage of resources under the resulting less utilised or excess capacity. A classic example of this situation was noticed in case of price-controlled gasoline in the United States in 1979. The economists at the U.S. Department of Energy estimated the non-price cost of obtaining gasoline in terms of lost time to be around the $200 million per month during the 1979 gas shortage (*Roanoke Times and World News*, July 5, 1979). Disguised price increase of blackmarketing is a common feature of price control observed in many cases in Indian economy from time to time.

What is the solution to such problem? The solution lies in long-term policy of encouraging the increases in output and supply of such scarce products rather than resorting to price control. In short-term, the government should adopt a process of supply management in the economy by means of additional imports to the domestic supply to maintain the stable equilibrium price when there is a temporary increase in demand.

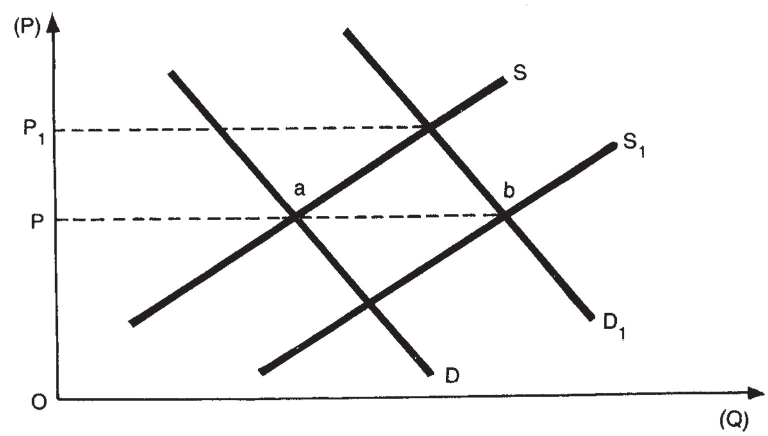


Fig. 13.15: The Impact of Supply Management

In Figure 13.15, P is equilibrium price corresponding to D and S curves. When demand during festive season increases the demand curve shifts to D_1. In the normal course, the price would rise to P_1. But, if the government manages to increase the market supply to S_1 by means of imports of the product, the new equilibrium interaction point b between demand (D_1) and supply (S_1) curves establishes equilibrium market price P — that was at the original level.

MODEL QUESTIONS

1. Discuss competitive equilibrium price with reference to time element.
2. Discuss the efforts of changes in demand and supply on equilibrium market price.

3. Distinguish between market price and normal price.
4. Explain the case of price-controlled gasoline in the American economy in 1979.
5. Explain the effect of government intervention in market price behaviour.
6. What is the solution to avoid black marketing of essential goods in short supply?
7. Residential Flats' prices in Mumbai are determined by the market forces. Giving reasons, trace the probable effect on the flat prices of the following:
   (a) When banks decrease interest charges in the housing loans.
   (b) Cement prices and other building material costs rise.
   (c) Recession in the economy
8. Explain, using diagrams, the probable effect on equilibrium price and quantity in the market for Cocoa beans, under the following situation:
   (a) A drought in the cocoa-producing regions.
   (b) An increase in effective advertising expenditure undertaken by the Cadbury.

Problem

1. In recent years, Bangalore is characterised as the Sillicon Valley of India. In the last few years, the commercial and residential real estate markets in Bangalore reached record high price levels. Are these markets related? Explain.

   [*Hints:* Marshallian cross and show demand shifts]

Project Work

Collect data on share prices index and trading in Bombay Stock Exchange. [Refer to current issues of The Economic Times]

❒ ❒ ❒

Unit VI

Pricing Decisions

Price and Output Decision Under Perfect Competition

14
CHAPTER

1. INTRODUCTION

Perfect competition meaning an extremely high degree of competition is an ideal market structure model in economic theory. Though basically, it is an abstract idea which is not subject to empirical verification, a perfectly competitive market model to an economist is like frictionless model to a physicist.

Under perfectly competitive market model, firm refers to an individual/single business unit, and industry means collective set of all the business units/firms producing identical goods.

The Motive of a Competitive Firm

It is assumed that the business motive of all the firms under perfect competition is profit maximisation. Each firm seeks to maximise its profits and no other goals are pursued.

Under these assumptions, we shall proceed to analyse the equilibrium of the firm and the industry in the short run and in the long run in a perfectly competitive market.

A firm under perfect competition is a price-taker. It accepts the prevailing market price and divide only about the quantum of output that maximises its profit.

2. SHORT-RUN EQUILIBRIUM OF THE COMPETITIVE FIRM

In the present analysis, the term 'competitive firm' is used to mean that the firm is operating under conditions of perfect competition. In a perfectly competitive market:

- There is a sufficiently large number of firms producing and selling the product. Thus, no individual firm alone can influence the market price.

- There is a large number of buyers so that no single buyer can affect the market.
- The products of all firms are homogeneous (identical).
- There is free entry or exit of firms in the industry.
- Both the sellers and buyers have perfect knowledge, *i.e.*, full informations about the market conditions and the prevailing prices. This means there is no ignorance that distorts competition.
- There is perfect mobility of factors of production.
- There is no government intervention. The market forces are allowed to operate freely.

Under this situation of a competitive market, only a single market price is ruling for the product. The competitive firm is, thus, a price-taker. It has a perfectly elastic demand for its product, so it can sell whatever is produced at a given price.

Since the firm has to accept the market determined price for the product, it can decide only about the quantity of the product.

The firm decides only about the equilibrium level of output. Under the sole objective of profit maximisation, thus, the firm will produce that level of output which maximises its profits.

The behavioural rule of profit maximisation is to equate marginal revenue with marginal cost.

Profit is maximised when $MC = MR$. Obviously, then, how much a competitive firm will produce in the short period depends on its short run marginal cost and the prevailing market price (since, under perfect competition, Price $= MR$ in the short-run).

Short-run is a functional or operational time period during which the firm cannot change its size, as certain fixed factors and the plant cannot be altered. So, the firm produces more only with the help of variable inputs along with the given fixed factor inputs.

To determine the equilibrium level of output at a given price in the short-run, the firm compares its short-run marginal cost *(SMC)* with the short run marginal revenue *(SMR)* of the product.

The short run marginal revenue (*SMR*) of the firm depends on the price of the product. The competitive price is a market determined phenomenon. The short-run equilibrium price is determined in the market by the intersection of the short period demand and short period supply curves, as shown in Fig. 14.1.

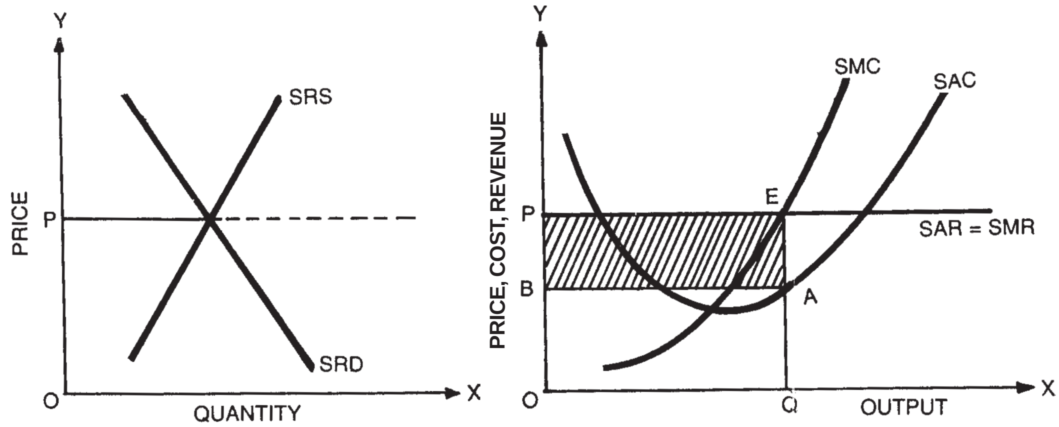


Fig. 14.1: Short-run Profit Maximisation

In the short run, the competitive firm maximises its profits by choosing an output *(OQ)* at which its *SMC* = *SMR*. *PEAB* measures the profits.

At this short-run price, the firm obtains its revenue functions from the demand curve for its products. From the firm's point of view, the demand for the product is perfectly elastic. Thus, at the short period market price, *OP* in our illustration (Fig. 14.1), the demand curve *SRD* is a horizontal straight-line, corresponding to which the short-run average revenue *(SAR)* and the short-run marginal revenue *(SMR)* are depicted.

Along with this, the short-run average cost *(SAC)* and short-run marginal cost *(SMC)* are drawn for comparison. The equilibrium point is determined by the intersection of the *SMC* curve from below, so that *SMC* = *SMR*.

In Figure 14.1, *E* is the equilibrium point, at which the *SMC* curve intersects the *SMR* curve from below.

Consequently, *OQ* is the equilibrium level of output determined by the firm in the short-run. Since areas under the respective average revenue and cost curve measure total revenue and total costs, the differences between the two show profit. The shaded area *PEAB* represents the maximised profits.

Further Analysis of the Short-run Equilibrium of the Firm

When the firm attains a short-run equilibrium position, it does not necessarily imply that it makes excess or supernormal profits (as shown in Fig. 14.2). Its profitability position depends on the conditions of average revenue (*i.e.*, the price) and the level of the average cost functions in the short-run equilibrium. Thus,

1. When Price (or *AR*) > *AC*, there is excess profit.
2. When *AR* = *AC*, only normal profit is yielded.
3. When *AR* (or Price) < *AC*, losses occur.

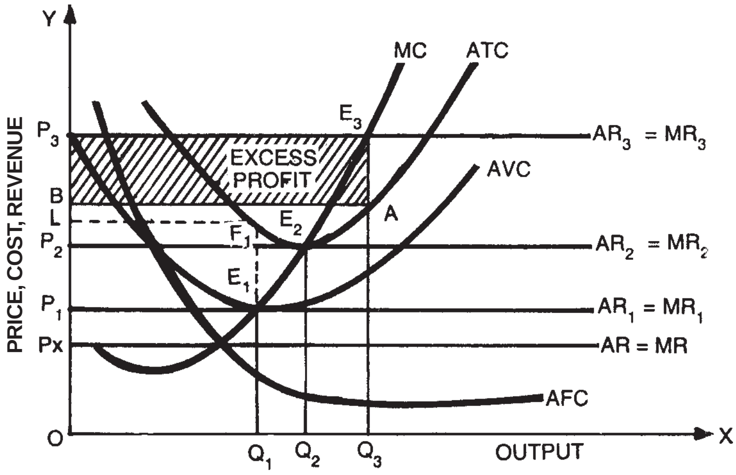


Fig 14.2: Short-run Unstable Equilibria of a Competitive Firm

When price is P_1, equilibrium position E_1, $P_1 = AVC$, thus, loss is $P_1\ E_1F_1L_1$. Price P_2 and corresponding equilibrium E_2 implies only normal profit, because $P_2 = ATC$. Price $P_3 > ATC$, suggests excess profit $P_3\ E_3\ AB$.

Again, the short-run equilibrium price is also not stable. With the changing conditions of demand and supply in the short-run, the short period market price varies. The firm has to adjust its output level in relation to the changing prices.

These points become explicitly clear when the process of equilibrium of a competitive firm is analysed graphically (or diagrammatically). For doing so, the individual firm's demand curve (or the average revenue curve) is to be set against its short-run cost curve as in Figure 14.2.

In Fig. 14.2, prices P_1, P_2, P_3, etc., are alternatively market determined short-run industry prices in different short-run demand and supply situations. The firm accepts them alternatively to determine the equilibrium output. With the corresponding revenue functions, such, $AR_1 = MR_1$, $AR_1 = MR_2$, etc., the short-run per unit cost functions: *MC, ATC, AVC,* are compared.

It may be recalled that a competitive firm will have a set of four per unit cost curves in the short-run, *viz., AFC, AVC, ATC* and *MC* curves.* The firm under perfect competition has a perfectly elastic demand for its product, hence its demand or the average revenue curve is a horizontal straight-line at a given price. All these curves are set in one diagram (Fig. 14.2). It must be noted that the *MC* curve in the figure has the shape of an "umbrella handle." This is because only the rising path of *MC* curve is important in deciding the equilibrium point, hence, the falling path of the curve has been eliminated. Similarly, the *AFC* curve is quite often eliminated from the equilibrium diagram, because it has no significant role to play in the equilibrium process in the short run. Because fixed costs do not vary with output, the firm in the short-run will not be very anxious to recover them immediately. This is not also

* This time we have chosen not to use prefix *S* to denote short run to the notations of the respective cost curves.

possible in the initial stage, as plant installation costs (fixed costs) are generally very high. The firm's short-run output is, thus, influenced solely be variable costs. The firm has to recover its variable costs or the current business expenses for its survival. Further the *MC* curve intersects at the lowest point of the *AVC* and *ATC* curves.

From the diagram, the following analytical points become explicit:

- **Loss.** If the market price of the commodity is less than the short-run average total costs at all possible output levels, there will be losses rather than profits to the firm. In our illustration (Fig. 14.2), when the market price is OP_1, the firm with the given cost condition would be at equilibrium at point *E,* and will produce OQ_1 level of output. At this level, though $MR = MC$, the firm does not get any profit. On the contrary, it incurs some losses as price (or *AR)* = *AVC* only. But its *AC* (or *ATC*) curve lies above its *AR* curve. Hence, the firm is not able to cover its full costs by the price at which it sells its output. At point E_1 the equilibrium condition $MR = MC$ is satisfied but the firm's total revenue is $OP_1E_1Q_1$ (the area underlying the firm's demand curve) at price OP_1. It is just equal to the firm's total variable costs (which is also $OP_1E_1M_1$, the area underlying the *AVC* curve). For, at point E_1, price $OP_1 = AR_1 = AVC$. Apparently, the firm's total fixed costs of producing OQ_1 level of output remain uncovered. This is the maximum net loss to the firm as it cannot recover some part of its fixed costs at the given price (of course, with the given cost condition). The firm will be ready to suffer this loss and continue in business in the hope that business conditions (the market price) may improve at some future date. Thus, so long as the firm is able to recover its current business expenses, technically termed "variable costs", in the short-run, it will continue to be in the industry.
- **Normal Profit.** When the price is equal to average total costs in the short-run, the firm gets only normal profits. In our illustration when the price is OP_2, the firm is in equilibrium at point E_2 at which $MR = MC$. At this point, Price = $AR = AC$. Thus, the firm's total revenue of producing OQ_2 level of output is equal to its total cost since the *AC* curve is tangent to *AR* curve at point E_2, the underlying area $OP_2\,E_2\,Q_2$ is common for both. At this price, the firm produces that level of output which gives him the total revenue which just equals its total costs; hence, the firm yields only normal profit. The demand curve *(AR)* is tangent to the *AC* curve. Therefore, $TR = TC$. This is called the "break-even point." At this point, the firm is not able to maximise its real business profit, but it only gets a maximum normal profit, which is just sufficient for the firm to be in business.
- **Excess Profit.** When the short-run market price is above the short-run average total costs, the firm makes excess (or supernormal) profits. In our illustration, when the price is OP_3, the equilibrium point is E_3 for the firm and the firm produces OQ_3 level of output. At this point, $MR = MC$, but $AR > AC$, therefore, the firm gets excess profit (profit which is in excess of normal profit). In the diagram, the total revenue is $OP_3\,E_3\,Q_3$ for producing OQ_3 output, and its total costs is $OQ_3\,BA$. The difference between the two is represented by the shaded area which denotes excess profit.

Shut-down Point

If the market price for the product is below minimum average variable costs, such as OP_x in our illustration, the firm will cease to produce, if this appears to be not just a temporary phenomenon. When the price is less than the average variable cost, it will neither cover fixed costs nor a part of the variable costs. Then the firm can minimise losses up to total fixed costs only by not producing. It is therefore, regarded as the shut down point.

Shut-Down Point Estimation

$$\text{Shut-Down Point (SDP)} = \frac{\text{Avoidable Fixed Cost}}{\text{Per Unit Contribution}}$$

Avoidable Fixed Cost = Total Fixed Cost – [Unavoidable Fixed cost + Additional cost of shut down]
Per Unit Contribution = Price – Average Variable Cost
Example,

A manufacturer of product *X* when produces 1,00,000 units under its normal capacity of the plant in a year detects the following particulars:

(a) Raw material costs : Rs. 11.50 per unit

(b) Variable overheads costs: Rs. 3.50 per unit

(c) Labour costs: Rs. 5.00 per unit

(d) Fixed overheads costs: Rs. 10.00 per unit

(e) Variable marketing/Selling costs: Re. 1 per unit

In the next three months, the firm can produce only 16,000 units and sell at the prevailing market price Rs. 30 per unit.

It is observed that if this plant is shut-down the fixed manufacturing costs can be reduced to Rs. 60,000 for the quarter. However, additional cost of plant shut down estimated to be Rs. 10,000.

Estimate the shut down point and give managerial decision as to whether the plant should be shut down for three months.

Solution:

- Average Variable Cost (*AVC*)

  Rs. 11.50 + Rs. 3.50 + Rs. 5.00 + Rs. 1.00 = Rs. 21
- Per Unit Contribution = Rs. 70 (Price) – Rs. 21 (AVC) = Rs. 9
- Total contribution on 15,000 units:

  15,000 × Rs. 9 = Rs. 1,35,000
- Total fixed cost for 3 months

  100,000 × Rs. 10 = 3/12 = Rs. 2,50,000
- Avoidable fixed cost for the period (3 months in this case)

  [Total Fixed Cost Rs. 2,50,000] – [Unavoidable fixed cost (Rs. 60,000) + Additional cost shut down (Rs. 10,000)] = Rs. 1,80,000

- Estimation of SDP:

$$\text{Shut Down Point} = \frac{\text{Avoidable Fixed Cost}}{\text{Per Unit Contributi on}}$$

$$\frac{1,80,000}{9} = 20,000 \text{ units.}$$

- Estimation of Loss in operation:

Total Fixed costs for 3 months: Rs. 2,50,000

Less: Total contribution on 15,000 units (x Rs. 9): Rs. 35,000

∴ Loss expected: Rs. 1,15,000

- Estimation of shut down loss:

Unavoidable Fixed Cost: Rs. 60,000

Plus: Additional cost of shut down:Rs. 10,000

Total Loss on shut down: Rs. 70,000

Ans: In this case, the shut down point is 20,000 units. When the plant continues in operation, under the prevailing situation, the expected loss amounts to Rs. 1,15,000 which is far in excess of total loss on shut down estimated to be Rs. 70,000. It is, therefore, advisable that the managerial decision should be in favour of shut down of the plant for 3 months. Under this decision, the management minimises its loss from Rs. 1,15,000 (in operation) to Rs. 70,000 (when there is shut down).

It follows that in the short period, a competitive firm can be in equilibrium at various point E_1, E_2, E_3, etc., depending on the industry or market price and the costs condition of the firm. These are temporary equilibrium points. Thus, in the short run, the firm has unstable equilibrium, because the subnormal price is also unstable. At these various unstable equilibrium points, though $MR = MC$, the firm gets excess profits at some point, normal profit at some other, or even incurs losses at some others.

To summarise the analysis:

1. The firm in the short-run has temporary equilibrium.
2. The firm is at equilibrium in the short run, when the short run marginal cost is equal to the marginal revenue at the given short run equilibrium price.
3. The firm gets maximum normal profits when the price is equal to the firm's average total costs.
4. The firm yields maximum excess profits when the market price is higher than the firm's average total costs.
5. A maximum loss is incurred by the firm when the price is just equal to the average variable costs. The loss is equal to the total fixed cost. The loss is minimised when the price is less than the average total costs but above the average variable cost.
6. If the price is very low, being less than the average variable costs, the firm stops production altogether.

3. THE NATURE OF EQUILIBRIUM UNDER COST DIFFERENCES BETWEEN FIRMS

In the above analysis of equilibrium of the firm, we have assumed that all the firms in the industry have identical costs condition. This is possible under two assumptions: *(i)* there is perfect competition in the factor market so that there are identical factor prices, and *(ii)* all factors (including entrepreneurs) are homogeneous, *i.e.*, all units of all factors are equally alike to all the firms.

Under these assumptions, one firm represents the cost for all firms in the industry. But, if we relax the second condition of homogeneity, there are costs differences, so the nature of the equilibrium will vary from firm to firm.

In relaxing the homogeneity condition of factors, we may consider two possibilities:

All Factors Except Entrepreneurs are Homogeneous

That is, entrepreneurial skill is assumed to vary from firm to firm. As such, the cost conditions of different firms tend to differ on account of the difference in organisational skills. A firm controlled by the most efficient entrepreneur will be producing at lower costs of production due to better productivity under good organisation than the firm which is controlled by a relatively inefficient entrepreneur. Evidently, per unit cost curves of the firms managed by efficient entrepreneurs will be at a lower level, while those of the firms run by inefficient entrepreneurs will be at a higher level. The degree of differences in the costs conditions will depend on the differences on the entrepreneur skills.

The nature of the short run equilibrium in this sort of situation can be expressed as in Figure 14.3.

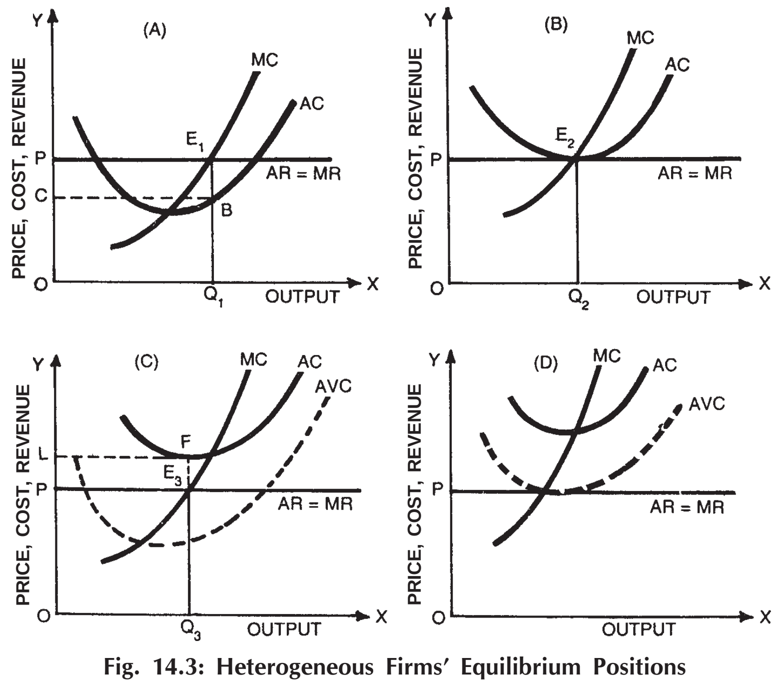


Fig. 14.3: Heterogeneous Firms' Equilibrium Positions

Firm *A* earns excess profit. Firm *B* earns normal profit. Firm C incurs bearable loss PE_3FL, since the price covers variable cost plus a part of its fixed cost. Firm *D* finds loss unbearable as it fails to recover even running expenses (variable costs) of the business.

Figure 14.3 represents cases of four types of firms. Firm *A* is assumed to be organised by the most efficient entrepreneur. During the short period, at *OP* market price, this firm attains equilibrium by producing OQ_1 level of output. Because of costs of lower level, it earns PE_1BC amount of supernormal profit. Firm *B* is assumed to be controlled by the entrepreneur who is relatively less efficient than that of firm *A*. At the same *OP* market price, thus, the firm *B* produces OQ_2 equilibrium level of output. At equilibrium point E_2 the firm's $MC = MR = AR = AC$. It, thus, earns normal profit only. Firm *C* is assumed to be managed by a still less efficient entrepreneur. It produces OQ_3 level of output at the price *OP*. At E_3 equilibrium point, the firm's $MC = MR$, but *AR* is less than *AC* and more than *AVC*. The firm, thus, covers its variable costs and a part of fixed costs, too. The firm *C* remains in the business despite the losses incurred. But the firm *D* which is managed by a very inefficient entrepreneur has a relatively higher cost level. The firm, thus, finds that at *OP* ruling market price, the revenue curve is much below the *AVC* curve. Thus, the firm fails to cover even its current business expenses. The losses are much and the only way out is to close down. The firm *D* will, thus, quit the industry even in the short-run.

In short, we may conclude that under heterogeneity of entrepreneurship, cost conditions differ, so at the ruling market price though firms reach an equilibrium point by equation *MR* and *MC*, their profitability differs. Some firms which are controlled by most efficient entrepreneurs would earn supernormal profit, while other firms, controlled by somewhat less efficient entrepreneurs, get only normal profits. Some other firms, controlled by still inefficient entrepreneurs, might incur losses. Some might get subnormal profits while some might get zero normal profit, and some might minimise the losses by recovering a part of fixed costs. And, firms which are managed by totally inefficient entrepreneurs incur heavy losses. Ultimately, they have to shut down their business if they fail to improve or if the same market situation persists for long.

All Factors are Heterogeneous

When all factors and their units are heterogeneous, the productivity gaps between the firms will be wider. Consequently, their cost differences will tend to be even bigger than what we have assumed in the cases of heterogeneous entrepreneurship.

Hence, the same Fig. 14.3 can be interpreted to explain the nature of equilibrium with a large degree of differences between the different firms' costs and profits conditions. Thus, the firms which employ more efficient factors of production will have lower costs and more profits — supernormal profits. Less productive firms due to inefficiency of factors will earn just normal profits. Some firms will earn only subnormal profits and some zero normal profits, while firms having very inefficient factors of production will incur heavier losses and will tend to quit the industry.

4. THE SHORT-RUN SUPPLY CURVE OF THE FIRM AND INDUSTRY

From the equilibrium output levels, it is easy to derive the supply curve of the firm and industry.

Short-run Supply Curve of a Firm

Under perfect competition, the firm supplies what it produces at a given market price. It produces that level of output at which $MR = MC$. Thus, firm's supply curve can be derived from its equilibrium points, *i.e.*, the points of intersection of its *MC* curve with alternative demand curves at different prices. To illustrate the point, let us reconsider the diagram of firm's equilibrium as in Figure 14.4.

In Figure 14.4, *SS* supply curve is derived from *SMC* curve.

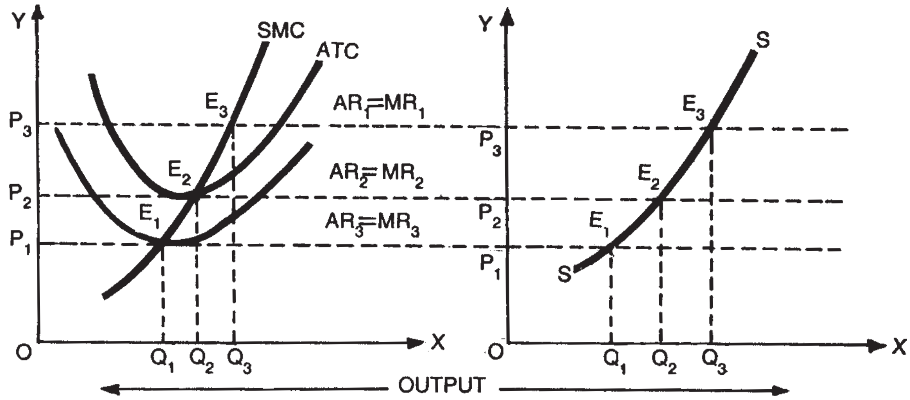


Fig. 14.4: Derivation of Firm's Supply Curve

The perfectly competitive firm's supply curve is that segment of its *MC* curve which lies above its *AVC* curve

It is easy to see from the figure that at various prices, different amounts of equilibrium output are produced by the firm. Whatever is produced is supplied at the given price, because the demand is perfectly elastic for the firm's output. Hence, the equilibrium points E_1, E_2, E_3 become the points of supply curve and joining them we get the *SS* supply curve, as shown in the parallel diagram. The result may be summarised in Table 14.1.

Table 14.1: Relation Between Price and Output Produced/Supplied

Price	*Equilibrium Output Produced*	*Amount Supplied*
OP_1	OQ_1	OQ_1
OP_2	OQ_2	OQ_2
OP_3	OQ_3	OQ_3

It, thus, follows that the supply curve so derived is an usual upward sloping supply curve, indicating that the supply expands with the rise in prices and *vice versa*.

The supply curve so derived is in fact just nothing but the reproduction of the marginal cost curve (as E_1, E_2, E_3, etc., points being common for both).

It must be noted that only the rising path of *MC* can serve as the supply curve of the firm while the falling path cannot, for the obvious reason of its being insignificant in equilibrium process. The supply curve of the firm in the short-run, however, is that portion of the marginal cost curve that lies above the average variable cost curve. The *MC* curve lying below the *AVC* curve cannot be regarded as the supply curve because at this point, the firm stops production altogether (as has been seen in the analysis in the previous section). Supply, thus contracts to zero at any price below *AVC*. The firm produces either at a loss or profit at any point as per the given price, where the short-run *MC* curve equals the price only when the price is above *AVC*.

In short, a competitive firm's marginal cost curve above the *AVC* curve is its supply curve in the short-run.

The Short-run Supply Curve of the Industry

The total market of the industry's supply is the aggregate of all individual sellers' (or firms') supply at the prevailing price. Since the individual firm's supply curve is represented by its marginal cost curve, it follows that the supply of the industry is based on the costs of the firms. In market price determination, therefore, when the supply has a significant role in the short period, the cost element becomes important. At each possible price, firm *A*, firm *B*, etc., produce equilibrium output as per the equality of *MC* with price. When all factors are homogeneous, all the firms under perfect competition will have identical cost conditions. Then the shape of *MC* curves for each firm will be similar. By horizontal summation of these curves, the supply curve of the industry is derived. This has been illustrated in Figure 14.5.

It will be seen that the slopes of these curves are identical. Indeed, industry's supply curve represents larger quantities than those of firms. But if entrepreneurs are heterogeneous, all other factors being identical, the cost condition of the different firms will be different according to their differing entrepreneurial ability. In this case, the slope and position of the *MC* curve will be different for the different individual firms as has been illustrated in Figure 14.5.

It can be seen that firm B has much lower costs as compared to A. The industry supply curve is the superimposition of these curves. One thing, however, remains true, that the industry supply curve is also an upward sloping curve implying that industry expands its supply only at a rising price and contracts it at a falling price.

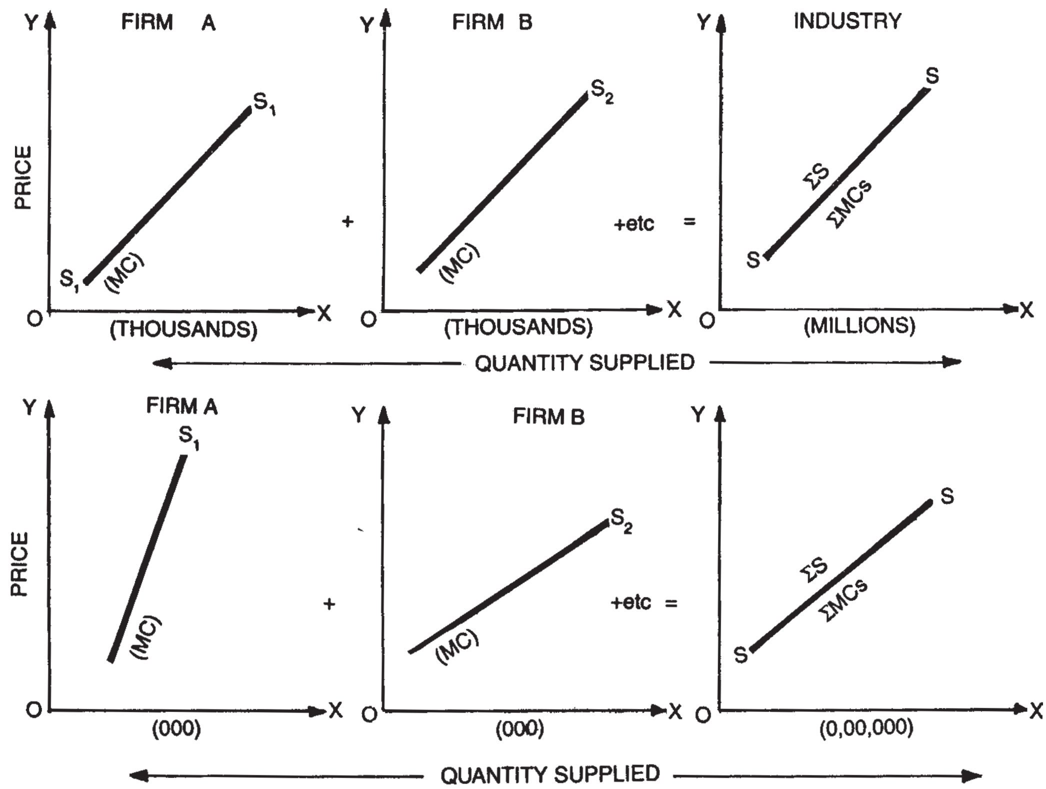


Fig. 14.5: Derivation of Industry's Supply Curve

5. THE SHORT PERIOD EQUILIBRIUM OF THE INDUSTRY

An industry is in equilibrium in the short-run when there is no tendency for its total output to expand or contract, *i.e.,* the output of the industry is steady. When the following three conditions are satisfied, an industry will be in equilibrium in the short-run:

1. The individual firms comprising the industry have no tendency to vary their output. This means, when each individual firm produces output at which is $MR = MC$, at the prevailing price, no existing firm will vary its output. In other words, all the existing firms must be producing an equilibrium level of output.
2. It is not necessary that each firm in the industry should be earning normal profits in the short-run. Some firms may be earning normal profits, some supernormal profits, or even some may be incurring losses depending on their cost functions. This means, firms making supernormal profits and maximum losses can co-exist along with the short-run equilibrium of the industry.
3. The short period market price and its determining factors, *viz.*, short period demand and short period supply, are in equilibrium. When the total quantity demanded is equal to total quantity supplied, at the equilibrium short-run market price, the market is cleared, so there is no reason for the market price to change in the short-run. Thus,

the market and all the firms in the industry attain short-run equilibrium at this price (See Fig. 14.6).

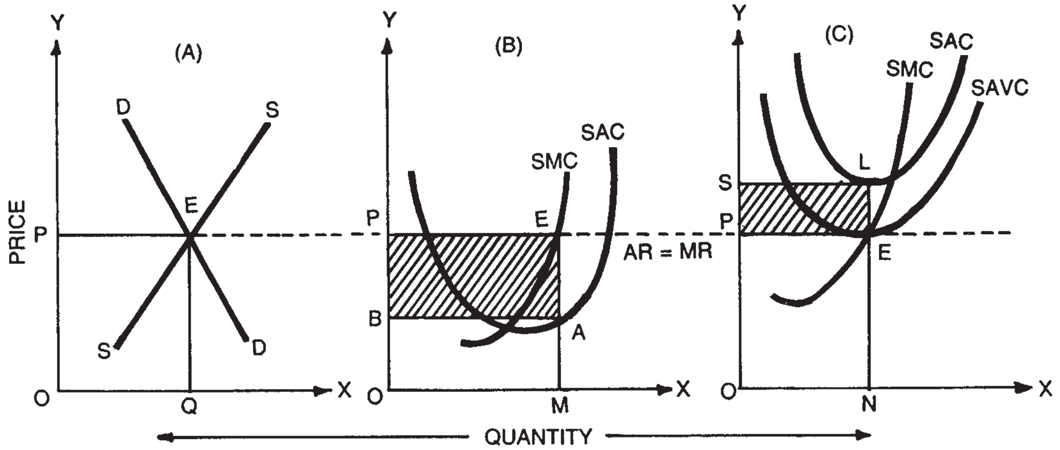


Fig. 14.6: Short-run Equilibrium of Industry and Firm

In short-run, industry equilibrium is determined by the number of firms and their equilibrium output. Intersection of short-run demand and supply curves of the market, determine short-run price *OP* and corresponding *OQ* output. Individual firms determine their equilibrium output in view of *SMC* = *SMR*.

In Figure 14.6 (Panel A), curve *SS* represents short-run industry supply and *DD* represents short-run industry demand. Both the curves intersect at *E* determining *OP* as the short-run equilibrium price, at which *OQ* is the quantity demanded equal to the quantity supplied in the entire market.

At this price, industry is in equilibrium. The firms are also in equilibrium by equating *MR* with *MC*. But, they may be making profits or losses as in Figure 14.6 panels *B* and *C* respectively.

6. LONG-RUN EQUILIBRIUM OF THE FIRM

For attaining equilibrium, the same principle of equalising *MR* with *MC* is applied in the long-run. Thus, the firm has to set its long-run costs with the price and revenues.

In the long-run, since the firm can adjust its output by changing the scales of plant, the long-run average cost curve is disc-shaped. But the competitive firm's demand curve being perfectly elastic at the given long-run market price, the *LMR (= LAR)* curve would be a horizontal straight-line. The firm would produce that level of output at which *LMR* = *LMC*, so that its profits are maximised. In other words, in the long-run, the firm adjusts its output and the scales of its plant so as to equate long-run marginal costs with price. As Prof. Lipsey (2000, p. 250) remarks, entry into and exit of firms from the industry is the key to long-run equilibrium under perfect competition. The process of long-run equilibrium of a competitive firm has been illustrated in Fig. 14.7.

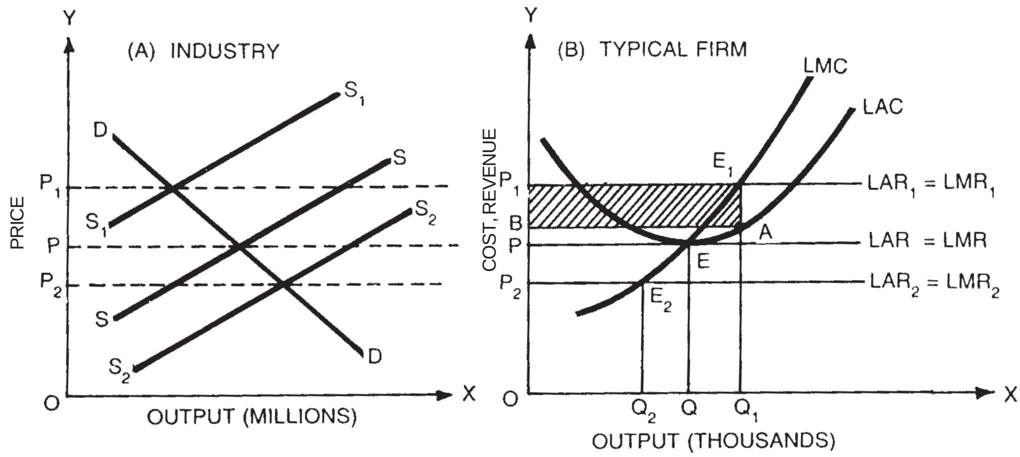


Fig. 14.7: The Process of Long-run Equilibrium

In long-run, market price is determined by intersection of long-run demand and supply curves. Corresponding to P_1, P_2, P_3 prices, E_1, E_2 and E_3 equilibrium positions are shown to explain the process of attaining long-run equilibrium by the competitive firm.

Figure 14.7 graphically depicts the process of long run equilibrium adjustment in the output produced by typical firm in relation to the alternative long-run market prices.

In Figure 14.7, panel *(A)* represents the market demand and industry's supply position of a given product in the long-run; panel (*B*) represents a given firm's *LAC* and *LMR* at various P_1, *P*, etc. The firm is a price-taker and the market price in the long-run (the normal price) is determined by the intersection of the demand curve *DD* and supply curve *SS* of the industry. Initially, suppose S_1 S_1 is the supply curve which intersects the *DD* curve so that OP_1 is the equilibrium price. At this price, the firm gets LMR_1 curves which intersect the *LMC* curve at point E_1.The firm produces OQ_1 of output. At this point, the firm gets excess profits, since $LAR > LAC$. The amount of excess profit earned is denoted by the shaded area P_1E_1AB. As such, some new firms are attracted to the business. Because when a firm in the long-run gets pure excess profit, it means that relatively there is a small number of firms in the industry as compared to industry's total demand for the product. Further, the long-run provides ample time for the producers in other industries to enter this industry which appears to be more profitable. Mobility of firms from one industry to another is possible under perfect competition, as perfect mobility of all factors is assumed to be an essential condition of a competitive market. When the new firms enter the industry under consideration, the supply of the industry increases so that the supply curve shifts to the right. Then the long run equilibrium price will obviously decline with the increase in supply, the demand being unchanged. With the fall in price, the firm contracts its output also, and obviously its excess profits will decline. But still the firms may yield some excess profit. This continues to provide an attraction to new producers to enter the industry. When more new firms enter, the supply curve shifts further downwards to the right. Now the supply curve may become *SS*; when it intersects the demand curve *DD, OP* price is obtained. The firm readjusts its output with the falling price at *OP*. Now, the firm produces *OQ* level of output, at which $LMR = LMC$. But at this point LAC = Price.

Hence, the firm gets only the normal profit. The attraction for the new firm now ceases. Further, if the supply curve would have shifted further to S_2S_2, then the price would have been OP_2. Then, the firm would have attained a temporary equilibrium point E_2. But the firm at this point incurs losses. The firm in the long-run must cover its full costs and should get normal profit. If it cannot, it has to quit the industry. When some firms, due to excessive supply in the industry, find it difficult to carry on, they may quit as their plants wear out, or shift to another industry. If this happens, then the supply curve starts shifting to the left, showing a decrease in supply. When it moves back to *SS*, the equilibrium normal price *OP* is obtained. At this price, the firm produces equilibrium output, which gives just normal profits. At this position, the firm will find itself in a stable condition and will not change its output any further in the long-run. Thus, under perfect competition, long-run equilibrium is attained when the number of firms is so adjusted that an individual firm can get neither excess profit nor suffer any loss, but only normal profit. This occurs at a point where the long-run equilibrium price is equal to minimum *LAC*.

The long-run full equilibrium position of a typical representative firm is, therefore, redrawn explicitly in Figure 14.8.

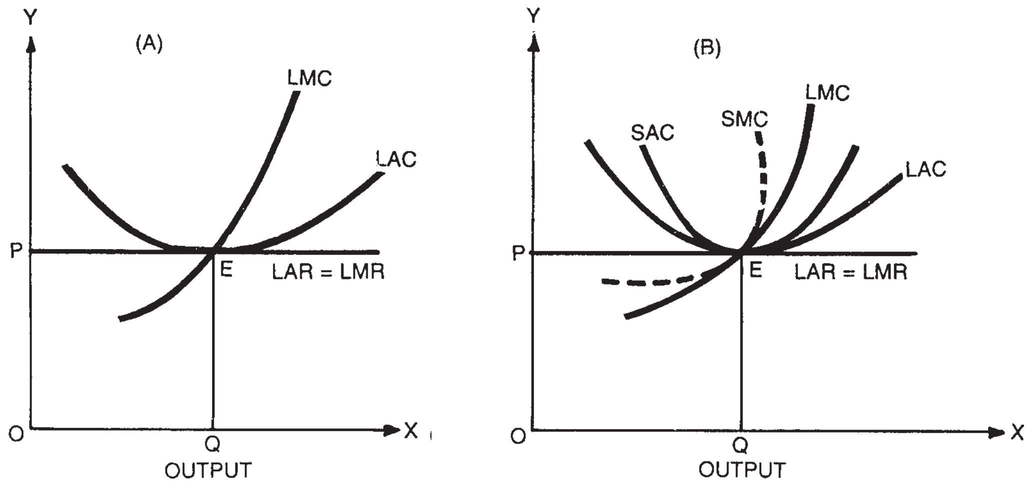


Fig. 14.8: Long-run Full Equilibrium

In long-run, price = *LAR* = *LMR* = *LMC* = *LAC*. Therefore, only normal profit. Panel B shows *P* = *LMC* = *LMR* = *LAC* = *SAC* = *SMC*.

In Fig. 14.8 Panel A, the firm earns just normal profit under the full equilibrium conditions of the long-run, thus: *P* = *LAR* = *LMR* = *LAC* = *LMC*. Similarly, Fig. 14.8 Panel B shows that long-run price = *LMC* = *LMR* = *LAC* = *SAC* = *SMC*.

The firm in the long-run has a permanent single equilibrium point, where:

Price = *LMR* = *LMC* = *LAC*.

Since the *LMC* intersects *LAC* at the minimum point, *LMC* = *LMR* = Price, is possible only if the firm operates at the minimum point of the *AC* curve in the long-run, *i.e.*, when it produces the least cost output. A firm in the long-run must operate at this minimum point.

It cannot afford to operate at any other point on the *LAC* curve. Given the normal equilibrium price, if it operates at the higher point of *AC*, it incurs unbearable losses in the long-run and it has to quit the industry. Therefore, under perfect competition, in the long-run, it must operate at the minimum point of average cost for its survival. In the long-run, a firm's profit is just normal.

The condition of a long-run equilibrium of a competitive firm can be summarised thus:

1. *LMC* = *LMC*, *i.e.*, profit is maximised.
2. Price *(AR)* = *LAC*, therefore, normal profits.
3. *LMR* = *LAR* (Price), implying that the firm is a price-taker or the output of the individual firm cannot influence the price.
4. *LMC* = *LAC*, *i.e.,* the firm is operating at a minimum average cost.

The last condition indicates that, under perfect competition, all firms in the long period must operate at their most efficient level of output so that *AC* is at the minimum. If this is so, the resources are utilised in an optimum way.

Finally, the existence of long-run equilibrium condition of a firm means that short-run equilibrium also exists simultaneously, because the long-run is composed of a series of short-run phases.

Thus, when a firm is in long run equilibrium, it must be in short-run equilibrium as well, but not *vice versa*. To be able to produce its equilibrium output at the lowest point of *LAC*, a firm has to build a plant associated with the short-run average cost curve *(SAC)* which has the same lowest point as that of *LAC*. Short-run marginal cost *(SMC)* curve should intersect at the lowest point of *SAC* curve. This has been illustrated in Fig. 14.8, Panel B.

Thus, when a firm is in long-run equilibrium.

Price = *LMC* = *LMR* = *LAC* = *SAC* = *SMC*.

In the long-run, industry automatically attains equilibrium when all the firms attain equilibrium.

7. EQUILIBRIUM OF THE INDUSTRY IN THE LONG-RUN

The equilibrium in a perfectly competitive industry is established under the following conditions:

1. Industry being a collection of firms, for an industry to be a long-run equilibrium, apparently all the existing firms in the industry must be producing an equilibrium level of output by equating the long-run marginal cost with the long-run marginal revenue: *(LMC* = *LMR)*. Aggregate of their output constitutes the total supply of the industry.
2. The number of firms in the industry must be stable. There should be no entry of a new firm. Neither there is exit of any from the existing ones. This requires that all the existing firms must be earning normal profits. This happens when all the firms have Price or *LAR* = *LAC*.

Unless all the firms are earning just the normal profits, industry will not attain a stable equilibrium in the long-run. Because, if some firms are earning excess profits, it would encourage new entrants in the industry which will lead to changes in the industry supply and market prices in the long-run. Thus, it is essential that all the firms must earn normal profits in the long-run so that the industry attains an equilibrium position.

3. The long equilibrium price is established so that total quantities demanded and supplied in the long-run are equal and the market is cleared off. The long-run equilibrium of the industry is portrayed in Figure 14.9.

In Figure 14.9 the long-run price *OP* is determined by the intersection of the long-run supply curve *S* and demand curve *D*. At this price, the firm's equilibrium is determined by equating *LMR* = *LMC*. Thus, *OM* is the equilibrium output of the firm in the long-run. There is a full equilibrium position: Price = *LAR* = *LMR* = *LAC* = *LMC*. As such, the firm enjoys just normal profits.

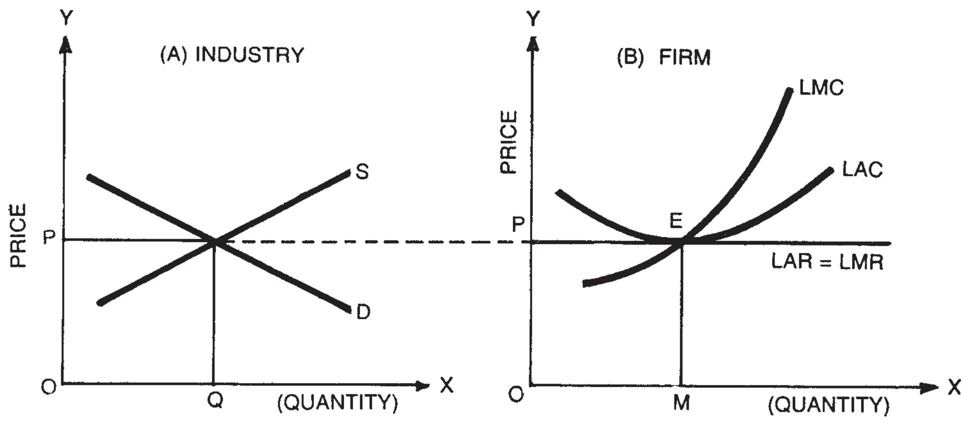


Fig. 14.9: Industry's and Firm's Equilibrium in the Long-run

Long-run equilibrium: Price = *LAR* = *LAC* = *LMR* = *LMC*.

It follows that, when all the firms are in equilibrium, and all of them earn normal profits, or their number being stable, the market supply position becomes stable in the long-run and under the given demand condition (*D* in Figure 14.9 Panel A), the long-run equilibrium price *(OP)* is established making industry in the long-run equilibrium. The firms under homogeneity conditions are identical — having identical cost functions so they must be operating at the minimum point of *LAC* (See Figure 14.9 Panel B). Those firms which are inefficient so that their cost functions are at a higher level, *i.e.*, *LAC* price, have to quit the industry in the long-run as they fail to earn normal profits and losses are not sustainable by them.

To sum up, industry and firm's equilibrium conditions in the long-run are Long-run Equilibrium Price = *LAR* = *LAC* = *LMR* = *LMC*.

8. LONG-RUN EQUILIBRIUM OF THE FIRMS UNDER HETEROGENEOUS CONDITIONS

In the above analysis, we have assumed that all factors of production are homogeneous for all firms, so all of them have identical cost conditions. But, in reality, we may find that all factors are not homogeneous. Under heterogeneous conditions of factors, the cost conditions will differ from firm to firm. Hence, the nature of equilibrium will not be identical for all the firms.

Now, if we assume that entrepreneurs are not homogeneous, but all other factors are homogeneous, then, in the long-run, we can have two categories of firms: *(i)* intramarginal firms, and *(ii)* marginal firms. Intramarginal units are those which are controlled by the most efficient entrepreneurs, so that their costs of production are lower than those of other firms. At the long run normal price, it is quite likely that these firms may be earning some supernormal profit. The case of intramarginal firms is thus represented in Figure 14.10.

In Figure 14.10 Panel A, it will be seen that at price *OP*, the Firm A, produces more efficiently at a lower cost, is in a position to earn supernormal profit, represented by the shaded rectangle area: PE_1, *MN*. Evidently, intramarginal firms will earn different degrees of supernormal profit, depending on the level of their *AC* and *MC* cost curves.

Similarly, Figure 14.10 Panel B represents the case of a marginal firm. Firm B is assumed to be less efficiently managed as compared to A. It is just efficient enough to stay in the industry by earning a normal profit.

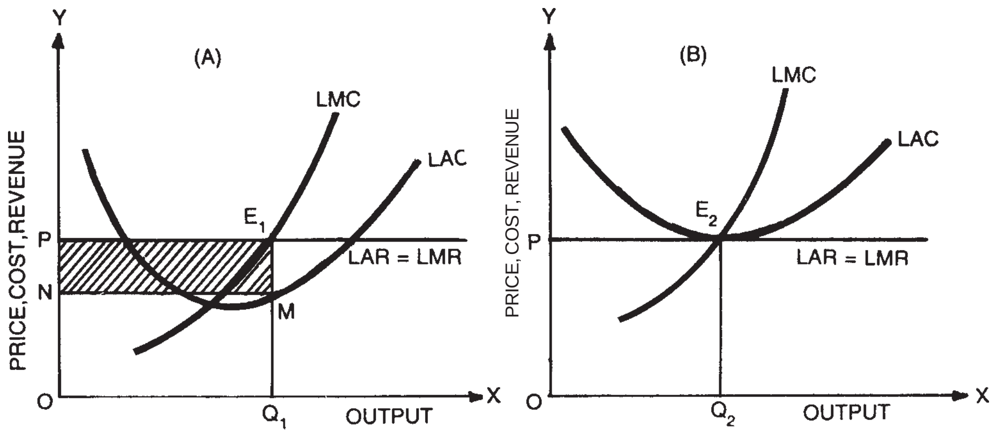


Fig. 14.10: Equilibrium Position of Intramarginal and Marginal Firms

In the long-run, intramarginal firm earns excess profit, while the marginal firm earns only normal profit.

A marginal firm earning a just normal profit in the long-run is on the margin of profitability. Being on the margin of profitability, if any price below *OP* in long-run takes place, the firm will fail to earn normal profit and it will have to shut-down. Intramarginal firms are free from such danger. A possibility may be considered that if there is any entry of new firms which are equally or more efficient than firms like firm A, there will be keen competition in the market. This will cause a decline in the long-run equilibrium price. Then, intramarginal firms may start earning only normal profits and consequently may become marginal, while marginal firms like firm 'B' have to quit the industry.

The gist of the discussion is that even in the long run under equilibrium conditions of the firms and industry, it is possible that at least some firms (the intramarginal firms) may tend to earn supernormal profits. This is due to heterogeneity of organisational skill. The same analysis is obviously extended with greater degree of cost differences when all factors are heterogeneous.

Mini Case Study: College Canteen

Mr. Patel runs a canteen in a college in Navrang Pura. This college is opposite to the Gujarat University Campus side entrance for the lecture halls. This college is a degree college having busy lecture schedules beginning right from morning till evening up to 4:00 p.m.

Patel Canteen has seating accommodation for 100 customers at a time during morning 8:00 to 10:00, lunch hour 12:00 to 2:00 the flow of teachers and students as customers is continuous and all seats are in full turnover.

After 4:30, there are only a few customers. Yet, Mr. Patel keeps the canteen open up to 6:30 p.m.

During these odd hours, a few customers always do come for the snacks and tea. These are the postgraduate students coming from the nearby Gujarat University, as they have evening classes 6:00 p.m. on wards.

Now, the question is should Mr. Patel continue to keep the canteen open during 4:30 p.m. to 6:30 p.m. or shut-down.

In his decision-making, Mr. Patel should consider his cost-function and business revenues from the canteen at these odd hours.

When he looks upon the fixed costs elements of canteen business – such as the rent, tables, chairs, utensils, plates, kitchen facilities, etc., tend to remain unchanged whether runs it up to 4:00 p.m. or up to 6:30 p.m. Only what he has to consider is the variable costs pertaining to electricity, gas, food materials, etc. Even canteen workers wages is semi-variable, so it remains almost fixed like. In short, Mr. Patel should consider that during these hours of operations, least he should get minimum revenue at least that should cover up his running expenses (*i.e.*, variable costs). So, that there is no loss on running costs. And, he may be hopefully expecting some days more customers at these add hours of business, so that revenue may exceed the total costs and add into his profits. A rational businessman always looks to the opportunities of making some profit in doing the business.

Suppose, he observes that Monday to Fridays he tends to cover up his running expenses but on Saturdays, his revenue is below the variable cost. For, usually there are very few customers when there are no evening lectures in weekend. He, thus, decides to close the canteen by 4:30 p.m. on Saturdays.

Same logic of decision-making is applied in running the canteen during summer holidays. He may shut it down afternoon onwards.

In holiday resorts also, the similar decision is made by the owners. Resorts are open for the business only during the period when business revenue is at least equal to the variable costs. During rainy seasons, a holiday resort in the area of heavy rain may be closed for the month of July and August.

In place like Goa, to make-up for the situation of lower business, the resorts may be offering high concessional rates to attract the common tourist of high demand elasticity.

MODEL QUESTIONS

1. Analyse carefully the conditions of equilibrium of an individual firm under perfect competition both in the short-run and the long-run periods. Illustrate your answer with diagrams.
2. Explain how an individual firm attains equilibrium in the short and the long periods under conditions of perfect competition.
3. Show how an individual firm will attain equilibrium under perfect competition in the short-run period in the following situations:
   (a) When all factors are homogeneous;
   (b) When entrepreneurs are heterogeneous, and all other factors homogeneous.
4. (a) Derive the short-run industry supply curve with the help of cost curves of a firm under perfect competition.
   (b) Do all firms always get normal profit under perfect competition?
5. Explain the following statements:
   (a) Price can be substituted for marginal revenue in the *MR* = *MC* condition of a firm's equilibrium, when an industry is purely competitive.
   (b) A competitive firm must look to average variable cost in determining whether or not to produce in the short-run.
   (c) That segment of a firm's *MC* curve which lies above its *AVC* curve constitutes the short run supply curve for the firm under perfect competition.
   (d) Under perfect competition, a firm's average revenue and marginal revenue are equal for all levels of sales.
   (e) Perfect competition does not imply rivalry of the firms.
   (f) The supply curve of a competition industry is the horizontal sum of the marginal cost curves of all the constituent firms.
   (g) A competitive firm is in long-run equilibrium only when it is producing at the minimum point of its *LAC* curve.
6. What are the necessary and sufficient conditions for equilibrium of a firm under perfect competition?

❒ ❒ ❒

Monopoly: Pricing and Output Decision

15

CHAPTER

1. MEANING OF MONOPOLY

Monopoly is a form of market structure in which a single seller or firm has control over the entire market supply, as there are no close substitutes for his products and there are barriers to the entry of rival producers. This sole seller in the market is called 'monopolist.'

Features of Monopoly

The characteristic features of a monopoly firm are:

- **Single firm.** The monopolist is the single producer in the market. Thus, under monopoly firm and industry are identical.
- **No substitute.** There are no closely competitive substitutes for the product. So the buyers have no alternative or choice. They have either to buy the product or go without it.
- **Anti-thesis of competition.** Being a single source of supply, monopoly is a complete negation of competition.
- **Price-maker.** A monopolist is a price-maker and not a price-taker. In fact, his price fixing power is absolute. He is in a position to fix the price for the product as he likes. He can vary the price from buyer to buyer. Thus, in a competitive industry, there is single ruling price, while in a monopoly, there may be price differentials.
- **Downward sloping supply curve.** A monopoly firm itself being the industry, it faces a downward sloping demand curve for its product. That means it cannot sell more output unless the price is lowered.

- **Entry barriers.** A pure monopolist has no immediate rivals due to certain barriers to entry in the field. There are legal, technological, economic or natural obstacles, which may block the entry of new firms.
- **Price-cum-output determination.** Since a monopolist has a complete control over the market supply in the absence of a close or remote substitute for his product, he can fix the price as well as quantity of output to be sold in the market.

Though a monopolist is a price-maker, he has no unlimited power to charge a high price for his product in the market. This is because, he cannot disregard demand situation in the market. If buyers refuse to buy at a very high price, he has to keep a lower price. He will produce that level of output which maximises the profits and charge only that price at which he is in a position to dispose of his entire output. Thus, a monopolist sets price for his production in relation to the demand position, and not just fix up any price he likes.

2. ABSOLUTE AND LIMITED MONOPOLY

A distinction needs to be made between absolute and limited monopoly. In a very strict sense, an absolute or pure monopoly refers to a form of market which is controlled by a single producer who is in a position to charge any price for his product, and the highest price he can charge may be to the extent of the entire income of the buyers. Chamberlin thus puts that, for absolute monopoly power, the firm must have control over the supply of all goods and services in the country as a whole. Such type of pure monopoly, however, can never exist. In a rather relaxed sense, however, we may define an absolute monopoly as the one in which the sole seller has full control over the market supply of a product which has no substitute, not even a remote one. This means that pure monopoly is a complete negation of competition. As there are no immediate rivals, the monopolist can freely adopt his own price policy. According to Triffin, "pure monopoly is that where the cross elasticity of demand of the monopolist's product is zero." Such pure monopoly is merely a theoretical concept. It is a rare phenomenon in reality. For, a commodity is bound to have a substitute, though it may be a very remote one. For instance, a stereo recordplayer is a remote substitute for television as a means of entertainment. Again, in a wider sense, all goods and services are remote substitutes for a given product as they compete for consumer's allocation of income. In practice, therefore we cannot come across pure monopoly. It, thus, remains merely a theoretical concept.

In reality, we find a limited monopoly or a relative monopoly. Relative monopoly is defined in various ways. Professor Lerner, for instance, compares the demand curve faced by an individual competitive producer with that faced by the monopolist. To a competitive firm, a demand for its product is perfectly elastic, while to a monopoly firm, it is inelastic. According to Lerner, thus, the degree of inelasticity of demand measures the relative degree of monopoly power enjoyed by the firm. Chamberlin, however, defines relative monopoly from the point of view of supply. He observes that relative monopoly exists when the supply of a product is concentrated in the hands of one or a few producers. For all practical purposes, we may, however, put that a monopolist in the real world has a limited degree of monopoly power as he is the producer controlling the market supply of a particular product which has no close substitutes. As there are no close substitutes, the cross elasticity of demand between a monopolist's product and other products is very low. Nevertheless, a monopoly implies a threat of competition, even from a remote substitute. In a limited monopoly, of course, a relatively high or low degree of monopoly power depends on the closeness or remoteness of the substitute for a given product. Further, so long as new entries are prevented in the field of production, a high relative degree of monopoly power is secured by the monopolist. In short, the lesser the degree of competition, the greater is the degree of monopoly power enjoyed by the monopoly firm. Some economists, however, prefer to use the term 'simple monopoly' instead of 'limited monopoly.' Simple monopoly implies absence of close substitutes. But it does not mean absence of competition, as it has to face competition from remote substitutes.

In short, a simple monopoly means a single seller controlling the market supply of a product that lacks close substitutes. Hence, there are no immediate rivals to a simple monopolist but his degree of monopoly power is not absolute, as the possibility of competition at any time is not completely ruled out. For instance, in the beginning, the Tata Iron and Steel Company Ltd. (TISCO), had a very high degree of monopoly in the supply of steel and allied products, but now it faces competition from Indian Iron and Steel Company (IISCO) and Mysore Iron and Steel company as well as from the steel plants of Bhilai, Bokaro, Durgapur and Rourkela. Besides, there is Vishakapatnam Steel Plant of Rashtriya Ispat Nigam Ltd. (RINL) established in 1992. There are other players in the private sector, such as Essar, Mukand, Lloyds, Jindal, Nippon Denro Ispat Ltd., Mahindra Ugine Steel Company Ltd., FACOR, Mardia Steel Ltd. TISCOs monopoly power is now, to an extent, due to its quality and some buyers' specific preferences.

Whether monopoly exists in pure form or not, the theory of monopoly serves as an important tool for analysing the problems of pricing, output and resource allocation in the market structures and actual production activity. In fact, some industries, especially public utilities, have a high degree of relative monopoly power, so they approximate to pure monopoly. Again, in a market, a dominant firm controlling almost 75 to 80 per cent of the total market can very well be fitted to the pure monopoly market model. Furthermore, principles of pure monopoly would serve as a stepping stone to deal with the more realistic phenomenon, like monopolistic competition, with greater ease.

3. MEASURES OF MONOPOLY POWER

In practice, no monopolist possesses absolute power. Thus, a pure monopoly does not and cannot exist in a market economy. There is always a partial or limited monopoly in any field. Monopoly power is expressed in charging a high price much above the cost by restricting output to earn a high level of supernormal or net profit.

Economists have suggested various methods of measuring the degree of monopoly power. The important measures are: *(i)* Traditional measure, *(ii)* Lerner's measure, and *(iii)* Triffin's measure.

Traditional Measure

A monopolist is a price-maker, but his price fixation is conditioned by the elasticity of demand. When the demand is inelastic, he can charge a high price without losing much sale and can earn maximum net monopoly profit. The degree of monopoly power varies inversely with demand elasticity. Under perfect competition, since a firm's demand curve is perfectly elastic, the degree of monopoly power is zero. In a monopoly market, if the demand for the firm's product is inelastic, a larger degree of monopoly power is obtained to that extent. Complete inelasticity of demand obviously implies unlimited degree of monopoly power to a single seller in the market.

Lerner's Measure

According to Lerner, the difference between the price charged by the monopolist, and his marginal cost serves as the best measure of the degree of monopoly power. He devised a formula to measure the degree of monopoly power, called Lerner's Index, as follows:

$DMP = P - MC/P$

where, DMP stands for the index or degree of monopoly power, P stands for the price, and MC refers to the marginal cost.

Under perfect competition, $P = MC$

$\therefore DMP = 0.$

Under monopoly, $P > MC$. $\therefore DMP > O$. DMP depends on $P - MC$.

The index of monopoly power is greater than zero but less than unity. It cannot be equal to unity, because MC cannot be zero for any product.

Again, Lerner's formula looks like the inverse of the formula for the elasticity of demand. This can be seen as under:

In monopoly equilibrium, $MR = MC$.... by substitution:

$DMP = P - MR/P$

Since, $MR = P$ (e–1/e) (this has been proved earlier in Chapter 13), by substitution:

$DMP = P - P(e - 1/e) / P = 1/e$

It, thus, follows that the degree of monopoly power varies inversely with the elasticity of demand.

However, Lerner's index does not measure anything beyond the effectiveness of existing substitutes. It does not consider potential substitutes. It also cannot measure non-price competition in cases of product differentiation. In fact, the real degree of monopoly power can never be measured through a single index.

Triffin's Measure

Triffin suggested the cross elasticity of demand between products as a measure of monopoly power. The cross elasticity of demand between any two goods, X and Y, measures the effect upon the demand or sales of X on account of a change in the price of Y. Thus,

$$exy = \frac{\Delta Qx}{Qx} \times \frac{Py}{\Delta Py}$$

Triffin states that when the price of cross elasticity of demand between the product of one firm and of all other firms is zero, it implies that other firms' products are not substitutes for the product of this firm. The reciprocal of cross elasticity would thus be infinity, indicating absolute monopoly power.

In short, Triffin prefers to use the inverse of price cross elasticity of demand rather than the price elasticity of demand (as used by Lerner). He mentions that, to a pure monopoly firm, the cross elasticity demand for its product is zero, therefore:

$$DMP = \frac{1}{exy} = \frac{1}{0} = \propto. \text{ This implies an absolute monopoly power.}$$

Monopoly and Monopoly Power

A distinction between monopoly and monopoly power should be carefully noted. A pure or perfect monopolist possesses absolute monopoly power. But, one need not be a pure monopolist to possess a degree of monopoly power. Monopoly power implies ability to set the price. Even small producers like tailors, beauty parlours, medical practitioners, etc., do possess a degree of monopoly power, though individually they have no control over the entire market, but they are price-makers rather than price-takers. Different grades or degrees of monopoly power exist in reality.

4. SOURCES OF MONOPOLY POWER: WHAT MAKES A MONOPOLY?

There are several conditions which may form an entry barrier to give rise to monopoly power to a firm. The main sources of monopoly power are:

Natural Source

In many cases natural sources create a monopolistic position, which are described as 'natural monopolies.' In certain circumstances where competition is inconvenient or may not be workable, automatically a firm may acquire monopoly power. For instance, in the case of public utilities like telephone service or water supply, bus transport, electricity, etc., the supply by more than one firm is basically inconvenient and relatively costly to consumers. Hence, monopoly is preferred in such cases. Thus, all public utility services, in general, tend to become natural monopolies. Government, thus, grants them exclusive franchise but subjects them to certain regulations to prevent abuses of monopoly power.

Similarly, in many professional services, natural talent and skill bestow monopoly on some individuals. For instance, a surgeon who is highly skilled and popular can charge higher fees than others in the field, as he has the monopoly of his skill. The same is the case with a lawyer, a singer, or an actor.

Another natural factor is location. Even in an imperfect market, sellers of homogeneous products may have a distinct monopoly position on account of locational advantage. For example, each petrol pump or a departmental store has its own location privilege and position, bestowing some degree of monopoly to the firm concerned.

So also, limited size of the market and huge capital needs may confer natural monopoly on the existing firm. If the size of the market is small and technologically superior huge capital investment is required in producing a commodity, such as in electricity, it will not permit the existence of more than a single large plant, thereby conferring monopoly on the existing firm.

The exclusive ownership of a key resource by a single firm simply leads to monopoly. De Beers, the South African diamond company is a classic example of such monopoly. De Beers has the control over 80% of the world's diamond supply.

Exclusive Possession of Technical Knowledge

Exclusive knowledge of techniques of production also bestows monopoly to a firm. If the firm alone possesses the technical know-how about the production of a commodity, entry of rivals in the market is not possible, then the firm automatically acquires monopoly position.

Exclusive Ownership of Raw Materials

Sometimes, monopoly is acquired through the sole ownership or control of essential raw materials by a firm, as it would be an effective barrier to the entry of other firms in the field. Right to private property thus serves as a means to achieve monopoly power. For instance, De Beers Company of South Africa has the monopoly in molybdenum supplies as most of the world's diamond mines are owned by it.

Legal Sources

Legislative enactments regarding patents and copyrights, trade marks, etc., grant monopoly to the privileged firms, and such legal provision obstructs the entry of potential competitors in the field. Under such legal privileges, by using trade marks and trade names, producers try to differentiate their products from those of other manufacturers and try to secure consumers' patronage and thereby acquire some degree of monopoly power. Similarly, when a patent right or copyright is granted to a firm, it tends to bestow monopoly on the domestic producers by restricting foreign competition in the home market. Licensing requirements in certain industries also tend to create a monopolistic position for those producers who are fortunate enough to get such licences as others are legally forbidden to undertake similar industrial activity. Thus, monopolies created through legal privileges are termed "legal monopolies" or "government granted monopolies."

Economies of Large Scale

Big and old firms enjoy economies of large-scale on technological grounds by employing complex capital. Consequently, they have low cost of production and are able to supply goods at low prices which obstructs new entrants in the business. In this way, such firms may tend to hold a degree of monopoly power.

Business Reputation

Business reputation of long standing firms possesses a degree of monopoly power. They are always in an advantageous position in comparison to new adolescent rivals. Mature firms have little financial difficulties, nor do they require extra efforts to build up a clientele. This also confers an element of monopoly on such a firm.

Business Combines

Through business combines, like the formation of cartels, syndicates, trusts, pools or holding companies, joint monopolies are created by big business houses to capture economic power and position. Business combinations are made to eliminate competition among the group and to acquire a degree of monopoly power, as well as to curb rivals and to blockade the entry of new potential competitors by aggressive and unfair tactics like product disparagement, rock bottom price cutting, hiring away of strategic personnel of rivals, etc. Monopoly acquired through such cartel or trust formations is socially least desirable. Hence, many enlightened governments have passed anti-monopoly legislations. For example, the Sherman Anti-trust Act of 1883 passed in the U.S.A. is a glaring example in this regard. In India, the Monopolies and Restrictive Trade Practices (MRTP) Act, 1969, sought to deal with the concentration of economic power and check the growth of monopolies. It was repealed in 2002. In December 2002, Competition Act, 2002 has been passed to regulate combinations.

Creation of Artificial Barriers to New Competition

The existing firm may resort to tactics like limit pricing policy, heavy advertising, continuous product differentiation, etc., thereby reducing the scope of new entry and competition, ultimately to establish its monopolistic position in the market.

In view of the effective entry barriers, monopolies may be grouped into : *(i)* those having no fear of competition, and *(ii)* those having a constant fear of competition. When a monopolist is armed with some effective and strong entry barriers in his field, he is least worried about any potential rivals, so he will devise his price-output policy so as to take full advantage of his special position and earn maximum net profit. If, however, a monopolist is not well-armed against rivals, he will be under the threat of competition, consequently, he will decide his output policy to safeguard his monopoly position first rather than maximising his profits. In this regard, Professor Machlup considered that a monopolist of the first category is confident and with a secured optimistic attitude, while the second category of monopolist lacks confidence and holds a pessimistic view about his business prospect.

5. MONOPOLY EQUILIBRIUM IN THE SHORT-RUN: HOW A MONOPOLIST DETERMINES PRICE AND OUTPUT

To examine the equilibrium price and output determination of a monopoly firm or the monopolist, we may begin with the construction of a perfect monopoly market model under the following assumptions:

- There is only a single seller or firm in the market facing many buyers.
- The entire market supply is controlled by the firm, as there are no close substitutes for its product.

- There are entry barriers. So, competition from the rivals is not possible.
- The demand curve for the firm's product is downward sloping. It is known to the firm; so average and marginal revenues for different quantities of output are measurable at alternative prices.
- The monopoly firm itself being the industry is the price-maker.
- The firm attempts to maximise its profits.

In such a situation, the monopolist has to make two decisions: *(i)* to determine the price for his product, and *(ii)* to determine the equilibrium/optimum level of output.

In view of the downward sloping demand curve, however, these two decisions of the monopolist are interdependent. If he decides one, the other is just implied.

Thus, he cannot determine both the price and output separately. Either he can decide a price on the given demand curve and sell the amount demanded by the buyers in the market. Alternatively, he can determine the level of output and has to set the price as per the demand condition. Thus, the monopolist cannot have independent decisions about both the price and the quantity of output. He can either decide the quantity or the price, but not both as per his choice.

The monopolist is, however, interested in profit maximisation, so he follows the behavioural rule of equating the marginal cost with the marginal revenue, by which the profit is maximised.

The monopolist, thus, maximises his short-run profits, when he produces that level of output at which

- The short-run marginal cost is equal to the short-run marginal revenue ($SMC = SMR$).
- The marginal cost is rising.

In graphical terms, the crucial conditions for the short-run monopoly equilibrium are, thus,

- The intersection point between the *SMC* and *SMR* curves.
- The *SMC* curve cuts the *SMR* curve from below. In other words, the shape of the *SMC* curve at the point of intersection.

Once the equilibrium or optimum level of output is decided by the monopolist, the price is to be set in relation to the demand position. The monopolist cannot determine price independently of the market demand.

A monopoly firm equates its *MC* with *MR* and determines equilibrium output. Price is determined in view of demand or average revenue curve.

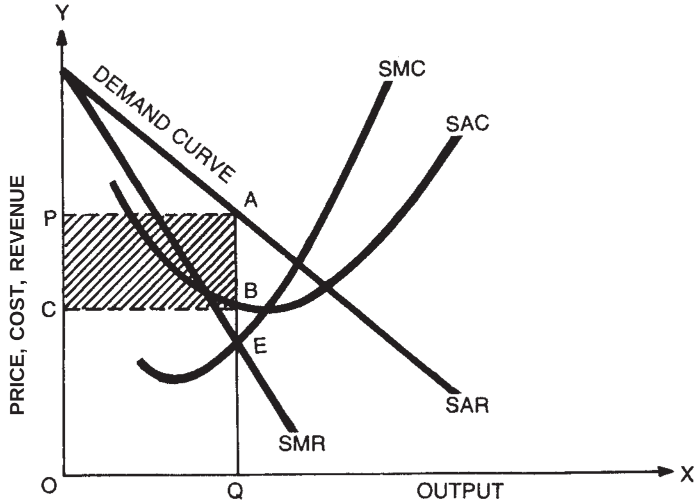


Fig. 15.1: Short-run Monopoly Equilibrium

The point is made clear in Figure 15.1. In Figure 15.1, the equilibrium point *B* is determined by the intersection of the *SMR* curve and the *SMC* curve, so that *SMC* = *SMR*. Thus, *OM* equilibrium output is produced by the firm. The firm can sell this output only at price *OP*. The price is determined by drawing a perpendicular *AQ* which intercepts the demand curve (*SAR* curve) at point *A*. In this illustration, monopoly profit is *PABC* for output *OQ* at price *OP*.

Evidently, once the output is decided, the price is determined correspondingly in relation to the given demand curve. Alternatively, if the monopolist fixes the price, the output will be determined accordingly. But, for profit maximisation, he adopts the rationale of equating *MC* with *MR* and the process of adjustment is easily described graphically. Anyway, though a pure monopolist has full control over the market supply, he cannot determine price independently of the market demand for his product. Thus, when equilibrium output is decided at the point of equality between *MC* and *MR*, the price is automatically determined in relation to the demand for the product. In our illustration, the monopolist will not charge a price higher than *OP*, because if he does so, he will not be able to sell *OM* output. He would not like to lower the price either because that will reduce his maximum profit. Thus, when *OP* price is charged and *OM* output is sold, the monopolist obtains a maximum profit, which is represented by the shaded rectangle *PABC*. This is termed as monopoly profit and it is over and above the normal profit, which is already estimated in the total costs of the firm. Another important point that must be observed in the diagram is that the monopolist is in equilibrium on the elastic segment of his demand curve (the *AR* curve). Secondly, the monopoly equilibrium output is determined at the falling path of the *AC* curve, which means that the monopolist restricts output before producing it at the optimum level of minimum average cost in order to maximise his profit.

Illustration: Monopoly Price-Output Decisions

A monopoly firm's demand and cost functions are as under:

$Q = 100 - P$

$TC = 100 - 10Q + 20Q^2$

where, Q = demand in 10,000 units, P = Price, and TC = Total cost

By manipulation, the demand equation is:

$P = 100 - Q$

$\therefore\ TR = P.Q = 100Q - Q^2$

$\therefore\ MR = 100 - 2Q$ and, $MC = -10 + 40Q$

Applying profit maximisation rule ($MC = MR$):

$-10 + 40Q = 100 - 2Q$

$\therefore\ 42Q = 110\backslash Q = 2.62 = 26{,}200$ units.

A Rule Of Thumb For Monopoly Pricing

In practice, the monopolist may have a limited knowledge of the *AR* and *MR* curves, many also know the *MC* over a limited output range only. For all practical purposes, therefore, the following formula may be used to determine price directly as a mark-up over marginal cost:

$$P = MC + \left[1 + \frac{1}{e}\right]$$

where,

P = Price
MC = Marginal cost
e = Elasticity of demand

Example. Suppose, the price elasticity of demand for the monopolist product is 0.3 and the marginal cost is Rs.10 per unit of output, then,

$$P = 10 + \left(1 + \frac{1}{0.3}\right) = 10 + 4.33 = 14.33$$

Mark-up here is 4.33

If demand elasticity is 1.3, then mark-up is 1.77. Hence, the price is determined at Rs. 11.77.

Mark-up is high when demand is less elastic and *vice versa*.

6. LONG-RUN MONOPOLY EQUILIBRIUM

In the long-run, the monopolist can change the scale of his output in response to a long- run change in demand. This is the case with a competitive firm also. But what distinguishes monopoly from pure competition is that the entry of new firms being ruled out, excess profits (supernormal profits) are possible even in the long-run. Again, the long-run demand curve for a monopoly product is relatively inelastic as compared to the industry demand for a competitive product, whereas a competitive firm's demand curve is perfectly elastic.

As a rule, a monopoly firm will attain a long-run equilibrium, determined by the equality of long-run marginal cost (*LMC*) and the marginal revenue, so that the profit is maximised. In making long-run production adjustment, the monopolist may have to consider either of the possible courses. First, in the short-run, he was producing under loss, and now he finds that the plant size to be developed in the long-run cannot overcome that loss and there are no chances of earning even a normal profit. So it is better to wind up the business. In technical terms, when the *LAC* curve is assumed to lie above the demand curve, the firm has to shut down further production in the long-run. Secondly, if the firm is earning some profit in the short-run (and normally a monopoly firm does), it has to determine the most profitable long-run plant size and correspondingly different price and output. This has been illustrated in Figure 15.2.

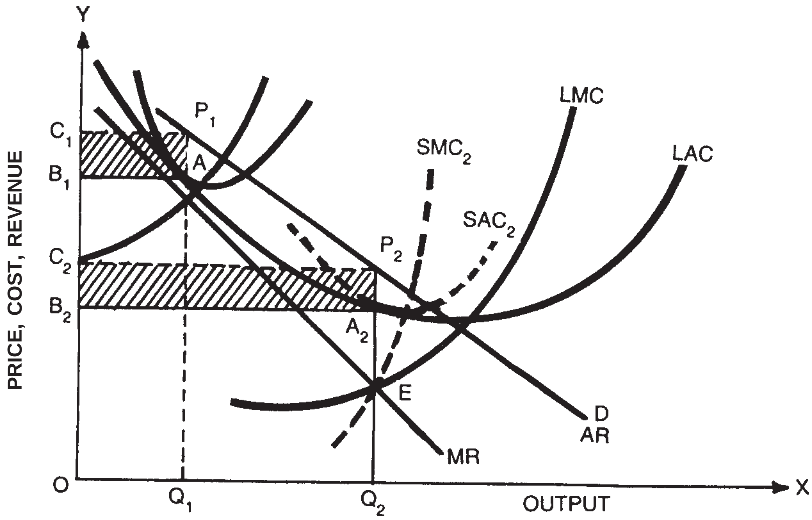


Fig. 15.2: Long-run Monopoly Equilibrium

In Figure 15.2, curve *D* is the demand curve as well as the average revenue of a monopoly firm. *LAC* and *LMC* are the long-run average and marginal cost curves. *LAC* is an envelope to various *SAC* curves. Now, if we start with the initial period, in SAC_1 phase, the monopolist produces OQ_1 output and charges P_1A_1 price and $P_1A_1B_1C_1$ profit is earned. In the long-run, he expands his output. He seeks to adopt a suitable plant size in the long-run so that a large profit is reaped, which is the maximum in the long run conditions. For equating *LMC* with *LMR* at the intersection point *E* of their respective curves OQ_2 level of output is thus produced. This is made possible by adopting plant size represented by SAC_2. P_2Q_2 is the price determined. Since the price or the average revenue P_2Q_2 exceeds A_2Q_2 long-run average cost, pure monopoly profit is earned, which is represented by the shaded rectangle $P_2A_2B_2C_2$.

Long-run monopoly equilibrium is determined at a point *E* at which *LMC* curve intersects *LMR* curve.

With the long run adjustment of output, both optional short run and long run marginal costs are equal to the marginal revenue. The optional plant size here refers to that short run phase wherein the short run average total cost curve (SAC_2 in our illustration) is tangent to the long run average curve (LAC) at the point A_2 that corresponds to the long run equilibrium output (OQ_2). Obviously, then the profit obtained amounting to $P_2A_2B_2C_2$ is definitely greater than the profit $P_1A_1B_1C_1$, obtained from the previous plant size (SAC_1). Figure 15.2 portrays shifting equilibrium of the monopolist from the short run to the long run.

It follows that in the long run also, the monopolist can earn a high excess profit. This is because of absence of rivals. In fact, a monopolist reaps a high monopoly profit by reason of his power to restrict output and to equate MC with MR and with AR or price. If he were to produce more, he will have to lower the price so that his excess profit would dwindle. He can restrict output because of absence of rivals. Thus, it has been said that the monopolist makes a monopoly profit for not producing. The above analysis of Figure 15.2 also implies that a monopolist does not produce goods but produces profits. Indeed, a monopolist's power to make profit is limited by the demand conditions, cost situation and the nature of entry barriers.

The Classic Case of De Beers' Monopoly in Diamond Business

De Beers, a South African mining group is a classic case of monopoly in diamond extraction. It resorted to capture its monopoly in the world diamond market through advertising strategy of popularising diamonds as precious prestige goods among the gem stones. De Beers has established a Central selling organisation which controls more than 80 per cent of the diamond business of the world. The company has its eye on emerging new market territories including China — as the world's biggest single market.

De Beers' monthly pricing strategy implies continuous rise in the value of diamonds with its management of control over the market supply. When there is a slack in market condition it withholds the stock at an appropriate time. The company supplements its supply control with demand manipulation to maintain a high level of diamond prices.

The company, however, observes that the diamond market in the new millennium is facing some serious problems. The main problems pertain to the oversupply of diamonds, falling prices and reduced profitability. Recently, big countries like Russia and America have dumped their stocks in the world diamond market that has caused reduced prices and lower profits to the Diamond King. The company had undertaken certain strategic measures to deal with the situation, such as:

- Purchase of surplus gems to hoard them (worth over $4 billion).
- Control over its mine operations and output.
- Negotiations with Russia.

The company is, however, worried on account of the discovery of new rich diamond mines in Australia and Canada. This may lead to an increase of diamond supply with adverse consequences on price and profitability of diamond industry as well as company's business and monopolistic position in future.

On the other hand, the Western market appears to be at the point of saturity. There is only a ray of hope by exploiting the Asian markets to sustain the growth of diamond industry (Mitchelson and Mann: 1995).

7. COMPARISON OF PERFECT COMPETITION AND MONOPOLY

Following Koutsoyiannis, we may adopt the following methodological scheme for the comparison of two market models, such as perfect competition and monopoly.

- Objectives of the firm.
- Assumptions regarding the market conditions.
- Behavioural Rules of the firm.
- Basic magnitude of the long run market equilibrium, *viz.*, *(i)* price, *(ii)* output, *(iii)* profit, and *(iv)* capacity utilisation.

Comparison of Objectives of the Firm

Theoretically, both types of firms, whether competitive or monopolistic, are seeking profit maximisation. However, a monopolist is in a somewhat better position to maximise his profits than a competitive producer. He may also strive to acquire more market power, in practice.

Comparison of Assumptions Regarding Market Conditions

Assumptions of the competitive and monopoly market models sharply differ from each other as follows:

- **Number of Sellers.** In a perfectly competitive market, there is a large number of sellers. In a monopolistic market, there is only a single seller.
- **Control over Market Supply.** A competitive firm has no control over the market supply. Its action is insignificant in the market because its individual supply is just a fraction of the total market supply. A monopolist, on the other hand, has full control over the market supply.
- **Industry.** In a competitive model, many firms producing homogeneous products constitute an industry.

In a monopolistic market, the monopolistic firm is itself the industry.

- **Entry Conditions.** Perfect competition is characterised by the free entry and exit of the firms. There are no entry-barriers. In a monopolistic market, entry of rivals is blocked.
- **Degree of Knowledge.** Perfect knowledge about market conditions is assumed on the part of participants in both market structures — perfect competition and monopoly.

Comparison of Behavioural Rules of the Firm

- A competitive firm is a price-taker. A monopolistic firm is a price-maker.
- The demand curve confronted by a competitive firm for its product is perfectly elastic. It is a horizontal straight-line. It implies that the firm can sell any amount of output at the ruling market price. While the demand curve confronted by a monopolist

is relatively inelastic. It is a downward sloping curve. It suggests that the monopolist can sell more only by lowering price.

- To a competitive firm, price is given in the market. So at that price, the average and marginal revenue will be the same. Hence, *AR* and *MR* curves coincide and are represented through the demand curve which is horizontal straight-line. In the case of monopoly, the downward sloping demand curve represents the *AR* curve. The *MR* curve also slopes downwards, but it lies below the *AR* curve. If it is linear, then it lies at half the distance between the price axis and the demand curve.
- It follows that a major difference between a competitive equilibrium and a monopoly equilibrium is that whilst in the case of the former, the *MC* curve of the firm must be rising at or near the equilibrium level of output, in the case of the latter this is not essential. A monopoly firm can attain equilibrium under any state of returns to scale or cost conditions, whether constant, rising or falling. The fundamental condition of monopoly equilibrium that must be satisfied is $MC = MR$, and the *MC* curve must intersect the *MR* curve from below (yet it need not necessarily be rising).

Monopoly Equilibrium Under Different Costs Conditions

A detailed observation of monopoly equilibrium under different conditions of returns to scale and corresponding cost behaviour is made through diagrams, as in Figure 15.3.

- **Rising Costs.** In some industries there are diminishing returns or increasing costs. The situation is described in Figure 15.3(A). The average cost and the marginal cost curves are rising upward. The equilibrium output is *OQ*. Correspondingly, *PQ* is the price set. The shaded rectangle *PABC* shows the excess monopoly profit. It may be noted that, in this case, the monopolist would not like to expand his output. Thus, by restricting output, he can charge a very high price and earn supernormal profit. Briefly, under conditions of diminishing returns or increasing costs, the monopoly price tends to be much higher than the competitive price.
- **Constant Costs.** Some industries may work under conditions of constant costs. In that case, marginal and average costs remain constant. Thus, the *MC* and *AC* curves coincide in a horizontal straight-line. This condition is incompatible with a competitive firm's equilibrium because a horizontal straight-line will represent *AC*, *MC*, *MR* and *AR* together; so there cannot be any intersection point representing an equilibrium position. A monopolist, however, can be at equilibrium in this case, as shown in Figure 15.3.

Panel *A* represents rising costs condition. Panel *B* portrays constant costs. Panel *C* shows decreasing costs condition. Corresponding monopoly equilibrium positions are easily comparable in this diagram.

Here, the equilibrium output is *OQ* and the monopoly price is *PQ*. The monopoly profit is *PABC*, the shaded rectangle. It may be noticed that the level of output in such a case does not affect the average cost of production; so the monopolist is not concerned with the size of production. Hence, the cost condition being constant remains a neutral factor. The monopoly price is, therefore, primarily determined by the position of demand.

- **Decreasing Costs.** Some lines of production may be operating under conditions of increasing returns or decreasing average and marginal costs. Falling cost conditions are incompatible with perfect competition. But monopoly equilibrium is possible even under such a condition.

  Indeed, a firm with a falling *MC* curve can never remain only a small supplier of the total market output. It increases its output to exploit fully the economies of large scale production. Eventually, it continues to expand and increase profits till it completely dominates the market. In Figure 15.3(C), the monopoly equilibrium is depicted by falling average and marginal costs. Equilibrium output is *OQ*, monopoly price is *PQ* and monopoly profit is *PARC*. It must be noticed that the *MC* curve cuts the *MR* curve from below, yet at equilibrium output, it continues to fall.

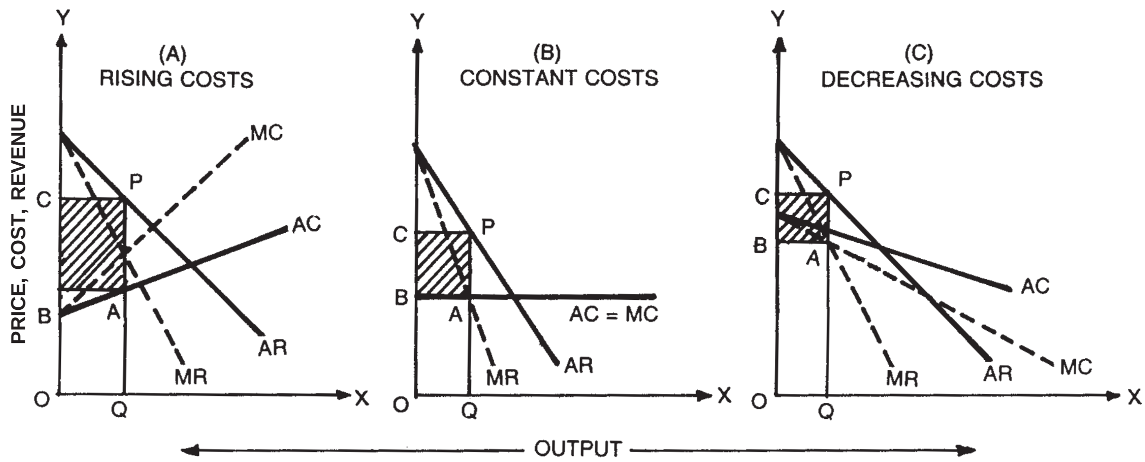


Fig. 15.3: Monopoly Equilibrium Under Different Cost Conditions

If, however, the *MC* curve falls more rapidly than the *MR* curve, then there is no chance of any intersection between the two and in such a case equilibrium is not possible. Thus, the situation in which the *MC* curve is steeper than the *MR* curve and lies much below the *MR* curve is incompatible with monopoly equilibrium. This is, however, a rarity. But, in the long-run, the *MC* curve tends to fall more swiftly than the *MR* curve.

Comparison of Long-run Market Equilibrium

To compare between the long-run equilibria of the perfectly competitive firm and the monopolistic firm, we may refer to the following idealised diagrams (as in Fig. 15.4 Panel *A* and *B*).

In these figures, we have not mentioned prefix *'L'* to denote 'long-run' to the cost and revenue functions, just for the sake of convenience in exposition of the analysis.

Relationship between Price and MC. Comparing the long-run equilibrium conditions of the two models, we find that though the fundamental rule of profit maximisation is the same, *i.e.*, equating *MC* with *MR*, the characteristic difference lies with respect to price or average revenue and *MC*. In perfect competition, price = *AR* = *MR*; thus, at equilibrium output, *MC* = price. In monopoly, on the other hand *MR* < *AR* or price at all levels of output; at equilibrium point, thus, *MC* = *MR*, but it will be less than price. Briefly, thus, under competition, price = *MC*, under monopoly price > *MC*.

Panel *A* represents competitive firm's equilibrium. Panel *B* represents monopoly firm's equilibrium. Monopoly price *PM* is higher than competitive price *OP*. Competitive output *OQ* is more than monopoly output *OM*. Competitive firm gets normal profit. Monopoly firm makes monopoly profit *PABC*.

Mrs. Joan Robinson specifies an empirical relationship between the monopoly price and *MC* as follows:

$$\text{Price} = MC \times \frac{e}{e-1}$$

Where, e stands for the price elasticity of demand.

This means, the exact level of monopoly price will depend upon the relative strength of the elasticity of demand and the marginal cost. Greater the inelasticity of the demand curve (steeper the slope of the curve), the higher the monopoly price.

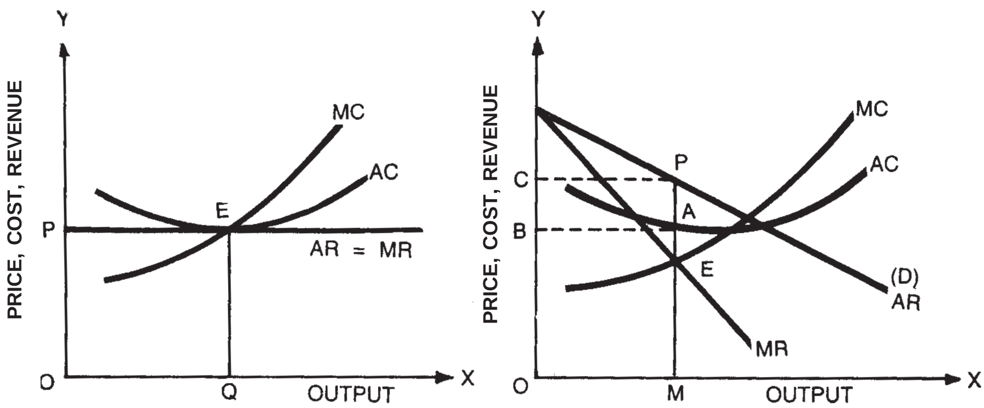


Fig. 15.4: Comparison between Equilibrium Positions Under Competition and Monopoly

Monopoly equilibrium is, however, always set in the elastic segment of the demand curve. This is because, under monopoly equilibrium, since *MR* = *MC*, we have:

$$P \text{ or } A = MR \times \frac{(e-1)}{e}$$

Alternatively:

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

Thus,

(a) When $e > 1$; *MR* is positive.

(b) When $e = 1$; *MR* is zero.

(c) When $e < 1$; *MR* is negative.

In Fig. 15.5, *MR* is zero at point *B*, corresponding to which point *A* in the demand curve measures $e = 1$.

Any equilibrium point (*E*) of the monopoly firm will lie between *P* and *B*, but not at *B*, that is, on the positive side of the *MR* curve, which lies in the *PA* segment of the demand curve which is relatively elastic ($e > 1$).

Since any point on or beyond *B* is also ruled out under monopoly equilibrium, it follows that the demand curve or *AR* curve cannot cut the X-axis though the *MR* curve can. Because, inelastic segment of the demand curve between *A* and *D* implies negative *MR*, with which positive *MC* curve cannot intersect, and the *MC* can never be negative. Evidently, the following two conditions are proved under monopoly equilibrium:

(i) The demand curve (or *AR* curve) of the monopolist cannot cut the X-axis, though the *MR* curve may.

(ii) The equilibrium condition of the monopolist, *i.e.*, *MR* = *MC* occurs in the elastic segment of the demand curve.

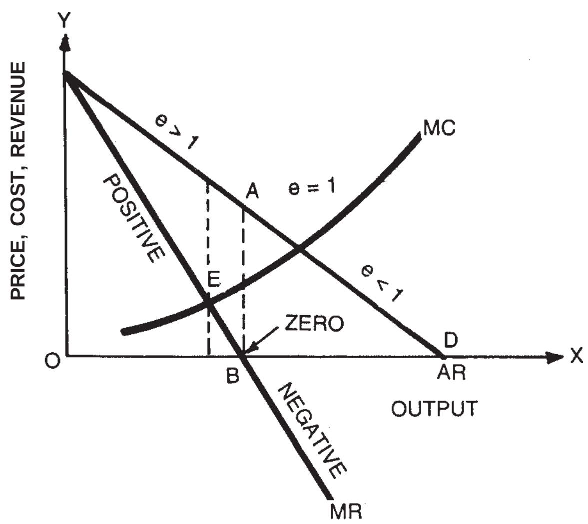


Fig. 15.5: Monopoly *AR* & *MR* and Equilibrium

It should be noted that the price set by a monopolist is not equated to *MC* but stands above it and determined in relation to the demand curve. In monopoly, *MC* associates cost and quantity, not price and quantity. Thus, though the marginal cost curve plays an important role in determining equilibrium output, unlike in a competitive firm, in case of monopoly, it does not function as the supply curve. The supply curve is related to the price and output. In a competitive model, the firm equates price and *MC* because, Price = *MR*. So, the *MC* curve is directly associated with equilibrium price and output; hence, it functions as the supply curve as well. While in the case of a monopoly firm, the *MC* curve is not directly associated with price and output, but only with output, while price is based on the demand curve (or the average revenue curve). As such, analytically speaking, the *MC* curve of a monopoly firm cannot be just reproduced as the supply curve.

- **Output and Cost Conditions.** Monopoly price is often associated with an output the average cost of which is still falling. Often the *MC* curve cuts the *MR* curve to the left of the lowest point of the *AC* curve. The chief reason for this restriction of output is that as output increases the unit revenue or the price falls, and marginal revenue drops below this declining price, whereas marginal cost is likely to mount. Incidentally, under perfect competition, it pays a firm to expand production when the average cost is falling in as much as the price and marginal revenue both stay as high for a large output as for a small output. But, in a monopoly it does not pay to expand output to a great extent as price and *MR* tend to fall, while *MC* tends to rise though *AC* may be falling.
- **Magnitudes of Price and Output.** Usually, the monopoly price tends to be higher while the monopoly output smaller than that under perfect competition. A direct comparison of price and output under monopoly and competition is, however, difficult because a competitive firm is just a part of the industry as a whole, while a monopoly firm is an industry by itself. In a much simplified way, however, under special assumptions, such a comparison may be made as shown in Figure 15.6.

Monopoly price P_2M_2 > Competitive Price P_lM_1.

Monopoly output OM_2 < Competitive output OM_1.

In Fig. 15.6, *DD* and *SS* are the industry's demand and supply curves in a competitive market. The market price P_1M_1 is determined by the intersection of the *DD* and *SS* curves. The industry's equilibrium output is OM_1. Now, let us assume that all the firms in this industry combine together by forming a cartel and acquire a monopolistic position in the market. It is also assumed that all the firms have identical cost conditions and the business combination does not result in any extra economies of scale. Hence, the *SS* curve of the industry now functions as the *MC* curve for the cartel. A cartel being a monopoly institution, it will not set its equilibrium output at which $MC = MR$. In relation to the demand curve *DD* (which, in turn, is the *AR* curve), the *MR* curve is drawn, which is intersected by the *MC* curve at point *B*. Corresponding to this point *B,* OM_2 output is determined and P_2M_2 price is charged. It is easy to see that $P_2M_2 > P_1M_1$ (P_2M_2 is monopoly price while P_1M_1 is competitive price). Again, $OM_2 < OM_1$ (OM_2 is monopoly output while OM_1 is competitive output).

It follows that, price is higher and output less under monopoly market than in a competitive market. From the social and consumer point of view, competition seems to be less advantageous than monopoly in normal circumstances.

- **Profit.** In a perfect normal equilibrium condition of a firm under competition, in the long run only normal profit is realised. In the case of a monopoly, excess monopoly profit can be earned even in the long-run. In fact, the positive difference between price and *MC* in a monopoly gives excess profit. In short, under perfect competition normally there is no possibility of abnormal profits in the long-run, while a monopolistic firm can earn abnormal profits in the long-run.

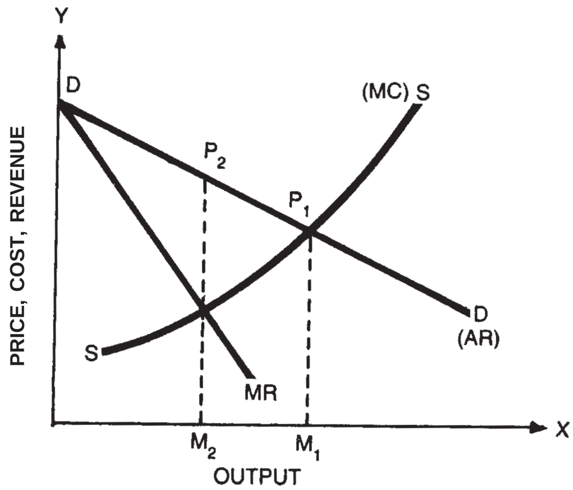


Fig. 15.6: Monopoly and Competitive Price and Output

- **Capacity Utilisation.** In the long-run, when the competitive firm gets only normal profit, it operates at the minimum point of the *LAC* curve. Hence, the competitive firm tends to be of optimum size. The normal capacity of a competitive firm is fully exhausted in the long-run. A monopoly firm, on the other hand, attains equilibrium at the falling path of the *AC* curve, which means it does not utilise its plant capacity to the full extent. The 'excess capacity' in the monopoly firm, thus, causes it to be of less than optimum size.

Monopoly vs. Competition

Under the assumption of a linear (constant) cost function, the following model demonstrates the monopoly and competitive price output differences.

Pm = Monopoly price;

Qm = Monopoly output;

Pc = Competitive price;

Qc = Competitive output;

CAB = Consumer surplus/welfare

On Figure 15.7, monopoly price (*Pm*) is higher than the competitive price (*Pc*). While, monopoly output (*Qm*) is less than the competitive output (*Qc*). Monopoly in the market as against the competition, therefore, implies a low level of consumer surplus/welfare, represented by the shaded triangle *CAB*. This suggests that with a shift from monopoly to a competitive market situation, the consumer surplus/welfare gain is improved to the extent of *CAB*. It is also implied that there is allocation inefficiency of resource use under monopoly situation as output is restricted up to *Qm*. Changing to competition means increase in output up to *Qc* under the same given resource availability — which means a more efficient allocation/use of the productive resources. In short, monopoly market situation indicates misallocation of resources, whereas competitive market situation indicates optimum allocation/use of resources. It is, therefore, required that the government's role is to intervene in the functioning of market in order to check the growth of monopoly and encourage/facilitate competition in the market economy, thus to uplift the welfare contour of the national economic society.

8. MISCONCEPTIONS ABOUT MONOPOLY PRICING AND PROFITS

It is commonly alleged that a monopolist can always charge a very high price and earn high profits because he has control over the market supply and is a price-maker. This is really not so. A monopolist cannot determine price on the basis of his supply alone. He has to consider the demand aspect as well. In fact, the monopoly price is determined by the relative strength of the forces of demand and supply. Again, while determining the equilibrium price and output, the monopolist is interested in maximum sales because he wants to maximise total profits and not unit profits. So, if the demand is slack, he will have to set a low price corresponding to profit maximising condition: $MC = MR$. Again, it is also erroneous to take it for granted that the monopolist's price is always higher than the competitive price. It, in fact, depends on various considerations. If the demand is highly inelastic, while the supply is under conditions of increasing costs, then the monopolist will restrict output in order to produce at a lower cost and earn a higher profit. Under these circumstances, obviously, the monopoly price will be very high compared to the competitive price. For example, private monopoly is socially harmful in respect of production and sale of essential agricultural commodities like foodgrains for which the demand is highly inelastic while the supply is under increasing costs on account of the law of diminishing returns operating on land.

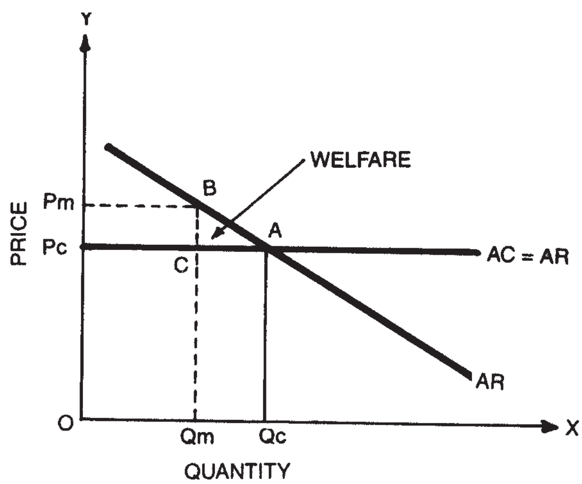


Fig. 15.7: Monopoly/Competitive Model

If, on the other hand, the demand is highly inelastic, but the supply is under increasing returns or decreasing costs condition, the monopoly price would tend to be nearer the competitive price. In such cases, monopoly can be socially tolerated. For instance, in producing comforts and luxury items, if a private monopolist invests huge capital, thereby enjoying the economies of scale so that he may supply goods at a low price at a competitive rate, then, such monopoly can be tolerated. Again, when there is a very limited market for a product a monopolist can supply it at a lower price on account of its low cost of production due to large-scale economies than what is feasible in a competitive market by a large number of firms producing the goods on a small-scale. The competitive market price in such a case will tend to be high because though $P = AC$, under competition, the AC itself tends to be high due to lack of economies of scale and the small scale of production adopted by each firm. If, however, there is a monopoly which has to cater to the entire market; it would resort to a large scale production. Hence, the output will be produced at a much lower cost, so even if the monopolist sets a higher price than AC for the sake of high profit, it may relatively turn out to be lower than that of the competitive firm.

Similarly, it is also incorrect to say that the monopolist can always earn abnormally high monopoly profit due to his advantageous position in the market. In many cases, demand and cost situation may not be very favourable to the monopolist, so that he cannot make profits. In the long-run, the monopolist may be under the threat of new entry in his line of production, so that he may resort to price limit which gives him a lower profit but not a high maximum profit. Potential competition, thus, serves as a significant constraint on the behaviour of the monopolist. Again, in some cases, the demand situation may be such that the demand curve or the average revenue curve in the long run may be just tangent to the *LAC* curve. In this case, the monopolist would earn only a normal profit (See Fig. 15.8 to understand the situation).

Since PM price $= LAC$, monopoly firm earns only normal profit.

In Figure 15.8, the monopolist decides an equilibrium output OM, and charges PM price. Since the AR curve is tangent to the LAC curve at point P, Price = Average Revenue = Average Cost. Hence, the monopolist simply earns a normal profit.

The only difference between such normal profit monopoly equilibrium and competitive equilibrium is that the monopolist is producing at less than optimum size, *i.e.*, at a higher average cost, while a competitive firm, earning normal profit, would be producing at a minimum average cost, *i.e.*, it has an optimum size. In other words, under monopoly, eventhough there is just a normal profit earned, there is unutilised capacity of the plant and resources, while in a competitive firm's equilibrium, the normal capacity is fully utilised.

Anyway, it can be concluded from the above discussion that the monopolist cannot always earn high monopoly profits. Again, the monopolist in the long-run should earn at least normal profits, otherwise he cannot survive. A monopolist finding the cost situation much above the demand consideration in the long-run has no alternative but to wind up his business.

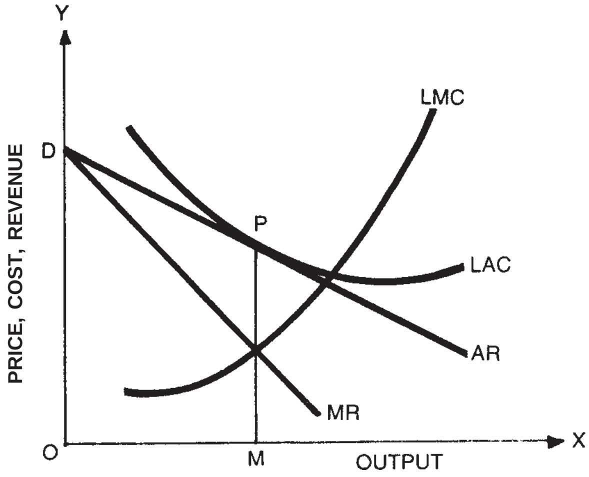


Fig. 15.8: Normal Profit Monopoly Equilibrium

Monopoly Equilibrium with a Loss

A monopolist may be operating at a loss in the short-run. Short-run monopoly equilibrium with a loss is illustrated in Figure 15.9.

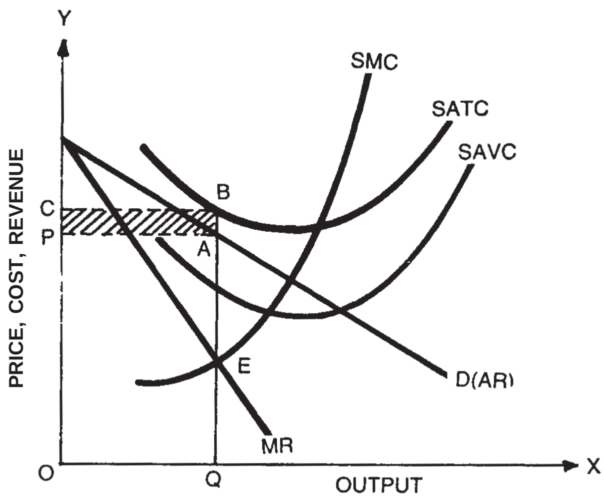


Fig. 15.9: Loss-making Monopoly Firm's Equilibrium

In Figure 15.9, equilibrium point *E* is determined by the intersection of *MR* curve with *SMC* curve. Producing *OQ* equilibrium output, which is to be sold at *OP* price, the firm incurs loss *AR* per unit for failing to recover full average cost. Area *PABC* measures total loss.

PABC measures the loss.

In the long-run, when the monopolist finds that the demand condition is such that he cannot cover up long-run average cost, nor is it possible to lower the cost function, he quits. Figure 15.10 represents such a case of a quitting monopolist.

LAC is above *LAR*, therefore, unbearable loss.

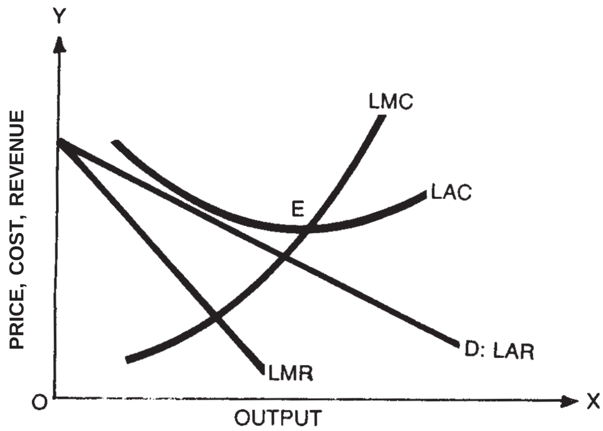


Fig. 15.10: Long Run Loss: Monopolist Quits

In Figure 15.10, *LAC*, curve is above *LAR* curve, therefore, any equilibrium position, such as *E*, suggests that there is a permanent loss to the firm, so it must quit.

Monopoly in Sporting Industry

Recently monopoly elements in sports have emerged as lucrative business and become a sensitive issue in the West and other parts of the world, as there tends to be monopolistic deals between sporting organisations and broadcasting corporations. In many cases, monopoly in sports is abused by the sporting authorities by using their control and rights in charging exorbitant price for the broadcasts of the games on TV For instance, the English Premier League charged about $1 billion to the BSkyB for the rights to broadcast a fraction of its matches via satellite in Britain. Likewise, the National Football League (NFL) in the USA asked for about $15 billion for broadcasting its matches on American TV networks. It is a matter of fact that the NFL managed price discrimination tactics to apportion rights among several broadcasters to maximise its profits.

To regulate such monopoly power of the purveyors of sport, it is suggested that the government intervention is socially desirable. Julian Le Grand and Bill Hew, both of the London School of Economics have recommended that a government agency should control the prices broadcasters charge viewers, so that broadcasting fees paid for the sport rights would hold down (See, *Economist,* London, 17 Feb. 98, p. 82).

But, this is not a simple proposition to put into practice, for the viewers do not pay the prices directly. They pay indirectly: through taxes to finance the government owned broadcasting through additional advertisement time, and high adverisement expenditure included in products they buy, high subscription fees for cable or satellite channels, and so on.

Another solution lies in encouraging competition among the sporting teams in each popular game. Anti-trust authorities have to make some concrete efforts in this direction.

MODEL QUESTIONS

1. Define monopoly. How does a firm attain equilibrium under monopoly?
2. What is monopoly? How does a monopoly firm attain equilibrium under different cost conditions?
3. Define Monopoly. How is monopoly price determined?
4. (a) What are the sources of monopoly power?
   (b) Describe the major types of monopoly.
   (c) What are the measures of monopoly power?
5. Compare Perfect Competition models with Monopoly models of market structures.
6. Examine the following statements:
   (a) A monopolist seeks to earn a maximum unit profit.
   (b) Pure monopoly is far from frequent.
   (c) The monopolist is a price-maker; the competitive producer is a price-taker.
   (d) Monopoly price is always higher than the competitive price.
   (e) A monopolist never earns normal profits.
   (f) Under monopoly, price is higher and output is restricted.
7. Compare the long-run equilibrium of a firm in a perfectly competititve and a monopolistic market.
8. "Monopoly price need not necessarily be high." Examine this statement theoretically and indicate some cases in practice.

Problems

1. If Qx = 60 – Px

   TC = 60 – 6Q + $12Q^2$

   Q = demand in million

   P = price

   TC = Total cost

   Determine monopoly firm's output.
2. A monopoly firm has the following:

   Cost function: $TC_x = 1000 - 100Q_x + 200Q_x^2$

   Demand function: $Dx = 1000 - Px$. Determine its profit maximising quantity.

❐ ❐ ❐

Monopoly: Price Discrimination

16
CHAPTER

1. MEANING OF PRICE DISCRIMINATION

A monopoly firm which adopts the policy of price discrimination is referred to as a discriminating monopoly. Price discrimination implies the act of selling the output of the same product at different prices in different markets or to different buyers.

In a broad sense, price discrimination occurs in two ways: *(i)* by charging different prices for the same product, and *(ii)* by not setting prices of different varieties of products or different products in relation to their cost differences. In the theory of discriminating monopolies, however, for the sake of simplicity and convenience, the meaning of price discrimination is basically confined to the former notion, *i.e.,* charging of different prices for the same product to different buyers or in different markets. Indeed, the conclusion arrived at from this simple variation of price discrimination can be extended to a more complicated version.

2. FORMS OF PRICE DISCRIMINATION

Price discrimination may take many forms and guises. The common forms of price discrimination may be stated as under:

- **Personal discrimination.** Generally, depending upon the economic status of buyers, different prices may be charged to different buyers in providing similar services. For example, a surgeon may charge a high operation fee to a rich patient and a lower fee to a poor one. Similarly, lawyers may charge different fees to different types of clients depending on theirincome status. A teacher also discriminates between rich and poor students as regards his private tuition fees.
- **Age discrimination.** Price discrimination may be based on the basis of age of the buyers. Usually, buyers are grouped into children and adults. Thus, for instance, a

barber may charge lower rates for children's haircuts than those for adults. In railways and bus transport services, it is a commonly adopted form of price discrimination that persons below 12 years of age are charged at half the rates.

- **Sex discrimination.** In selling certain goods, producers may discriminate between male and female buyers by charging low prices to females. For instance, a tour organising firm may provide seats to ladies at concessional rates. In certain cinema houses in small towns, a *Zenana* show may be arranged at concessional rates for ladies only.
- **Locational or territorial discrimination.** When a monopolist charges different prices in different markets located at different places, it is called locational or geographical discrimination. For instance, a film producer may sell distribution rights to different film distributors in different territories at different prices. Similarly, a firm may discriminate between domestic markets and export markets for its products.
- **Size discrimination.** On the basis of size or quantity of the product, different prices may be charged. For instance, an economy size toothpaste tube is relatively cheaper than a small size tube. Similarly, a product is sold in the retail market at a higher price than in the wholesale market by the producer.
- **Quality variation discrimination.** On the basis of some qualitative differences, different prices may be charged for the same product. For instance, a publisher may sell a deluxe edition of the same book at a higher price than its paperback edition. Quality variation may be in the form of material used, the nature of packing, colour, style, etc. Thus, jellies packed in tins are sold at a lower price than in bottles. A tailor charges higher stitching charges for a safari bush shirt than for an ordinary shirt. A particular print or colour saree may be priced higher than other sarees of the same cloth.
- **Special service or comforts.** Price discrimination may also be resorted to on the basis of special facilities or comforts. Railways, for instance, charge different fares for the first class and second class travel. Similarly, cinema houses keep different admission rates for stalls, upper stalls, dress circle and balcony. Likewise, restaurants charge different rates for special rooms and general tables. In a hospital also, charges for special wards and general wards are different.

Following Prof. Watson we may summarise the Basis of Price Discrimination as follows:

Main Classes	Basis of Discrimination	Illustrations
1. Product:	(a) Quality	Better quality, higher prices; e.g., deluxe models of TV Sets.
	(b) Labels	Higher prices for labelled or branded products and lower prices for unbranded products like video cassettes, etc.
	(c) Size	Large-size — higher price.
	(d) Time	Off-season rates, excursion rates in transport.

2. Personal:	Income	Doctor's fees.
3. Group:	(i) Age (ii) Sex (iii) Military status (iv) Location (v) Status of buyers (vi) Use of product	Children's fare. Concessional rates to ladies in tours. Lower admission charge for men in uniform. Zone prices. Lower export prices. Concessions to students. Electricity charges for domestic use and commercial use.

- **Use discrimination.** Sometimes, depending on the kind of use of the product, different rates may be charged. For instance, an electricity distribution company may charge low rates for domestic consumption of electricity while still lower rates for industrial use as compared to the higher rates for light and fan.
- **Time discrimination.** On the basis of the time of service, different rates may be charged. For instance, cinema houses charge lower rates of admission for morning and matinee shows than for regular shows. Similarly, the telephone company charges half-rates for trunk-calls at night.
- **Nature of commodity discrimination.** Sometimes, because of the nature of a commodity, price discrimination may be made, for instance, freight charges by the railways are different for coal and iron for the same distance.

3. DEGREES OF PRICE DISCRIMINATION

The extent and mode of price discrimination depend on circumstances. Professor Pigou, however, distinguishes between three degrees of price discrimination, *viz*.: *(i)* first degree price discrimination, *(ii)* second-degree price discrimination, and *(iii)* third-degree price discrimination.

First Degree Price Discrimination

It is the extreme case of price discrimination. Under this, the monopolist charges different prices to different buyers for each different unit of the same product. The price charged for each unit, in each buyer's case, is set in accordance with the marginal utility the buyer estimates and thus at what maximum price he is willing to pay for it. Under first degree price discrimination, the entire consumer's surplus of the buyer is converted into monopolist revenue and profits. Here, the demand curve itself becomes the *MR* curve of the monopolist (See Fig. 16.1). Mrs. Joan Robinson describes this as 'perfect discrimination.' It is possible only when buyers are few so that each one can be dealt with individually and the monopolist fully knows what maximum they would pay for each unit of his product. This being a rare phenomenon, the discrimination of first degree is almost a rarity.

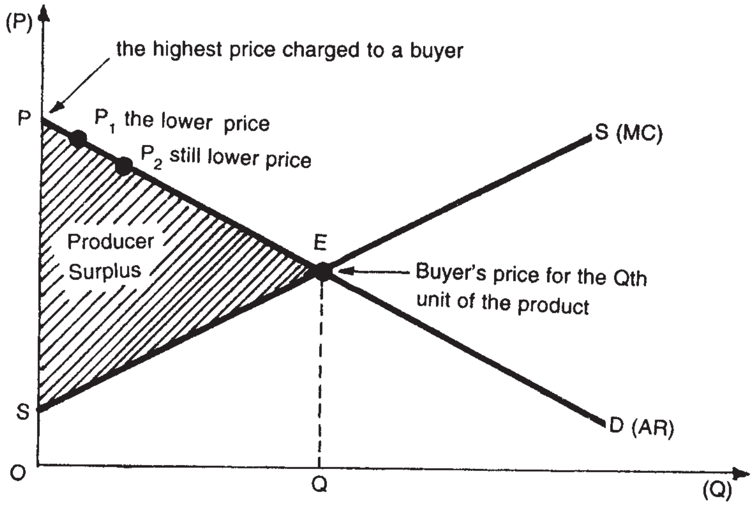


Fig. 16.1: Perfect Price Discrimination: (First Degree)

Perfect Price Discrimination

First degree price discrimination may better be called perfect price discrimination.

When a monopolist can charge each buyer the highest price that he/she is willing to pay, the price discrimination is perfect. Figure 16.1 illustrates perfect price discrimination theoretically through a diagrammatic model.

The monopoly firm equates its supply curve with demand curve and produces *OQ* equilibrium level of output. The firm charges each buyer a price which he is willing to pay the most highest say, he may be charging Rs. 19 to a buyer which he is willing to pay utmost. He charges Rs. 9 to a buyer who is willing to pay only up to Rs. 9 for the unit and so on. When the price is charged to each buyer in accordance with what he is willing to pay utmost, there is no consumer surplus left with any buyer. In other words, the entire consumer surplus is converted into producer surplus. The producer surplus is shown as PSE in this diagram. Under perfect price discrimination, thus the monopolist maximises its profit to this extent.

There are two major problems encountered in resorting to perfect price discrimination. First, the monopolist should know perfectly well as to how much maximum price a buyer is willing to pay. This the buyer may not intend to reveal correctly. Second, there should be no possibility of reselling.

In practice, these conditions cannot be met perfectly well. Often, therefore, price discrimination tends to be imperfect. It may be of a second degree or third degree price discrimination.

Second-Degree Price Discrimination

Under this category of price discrimination, the monopolist sells blocks of output at different prices. Here, the possible maximum price is charged for some given minimum block of output purchased by the buyer and then the additional blocks are sold at successively lower prices. However, the units in a particular block will be uniformly priced.

Thus, when first degree price discrimination is a case of unit wise differing prices, the second degree price discrimination is a case of block wise differing prices. In the second degree price discrimination, the monopolist captures a part of the consumer's surplus and not the whole of it. In each group or market, the marginal buyers, of course, do not get any consumer's surplus, as the price is equal to what they are prepared to pay, while intramarginal buyers receive some consumer's surplus for what they have been asked to pay is actually less than what they are willing to pay for the commodity. This sort of price discrimination is feasible when the total market for the product is very wide, with a large number of buyers having different tastes, different incomes, and different conditions, so that subdivisions of the market or groups of buyers can be easily made.

Thus, in the case of public utilities, like supply of electricity, telephone services, gas services, rail and bus transport services, etc., the services are given in blocks of small units, such as kilowatt hours of electricity, minutes of telephoning, cubic feet of gas, kilometres of distance, etc., that can be easily measured, recorded and billed. A graphical illustration of second degree price discrimination is given in Figure 16.3.

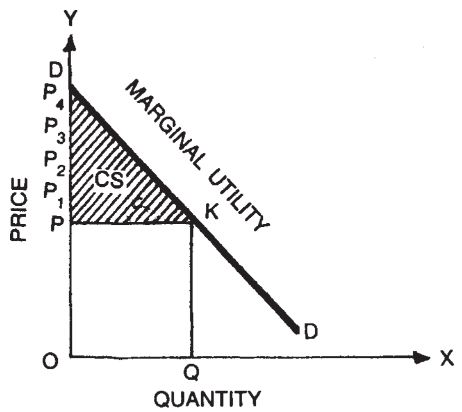


Fig. 16.2: Price Discrimination (First Degree)

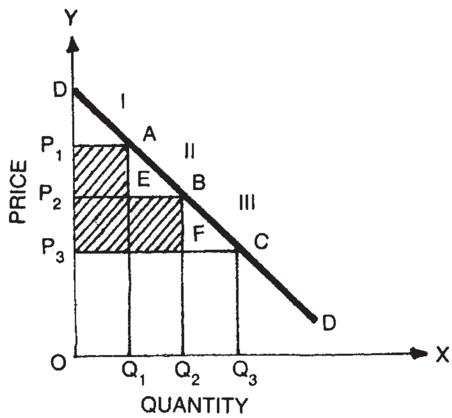


Fig. 16.3: Price Discrimination (Second Degree)

In Figure 16.3, *DD* is the market demand curve for electricity in a region. Say, the monopolist produces output OQ_3, which can be sold at OP_3 uniform price. Then, the total revenue of the monopolist would be: $OP_3\ GQ_3$. Instead, if price discrimination is adopted, total revenue can be enhanced. The market demand may be divided into say three groups. Their limits are represented by points *A, B*, and *C*. Thus, OQ_1 amount may be sold in the first group (I) at OP_1, $Q_1\ Q_2$ amount is sold in group II at OP_2 price, and Q_2Q_3 is sold to group III at OP_3 price. Thus, under price discrimination the total revenue of the monopolist becomes the sum of the three rectangles: $OP_1AQ_1 + Q_1\ EBQ_2 + Q_2FCQ_3$ area $OP_1\ AEBFCQ_3$, which is obviously greater than OP_3GQ_3.

Third Degree Price Discrimination

Third degree price discrimination is the most common type of monopolist price discrimination in which the firm divides its total output into many submarkets and sets different prices for its product in each market in relation to the demand elasticities. The third degree price discrimination, thus, crucially differs from the second degree one in one respect that in the latter case, the price tends to be minimum as per the marginal utility of the marginal buyers, while in the case of the former, price depends on the allocation of output and the related demand elasticities in each market. For allocations of output, the monopolist would follow the principle of equi-marginal revenue, *i.e.*, total output in each market will be distributed for sale in such a way that from each market, the resulting marginal revenue should be equal, so that the revenue is the maximum. Different prices are charged in different market, but in each market, buyers are treated equally.

Figure 16.4 represents the case of third degree price discrimination. Two markets are taken into account. Demand curves for Market I and Market II are D_1 and D_2, respectively. D_1 is less elastic and D_2 is more elastic demand curve. When the monopoly firm produces Q_1Q_2 total output, it distributes OQ_1 amount in Market I and OQ_2 in Market II. OP_1 price is set in Market I and OP_2 price in Market II.

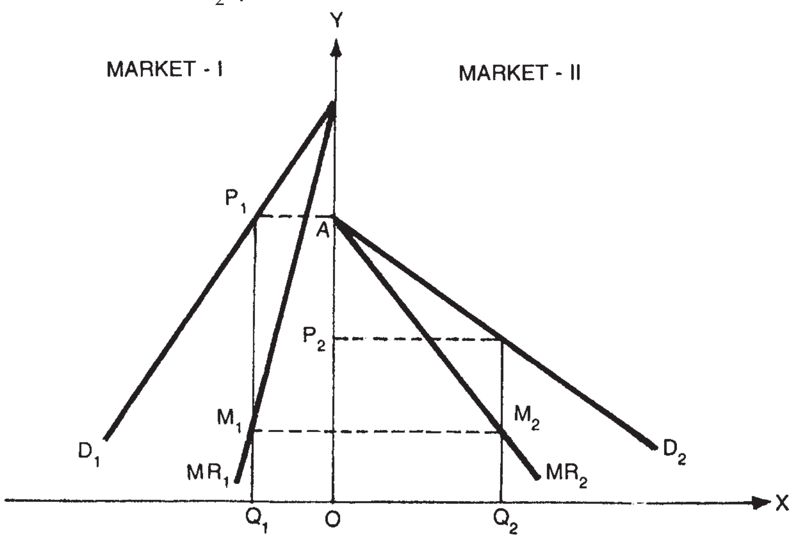


Fig. 16.4: Third Degree Price Discrimination

OP_1 is a higher price charged in Market I having less elastic demand for the product than OP_2 price charged in Market II (having more elastic demand). In this way, however, marginal revenues from both markets are equated ($M_1Q_1 = M_2Q_2$).

The theory of discriminating monopoly is usually confined to the third degree price discrimination which is a very practicable method. For theoretical details, refer to Figure 16.6.

Price Discrimination Strategy

Third degree price discrimination strategy is also referred to as group pricing or zone pricing. In this strategy, markets are separated into different groups and zones of the buyers and different price are charged to the groups in relation to their demand elasticities. The zone having inelastic demand for the product is charged higher price, and the zone having more elastic demand for the product is charged a lower price.

Further, a price discrimination strategy called 'versioning' is becaming popular in many businesses today. Different versions of a product to different groups of buyers are offered at different prices catering to their varying needs and desires. For example, DVD version and VCD version of same movie is offered by the music company and the DVD copy is sold at a higher price than the VCD copy.

'Bundling' is another method of price discrimination. Items of multiple products are bundled together in a package. Package deal is made cheaper than the total prices of individual items sold. For example, a T.V. set is separately charged at Rs. 25,000 and the DVD player at Rs. 8,000. But, in a package deal of bundling the price may be quoted as Rs. 30,000.

'Two-layers Pricing' is also a mode of price discrimination adopted by some organisations in order to enhance their profits, especially in Travel Resorts or Health Clubs. For example, a fixed membership or admission fee is charged to the consumers for the right is enter or buy a product and then in addition variable prices for the different units of the products or services purchased by them.

Another form of third degree price discrimination is 'Promotional Coupons Sales'. Under this system, those buyers who attach coupons or vouchers are charged a discounted lower price than the customers who buy at regular prices. Time to time, some organisations, Pizza-Hut, for instance, advertises promotional sales coupons on some dates in a newspaper. Like-wise, budget airlines, such as Air-Asia in Malaysia and Thailand offer different blocks of lower prices for travel during different periods on the same routes and destinations to the on-lines buyers. Early birds – customers grabs the advantage of the lower prices, while others have to pay higher prices for the same services.

Cannibalisation

Under discriminating monopoly, sometimes there is a chance of cannibalisation occurring when the sales of low-priced segmented product demand may cause a decline in the demand for the high-price segmented product. For example, high-income group families occupying standard rooms in hotels, thus, quite likely that in off-seasons, the demand for standard rooms rises, while that for deluxe rooms declines. That is to say, the sales of standard rooms have cannibalise the demand for deluxe rooms. Likewise, the sales of promotional discount-price shirts may cannibalise the demand for the new arrival shirts.

Cannibalisation may take place when the seller has no power to discriminate directly by perfectly separating the buyer segments in the market. The monopolist, thus, chooses to rely on a direct segment discrimination based on the product.

Cannibalisation, however, can be mitigated in various ways:

- Choose the product design reflecting an equivalent degradation of low-priced product and upgradation of high-priced product. That means, products are differented much along with price discrimination. Of course, then there is no pure price discrimination based on the homogeneity of products.
- Introduce multiple discrimination product variables. In a package of restricted economy class fares, the airline, for instance, may put several conditions to avoid cannibalisation of the demand at normal fares.
- Make demand-supply adjustment. In promotional low fares ticketing, the airlines, may limit its range for instance much lower than the normal fare ticket provision. Budget airlines are practing this kind of pricing strategy to do away with the problem of cannibalisation of demand under segmented price discrimination.

4. THE INGREDIENTS FOR DISCRIMINATING MONOPOLY: CONDITIONS ESSENTIAL FOR PRICE DISCRIMINATION

The following are the essential conditions enabling the firm to resort to price discrimination:

- **Monopoly.** Monopoly is a prerequisite of price discrimination. Undoubtedly, price discrimination is incompatible with perfect competition, because, as there are many sellers selling a homogeneous product, if one seller quotes a higher price to a group of buyers, who know the ruling market price, it is quite likely that they will go to other sellers. Under a monopoly, price discrimination is possible because even though different buyers would know that they are differently charged, they have no alternative source of buying the product. Monopoly is a necessary but a sufficient condition to engage in price discrimination. Other ingredients for price discrimination are as follows:
- **Segmentation of the market.** The monopolist should be in a position to segment the market by classifying the buyers into separate groups. When total market is divided into submarkets, each submarket acquires a separate identity so that one submarket has no connection with the others. Again, consumers have no inclination to move from a high priced market to a low priced one, either due to ignorance or absence of inertia.
- **Apparent product differentiation.** Through artificial differences in the same product, such as differences in packing, brand name, etc., an apparent product differentiation may be created, so that it can be sold to the poor and the rich consumers at different prices. Price discrimination, with product differentiation, is tolerated by buyers.
- **Buyers' illusion.** When consumers have an irrational attitude that high priced goods are always highly qualitative, a monopolist can resort to price discrimination. Obviously, there is hardly any difference in viewing a film from the last row of the stalls and from the front row in the upper stall seats, yet a purchaser of an upper stall seat derives greater pleasure or place utility of occupying a high priced seat.

- **Prevention of resale or re-exchange of goods.** Goods of discriminating monopoly, sold in different markets, should not be re-exchangeable between buyers of a low priced market and a high priced market. Wide geographical distance, high cost of transport, national frontiers (in case of internationally traded goods) and tariffs, effectively prevent re-exchange.
- **Non-transferability characteristics of goods.** There are some goods which, by their very nature, are non-transferable between one buyer and another. In direct personal services, therefore, price discrimination is easily resorted to because of this non-transferability characteristic. Obviously, a poor person cannot go on behalf of the rich to get medical treatment from a doctor. Similarly, haircuts, private tuitions, etc., are non-transferable services by their very nature.
- **Let-go attitude of buyers.** When price differences between two markets are very small, the consumers do not think it worthwhile to consider such discrimination. For instance, in the distribution of Dalda Vanaspati (cooking medium), there is a zonal price differential which is a marginal one, so that we hardly pay any attention to such differences of 5 to 10 paise per kilogram in different zones.
- **Legal sanction.** When, in some cases, price discrimination is legally sanctioned, the transfer of use of the produce is legally prohibited in order to make it effective. For instance, if electricity, for domestic purposes is used for commercial purposes, the customer is liable to penalties.

5. WHEN IS PRICE DISCRIMINATION PROFITABLE?

Even though circumstances may favour price discrimination, it may not be always profitable for the monopolist. Price discrimination is possible when there are different separate markets. But, the profitability aspect of price discrimination basically depends on the nature of elasticity of demand in these markets. Thus, the basic conditions of profitable price discrimination are:

1. Elasticity of demand differs in each market.
2. The cost-differential of supplying output in different markets should not be large in relation to the price-differential based on elasticity-differential.

Indeed, the elasticity-differential in different markets is a very vital condition. If the degrees of elasticity of demand at each price in different markets have the same numerical coefficient, price discrimination cannot be profitably adopted. Thus, markets with identical elasticities of demand will be treated as one by the monopolist from the price policy point of view. Because, in order to maximise profit, the monopolist follows the rule of equating marginal cost with marginal revenue. When the monopolist considers separate markets, he takes the combined marginal revenue (*CMR*) by aggregating the marginal revenue of different markets and distributes equilibrium total output in different markets so that marginal revenues in each market are the same.

Now, if the monopolist faces iso-elastic demand curves in two markets, he will not resort to price discrimination, because he finds that it cannot improve upon his total revenue; so it cannot add to his profits. When at a single price, elasticities of demand are equal in two markets, their average revenue are equal, so their marginal revenues too are equal. This is apparent from the formula:

$MR = P\,(e - 1)\,/e$

Now, when *P* and *e* are the same in two markets, it follows that *MR* in the two markets is the same. Hence, if any amount of output is transferred from one market to the other and different prices are charged, the aggregate total revenue from the two markets will remain the same as before. This means, that the gain realised in one market is lost in the other. Hence, the purpose of price discrimination, *i.e.*, to maximise profit, is not served. The monopoly profit, whether in simple monopoly or discriminating monopoly in this situation, remains the same. So, the monopolist will not resort to price discrimination and displease his buyers for no material gain.

It follows that if elasticities of demand in two markets at a single monopoly price are different, it would be profitable to adopt price discrimination. Because when elasticity differs in two markets at a given price, the marginal revenue in the two markets will not be identical. To clarify the point, let us assume two markets I and II, and the single monopoly price Rs. 10; say, elasticity of demand in market I, $e_1 = 2$, while in market II, $e_2 = 4$.

Thus,

In market I, $MR_1 = P = \left(\frac{e-1}{e}\right) = 10\left(\frac{2-1}{2}\right) = 5$

While, in market II, $MR_2 = 10\left(\frac{4-1}{4}\right) = 7.5$

Again, *MR* is high in market II, having a higher elasticity of demand. Hence, if output is transferred from the low elasticity market to the high elasticity one, marginal gain will be more than marginal loss. For instance, if one more unit is sold in market II, the gain will be Rs. 7.50 while the loss in market I is Rs. 5. Hence, net gain is Rs. 2.50. But on account of the downward sloping demand curve, the price will have to be lowered in market II in order to sell more.

Suppose the price is lowered to Rs. 9. Then, $MR_2 = 9 \times (4 - 1)/4 = 6.75$.

Correspondingly, due to lesser output supplied in market I, the price may rise there, to say Rs. 11. Then, $MR_1 = 11 \times (2-1)/2 = 5.50$. This means, by resorting to price discrimination, *MR* of inelastic demand market is also improved, and consequent rise in average and total revenue leads to a rise in total profit.

It may, therefore, be concluded that price discrimination is a profitable proposition to a monopolist only when he deals with different markets with different elasticities of demand.

6. PROFIT MAXIMISATION: PRICING AND OUTPUT EQUILIBRIUM UNDER DISCRIMINATING MONOPOLY

Assuming a third degree price discrimination, the price discriminating monopolist has to decide:

1. the total output to be produced;
2. the distribution of the supply of output in different markets, *i.e.,* how much to sell in each market with a view to maximising profits.
3. the prices of the product in different markets.

The behavioural equilibrium conditions in this regard are:

(a) To determine total output, the monopolist should equate marginal cost (*MC*) with the combined marginal revenue (*SMR*) of different markets.

(b) To maximise profits, the total output in different markets will be distributed in such a way that marginal revenue in each market is the same.

(c) Prices in different markets will be decided in relation to the quantity of output allocated for the sale and the position of the demand curve. As a rule, a higher price will be quoted in the market with inelastic demand, and a lower one in the market with elastic demand. Obviously, lesser quantity will be supplied to the inelastic demand market and larger amount to the elastic demand market. Indeed, once allocation of output is decided, price determination in each market automatically follows directly from the demand curve.

The Model

To explain the equilibrium conditions of the price discriminating monopolist, we may assume a simple model for the graphical analysis as follows:

1. The monopolist is facing two separate markets I and II.
2. The demand for the product in the market I is relatively inelastic (i.e., $ed_1 < 1$)
3. The demand for the product in the market II is relatively elastic, i.e., $ed_2 > 1$.
4. The firm's per unit revenue functions/curves are evident from the respective demand curves of the two markets, as such, by aggregating them the combined revenue curves are also obtainable as shown in Fig. 16.5. D_1 represents the demand curve of market I, which is relatively inelastic. AR_1 and MR_1 are the respective average and marginal revenue curves of the market I. In market II, demand curve D_2 is relatively elastic. AR_2 and MR_2 are its average and marginal revenue curves. S*MR* represents the combined marginal revenue curve. $\Sigma MR = MR_1 + MR_2$. The *MC* curve represents the marginal cost of output.
5. The firm's cost conditions are known.
6. The rationale of price discrimination is the maximisation of total profits. Under these assumptions, comparing the per unit costs and revenue conditions, the equilibrium

level of output can be reached by the monopolist when the MC is equal to the combined marginal revenue curve Σ MR, as shown in Figure 16.5.

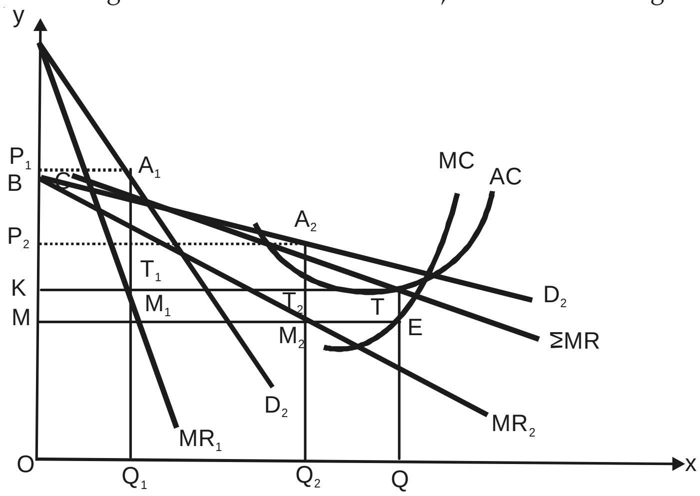


Fig. 16.5: Equilibrium Under Third Degree Price Discrimination

***Note*:** EMR is drawn by superimposition of MR_2 curve to MR_1 curve at point C.

Total output OQ, where MC = S MR.

Market I: OP_1 price, OQ_1 output. □P_1A_1 T_1K profit.

Market II: OP_2 price, OQ_2 output. □P_2A_2 T_2K profit.

As shown in Fig. 16.5, equilibrium point is determined where the MC curve intersects S MR curve, so at this point, marginal cost equates with aggregate marginal revenue (MC = MR.) It is the profit maximising equilibrium condition. Thus, OQ is the equilibrium output. The monopolist now allocates this OQ output in such a way that MR_1 = MR_2. To determine this, a horizontal line ME parallel to the X-axis is drawn. The line ME crosses the MR_1 curve at point M_1 and MR_2 curve at point M_2. Correspondingly, OQ_1 and OQ_2 quantities of output are determined for allocation in these two markets, respectively. When OQ_1 is allocated to market I, in relation to its demand curve D_1, OP_1 price is obtained. Similarly, when OQ_2 is to be sold in market II, OP_2 price is set to capture this much demand in market II. It is easy to see that MR_1 for OQ_1 output is M_1Q_1 = OM, MR_2 for OQ_2 output is M_2 = OM. Again, OQ_1 + OQ_2 = OQ and SMR for OQ is EQ = OM. Therefore, SMR = MR_1 = MR_2.

In short, OQ is the total output determined, where MC = MR. Of the total OQ output produced, OQ_1 is supplied to market I and sold at price OP_1. The rest OQ_2 is supplied to market II and sold at price OP_2. It can be seen that $OP_1 > OP_2$, while $OQ_1 < OQ_2$. Demand is inelastic in market I, so the price charged is high and amount supplied is less. Demand being more elastic in market II, a large quantity is supplied and the price charged is low.

In our illustration, the discriminating monopolist's profit maximisation is measured as under:

Profit = TR – TC

In market I: Total Revenue obtained from sale of OQ_1 output at OP_2 price is measured by the area □$OP_1A_1Q_1$. Similarly, total cost of producing OQ_1 output is measured as □OKT_1Q_1.

In market II: Total Revenue obtained from sale of OQ_2 output at OP_2 price is measured as □$OP_2A_2Q_2$. Similarly, total cost of producing OQ_1 output measured as □OKT_2Q_2.

Price earned from market I is, thus:

Profit (I) = □$OP_1A_1Q_1$ — □$OKT_1\ Q_1$

= □$P_1A_1T_1\ K$

Similarly, profit earned from market II is:

Profit (II) = □$OP_2A_2Q_2$ — $OKTQ_2$

= □$P_2A_2T_2K$

∴ Total Proft = Profit (I) + Profit (II) □$P_1A_1T_1K$ + □$P_2A_2T_2K$

Alternative Diagram

An alternative diagrammatical exposition is presented through Figure 16.6.

In Fig. 16.6, Panel (a) represents the conditions of Market I. D_1 represents its demand curve, which is relatively inelastic. AR_1 and MR_1 are the respective average and marginal revenue curves of the market I. Panel (b) represents market II. Its demand curve is D_2 which is relatively elastic. AR_2 and MR_2 are its average and marginal revenue curves. Panel (c) represents the condition of aggregate market of the monopoly firm. *CMR* represents the combined marginal revenue curve.

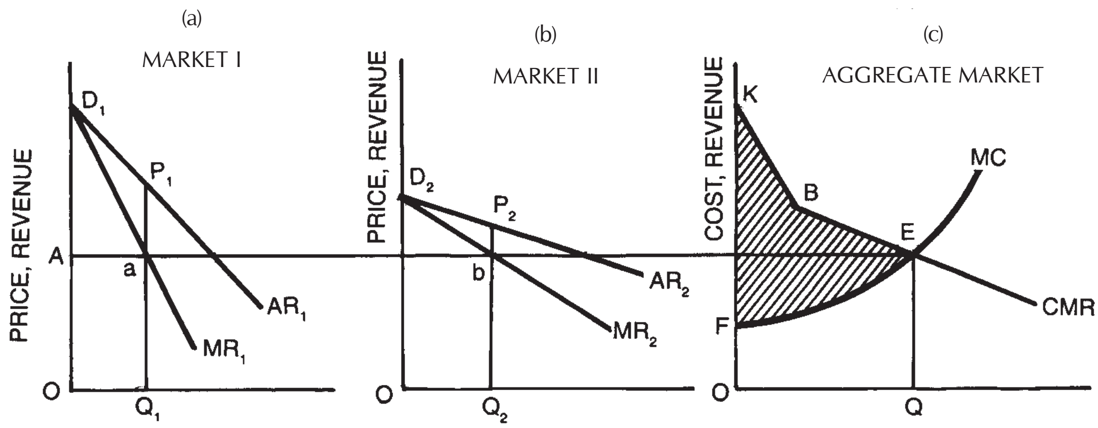


Fig. 16.6: Price Distribution

$CMR = MR_1 + MR_2$. The *MC* curve represents the marginal cost of output. At point *E*, the *MC* curve intersects *SMR* curve, so at this point, *MC* = *CMR*, it is the profit maximising equilibrium condition. Thus, *OQ* is the equilibrium output. The monopolist now allocates this *OQ* output in such a way that $MR_1 = MR_2$. To determine this, a horizontal line *AE* parallel to the x-axis is drawn. The line *AE* crosses the MR_1 curve at point *a* and MR_2 curve at point *b*. Correspondingly, OQ_1 and OQ_2 quantities of output are determined for allocation in these two markets, respectively. When OQ_1 is allocated to Market I, in relation to its demand curve AR_1, P_1Q_1 price is obtained. Similarly, when OQ_2 is to be sold in Market II, P_2Q_2 can be the price to have this much demand in Market II. It is easy to see that MR_1 for OQ_2 output is $aQ_1 = OA$, MR_2 for OQ_2 output is $bQ_2 = OA$. Again, $OQ_1 + OQ_2 = OQ$ and, CMR for OQ is $EQ = OA$. $\therefore$ $CMR = MR_1 = MR_2$.

In short, OQ is the total output determined, where $MC = CMR$. It gives total profit shown by the areas between the CMR curve and the MC curve. Thus, shaded area $KBEF$ measures total profit. Of the total OQ output produced, OQ_1 is supplied to Market I and sold at price P_1Q_1. The rest OQ_2 is supplied to Market II and sold at price P_2Q_2. It can be seen that $P_1Q_1 > P_2Q_2$, while $OQ_1 < OQ_2$. Demand is inelastic in Market I, so the price charged is high and amount supplied is less. Demand being more elastic in Market II, a large quantity is supplied and the price charged is low.

In the above analysis, we have assumed monopoly position of the firm in both the markets. Sometimes, however, the monopolist may face two markets one of which is a monopoly market and the other a perfect competition one. Such a situation is observed in the case of a firm dealing with the export market as well as the domestic market. Now, if in such a case the firm adopts price discrimination, it is called 'dumping.'

7. DUMPING

The practice of discriminatory monopoly pricing in the area of foreign trade is described as "dumping." It implies different prices in the domestic and foreign markets. Haberler defines dumping as "the sale of a good abroad at a price which is lower than the selling price of the same good at the same time circumstances at home, taking account of differences in transport costs." Under dumping, a producer possessing monopoly in the domestic market for his product, charges a high price to the domestic buyers and sells it at a low competitive price in foreign markets. A reverse of dumping is a situation in which a producer charges a low domestic price and a high foreign price for his product. The rationale behind dumping is that it enables the exporter to compete in the foreign market and capture the market by selling at a low price, even sometimes below cost and to make up the deficiency in sales revenue by charging high prices to the home buyers (taking advantage of monopoly power in the home market). In fact, the higher domestic price serves to subsidise a segment of foreign price, which considerably helps to promote exports. Export earnings may, however, be made available to promote the growth of home industries, which otherwise would not have been possible. Moreover, by resorting to dumping when the producer is able to widen the size of foreign markets for his product, his investment risks are minimised and when he has to launch large-scale production, he can reap the economies of large-scale, resulting in cost minimisation. Eventually, in the long run, it may become possible for him to sell goods at a cheaper price in the domestic market as well.

Thus, dumping, in essence, implies price discrimination. The success of international price discrimination, however, depends on the following conditions:

1. The producer must possess a degree monopoly power at least in the home market.
2. There must be clearly defined separate markets. In international trade, markets are clearly differentiated into home and foreign markets. In fact, in international trade, markets are separated by space, differences in customs, languages, currencies, etc.

3. It should not be possible for the buyers to re-sell the goods from a cheaper market to the dearer one. In foreign trade, of course, the distance transport cost element and the customs prevent this tendency.
4. Price discrimination is profitable only when two different markets have different elasticities of demand. It is meaningless to resort to price discrimination if two separate markets have identical demand curves, because under such conditions, the total receipts will not be affected by shifting to a uniform price policy.

Microtheorists presume that price discrimination, or dumping, maximises the total profit of exporters. According to microeconomic analysis, a monopolist, in order to maximise profit, will try to equate combined marginal revenue of the two markets with the marginal cost of his product. As Stigler puts, under dumping, the producer chooses that level of output at which marginal revenue in the home market as well as foreign market taken together is set equal to marginal cost, and the price is related to marginal revenue by the equation: $MR = P\ (e-1)/e$, where e is the elasticity of demand, different prices will be set for both the markets to derive maximum profits.

The condition of equilibrium in the case of dumping is depicted diagrammatically in Fig. 16.7.

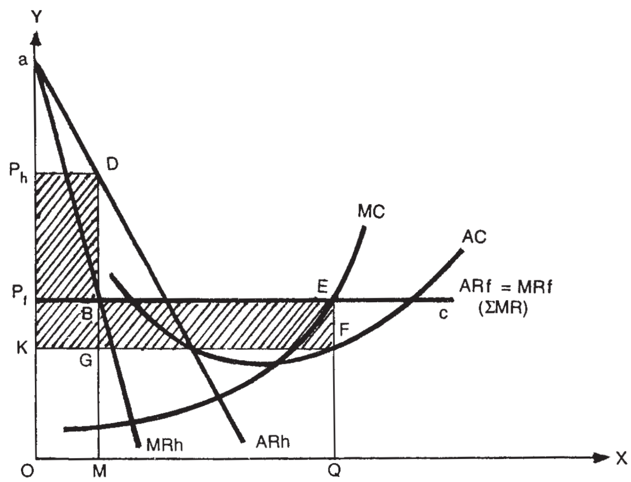


Fig. 16.7: Dumping

In Figure 16.7, it is assumed that the firm is selling its product in two markets: *(i)* home market, and *(ii)* foreign market. In the home market, the firm has a monopoly. In the foreign market, it has to face perfect competition. The demand curve for the firm's product in the home market is, thus, downward sloping. *ARh* and *MRh* are the average and the marginal revenue curves relating to the home market.

The firm is a price-maker in the home market. In the foreign market, however, due to perfect competition, the firm has to sell at the ruling price. *OPf* is assumed to be the price prevailing in the foreign market. At that price, the firm's demand curve is assumed to be perfectly elastic. Therefore, *AR* = *MRf* represents the identical average and marginal revenue curve of the firm relating to the foreign market. By superimposing *MR* curve on *MRf* curve, we derive the combined marginal revenue curve *abc* (the bold curve).

To determine equilibrium output in aggregate, the firm compares *MC* with combined *MR*. In the figure, the *MC* curve intersects the SMR curve (*abc*) at point *E*. Correspondingly, *OQ* level of output is determined. The firm has to distribute this *OQ* output between the home market and the foreign market. It will be distributed in such a way that *MRh* = *MRf* = *MC*. At point *b* on the combined *MR* curve, *MRf* = *MRh*. That is, *bM* is the identical marginal revenue in both markets, *EQ* is combined revenue. Here, *bM* = *EQ*. Considering this point *b, OM* is supplied in the home market. The home market price is determined in relation to the demand curve. Thus, the price *OPh* is determined for the home market. For the foreign market, the price *OPf* is already given. At this given price the firm sells *MQ* output in the foreign market. Thus, *OM* domestic sale + *MQ* export = *OQ* total output. The price charged in the home market *OPh* is higher than the export price *OPf*; which is a competitive rate.

In this case of dumping, maximum profit is yielded as follows:

(a) Profit from the home market, when *OM* output is sold at *OPh* price:

Profit = Total Revenue – Total Cost

= (*OPhDM* – *OKGM)*

= *PhDGK*

(b) Profit from the foreign market, when *MQ* output is sold at *OPf* price:

Profit = Total Revenue – Total Cost

= *MbEQ* – *MGFQ*

= *GbEF*

Total profit from both markets: *PhDGK* + *GbEF*.

In short, three conditions are necessary for equilibrium under price discrimination (including dumping):

1. There must be at least two separate markets, with different elasticities of demand.
2. Marginal revenues from all markets should be the same. Thus, $MR_1 = MR_2 = \ldots = MR\sim$. (*n* stands for the number of separate markets).
3. Marginal revenue of all markets must be equal to the marginal cost of producing entire output. Thus, $MR_1 = MR_2 = \ldots. MRn = MC$.

8. ECONOMIC EFFECTS OF PRICE DISCRIMINATION

The following are the major economic effects of price discrimination:

1. According to Mrs. Robinson, total output under price discrimination tends to be larger than the output under a simple monopoly with a uniform price policy.
2. Total profits of the discriminating monopolist will be higher than that of the simple monopolist, because price discrimination at least partially helps the monopolist in converting the consumer's surplus into a profit.
3. Price discrimination helps in increasing the sales and the output, as such, larger scale of production and minimisation of costs.
4. Socially justified price discrimination under which the poor buyers are charged lower prices, helps in improving the economic welfare of the community at large.
5. With the widening of the size of market in the case of dumping, the exporting firm can reap the advantage of the economies of large-scale plant size in operation.
6. Price discrimination of the first and second degrees obstruct the maximisation of utility by a consumer.
7. Price discrimination leads to inefficient allocation of resources in a market economy.
8. Price discrimination can also be inequitable when the richer consumers are benefited at the cost of the poor.

9. SOCIAL JUSTIFICATION OF PRICE DISCRIMINATION

Price discrimination is often condemned but not all price discrimination, for, whether a particular price discrimination is good or bad, and has social justification or not, is to be decided on the basis of various economic and normative considerations. In fact, the impact of price discrimination tends to differ significantly in different cases. So each case must be properly evaluated to arrive at a rational conclusion.

> Doctors usually resort to price discrimination by scaling fees to the income of patients.
>
> The discriminating monopoly model is valid for understanding the pricing policy of medical services — as charging what the traffic will bear. Doctors tend to justify this policy for understanding the pricing policy of medical services — as charging what the traffic will bear. Doctors tend to justify this policy for undertaking medical charities to help the poor patients. Kessel (1985), pp. 315, however, argues that "if there were mere competition among doctors in the sale of medical services, i.e., if doctors were individually free to pursue their self-interest, there would be less discrimination in the pricing of medical services." (p. 305)

In general, however, it may be laid down that there are certain cases and circumstances in which price discrimination can be justified and socially desirable on welfare grounds. Especially, it is the motive behind price discrimination that is important. In those cases where price discrimination implies larger production than that in a simple monopoly, society may be benefited in certain ways such as: *(i)* more wants are satisfied, *(ii)* average cost of production may be lowered on account of larger output and economies of scale, *(iii)* more employment by this discriminating monopolist, and *(iv)* relatively lower discriminatory prices than a single monopoly price. All these lead to greater economic welfare. Hence, such a discriminating monopoly has social justification. In some cases, it is an utmost social desirability to have discrimination for the availability of certain products or services. There may be cases in which no output will be made available if price discrimination is not followed either in theory or in practice. In technical language, if the average cost curve of a particular product is much above its demand or average revenue curve throughout its range, one price system will not at all be profitable. But, if price discrimination is adopted by subdividing the market aggregate, marginal revenue will be such that at least a small segment will tend to lie above the average cost curve, so that some profit is realised from one market which would compensate for the loss incurred in another, hence, the monopolist would be encouraged to produce output. Mrs. Robinson thus says that, "It may happen, for instance, that a railway would not be built, or a country doctor would not set up in practice, if discrimination were forbidden." Indeed, doctors in private discriminate between rich and poor patients. They justify discrimination on the ground that although they collect only nominal fees from poor patients, their actual cost of service is very high. They, thus, recover this loss by charging high fees to rich patients who can afford to pay. If uniform fees were to be charged, they would be certainly too high for the low income group people, and so their services would be beyond their reach. Similarly, railways find their economic way only through price discrimination. The operating cost is just a fraction of the total cost of the railways, but if all traffic is to be charged on the basis of the 'cost of service' principle, certain types of traffic may not exist at all, then there will be underutilisation of the capacities, so that railways will find it difficult to cover more traffic. They would, therefore, resort to discrimination in freight rate for different types of goods such as coal, milk, iron, clothes, cattle and grass. They also charge the lowest class passengers comparatively lesser than the better and highest class.

To Decision-making

- When a monopolist resorts to price discrimination, it is called discriminating monopoly.
- Price discrimination is the act of selling the same product at different prices to different buyers.
- Price discrimination is possible only under monopoly. It is incompatible with perfect competition.
- Separate markets and differences of elasticity of demand markets are the essential conditions of price discrimination. In markets with iso-elastic demand curves, price discrimination cannot be a profitable phenomenon.
- To maximise profits, the discriminating monopolist equates marginal cost with aggregate marginal revenue and determines equilibrium output at that point.
- The total output so produced is allocated to different markets, in such a way that marginal revenue in each market is the same and equal to the marginal cost of total output.
- Prices in each market are decided in relation to the demand curves and their elasticities. As a rule, the market with inelastic demand is charged a high price and the market with elastic demand a low price.

- Dumping is a special case of price discrimination. Under dumping, the monopolist has a monopoly in the home market, but has to face keen competition in the foreign market. Thus, he supplies a large output in the foreign market at competitive price and restricts supply in the domestic market and sets a higher price to make-up for his profits.
- Price discrimination is socially desirable only if it leads to some net social benefits.

Price discrimination may, therefore, be justified in those cases where the average revenue of the monopolist does not exceed the average utility to consumers. If, however, average revenue is greater than average cost, the monopolist does earn a profit. But his profit can only be justified if it is confined to maintaining the efficiency of the plant.

Price discrimination, however, does not receive social and moral justification under the following circumstances:

1. If price discrimination is solely motivated for maximisation of personal profit by taking undue advantage of group of buyers, inelastic demand position and artificially subdividing the market.
2. When price discrimination is resorted to in favour of rich consumers, it can prove to be a worst social evil. Similarly, when the net social benefit of price discrimination is negligible or zero, then also it lacks social justification.
3. When a case like dumping is resorted to in order to eliminate competition and acquire monopoly power in a wider market, it has no social justification. Because, here for the individual benefit of the firm, home buyers are exploited. When there is no social gain there can be no social justification. Only normal dumping is justified on the economic ground of market extension and economies of scales which ultimately prove to be socially beneficial.

MODEL QUESTIONS

1. (a) What is discriminating monopoly?

   (b) What are the degrees of price discrimination?
2. (a) What is price discrimination?

   (b) Under what conditions is it possible and profitable?
3. (a) When is price discrimination possible?

   (b) Explain how a discriminating monopolist would distribute his total output among different markets.
4. (a) What are the essential conditions for the practice of price discrimination?

   (b) Show how the discriminating monopolist will distribute his total output between the monopolistic home market and perfectly competitive world market?
5. What is price discrimination? When is it possible? Is discriminating monopoly socially preferable to a simple monopoly?

6. Explain the conditions in which profits will be maximised by a discriminating monopolist when:
   (a) there is monopoly in the domestic market and perfect competition in the export market, and
   (b) monopoly in both markets.
7. Explain fully the conditions which should be fulfilled if a discriminating monopolist is to be in equilibrium. Illustrate your answer with diagrams.
8. Write notes on:
   (a) Degrees of Price Discrimination.
   (b) Justification for Price Discrimination.
   (c) Discriminating Monopoly.
   (d) Dumping.
9. (a) What is Price Discrimination?
   (b) When is it possible?
   (c) Explain p rice discrimination under dumping.

❒ ❒ ❒

Monopolistic Competition Pricing Under Imperfect Competition

17
CHAPTER

1. INTRODUCTION

According to Chamberlin, the traditional value theory contains a curious mixture, confusion and separation of the ideas of perfect competition from pure monopoly. However, neither perfect competition nor pure monopoly are realistic phenomena. Indeed, pure monopoly can hardly exist because there are remote substitutes, or other substitutes the supply of which cannot be controlled by a particular monopolist. Similarly, perfect competition has certain pre requisites, all of which can even practically exist, at a time. Chamberlin thus observes that, in practice, there is a group of monopolists in every line of production competing with each other. This may be described as monopolistic competition.

Under imperfect market conditions, monopolistic/oligopolistic rather than perfect competition tend to emerge. In a growing market economy, firms tend to acquire market power through diversification, mergers and vertical integration, product differentiation, innovations and advertising.

2. THE CONCEPT OF MONOPOLISTIC COMPETITION

Monopolistic competition refers to the market organisation in which there is keen competition, but neither perfect nor pure, among a group of a large number of small producers or suppliers having some degree of monopoly power because of their differential products. Thus, monopolistic competition is a mixture of competition and a certain degree of monopoly power. In other words, a market with a blending of monopoly and competition is described as monopolistic competition. It is a hybrid of monopoly and competition — thus, monopolistic competition.

Monopolistic competition is commonly found in many fields, especially in retail trade, in the service industries, and in some branches of manufacturing. In the manufacturing field, the garment industry, shoemaking, cosmetic products, furniture manufacturing, etc., monopolistic competition is common. In the distribution field (retail business), monopolistic competition prevails in such trades as cloth stores, chemist and drug stores, electrical appliances stores, liquor stores, grocery stores, gasoline stations, etc., located in close proximity to one another. Similarly, service trades like barber's saloons, beauty parlours, laundries, and even coaching classes and restaurants in a city like Mumbai tend to have monopolistically competitive markets.

3. CHARACTERISITCS OF MONOPOLISTIC COMPETITION

Monopolistic competition, as the term suggests, entails the attributes of both monopoly and competition:

The following are the main features of monopolistic competition:

- **Large Number of Sellers.** A market organisation characterised by monopolistic competition must have a sufficiently large number of sellers or firms selling closely related, but not identical products. The large number of firms, in the same line of production, leads to competition. Since there is no homogeneity of goods supplied, competition tends to be impure but keen. The number of firms being relatively large, there are less chances of collusion of business combines to eliminate competition and to rig prices.
- Another impact of large number is that a relatively small percentage of the total market is shared by individual firms. Thus, an individual firm's supply is just a small part of the total supply so that it has a very limited degree of control over the market price. Once an equilibrium price is set in a particular line of production, the new entrant has to follow it, though not strictly, but in the vicinity of that range. However, in determining the course of its own price and production policy, each firm can afford to ignore the rival's reaction. Because as there is a large number of firms, the impact of one firm's action upon all other rivals will tend to be too insignificant to cause any reaction among rivals. To elucidate the point, suppose there are about 51 producers in a particular line of production, so that each one controls 1/5th part of the total market. Now, if one producer increases his sale by about 13 per cent through price reduction, each of the rivals may experience a decline in his sales just by 0.2 per cent which will be treated as insignificant. Hence, a firm is not a price taker under monopolistic competition. It can adopt an independent price and production policy. This is what distinguishes monopolistic competition from perfect competition. The firm's independence, under monopolistic competition, is attributed to the degree of product differentiation it adopts.
- **Product Differentiation.** Monopolistic competition is essentially competition with differentiated products. It is the most distinguishing feature of monopolistic competition that the product of each seller is branded and identified. Unlike perfect competition, thus; there is no homogeneity of product. Through product differentiation, each seller acquires a limited degree of monopoly power.

- **Large Number of Buyers.** There are a large number of buyers in this type of market. However, each buyer has a preference for a specific brand of the product. He, thus, becomes a patron of a particular seller. Unlike perfect competition, here buying is by choice and not by chance.
- **Free Entry.** Under monopolistic competition, there are no entry barriers. Firms can enter or quit freely. This makes competition stiff because of the close substitutes produced by the new entrants with their own brand names.
- **Selling Costs.** Selling costs are a unique feature of monopolistic competition. Since products are differentiated and may be varied from time-to-time, advertising and other forms of sales promotion become an integral part in marketing the goods. Outlays incurred on this account are termed as selling costs. Selling costs are, thus, costs which are meant for sales promotion. This distinguishes it sharply from pure competition. In pure or perfect competition, there is no need to advertise products and undertake sales promotion efforts because the goods are homogeneous and each firm experiences a perfectly elastic demand curve so that it can sell as much as it likes at the ruling price. Under monopolistic competition, products are differentiated and these differences are made known to buyers through advertisement and other means of sales promotion. Again, selling efforts are needed to cause a shift in demand for the product and to capture a wider market. The demand curve faced by each firm under monopolistic competition is downward sloping. Hence, at a given price, if more quantity of a good is to be sold, an upward shift in the demand curve is essential. This upward shift, or increase in demand for product, is achieved by a firm through advertisement and sales promotion effort, *i.e.*, by increasing selling costs. Briefly, advertising and selling costs which are incompatible with perfect competition due to homogeneity of goods become an integral part of monopolistic competition due to product differentiation.
- **Two-Dimensional Competition.** Monopolistic competition has two facets: *(a)* price competition, and *(b)* non-price competition. In this kind of market, the firms compete with each other on the price issue. They also compete on non-price issues to expand their sale. Non-price competition is in terms of product variation and selling costs incurred by each seller to capture his share in the market.
- **The Group.** Chamberlin introduced the concept of group to replace the traditional concept of industry in the theory of value. Industry refers to a collection of firms producing a homogeneous commodity. The term 'industry' is in perfect tune with pure or perfect competition. It is also conducive to a monopoly market, as a monopoly firm itself is the industry. But the term is not in harmony with monopolistic competition. Monopolistic competition is characterised by product differentiation. Firms, under monopolistic competition produce similar but not identical goods. Therefore, we cannot conceive of an industry in the monopolistically competitive market. It is ridiculous to talk of the furniture industry, bicycle industry, automobile industry, etc., in an analytical sense. This is because, on account of product differentiation, the product of each firm is identifiable and, in a sense, therefore, each firm is an industry in itself, just like a monopoly firm.

In reality, the major companies control a large number of products — domestic as well as international — over the wide spectrum of industrial economy. There are a variety of product groups (rather than traditional concept of industry), such as:

◆ Automobiles	◆ Electronics
◆ Textiles	◆ Computers
◆ Footwear	◆ Heavy Chemicals
◆ Soap	◆ Cement
◆ Food and Beverages	◆ Electrical machinery
◆ Drugs and Chemicals	◆ Non-electrical machinery
◆ Confectionery	◆ Metals and Metal products
◆ Cosmetics	◆ Coalas and Coffee
◆ Paper	◆ Construction.

In short, since there is no homogeneity of products sold by all the sellers in the monopolistically competitive market, we cannot think of industry as conceived by Marshall. Chamberlin, therefore, introduced the concept of group. A group is a cluster of firms producing very related but differentiated products. Thus, when product differentiation is a prominent feature of the market, the collection of firms that produce similar varieties of product having a high negative cross elasticity of demand is referred to as 'group' or 'product group.' Chamberlin assumed the 'group' to be open that is, there is unrestricted entry of new firms into the groups till it reaches complete equilibrium.

4. EQUILIBRIUM OUTPUT AND PRICE DETERMINATION OF A FIRM UNDER MONOPOLISTIC COMPETITION

A firm under monopolistic competition is a price-maker. Thus, unlike perfect competition, there is a pricing problem. The firm has to determine a suitable price for its product which yields a maximum total profit. Assuming a given variety of product and constant selling outlays, when price is considered as the only variable factor, the short-run analysis of price adjustment by an individual firm under monopolistic competition, more or less, entails the same features like that of price-output determination under pure monopoly. In the long-run, however, a major difference is noticeable in the equilibrium process and position due to a change in demand conditions and other factors associated with the process of group equilibrium.

The Short-run Equilibrium

To explain the process of individual equilibrium, we assume that all other producers are in equilibrium with respect to their prices, varieties of products, and sales outlays. We further assume that the firm which we have taken in our consideration has also a given variety of product and constant sales expenditure. Hence, there is only the problem of price and output determination.

In the short-run, the firm can adopt an independent price policy, with least consideration for the varieties produced and prices charged by other producers. The firm being rational in determining the price for a given product will seek to maximise total profits.

Since the quality of product is assumed to be given, we have a definite demand schedule for it. Again as the product is differentiated, the demand curve is downward sloping. The demand curve or the sales curve of the firm in a monopolistically competitive market is, however, much more elastic than that of a firm in a pure monopoly. This is so because there is a large number of competitors selling similar products as close substitutes, whereas in the case of pure monopoly, there is absence of competition. The precise shape and degree of elasticity contained in the demand curve of a firm under monopolistic competition, however, depends on two factors: *(i)* the number of firms in the group, and *(ii)* the extent of product differentiation. If, however, the group has a large number of firms and if the product differentiation is relatively weak, the demand curve of each firm will be highly elastic. If, however, the group is relatively small and the product differentiation is prominently significant, then the demand curve of each firm will tend to be less elastic.

Knowing the demand curve, which is the sales curve of the firm for a given product, we can easily derive its marginal revenue curve. The demand curve itself is the average revenue curve, which is downward sloping curve for a firm in a monopolistically competitive market. The marginal revenue curve also slopes downward and lies below the average revenue curve.

In order to maximise its total profits or minimise its losses in the short-run, the firm produces that level of output at which marginal cost is equal to marginal revenue (*i.e.*, *MC* = *MR*). Thus, equilibrium output is determined at the point of intersection of the *MC* curve and the *MR* curve as shown in Figure 17.1.

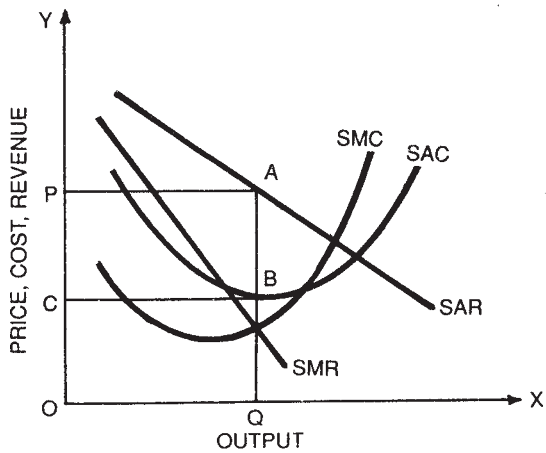


Fig. 17.1: Short-run Equilibrium of a Monopolistically Competitive Firm

In Figure 17.1, we have assumed the case of a representative firm with hypothetical cost and revenue data in a monopolistically competitive market. For the sake of simplicity, it is thus assumed that: *(i)* demand conditions, and *(ii)* cost conditions are identical for all the firms in the group. These assumptions, in fact, are the bold assumptions made by Chamberlin in his theory of monopolistic competition and its characteristic, *i.e.*, diversity of group under product differentiation. No doubt, these assumptions very much simplify our model, but they are not altogether unrealistic. In the case of retail shops such as provision stores or chemist shops, etc; standardised products will tend to have more or less identical demand and cost conditions, as their product differentiation is confined to only locational differences.

Equilibrium point *E* is determined where, *SMC* = *SMR*. *OP* price. *OQ* output. □*PABC* is profit.

In Figure 17.1, we see that the firm attains equilibrium when *OQ* output is produced at which *SMR* = *SMC*. In relation to the given demand curve (*SAR* curve), the firm will set *OP* price to sell *OQ* output. The firm as such earns supernormal profits to the tune of *PABC*. Such profits in the short-run are possible when there are not enough rivals who sell closely competitive substitutes to compete these profits away.

The Long-run Equilibrium

When firms in the short-run earn supernormal profits in a monopolistically competitive market, some new firms will be attracted to enter the business, as the group pertaining to the industry is open. On account of rivals' entry, the demand curve faced by the typical firm will shift to the origin and it will also tend to be more elastic, as its share in the total market is reduced due to competition from an increasing number of close substitutes. Gradually, in the long-run, when the firm's demand curve (*AR* curve) becomes tangent to its average curve, the firm earns only normal profits. The situation is depicted in Figure 17.2.

As shown in Figure 17.2 in the long-run, the firm produces *OQ* level of output, at which *LMC* = *LMR,* (*EQ*). At this equilibrium output, the *LMR* curve is tangent to the *LAC* curve at point *P*. Thus, *PQ*, is the price which is equal to the average cost. Apparently, *OQPA* is the total revenue as well as total cost, so the firm earns only normal profit in the long run. Existing competitors in the market in the long-run will be producing similar products, and their economic profits will be competed away. Thus, in the absence of long-run profits, there is an incentive to the entry of new firms. Furthermore, it can also be noticed that when a typical firm attains equilibrium and determines the price (= *AC*), by producing *OQ* level of output as shown in Figure 17.2, it is just breaking even. Since the *LAR* curve is tangent to the *LAC* curve at point *P*, which is attainable only by producing *OQ* level of output, any output less than that implies that *AR* < *AC*, indicating a loss. So also, any output more than *OQ* means *P* < *AC* and a loss.

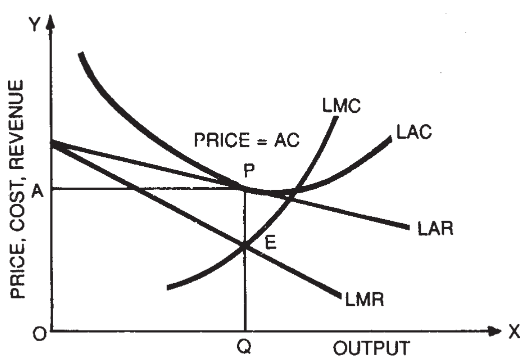


Fig. 17.2: Long-run Equilibrium of a Monopolistically Competitive Firm

At *E, LMC* = *LMR*. Further, *PQ* Price = *LAR*. Only normal profit.

It should be noted that monopolistic competition implies severe competition between a large number of firms producing close substitute products. Hence, this market situation is more similar to perfect competition than monopoly. In a monopolistic group, owing to the unrestricted entry of new firms, abnormal profits are usually competed away in the long-run, and firms will always seek to realise pure economic profits once again by advertising and innovation in products or processes. Consequently, firms will resort to non-price competition, *i.e.*, competition in product variation as well as by increasing their advertising expenditure (selling costs).

5. PRODUCT DIFFERENTIATION: BASIS AND OBJECTIVES

Product differentiation is a unique feature of monopolistic competition.

Basis of Product Differentiation

There are many ways of making products different from one another. Branding is the most common and essenial aspect of unique identification of product. Analytically, differentiation may be classified into two types: *(i)* quality and characteristics of the product itself, and *(ii)* conditions relating to the sale of the product.

Product differentiation relating to quality and characteristics of the product can have a wide dimension, implying real as well as spurious or imaginary differences. Products of different firms may have real or physical differences in their functional features — the mode of use and operations, etc.; size, design and style, strength and durability, differences in the quality of materials, chemical composition, workmanship, cost of inputs, etc. There may be imaginary or spurious differences relating to trade marks and brand names (*e.g.,* aspirin products like Aspro, Anacin, Avedan, etc.), colour and packing, etc. Advertising claims and sales propaganda are also some of the spurious differences which may influence the minds of buyers of products of different sellers.

Branding is Rewarding

Under monopolistic competition, branding is often rewarding. A brand is something — extra satisfaction due to confidence or trust about the quality of the product — that is bought by a consumer.

Branding is a power marketing concept which is timeless. Branding is extensively used by the producers such as Coca-Cola, Pepsi, UnilLever, Rado, Citizen, and so on. A brand has characteristics and association — an identifiable product, service person or place: say, a brand can be a name of a place like London or Hong Kong, a film star like Shah Rukh Khan, a musical brand like Spice Girls, the name of the firm itself such as Citibank, or a special name given to the product such as Pepsi Cola, and so on — to which the consumer perceives relevant unique added value to the product.

Branding is a creation of an integrated marketing communication programme or marketing activity "mix" of strategic devices involving seven Ps: product, price, place, promotion, process, projection, physical evidence and prestige in today's competitive business environment.

Product differentiation may be due to the conditions of sale and marketing. In this regard, the proximity and prestige of the location of business, the attitude and courteous approach of the personnel attending to customers, the firm's own business reputation, buyer's confidence, the terms of trade, such as discount and credit, acceptance of returned goods, and guarantee of service and repairs, etc., are the important aspects of product differentiation.

Product differentiation, thus, may range from strong to weak, which influences the consumer's psychology and preference or choice. In any event, product differentiation, whether real or spurious, identifies the seller and confers on him a degree of monopoly power which he can exploit well to capture a segment of the market.

6. OBJECTIVES OF PRODUCT DIFFERENTIATION

Product differentiation has two dimensions: (i) product differentiation as a point of time, and *(ii)* product development or quality variation over a period of time. Product differentiation at a point of time aims at identifying the product of the seller from the product of rivals. But over a long period of time, when the sellers resort to product competition, each one adopts quality variation of improvement in the product. The purpose of product development is in quality variation. The product is adjusted more sensitively to the tastes and preferences of consumers, which would ensure their strong patronage. Instances of product development undertaken by Indian producers, from time to time, are not uncommon. For instance, for better results, T.V. manufacturers are making technical improvements in their sets. In electrical appliances, furniture, garments, etc., also, material, design, styles, etc., are varied for betterment of the products. Even in textbooks and other books, when new editions are brought out, there is some improvement in the quality. By resorting to product improvement and giving a new brand name to it, the producer hopes to have a more inelastic demand for his product as well as a demand curve further up and to the right of origin. So, he can charge a higher price than what was charged for the old variety, without losing patronage. This is possible because he then enjoys greater attachment of the consumers to this product. If he charges the same price and improves his product, his sales are bound to multiply. That is how when producers resort to quality variation and product differentiation in a monopolistically competitive market, the phenomenon of product competition takes place.

7. PRODUCT DIFFERENTIATION: A FACET OF NON-PRICE COMPETITION

In a monopolistic group, when a firm resorts to non-price competition, it undertakes quality variations. Qualitative changes in the product imply adapting the product to the latent demand of prospective buyers. It means moulding a variant of the product item that makes a greater and wider appeal to the consumers. Indeed one variant of the product may command the loyalty of more buyers than another one. When a quality improvement of product is brought about in relation to the materials used, the workmanship or to the service, etc., the firm benefits from altogether a new demand for its product than what it had for its previous product. This is because the quality variation conforms to the tastes and preferences of buyers. With improved product and enhanced utility, the producer hopes to face a more inelastic demand for the product. The demand curve as a result shifts up and to the right with respect to the origin. Apparently, when the producer finds demand for his product or sales curve less elastic due to quality variation, other things being unchanged, he charges a higher price than before, without experiencing any market contraction in the sale of his product, or, if he continues to charge the same price, he finds an increase in the demand for his product. The line of argument is further exposed in Figure 17.3.

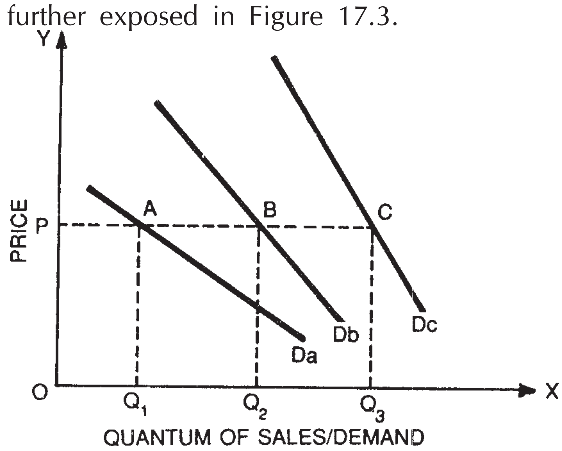


Fig. 17.3: Sales Curves with Product Improvement

Demand Curve *Da* corresponds to variety *A*, *Db* to *B* and *Dc* to *C*. Still improved variety *C*. *PC* is a demand line.

In Figure 17.3 with different improved varieties *A, B, C,* etc., of the product, the illustrative firm faces more and more inelastic demands as well as a demand curve further up to the right, such as *Da, Db, Dc,* etc. Remember, here each variant of the product has its typical demand or sales curve. Hence, the shift from *Da* to *Db* is not a shift of the demand curve but *Da* and *Db* are the two different demand (or sales) curves for the two varieties of the product, namely, *A* and *B*. At a given price *OP*, we find points *A, B, C,* etc., on each demand curve *Da, Db, Dc,* etc., showing their respective price-quantity relations.

Besides, product variation involves changes in the cost of production curve. Qualitative improvement in the product implies an increase in the cost of production; so the cost curve shifts.

In short, when product variation is undertaken, cost of production changes and simultaneously, there is an alteration in the demand for it. A peculiar feature of product variation is that as the product is varied qualitatively rather than quantitatively, a series of product variations, as such cannot be measured along an axis and displayed in a single diagram. Hence, for each variety of product, a diagram is to be imagined with regard to its cost curve and the relative demand position.

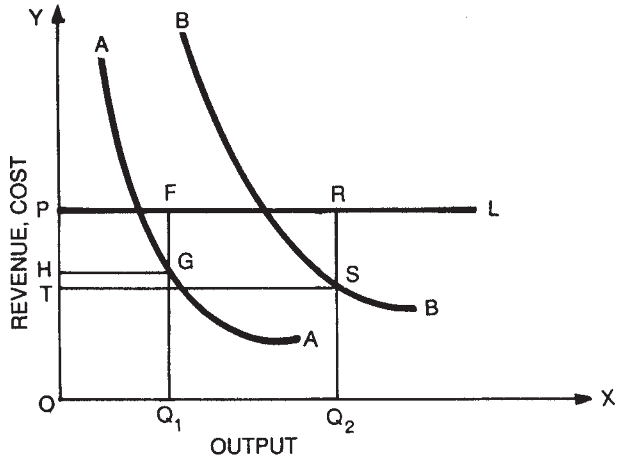


Fig. 17.4: Product Adjustment: Individual Equilibrium

In the product adjustment, the problem of the entrepreneur is to select the "product" whose cost and whose demand are such as will yield the largest total profit at a given price (Chamberlin, 1962: p.78). In other words, a rational producer seeks to choose that variety of product at a given price which yields the maximum total profits. To illustrate the point, let us assume two varieties of product, *A* and *B*. In Figure 17.4, the curve *AA* represents the cost curve for product *A* and the curve *BB* represents the cost curve for product *B*. Assuming a fixed price *OP* for any variety of the product, we have *OQ* demand for the product *A* and OQ_2 demand for the product B. It should be noted that *PL* is a fixed price line, but it is not a demand line.

Case of American Pharmaceutical Companies

Measday (1977) observes that in the seventies the big Pharmaceutical companies in America made full use of exploiting their monopoly power involved in brand and trade marks — which serve as an important competitive barrier, eventhough free licensing policy is adopted by the government, permitting manufacturers to enter into the pharmaceutical industry in the case of certain drugs. For instance, over 50 per cent of the market for Chloral Hydrate — an unpatentable drug was shared/controlled by Squibb's Noctee Brand and sold at a three to four times higher price into the wholesale market, although a similar product is supplied cheaply by reliable smaller firms. Likewise, almost 80 per cent of the market for Meprobamate (a freely licensed patented drug) was controlled only by three brands: Equanil, Miltown and Meprospan and charged double the prices quoted by other smaller firms.

Elsewhere in the world throughout it is a common experience that branded and generic versions of the same drugs have wide price differentials. Branded drug producer uses simply the registered trade mark name, whereas the small generic producer only puts its chemical name, otherwise content-wise there is no real difference.

In short, in pharmaceutical industry usually trade marks give a wider advantage of monopoly power to the big producers and make handsome profits. In other industries, probably, no such wide price differentials between brands are noticeable. Procter and Gamble, for instance, prices its crest toothpaste much comparable with other brands in the market.

An explanation for wider price differential in branded drugs may be attributed to the fact that the physicians usually prescribe the drug with the brand names and simply they do not have much idea about the price differentials. Furthermore, there is an illusion that an unbranded drug may be inferior in quality.

The moral of this story in business is that: the key to success lies more in marketing skill, advertising of the trade marks than just only producing. Approach to market is undoubtedly more important than manufacturing alone in these days of dynamically moving world.

Source: "The Pharmaceutical Industry" in The Structure of American Industry, Walter Adams (ed.), New York: Macmillan, pp. 250-284.

It does not imply, in this case, that at a given price there is indefinitely a large demand. Though price is the same, each variety of the product has its typical demand. At point *F*, thus, there stands a demand curve and at point *R*, there is a different demand curve implied. These demand curves are not drawn in the diagram just to avoid complexities. Thus, in the process of attaining product equilibrium, the firm cannot move back and forth along the cost curve, say along *AA*, in order to determine the most profitable output. Rather, the firm has to move from one cost curve to another in accordance with the product variation. In order to select a variety, the firm makes comparisons between costs and demands and the resulting profits for all possible varieties and chooses the most profitable one. In our illustration, for product A, the firm's total revenue at *OP* price is from *OPR* (FQ_1) while its total cost is $OHGQ_1$. Therefore, the total profit is *PFGH*. For product *B*, however, total revenue at *OP* price is $OPRQ_2$ > and total cost is for OQ_2 output $OTSQ_2$. Therefore, the total profit is *PRST*. Comparing the two it is easy to see that *PRST* > *PFGH*. Evidently, the rational firm will choose *B* and sell its OQ_2 amount at *OP* price. It may be observed that the for the selected variety of the product is not relating to the most *C* production, *i.e.*, OQ_2 is not produced at the minimum point of average cost curve. Again, the product chosen may not have the lowest cost of product to the cost conditions or its other varieties. For instance, the curve *BB,* the curve *AA*, but its product *B* which yields a larger profit than that. Moreover, the product chosen may not necessarily be the one which is in demand. Suppose we may take product *C* into account whose demand is high the cost is also relatively high, the relative profitability of *C* may be less than that of *B*. In that case, the rational firm will choose product *B* rather than *C*.

Price and Cost Product Variation

So far we have analysed the equilibrium process of an individual monopolistic competition, assuming price as constant and product as a variant. Let us now consider both the factors, price and product, as variable. A rational producer will choose that variety of product and price which yields maximum total profits. To illustrate the point, let us assume three varieties *A, B,* and *C* of a product, demand curves, *Da, Db* and *Dc*, as shown in Fig. 17.5.

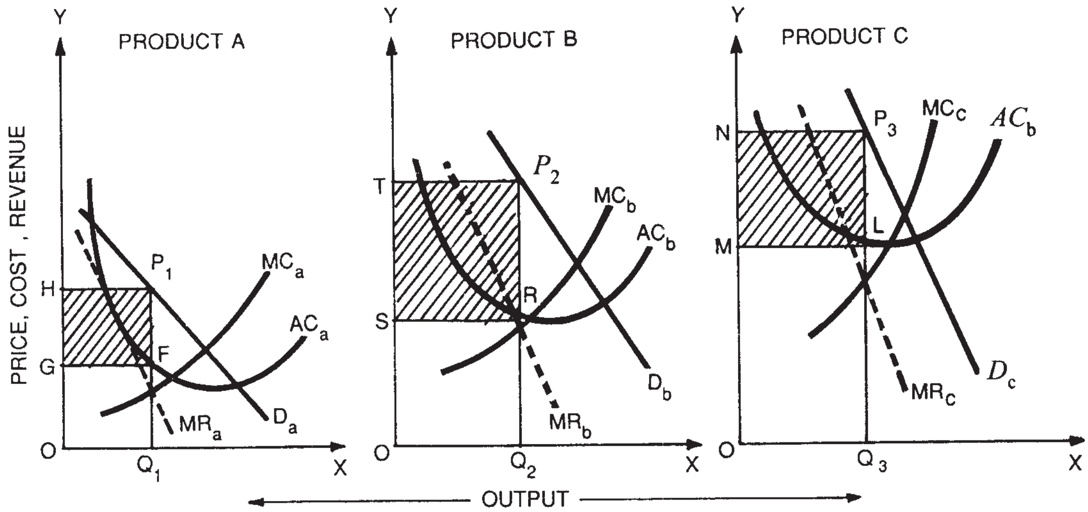


Fig. 17.5: Price-cum-Product Variation: Individual Equilibrium

For product *A*, equilibrium price and output conditions are P_1Q_1 and OQ_1. Its yields profits (P_1FGH. Product *B* has equilibrium condition of P_2Q_2 price and OQ_2 output which yields profit for P_2RST. Similarly, for product *C*, equilibrium price is P_3Q_3 and output is OQ_3, which yield profits P_3LMN. On comparison, $P_2\,RST > P_3LMN > P_1FGH$. It, thus, follows that product *B* is the largest profit-yielding variety. So, the producer will select product *B* and produce OQ_2 quantity and determine the price P_2Q_2 for it.

8. QUANTITATIVE MEASURES OF PRODUCT DIFFERENTIATION

Product differentiation fundamentally is a qualitative idea. Nevertheless, following Telser (1961), we may state three main approaches to differentiation in quantitative terms on practical consideration, as under:

- Cross Elasticity Coefficient.
- Advertisement Expenditure — Sales Revenue Ratio.
- Entropy.

Cross Elasticity Coefficient

Product homogeneity, as in the case of pure competition, implies perfect substitution between the products supplied by different sellers in the market so that the buyers have no specific seller only. There is absence of choice element.

Product differentiation, under monopolistic competition on the other hand, suggests lack of such perfect homogeneity since goods are branded with identification of the sellers. These products, however, have a degree of substitutability. That is to say, if a seller raises price of his brand product significantly, buyers may switch over to another brand for the similar product supplied by other seller.

For this reason, we may consider coefficient of cross elasticity of demand for the cross products (branded substitutes) to measure the degree of product differentiation and corresponding degree of monopoly element implied. The following formula may be used:

$$CEab\ 100 = \frac{\Delta Qa}{\Delta Pb} \times \frac{Pb}{Qa}$$

Where,

CEab stands for the cross elasticity of demand for brand *a* in relation to brand *b* in the same line of product supplied by two different firms *A* and *B*.

Qa refers to quantity demanded for product/brand *a*. *Pb* refers to price of product/brand *b*. Likewise cross elasticity between *'a'* and *'c'* or *'d'*, etc. can be also measured.

Illustration 1

Suppose a market survey in a city X shows that the weekly demand for Sharp 53 cm TV set has increased from Rs. 2,000 to Rs. 2,100. Other things being equal, the price of Toshiba TV set has increased from Rs. 20,000 to Rs. 21,500.

In this case, we may measure the cross elasticity coefficient as follows:

Assuming,

Sharp TV = product *a*

Toshiba TV = product *b*

$$CEab = \frac{100}{1500} \times \frac{2000}{2000}$$

$$= +0.67$$

In general, cross elasticity coefficient and product differentiation have inverse relationship. A high cross elasticity coefficient implies a lesser degree of product differentiation and *vice versa*.

This measure can be applied only to the related products which are substitutes in the market and not to the complementary goods.

Secondly, the cross products should have significant price variations. Marginal price change will not reflect much about product differentiation through this measure.

Advertising — Sales Ratio (ASR)

$$ASR = 100 \left(\frac{AE}{SR}\right)$$

Where, *AE* stands for the advertising expenditure and *SR* for the sales revenue.

A high *ASR* implies lesser degree of real product differentiation and *vice versa*. Usually, in products like cosmetic and drugs it tends to be much higher (around 20 per cent); while in the case of automobiles it is much lower (around 1 per cent).

A major drawback of this measure is difficulty in obtaining data from the firms. Secondly, an illusionary product differentiation is often created through packing differences rather than advertising.

Entropy

Entropy is based on randomness. It is a subject measure referring to the consumer's loyalty to a particular brand/seller or the product.

The entropic degree lies between zero and unity. When product is homogeneous, the entropic value is zero — for the buyer has no specific preference.

In case of branded goods when products are differentiated, entropic degree will be high up to 1. In case of cigarettes, for instance, a customer has a preference for a particular brand and may stick to it once the habit is formed. So, is the case with toiletries, cosmetics, etc.

The major drawback of this measure is that it is not based on an objective criterion.

There can be other ways of measuring product differentiation, such as product differentiation barriers suggesting an element of monopoly power involved. It needs several informations and requires high skills on the part of the researcher/observer to come to any quantitative judgement.

Selling Costs

Expenditure incurred by a firm on advertising and sales promotion of its product is known as selling costs. Thus, selling costs include the following items of expenses:

1. Advertising and publicity expenditure of all sorts.
2. Expenses of sales departments, such as commissions and salaries of sales manager, sales executives and other staff.
3. Margins granted to dealers in order to increase their efforts in favour of particular goods.
4. Expenses for window displays, demonstration of goods, free distribution of samples, etc.

Economists, however, define selling costs as costs incurred in order to alter the location or shape of the demand curve or sales curve of a product. The effect of advertising expenses is to shift the demand curve for a given product to the right by making known to the prospective buyers its availability, by describing it, and by suggesting the uses it can be put to. Briefly, the aim of any producer, who incurs advertising expenses, is to sell a larger output at a given price than what he can sell in absence of these costs.

Under monopolistic competition, often extensive advertising expenditure becomes essential to highlight the features of product differentiation of the firm's product from that of rivals.

Through a successful advertising campaign, the firm may establish the buyers' preference, patronage and brand loyal for its product. Thus, render the demand inelastic — so that, it can raise price for augmenting sales revenue and profits.

Sales promotion is based on two important factors: *(i)* imperfect knowledge on the part of the consumers; and *(ii)* the possibility of changing their wants through advertising or selling appeal. Thus, the impact of selling costs on consumer demand depends on these two factors.

To Chamberlin, ignorance of products on the part of the consumer is an important reason for advertising. Buyers usually are ignorant of the different sellers in a given line of product and the differences in the quality of their products. They are also dimly aware of relative prices for similar goods. In this regard, a seller may resort to "informative advertising", *i.e.*, describing the quality and price of his product and thereby try to influence the shape and location of the demand curve. By spreading information about the product through appropriate advertisement, seller's market may increase, which leads to a shift to the right in the demand curve for the product. Without advertising, new products or varieties cannot reach the market under monopolistic competition. Indeed, the demand curve will be higher when more people are informed about the product through advertising.

There can also be 'manipulative advertising', which affects consumer demand by altering the wants or preferences of the people.

The Case of Competitive Advertising in Australian Telephone Market

Australia during 1990s witnessed intense non-price competition in the form of war on advertising campaign between Optus and Telecom, when the former entered into the Australian market with a big bang and challenged the monopoly power of Telecom in 1992. Telecom had to retaliate the move to protect its market share. Consequently, each of them have been incurring nearly $50 million advertising expenditure to capture the stake of $4 billion worth telephone market. Newspapers and television had been the large beneficiaries of this advertising bonanza.

Optus tried to attack Telecom and altered consumers' preference to an extent through its propaganda about quality of services. Telecom, on the other hand, resorted to price cuts and discounts in retaliation. Yet, the intense advertising did pay a rich dividend to Optus, that it could capture one-tenth of the market. Besides, the entry of other new firms such as GSM has resulted into further intensification of non-price competition in Australian telecommunication market. (Mitchelson and Mann:1995).

Advertising is a crucial aspect of monopolistic competition because it reinforces customer loyalty by highlighting the attributes of product differentiation and diversity on different firms.

A constantly advertised product becomes more familiar to the general buyers than one which is less advertised or not advertised at all in a monopolistically competitive market. So buyers generally tend to demand goods or brands with which they are more familiar. As such, demand for the advertised product shifts to the right. Manipulative advertising generates demand for the product by its influence on consumer's psychology, by playing upon human weakness such as fear, flattery, demonstration effect, so that the consumers' preference is altered in favour of the advertised product. Manipulative advertising eventually turns out to be competitive. Quite often, it consists of false claims about the superiority of the product over that of the rivals. Advertisements for many cosmetic products and pain relief drugs, etc., appearing in magazines, over radio and TV, etc., are manipulative and competitive rather than informative. In practice, however, it is difficult to disentangle information from competitive advertising.

Distinction between Selling Costs and Production Costs

The selling costs must be clearly distinguished from the pure cost of production of a given commodity. Following Chamberlin, we may lay down the significant points of distinction as under:

- Cost of production includes all expenses which must be incurred in order to provide the goods or service, transport it to the buyer, and place it into his hands ready for consumption. Cost of selling, on the other hand, includes all expenses incurred to obtain a demand, or market, for the product.
- Production costs are meant for the creation of utilities which would satisfy the latent demand of the buyers. Selling costs, on other hand, are meant for the creation and shifting of demand for the product.
- Production costs are meant to adapt the product to demand, while selling costs are undertaken to adapt demand to the product. In other words, production costs manipulate the product, selling costs manipulate demand.
- Increase in the costs of production increases the supply of the product. Increase in the selling costs increases the demand for the product.
- Production costs and selling costs exert their effect on prices in different directions. When production costs increase (assuming factor prices as given), the volume of output supplied increases. Hence, in the context of a given demand for a product, its market price tends to fall. While if additional selling costs are incurred, additional demand for the product is created which, in turn, causes the market price to rise.

Thus, the distinction between production and selling costs has immense theoretical significance. In classical theory, in the analysis of costs, the element of selling costs was neglected because selling costs appeared to be inconsistent with perfect competition on account of a standardised product and a large number of rivals.

In practice, production costs and selling costs are intermixed throughout the price system. Thus, at no single point can we say that production costs have ended and selling costs have begun. Say for instance, the transport cost cannot always be described as selling cost. Since transport cost enhances the place utility of product, logically, it can be treated as production cost along with the cost of manufacturing. Hence, it is difficult in practice to separate production costs from selling costs.

However, in determining the price, it is obvious that production costs-cum-selling costs must be covered by the firm if it is to remain in business.

Average Selling Cost Curve (ASC)

Advertising (synonymous with selling costs) increases the demand for the product. Hence, increasing selling costs imply increasing sales.

Like production costs, selling costs are also subject to the three sequential stages of returns, *viz.*, increasing sales returns, constant and diminishing sales returns. According to Chamberlin, in the course of analysis, selling costs, like production costs, can be split up into various factors of production, like land, labour and capital that are hired for selling purpose in different proportions. "The most efficient Marginal selling cost *MSC* intersects from below the average selling cost *ASC* as its minimum point combination of factors will always be sought for any given total expenditure, and the general laws governing its determination will be the same for the sales organisation as for the production organisation." It follows from this that, like the average production cost curve, the average selling cost curve is also U-shaped, as depicted in Figure 17.6.

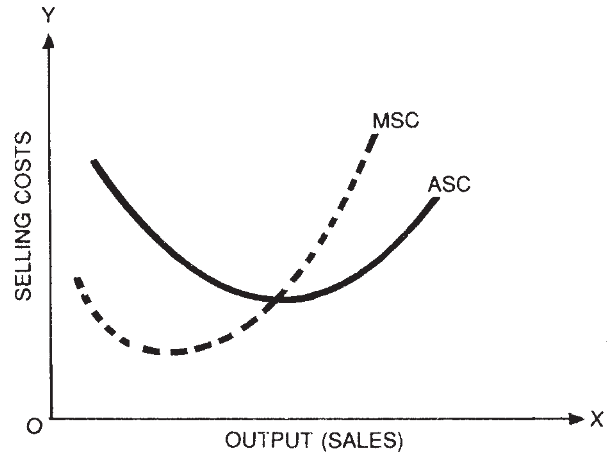


Fig. 17.6: Average and Marginal Selling Costs

In Figure 17.6, the curve *ASC*, representing average selling cost, is U-shaped. This implies that the selling cost per unit of output initially falls as returns are increasing, reaches the minimum and then, rises again under diminishing returns. This suggests that, initially, increase in selling costs, leads to a more than proportionate increase in demand for the product. Thereafter, demand tends to increase in proportion to increase in total sales outlay. Beyond a certain point, the demand tends to rise less proportionately to the rise in sales outlay.

The addition made to total selling outlay, for expanding the sale of one extra unit of a given product, is referred to as the marginal selling cost.

The marginal selling cost curve (*MSC*) also behaves in a U-shaped manner as shown in Fig. 17.6. It, thus, suggests that initially the marginal selling cost declines with the expansion of output and sales. It reaches the minimum, may remain constant for a while and, thereafter, starts rising. The reasons for this sort of behaviour of *MSC* are the same as has been discussed in the case of *ASC*.

Concept of the Combined Cost

In determining the optimum level of selling outlays, Chamberlin opines that we cannot draw any conclusion unless the cost of production is also taken into account. Here, he introduces the concept of combined cost. The aggregate of production costs and selling costs is referred to as combined costs. Thus,

Combined Cost = Production Cost + Selling Cost.

It follows that when as average production cost curve and the average selling cost curve are added together, a combined average cost curve is obtained (See Fig. 17.7).

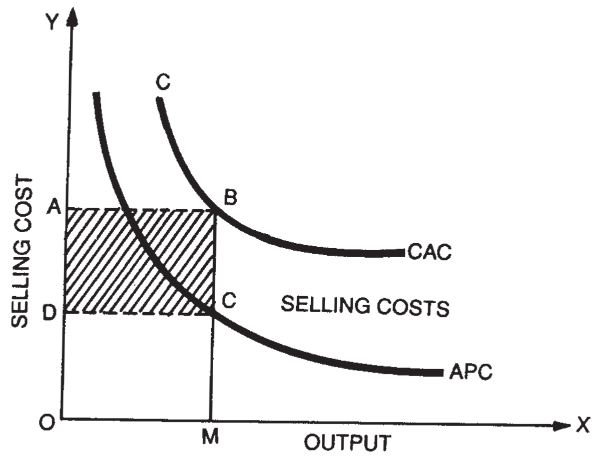


Fig. 17.7: Combined Costs

In Figure 17.7, the average production cost curve is represented by the curve *APC*. The average combined cost curve is denoted by *ACC*. Both the curves are U-shaped, however, the relationship between these two curves is as follows:

The vertical distance between the two curves measures the average selling cost at each level of output. For instance, for *OM* level of output, *CM* is the average production cost and *BM* the average combined cost. Thus, *BC* is the average selling cost. Again, the area underlying the *APC* curve measures total production cost for a given level of output, while the area between the range of *ACC* and *APC* curves represents the total selling outlays. The area corresponding to the distance between *ACC* and *APC* curves also measures the total selling costs. In the figure, at *OM* level of output, total production cost is □*OMCD* and the total combined cost is □*OMBA*. Therefore, □*ABCD* measures the total selling costs.

Individual Equilibrium: Selling Costs

No doubt, sales expenditure results in an increase in the demand for the firm's product. But the question is how much sales expenditure should the firm incur? The optimum sales expenditure is the one which yields maximum profits. Its determination, however, is an intricate problem because, to a monopolistically competitive firm, selling cost is one of the three interrelated variables — price, output and selling cost. Thus, in attaining equilibrium, the firm has to actually determine the most profitable output and incorporate relevant sales expenditure in order to create demand for that output. The firm has, therefore, to determine maximum profits or net returns, measured as follows:

Net Returns (Profits) = (Price × Output) – (Production Cost + Selling Cost)

Let us assume that product and price are given. The firm has to determine equilibrium output with a suitable sales expenditure. It will follow the same marginal rule of profit maximisation, but because of selling cost, it has to consider the combined cost rather than production cost alone. Thus, by equating marginal combined cost (*MMC*) with the marginal revenue (*MR*), it will determine the most profitable output as well as required selling cost. Since price and product are given, the *MR* curve tends to be a horizontal line at a fixed price. The process of equilibrium is depicted in Fig. 17.8.

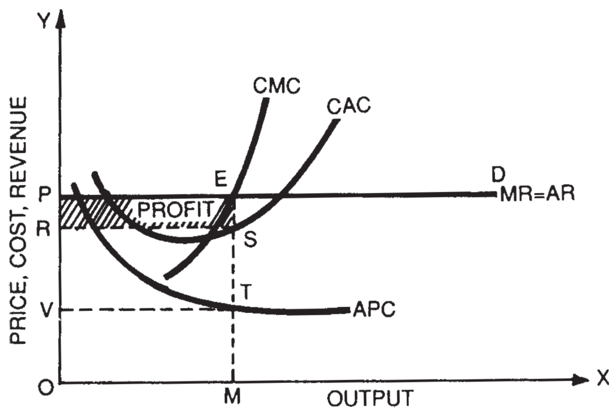


Fig. 17.8: Selling Costs Equilibrium

At *E : CMC = MR*. *OM* equilibrium output. *RSTV* measures selling costs. *PESR* represents profit.

In Figure 17.8, *APC* is the average production cost curve, *ACC* is the combined average cost (production cost + selling cost) curve. *MCC* is the marginal combined cost curve. At *OP* price, the line *PD* represents *MR* = *AR*. Equilibrium point *E* is determined by the intersection of the *CMC* curve with the *MR* curve (*PD*). Thus, *OM*, the equilibrium level of output is determined. To create sufficient demand for *OM* output, the total selling cost required is measured by the area *RSTV*. Similarly, the maximum profit obtainable is shown by the area.

Intensity of Advertising

The advertising sales ratio (*ASR*) is used to measure the intensity of advertising for a product. Usually, it is expressed in term of percentage.

The Market Advertising Intensity of a product is measured as the ratio of the advertising expenses to the sales revenue. Thus,

$$MAI(\%) = 100(AE/SR)$$

where,

MAI = the advertising intensity in a market

AE = advertising expenditure

SR = sales revenue

Advertising intensity in UK market of some products is estimated to be as follows:

Vegetables (0.23), TV sets (0.41), Refrigerators (0.75) are the case of low intensity, washing powder (8.0), soaps (14.4). Shampoo (24.8) are the cases of high intensity.

[***Source:*** Advertising Statistics Year Book (1999)].

Usually, high advertising intensity is found in the products sold in oligopolistic or monopolistic competitive markets, *e.g.*, cosmetics. In the case of innovated products or products subject to continual improvements and charges, the advertising intensity tends to be high.

On the other hand, consumer goods — necessary items such as fruits and vegetables that are frequently puchased need no more advertising efforts to induce the buyers to make their choice.

Advertising intensity tends to be relatively more in case of consumer goods than the producer goods markets.

A consultancy agency had measured the *ASR* for certain selected products in the U.K. for 1995, such as: soap (19.5%), shampoo (18.4%), watches (4.2%), books (3.0%), soft drinks (1.2%), Air travel (0.9%) and hairdressing (0.03%). The varying advertising intensity is attributed to the product characteristic and market demands, high traditional goods and new products will be heavily advertised than standardised products.

The *ASR*, however, does not indicate the absolute amount of advertising expenditure. Therefore, *ASR* in case of cars is lower than that of books, advertising on cars claim more space and time than on books.

MODEL QUESTIONS

1. (a) What are the characteristic features of monopolistic competition?

   (b) Show how an individual firm will attain equilibrium under monopolistic competition for a given product, its price and output being allowed to vary, selling costs having been ignored.

2. What are the selling costs? Why are they peculiar to monoplistic competition?
3. What is product differentiation?
4. How much should a competitive monopoly firm spend on advertising? Discuss.
5. How are products differentiated in practice under monopolistic competition?

6. Advertising is a necessary evil of modern business. Discuss.
7. Discuss the importance of advertising in the case of a monopolistically compeititve firm.
8. Would you justify for regulations of market power of monopolistically competitive firms? Why?

Problems

1. Monthly demand for product x of a firm increased from 3,000 units to 3,200 units when its competitor's price went up from Rs. 50,000 to Rs. 55,000. Measure the degree of product differentiation.
2. When monthly advertising expenditure of a firm was Rs. 70,000 its sales revenue was Rs. 1,80,000. Measure the intensity of advertising.

Project Work and Skill Development

- Collect data on advertising expenditure and sales revenue of the firms in Bombay and measure the coefficients of advertising intensity. Give your comments. Refer to websites.
- Collect information on advertising expenses on view films released recently by the Indian film producers in Mumbai/Delhi/Bangalore and also their collections. Give your comments.

❒ ❒ ❒

Oligopoly

18

CHAPTER

1. MEANING OF OLIGOPOLY

It is a market situation comprising only a few firms in a given line of production. Their products may be standardised or differentiated. The price and output policy of oligopolistic firms are interdependent. The oligopoly model fits well into such industries as automobile, manufacturing of electrical appliances, etc., in our country.

Feller defines oligopoly as "competition among the few." In an oligopolistic market, the firms may be producing either homogeneous products or may be having product differentiation in a given line of production.

The following are the distinguishing features of an oligopolistic market:

- **Few Sellers.** There are a few sellers supplying either homogeneous products or differentiated products.
- **Homogeneous or Distinctive Product.** The oligopoly firm may be selling a homogeneous product. For example, steel/aluminium/copper. These can be a unique or distinctive product. For example, automobile-passenger cars.
- **Blockaded Entry and Exit.** Firms in the oligopoly market face strong restrictions on entry or exit.
- **Imperfect Dissemination of Information.** Detailed market informations relating to cost, price and product quality are usually not publicised.
- **Interdependence.** The firms have a high degree of interdependence in their business policies about fixing of price and determination output.
- **High Cross Elasticities.** The firms under oligopoly have a high degree of cross elasticities of demand for their products, so there is always a fear of retaliation by rivals. Each

firm consciously considers the possible action and reaction of its competitors while making any change in the price or output.

- **Advertising.** Advertising and selling costs have strategic importance to oligopoly firms. "It is only under oligopoly that advertising comes fully into its own." Each firm tries to attract consumers towards its product by incurring excessive expenditure on advertisements.
- **Constant Struggle.** Competition is of unique type in an oligopolistic market. Here, competition consists of constant struggle of rivals against rivals.
- **Lack of Uniformity.** Lack of uniformity in the size of different oligopolies is also a remarkable characteristic.
- **Lack of Certainty.** Lack of certainty is also an important feature. In oligopolistic competition, the firms have two conflicting motives: *(i)* to remain independent in decision-making, and
(ii) to maximise profits, despite the fact that there is a high degree of independence among rivals in determining their course of business. To pursue these ends, they act and react to the price output variation of one another in an unending atmosphere of uncertainty.
- **Price Rigidity.** In an oligopolistic market, each firm sticks to its own price. This is because, it is in constant fear of retaliation from rivals if it reduces the price. It, therefore, resorts to advertisement competition rather than price cut. Hence, there is price rigidity in an oligopolistic market.
- **Kinked Demand Curve:** According to Paul Sweezy, firms in an oligopolistic market have a kinked demand curve for their products.

2. KINKED DEMAND CURVE

The kinked demand curve or the average revenue curve is made of two segments: *(i)* the relatively elastic demand curve and *(ii)* relatively inelastic demand curve as shown in Figure 18.1.

In Figure 18.1 corresponding to the given price *OP*, there is a kink at point *K* on the demand curve *DD*. Thus, *DK* is the elastic segment and *KD* is the inelastic segment of the curve. Here, the kink implies an abrupt change in the slope of the demand curve. Before the kink point, the demand curve is flatter, after the kink it becomes steeper.

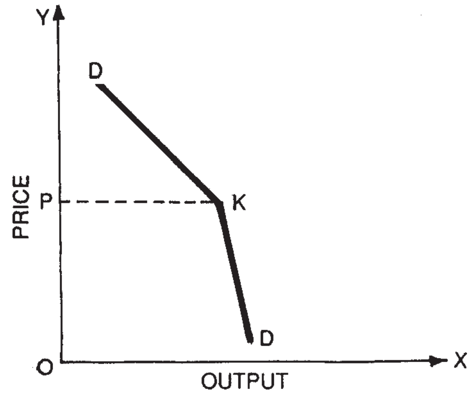


Fig. 18.1: Kinked Demand Curve

Above the kink at a given price, demand curve is more elastic and blow the kink less elastic.

The kink leads to indeterminateness of the course of demand for the product of the seller concerned. He thus, thinks it worthwhile to follow the prevailing price and not to make any change in it, because raising of price would contract sales as demand tends to be more elastic at this stage. There is also the fear of losing buyers to the rivals who would not raise their prices. On the other hand, a lowering of price would imply an immediate retaliation from the rivals on account of close interdependence of price output movement in the oligopolistic market. Hence, the seller will not expect much rise in his sale with price reduction.

3. KINKED DEMAND CURVE THEORY OF OLIGOPOLY PRICES

An important point involved in kinked demand curve is that it accounts for the kinked average revenue curve to the oligopoly firm. The kinked average revenue curve, in turn, implies a discontinuous marginal revenue curve *MA-BR* (as shown in Fig. 18.2). Thus, the kinky marginal revenue curve explains the phenomenon of price rigidity in the theory of oligopoly prices.

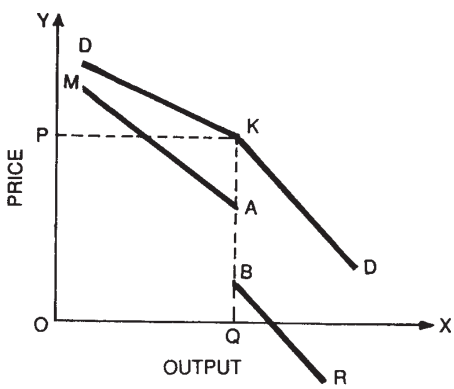


Fig. 18.2: Discontinuous Marginal Revenue Curve

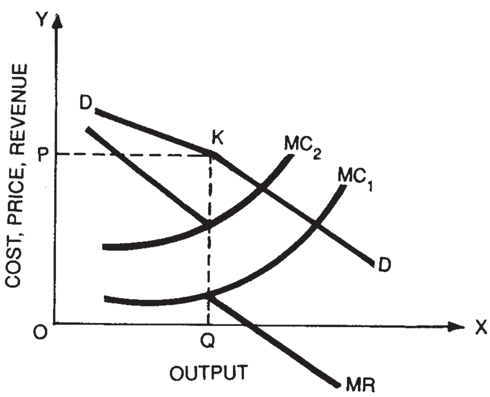


Fig. 18.3: Oligopoly Price Rigidity

Because of discontinuous marginal revenue curve (*MR*), there is no change in equilibrium output, eventhough marginal cost changes hence, there is price rigidity. *OP* does not change.

It is observed that quite often in oligopolistic markets, once a general price level is reached whether by collusion or by price leadership or through some formal agreement, it tends to remain unchanged over a period of time. This price rigidity is on account of conditions of price interdependence explained by the kinky demand curve. Discontinuity of the oligopoly firm's marginal revenue curve at the point of equilibrium price, the price output combination at the kink tends to remain unchanged eventhough marginal cost may change, as shown in Figure 18.3.

In the Fig 18.3, it can be seen that the firm's marginal cost curve can fluctuate between MC_1 and MC_2 within the range of the gap in the *MR* curve, without disturbing the equilibrium price and output position of the firm. Hence, the price remains at the same level *OP*, and output *OQ*, despite change in the marginal costs.

4. PATTERN OF BEHAVIOUR IN OLIGOPOLISTIC MARKETS

Haynes, Mote and Paul (1970) have enlisted the following important patterns of behaviour normally observed in oligopolistic markets:

Price Leadership

A traditional leader in the oligopoly market announces price changes from time to time which other competitors follow. The dominant firm may assume the price leadership. There is barometric price leadership when a smaller firm tries out a new price, which may or may not be recognised by the larger firms.

The price leadership of a firm depends on a number of factors, such as:

(a) *Dominance in the Market*. Dominating position in the market is achieved by the firm when it claims a substantial share of the market.

(b) *Initiative*. When the firm develops a product or a new sales territory.

(c) *Aggressive Pricing*. When the firm charges lower prices aggressively and captures a sizeable market.

(d) *Reputation*. When the firm acquires reputation for sound pricing policies and accurate decisions due to its longstanding in the business, the other firms may accept its leadership.

Price Wars

Under cut-throat competition among the rivals, price wars may emerge in an oligopolistic market. Under price wars, firms tend to charge prices even below their variable cost. Price wars are never planned. They occur as a consequence of one firm cutting the prices and others following suit.

Price Cuts to Weed Out Competition

A financially strong firm may deliberately resort to price cuts to eliminate competitors from the market and secure its position.

Collusion

Business syndicates or trusts may be formed by the competing firms and agree to charge a uniform price, thereby to eliminate price retaliation or price cut competition. Such business collusion implies conversion of an oligopoly into a monopoly. Business collusion is considered illegal under anti-trust laws, such as the Competition Act, 2002, in India.

Secret Price Concessions

Sometimes, oligopolists may offer secret price concessions for selected buyer instead of having an open price cut, which is likely to be retaliated by their rivals.

Non-Price Competition

Owing to the danger of retaliation in price cut competition, the oligopolists may also resort to non-price competition by competing in sales promotion efforts, advertising, product improvement, etc. Here, too, the rivals do retaliate.

5. MARKET SHARE

Market share is the percentage of share a firm is able to claim in the total market sales. Thus,

$$\text{Market share of a firm} = \frac{\text{Sales of the Firm}}{\text{Total Market Sales}}$$

Market share depends on the size of the firm as well as the size of the market along with the number of firms in the market. Under pure or perfect competition, an individual firm's market share tends to be just fractional.

A Case Study of Oligopoly: Grocery Retailing Trade

Over the years market trade in major cities is turning to become oligopolistic with varying degrees of concentration. A remarkable feature of urban metropolitan development is the rising share of the supermarket and corresponding decline of cooperative and independent retailers. Dunnett (1992) illustrated the phenomenon evidenced from the UK grocery trade during 1961-89. It is observed that supermarket claimed 29 per cent, cooperatives 11 per cent and independent retailers 60 per cent of the market shares in grocery retailing in 1961.

In 1981, the market share of the supermarkets increased to 63 per cent, and that of cooperatives to 14 per cent; whereas the share of independent retailers declined to 23 per cent. By 1989, the share of supermarkets went up to 74 per cent, while that of cooperatives decreased to 11 per cent and that of independent retailers to 15 per cent. If such a process happens in a city like Mumbai or Delhi in developing countries like India, it may create an adverse impact on the self-employment situation and intensity the problem of inequality in the distribution of income.

Oligopoly in US Steel Industry: A Case Study

Truett and Truett (1980) reported an interesting case study of US Steel of price leadership under oligopolistic market structure for the year 1976, reviewing pricing policy comments reported in *The Wall Street Journal*. The United States Steel Corporation (USS) has been the dominant firm in the steel industry and the small firms used to follow its lead. In mid-August 1976, for instance, the USS increased the price of a Class I cold-rolled sheet by 4.5%, *i.e.*, from \$ 296 per tonnes to \$309 per tonnes. Some small firms were not happy with this meagre increase to cope with inflation at that time. But, a larger increase was not suited to the USS. In light of this event, Truett and Truett used the following hypothetical supply function (due to non-availability of actual data), in order to explain the phenomenon of the dominant firm model.

Let,

Industry demand function be:

$Qd = 1403 - 2.6P$

Where Qd = total market demand for the product ('000 tonnes per month)

P = the market price

Suppose, the supply function of the smaller firms in the industry together is:

$Qs = 0.9P + 150$

Where, Qs = quantity of the product supplied ('000 tonnes per month)

Assuming $Qs = Qd$ form the above equations (relating to small firm's supply condition only) we have:

$0.9P + 150 = -2.6P + 1403$

$\therefore\ 3.5P = 1403 - 150 = 1253$

$\therefore\ P = \$358$

which means if the product price is \$358 per tonnes, the small firms supply can cover up the entire market.

By subtracting the supply function from the market demand, we can obtain the demand curve for the USS (Q_L), the leader firm,

$Q_L = 1403 - 2.6P - [(0.9P) + 150]$

$Q_L = 1253 - 3.5P$

Assuming price to be \$358, total revenue (TR_L) and marginal revenue (MR_L) for the dominant firm (USS) is worked out as:

$TR_L = 358Q_L - 0.2857Q^2$

$\therefore\ MR_L = 358 - 0.5714Q_L$

At existing price \$ 296 per tonnes, $Q_L = 1253 - 3.5\ (296) = 217$

$\therefore\ MR_L = 358 - (0.5714 \times 217) = 234$

When $MC = MR$ at \$260, it follows that MR (\$234) tends to be less than MC (\$260).

In this case, the firm has to readjust its output and price:

$MR_L = 260\ MC_L$

$\therefore\ MR_L = 358 - 0.5714\ Q_L = 260$

$\therefore\ Q_L = 171.5$ ('000 tonnes per month)

$P_L = 358 - (0.2857 \times 171.5) = \$309.$

At the price \$309, *MR* = \$ 309 which is greater than \$260 marginal cost; that is in favour of the firm.

This is a simple illustration. In reality, steel industry anywhere is characterised by much more complex pricing system. Further, any other giant rival firm in course of time may also take over the leadership. In 1975, for instance, Armco played the role of leadership in steel industry and was undercut by the *USS* (*Truett and Truett,* 1980, *p.* 179).

The moral of the story is that in reality price leadership game is a complex phenomenon. Nonetheless, the dominant firm case in oligopoly market does provide an insight about the demand and cost variables that are relevant for the players in this game.

In a pure monopoly, on the other hand, 100 per cent market share is claimed by the single seller, since there is no other competitor.

In oligopoly market, a big leader firm might be claiming a larger share than the followers or smaller firms.

With a price change in oligopolistic market, the market share of a firm may change. The degree of responsiveness of the market share of a firm to a change in the price of its product may be referred as 'market share elasticity' (MSE). Thus,

$$MSE = \frac{\text{Percentage change in market share of Firm } A}{\text{Percentage change in price of Firm } A}$$

Alternatively,

$$MSE = \frac{\%\Delta\ MS \text{ of Firm } A}{\%\Delta\ P \text{ of Firm } A}$$

where

MS = share,

P = price

D = change

In modern times, advertising expenditure is an important factor in improving the market share of a firm under oligopoly. In such a situation, market share elasticity can be measured as:

$$MSE = \frac{\text{Percentage change in market share of Firm } A}{\text{Percentage change in advertising expenditure of Firm } A}$$

Collecting relevant data on practical side, researchers can provide useful insight on these phenomena.

6. CONCENTRATION RATIO

The concentration ratio refers to the extent of market supplied by the number of firms involved.

Hirschey (2004) measured the concentration ratios (CR) for the US industries on the basis of 1997 Economic Census data. Table 19.1 summarily represents some of these measures for the selected industries.

Table 18.1: Concentration Ratios in the US Business

Industry	*Number of Firms*	*Industry Sales (US $ millions)*	*Percentage of Sales Top 4 Firm (CR4)*	*Accounted by Top 8 Firm (CR8)*
Soft Drinks	1008	13131	44.7%	55.6%
Footwear	366	4211	27.7%	42.4%
Cement	176	6532	33.5%	52.0%
Telephones	548	38376	54.4%	66.5%
Automobiles	253	205544	88.3%	97.5%
Breakfast Cereal	48	9099	82.9%	93.5%

Source: Hirschey (2004, p. 447)

It follows that automobile industry in the US is having an oligopoly element of high concentration ratio as top 8 firms claim 98 per cent of the market, though there are 253 firms in total.

The concentration ratio is measured as under:

$$CR_n = \left[\frac{\text{Total Firms}^{(n)}\text{ Sales}}{\text{Industry Sale}}\right]100$$

The CR can range between 0 to 100. However, CR4 and CR8 are common considerations.

If CR4 > 80 means that four firms control over 80 per cent of the total market sales. It is regarded as a high concentration ratio. If CR4 < 20 it implies much lower concentration ratio.

Suppose, the three firms concentration ratio is100 per cent. It means only three firms control the entire market supply, so this oligopoly market or industry is highly concentrated. A 75% five-firm concentration ratio would mean that 75% of the market is covered by the five big firms in the industry. The market situation is by and large oligopolistic with high concentration ratio.

The Herfindahl's Index (HI)

The Herfindahl's Index is a measure of concentration. It is obtained by squaring and aggregating the market share of each firm. Thus,

$HI = (MS_1)^2 + (MS_2)^2 + (MS_3)^2 + \ldots (MSN)^2$

where, MS stands for the ratio of market share of the firm.

1 ... to ... N = the number of firms in the market.

Under pure monopoly, there is a single firm claiming 100% of the market. Hence, in this case $HI = (1.00) = 1.00$ or 100%

Illustration: In a duopoly market, firm 1 has 60% share and firm 2 has 40% share, then:

$$HI = (0.60)^2 + (0.40)^2$$
$$= 0.36 + 0.16 = 0.52 \text{ or } 52\%$$

Illustration: In an oligopoly market, three firms claim the following shares = 50%, 30% and 20%

$$HI = (0.50)^2 + (0.30)^2 + (0.20)^2$$
$$= 0.25 + 0.09 + 0.04 = 0.38 \text{ or } 38\%$$

If all firms have equal share of 33.33% then:

$$HI = 3(0.333)^2 = 0.333 \text{ or } 33.3\%$$

It follows that *HI* tends to be higher when market is shared unequally than equally by the competing oligopolists.

A major limitation of the Herfindahl's Index (*HI*) is that it does not indicate the degree of actual and potential competition in the market or suggest the possibility of potential entrants.

7. GAME THEORY AND OLIGOPOLY

Oligopoly business is just like a game in uncertain situation. Professors Von Neumann and Murgenstern are the originator of game theory applied to the oligopoly problem.

The oligopoly firms in choosing a rational course of action face the problem similar to that of the players in any game. The players technically resort to game strategies — *i.e.*, complete sets of plans of action specifying what the player should do during the game. Out of several strategies the player has to make a choice. The same thing applies to the oligopolistic firm.

An oligopolist firm may came across certain common business strategies in decision-making, such as:

- Increase the price
- Increase advertising
- Improve the product quality.

The firm has to make a suitable selection. While doing so the firm has to consider the repurcussions — rival's reaction towards a particular business strategy chosen. In business competition, game, the counter-parts/rivals home their own strategies to choose. Hence, the final outcome depends on the interaction of strategies adopted by the competitors in the oligopoly market just like a game. In playing a game, the players should anticipate the more/ action of the competitors and formulate their own strategy of counteraction. In the same way the oligopolists decide.

Suppose: There are two oligopoly firms *A* and *B*. The problem is to decide whether to increase the advertisement expenditure or not. *A* pay-off matrix is to be constructed in two alternative anticipations:

- The rival firm does not increase advertising expenditure. (No retaliation).
- The rival firm retaliates. It also increases advertising expenditure.

Considering the outcome of advertising on profit estimated, pay-off matrix is computed in this case as in Table 18.2.

Table 18.2: Pay-off Matrix of the Advertising Game: Profit

(Rs. in million)

B's strategy / *A's strategy on Advertising*	*Increase*		*Do not Increase*	
Increase	A 10	B 5	A 15	B 1
Do not increase	A 5	B 6	A 6	B 3

It is observed that, when:

- *A* and *B* both increase advertising expenses. *A* gets 10 and *B* gets 5 million profits.
- *A* increases but *B* does not, *A* gets profit 15 million, while *B* gets 1 million.
- *A* does not increase advertising expenditure, but *B* increases. *A* gets 5 million, *B* gets 6 million profit.
- *A* and *B* both do not increase advertising, still *A* gets 6 million and *B* gets 3 million profit.
- A dominant strategy is based on optimum pay-off, irrespective of competitor's action.
- For *A*, dominant strategy is to increase advertising expenditure.
- For *B*, also dominant strategy is to increase advertising expenditure.

Therefore, from *A*'s point of view: *B* will not increase advertising expenditure is highly uncertain. Similarly, from *B*'s point of view, *A* will not increase advertising is highly uncertain. The final outcome is that both tend to advertise.

If both come to an understanding of not to increase advertising expenditure, both would gain, but this does not happen so commonly.

The critics, however, argue that the oligopoly game is not a 'constant sum game' as presumed in the theory. Firms in real world may not be fully aware of the rival's strategies. Watson (1963), thus, concludes that the game theory failed to provide a satisfactory explanation of oligoplistic behaviour in reality.

MODEL QUESTIONS

1. Explain the kinked demand hypothesis of oligopoly market. What is its impact on oligopoly pricing?
2. Describe main features of oligopoly.
3. Discuss the pattern of oligopoly market behaviour.
4. Define oligopoly. Explain how prices and output decisions are made in a oligopolistic market.
5. How is market share of a firm determined?

❐ ❐ ❐

Pricing Methods

19

CHAPTER

1. INTRODUCTION: GENERAL PHILOSOPHY

Pricing policy in practice is not completely devoid of pricing theory. There is an economic rationale behind pricing policy and practices.

Pricing is not an easy task. A pricing policy has to be well conceived as there are many pricing problems with practical considerations. The following are the general considerations, involved in formulating a pricing policy by a manufacturer or a firm:

Kind of Market Structure

Pricing policy is to be set in the light of competitive situation in the market. If the firm is operating under perfect competition it acts only as price-taker and there is hardly any choice left. The firm has a pricing problem, when there is imperfect or monopolistic competition. Under monopoly, the firm is a price-maker. It has to set its own price policy. Usually, a manufacturing firm today operates under imperfectly competitive market condition, and hence, it has to set its own price policy, as may be feasible. According to Joel Dean, how much price discretion a firm has depends on the market conditions, such as:

- The number, relative size, and product lines of competitors, *i.e.*, degree of closeness of substitute products supplied by the rivals.
- The likelihood of potential competition. This depends on the possibilities of entry of new firms in the market and the relative entry barriers.
- The stage of consumer acceptance of the product. In other words, degree of patronisation of the buyers towards the given product manufactured by the firm.
- The degree of potential market segmentation or subdivision and chances of price discriminations.

- The degree of product differentiation adopted by the concerned firm in comparison to the rivals in the market.
- The opportunities and possibilities for variation in the product service bundle.
- The richness of the mixture of service, advertisement and sales propaganda and the reputation of the firm and qualitative improvement in the product bundle.
- The cross elasticity of demand provides a unique dividing line between differentiated products and homogeneous products and an idea of the market condition and its relative competitiveness. If there is low cross elasticity of demand for the firm's product, it suggests a higher degree of monopoly power and possibility of selling its product at a high price — at a premium, or even at a discount, without disturbing competitors' prices or sales.

  When there is little product differentiation, but there are a few sellers, *i.e.*, there is an oligopoly market, the quantity that the firm can sell at various prices depends upon the reactions of the rivals to these prices, and it is not easy to predict the rivals' behaviour in an oligopoly market.

Goal of Profit and Sales

Pricing should normally aim at stimulating profitable combination sales. Sometimes, the firm may also seek profit maximisation. Sometimes, the firm may want to capture the market through sales maximisation. But, in any case, sales should also be more profit-oriented and never be loss-oriented, under normal circumstances.

Long Range Welfare of the Firm

Prices should be set to promote the long range welfare and well-establishment of the firm in the market. The firm may seek to discourage entry of the rivals through its low price policy.

Flexibility

Pricing policy should be flexible enough to meet the changes in the demand pattern and market situation.

Business Objective

The firm has to set a clear vision of its business objective such as survival, growth, etc.

Other Miscellaneous Proposals

A firm may also consider certain other proposals in its pricing policy, such as:

- Prices should be adapted and individualised in accordance with the diverse competitive situations encountered by different varieties of products produced by the firm.

- Provision may be made for a predetermined and systematic method of pricing new products which may be introduced by the firm in course of time, under its business planning for expansion.
- Determination of replacement parts prices form an organised classification of parts by type and manufacture.
- Determination of the price discount structure, *i.e.,* price discount differentials for distribution channels quantity-wise, territory-wise, terms of payment-wise, etc.
- Prices have to be viewed in relation to the quality and quantity of the firm's product and its promotional policies and sales expenditures.

2. OBJECTIVES OF PRICING POLICY

Pricing is not an end in itself. Pricing is a means to an end. Therefore, the firm must explicitly lay down its pricing objectives. The firm's overall objectives serve as guiding principle to pricing. Thus, firm's business objectives are normally spelled out as the objectives of its price policy. Empirical evidences reflect that theoretical goal of profit maximisation is rarely taken in practice by the business firms in their price policy.

The following are the commonly adopted major pricing objectives of a business firm:

- **Survival.** Basically, in these days of monopolistic competition or dynamic changes and business uncertainties, a firm is always interested in its continued survival first. For the sake of assuring continued existence, generally, a firm is ready to tolerate all kinds of upheaval in product lines, organisational and even personnel changes.
- **Rate of Growth and Sales Maximisation.** A firm may be interested in setting a price policy which will permit a rapid expansion of the firm's business and its sales maximisation.
- **Market Shares.** By adopting a price policy the firm may wish to capture a larger share in the market and acquire a dominating leadership position. In oligopoly market, this is quite common.
- **Target Return on Investment.** The firms may have a predetermined target return of their investment, for instance say 10 per cent.
- **Preventing Competition.** In pricing its product, the firm may keep an eye on rival's entry. So, it may fix up the price such that would prevent competition.
- **Making Money.** Some firms are interested in making a fast buck taking their monopoly advantage into account and try to sell their goods at premium. Thus, pricing objective may be of making money.
- **Service Motive.** A firm may set pricing policy such as to serve the community and improve its welfare.
- **Regular Income.** Some firms are interested in maintaining regular flow of income, so would set their price policy accordingly.

- **Price Stabilisation.** The firms may be generally interested in keeping their prices stable within certain range over a period of time, irrespective of marginal changes in demand and costs.

However, the survival of the firm is always the underlying objective in pricing. In practice, thus, the following interrelated pricing objectives are commonly held:

— to fulfil a goal rate of return on investment;

— to seek the anticipated rate of growth;

— to improve the market share;

— to stabilise prices and profit margins for the regular flow of income.

3. FACTORS INVOLVED IN PRICING POLICY

The executive's problems of private pricing policy involves many considerations and right advice from the professional business economist. The following are the important factors deserving special attention in determination of a pricing policy of any firm.

- Costs;
- Demand and Consumer Psychology;
- Competition;
- Profit; and
- Government policy.

Costs

Cost is an important element in price determination. Cost data serve as the base. Price has to be along cost. If price is below the cost of production it would mean losses. Thus, cost analysis is important. Along the total costs, average and marginal costs are to be determined.

- For business decisions in the short run, direct or variable costs have greater relevance. The firms seek to cover full allocated costs.
- Economy in cost is also important for setting a lower price for the product. A high cost of production obviously calls for a higher price.

Demand

In pricing policy, demand can never be overlooked. Rather, demand is more important for the effective sales. Demand for a firm's product depends on consumer's preferences. So, the consumer psychology is very important. Through appropriate advertising and sales campaign consumers' psychology can be influenced and their preferences may be altered, thus, demand can be manipulated.

A low or high price policy is to be set in view of the elasticity of demand. If demand for the product is highly inelastic, then only rising price policy would be a paying proposition to the businessman.

Further, in all cases demand is not price elastic. In some cases, especially, consumer durables, e.g., TV set, car, etc., demand is income elastic. Thus, when income of the buyers rises, the firm can expect to sell more such goods even at high prices.

In case of elastic demand for the goods, a price cut would be beneficial in boosting the sale. However, consumers' psychology — their anticipation about the price change is also significant. If consumers anticipate a further price cut, then the price cut policy will result in increasing the sale only marginally in the short-run. But, if they feel that the price cut is final, it will definitely improve the sale to a greater extent.

Competition

The nature of pricing policy largely depends on the degree of competition prevailing in the market. Under perfect competition, there is a uniquely determined ruling price in the market, also the firm has no scope to design its own price policy. Under monopoly, oligopoly or monopolistic competition, the firm can determine its own price policy.

Profits

In determining price policy, profit consideration is also significant. In practice, however, rarely is there a goal of profit maximisation. Usually, pricing policy is based on the goal of obtaining a reasonable profit.

Further, most of the businessmen would prefer to hold constant price for their products rather than going for a price rise on a price cut, as far as possible. Thus, price rigidity may be the norm of the price policy. But, rigidity does not mean inflexibility. Price fluctuations do conform to cost changes.

Government Policy

Pricing policy of a firm is also affected by the government policy. If the government resorts to price control, the firm has to adopt the price as per the formula and ceiling prescribed by the government, then there is little scope to pursue its own pricing. For instance, in India we have drug price control, etc.

4. PRICING METHODS

There are four important methods of pricing:

- Cost plus or full cost pricing.
- Going rate policy.
- Pricing for a rate of return.
- Administered prices.

Of these factors, Cost, Customers and Competition [3Cs] are crucial in the product pricing. The extent of managerial decision in this regard largely depends on the type of market structure faced by the firm in a market economy. When the firm exists in a competitive market its role is price-taker, then the pricing decision tends to be a market phenomenon and the manager has to focus on output policy. Cost factor is an important consideration. Under monopoly the firm has a greater power of price determination and the course of action depends on consumer factor elasticity of demand. Competition is out of question, but cost condition matters. Under monopolistic competition, the firm needs to consider entry or exist of competitive firms with product differentiation, while deciding its pricing strategy. Under oligopoly, rivals' reaction matters most in the determination of the pricing policy.

Cost Plus Pricing

Cost plus pricing is the most commonly adopted method. Under this method cost of a product is estimated and a margin of some kind of profit is added on the basis of which the pricing is determined. Empirical evidences have shown that a majority of the business firms usually set prices for their products on the basis of cost plus a fair profit percentage.

Briefly, thus:

$$\boxed{\text{Cost plus Pricing} = \text{Cost} + \text{Fair Profit.}}$$

Cost. In cost plus pricing principle in practice, cost refers to full allocated cost. According to Joel Dean (1976), there are, however, three different concepts of the cost component used in the formula of cost pricing:

- Actual cost;
- Expected cost; and
- Standard cost.

Actual cost refers to historical cost for the latest available period. It covers wage bills, raw material costs, and overhead charges at the then current output rate.

Expected cost means a forecast for the pricing period on the basis of expected prices, output rates and productivity.

Standard cost refers to a normal cost determination at some normal rate of output at a given level of capacity utilisation and productivity at a normal level.

In practice, usually, the cost base is determined from engineering estimates plus cost experience, historical data and projections.

Fair Profit. By fair profit is usually meant a fixed percentage of profit mark-up. It is arbitrarily determined. Typically, it is determined at 10 per cent in many cases. However, fair profit mark-up differs from industry to industry and among different firms in the same line of production. These variations are due to many factors, such as:

— differences in turnover rate,

— differences in risks,

— differences in competitive intensity; and

— differences in traditions or customary fixation of profit margin in different businesses.

Apparently, the 'fair profit' in cost plus principle in practical business is fundamentally different from the concept of 'normal profit' in economic analysis.

Cost plus pricing is essentially mark-up pricing in practice. It is determined by adding a percentage mark-up to the average variable cost (or marginal cost in monopoly) of the product. Thus,

$P = AVC + M$

where, M = mark-up measured as $X\%$ (AVC). It is also referred to as contribution margin.

For example, a firm's AVC is Rs. 50 and contribution margin ($X\%$) is 10% (thus 0.1 (50) = Rs. 5) $\therefore$ $P = 50 + 5 =$ Rs. 55.

In practice however, cost plus pricing method is regarded as more suitable when the producers are uncertain about the market demand for their products and would prefer stability when rivals' price strategies are unknown.

Mark-up Price

Mark-up price is expressed in terms of percentage. Either cost price or sale price is taken as the base in determining the mark-up.

- Cost Price-based Mark-up = $100\left(\frac{\text{Rupee Mark} - \text{up}}{\text{Cost Price}}\right)$
- Sale Price-based Mark-up = 100

Illustration

Cost price of a leather bag	=	Rs. 1,000
Mark-up decided by the seller	=	Rs. 200
$\therefore$ Selling Price	=	Rs. 1,200

Mark-up % based on Cost Price = 200/1,000 = 20%

Mark-up % based on Sale Price = 200/1,200 = 16.7%

Given the rupee cost and the desired percentage of mark-up, sales price can be worked by measuring sales mark-up as: 100 – cost-based mark-up.

Illustration

Suppose a retailer buys a produce for Rs. 200 at the wholesale rate. He fixes the cost-based mark-up at 30%

Thus, Sale-price mark-up = 100 – 30 = 70% or 0.7

$\therefore$ Sales Price = Rs. 200/0.7 = Rs. 285.71

Usually, mark-ups are calculated on the selling price at each stage of business transaction in a channel of distribution.

The mark-up price can be arrived at by using the formula:

$$\text{Mark-up Price} = \frac{AC}{(1-R)}$$

Where,

AC = average cost

R = expected return (%) on sales (*i.e.*, mark-up)

Illustration:

A garment manufacturer produces 1,000 shirts at the total cost of Rs. 50,000. The average cost is: 5,00,000/1,000 = Rs. 500. If the return on sales is expected 40%. Then,

$$\text{Mark-up Price} = \frac{500}{1-0.4} = \frac{500}{0.6} = \text{Rs. } 833.33.$$

Shortcomings of the Cost Plus Pricing Methods

The following are the major drawbacks of the Cost Plus Pricing:

- It completely ignores consumer's preference and demand.
- It has thus one sided approach. It takes only costs and firm's profit margin into account.
- It does not take account of the effect of competition.
- It ignores rival's reaction in prescribing a price for the firm's product.
- It over-stresses the precision of allocated costs. In practice, however, cost allocation lacks precision.
- Its concept of full cost may not be relevant for the pricing decision.
- It ignores the significance of incremental costs in pricing decision.
- It, thus, solely considers conventional accounting system, and ignores economic tools altogether.

Rate of Return Pricing

Another method is that the firms determine the average profit mark-up on costs necessary to produce a desired rate of return on its investment. Say, for instance, a firm may set its price of the product in order to get on an average a 12 per cent return on net investment.

Under the rate of return pricing policy, price is determined along a planned rate of return on investment. The rate of return is to be translated into a per cent mark-up as profit margin on cost. The profit margin is determined on the basis of a normal rate of production.

The total cost of a year's normal production is estimated and regarded as standard cost. Then, capital turnover is computed by taking the ratio of invested capital to the annual standard cost. The mark-up percentage of profit margin is obtained by multiplying capital turnover by the goal rate of return. Thus, if capital turnover (C) is 0.5 and the goal rate of return (R) is 12 per cent on invested capital, then,

$$\text{Mark-up Profit Margin} = C \times R$$
$$= 0.5 \times 12 = 16 \text{ per cent}$$

This method is essentially cost plus pricing method but an improved one since it builds price on cost which is standardised and it develops a profit mark-up related to a rate or return.

Going Rate Pricing

The going rate pricing is opposite of full cost, or cost plus pricing.

The going rate pricing is not just the phenomenon of perfect competition. It is usually happening in oligopoly and monopolistic competition. The going rate pricing policy means that though the firm has the power to fix up its own price for the product, it will not do so, but instead it tries to adjust its own price policy in time with the general pricing structure prevailing in the industry or market.

The going rate pricing is adopted when:

- Costs are difficult to measure; and
- The firm wants to avoid tension of price rivalry in the market; or
- When there is price leadership of a dominant firm in the market.

5. ADMINISTERED PRICE

The term administered prices was introduced by Keynes for the prices charged by a monopolist and therefore, determined by considerations other than marginal cost. A monopolist being a price-maker consciously administers the price of his product. He plays a personal part by restricting the output to establish higher price for the product. Unlike competitive prices, thus, administered prices are not determined by the impersonal play of market forces.

Indian economists like L. K. Jha and Malcolm Adiseshiah gave a slightly different meaning of administered prices. According to the Indian economists, an administered price for a commodity is the one which is decided and arbitrarily fixed by the government. It is not allowed to be determined by the free play of market forces of demand and supply. Administered prices in a market economy are the results of government intervention. They are prescribed by the government rather than determined by the market mechanism. For example, prices of petrol, diesel, kerosene and liquid gas are the administered prices in India.

In short, administered prices are the prices which are fixed and enforced by the government.

The following are the major characteristics of administered prices:

- They are fixed by the government.
- They are statutory, *i.e.*, they are legally enforced by the government.
- They are regulatory in nature.
- They are meant as corrective measures.
- They are the outcome of the price policy of the government.

Need for Administered Prices

Administered prices imply government intervention in the free functioning of the market mechanism. There are many reasons for the government intervention in the market and fixation of prices in some areas of agricultural and non-agricultural (industrial) sectors. The need for administered prices or the prices of the price regulation by the government may be stressed on the following counts:

- To correct the imperfections of the market mechanism and lopsidedness in price structure of the free enterprise or mixed economy. In reality, the assumptions of perfect competition do not hold good, so the 'invisible hands' of market mechanism fail to provide optimum allocation of resources, nor will it ensure full employment of available resources or an equitable distribution of income. Thus, the government intervention through administered price policy is warranted.
- To check the undesirable price rise, of scarce essential consumption of goods and raw materials, especially, when their demand outstrips their supply.
- To check the undue price rise of scarcely available essential consumption goods and raw materials, especially, when their demand outstrips their supply.
- To provide a relatively stable and assured income to the farmers, in the wake of fluctuating land produce on account of changing weather conditions, especially the vagaries of monsoons.
- To put a check on high prices charged by the producers under the profit maximisation motive by taking the advantage of their monopolistic position or growing market demand against the slow pace of the growth of market supply.
- To provide wage goods and other essential items of mass consumption at low subsidised prices to the poor sections of society.

Objectives of Administered Prices

There are many objectives or purposes behind administered prices or the price fixation by the government. Some of these are:

- **To protect the interest of the weaker sections of the society.** On equity consideration, administered prices are meant to confer benefits to the poor by providing essential commodities, especially, food and clothing items at a much lower rates, sometimes even below the cost of production or lower than the support or procurement price paid by the government. The whole purpose is to protect the weaker sections from excessive price mark-ups of necessary consumption goods.

- **To discourage or encourage the consumption or certain commodities.** The government may aim at changing the pattern of consumption through administered prices. By raising the prices of certain commodities, the purpose may be to put a check on their consumption. For example, time-to-time the government has been raising the prices of petroleum and petroleum products with a view to curb its increasing consumption. Likewise, to encourage the consumption of certain commodities, their prices may be lowered for a certain section of the people. In this regard, the system of dual pricing is introduced. Under the dual pricing system, there is a levy price for the commodity like cement, sugar, etc., which is made available to the poor section at a lower rate so as to encourage its consumption among the poor. Simultaneously, there is a free market price for the rest of the stock, for which the rich buyers pay higher price. In India, for instance, the prices of fertilisers have been deliberately kept low to induce more consumption/utilisation by the farmers and thereby to improve agricultural productivity.
- **To mitigate inflation or prevent stagflation.** Through price control the government may wish to suppress inflation in the sensitive spots. Price stabilisation is the avowed objective of administered price policy of the government.

  The policy of price control may also aim at countering the stagflation in the economy. Stagflation refers to the phenomenon of high and rising prices accompanied by declining productivity, and falling rate of industrial output, *i.e.*, recession. Thus, administered price policy may be designed to avert recession.
- **To raise public revenue.** By raising the administered prices of certain commodities under public monopolies, the government may intend to raise its revenue to meet its increased budgetary expenditure. Administered prices may be considered for the revenue purpose as an alternative to deficit financing or additional taxation in a direct sense. However, arbitrary rise in administered price (much above the cost) of goods under public monopolies is, essentially, a tax in disguise.
- **To ensure the efficient allocation of resources.** The administered prices may be designed to correct imbalances and distortions in the investment sector of the economy thereby to ensure efficient allocation and optimum use of the productive resources. The administered price policy may channelise investment in specific fields. By and large, the administered prices are meant to ensure that the free play of market mechanism does not result in mal-allocation of resources and distortion of the relative price structure.
- **To promote egalitarian goal.** The government may fix up the prices of certain commodities just to cover up their costs in order to supply them on a no-profit no-loss basis, thereby to improve economic welfare of the masses and fulfil the socialist goal.
- **To ensure equitable distribution of scarce goods.** An important purpose of the administered price policy is to ensure equitable distribution of commodities in short

supply according to the needs and requirements of the various consumers, users at reasonable prices. It is also meant to ensure their adequate supply to the priority sectors.

6. MAJOR ISSUES OF THE POLICY OF PRICE CONTROL/ ADMINISTERED PRICES

Administered prices are the result of the policy of price control resorted to by the government for an efficient management for the economy. Administered prices and/or price controls have to be formulated and implemented within the broad framework of the general economic policy of the government. Compared to other economic policy measures, price control is a direct measure of achieving certain macroeconomic goals like welfare, equity, and stability.

Nature of Price Control

The price control may be informal or formal. Under *informal* price control, the industries/ producers agree to voluntarily regulate the prices consistent within limits suggested by the government. Under *formal* price control, the prices are statutorily fixed by the government which is to be accepted by the all concerned. Price control may be total or partial.

Under *total* price control, the price for the entire stock of output is prescribed, administered and enforced by the government through a public distribution system and several control orders/directives. Administered prices of goods supplied by the public monopolies involve total price control.

Similarly, drug price control is total in respect of a particular drug produced by the private sector. A single price policy or 'mono pricing' is implied under total price control of a commodity.

Under *partial* price control, the government directly fixes the price for a part of the production of a commodity and arranges for its distribution. Rest of the stock is allowed to be sold in the open market at any price which is determined by the free play of the market mechanism. Partial control, thus, implies a system of dual pricing.

Dual Pricing

Dual pricing refers to two types of prices for a commodity, *viz.*, *(i)* controlled price, and *(ii)* market price. Controlled price of the product is directly, fixed up by the government for a certain portion of the total output. Its market price is the freely determined market price for the remaining quantity of output.

Dual pricing involves the following considerations:

- Determining a certain proportion of the output of a commodity which is to be procured by the government at a fixed rate called levy rate.
- Fixing the procurement or levy price.

- Arranging for the distribution of the procured quantity of output to specified categories of consumers/users called beneficiaries.
- Determining the issue price, *i.e.*, the price payable by the beneficiaries.
- Permitting the rest of the stock to be sold by the producers in the open market. It is referred to as 'free sale quantity' which is sold at freely determined market price through market mechanism.

Thus, the major problems associated with dual price system are:

- Identification of the commodity to be brought under the system of dual pricing.
- Determination of a considerate levy rate or procurement price.
- Determination of a reasonable levy price or issue price for the beneficiaries.
- Organisation of efficient distribution system.

The following are the main *merits* of dual pricing:

- It is easier and less expensive to administer.
- It legitimises the existence of two prices for the product as well as price discrimination among two groups of buyers.
- It permits restricting the benefits of price control to the deserving sections of buyers only on priority consideration.
- It reduces the pressure on the government budget to provide for subsidies and incentives for the production of a particular commodity.
- It also obviates the need for higher taxation.

The major drawbacks of dual pricing are as follows:

- There is a problem of leakages in administering the system of 'dual pricing.' This problem occurs when there is a vast difference between the 'issue price' and 'open market price' of the product. The leakage means transfer of levy quantity for the sale in open market by the producers.
- It may lead to black marketing.
- It may induce/intensify corruption.
- It may involve deterioration of quality of the output released for procurement.
- It increases the financial burden for the government in organising distribution system.
- It may put the government into an embarrassing position when over a period there is a tremendous expansion of output causing a 'surplus' in the economy so that at a time free market price tends to be lower than the levy price.

The Problem of Price Fixation: Cost Plus

The administered prices are fixed on the 'cost plus' basis. It, thus, involves the following considerations on the part of the price fixation authorities:

- Computation of the cost of production.
- Determination of reasonable return on capital.

Computation of costs is a difficult problem in a country like India where costs widely vary in different areas and there is paucity of data as well. Then, there is a problem of pricing whether it is to be based on marginal cost or average cost consideration. In 'cost plus' formula the profit allowance must be made by estimating a reasonable rate of return on capital. A consideration is also required for the inter-relationship between input prices and output prices of farm and industrial sectors. While determining the administered prices of certain goods. Sometimes, a highly fixed raw material prices may cause higher prices for the finished products which may generate inflationary pressures so that the socialist goal of the price policy is vitiated.

7. EXPORT PRICING

Export pricing relates to pricing of products exported by the firm. Its decision is based in view of international marketing. World market is complex, competitive and sensitive.

In determining the export pricing, the firm should be fully aware of the varied market structures and changing business environment for the products in different countries from time-to-time.

Product cost is not the only cost for consideration in export pricing. Sales promotion cost is also a crucial factor. Other non-price factors also play significant role in export marketing. Delivery cost, and demonstration costs, display discount costs, rivals prices and business policies, qualities of the products and so on need to be considered. For exporters, export marketing strategies rather than price matters much. In a global trading, export prices are usually decided on the basis of what the traffic can bear. Pricing of goods for exports is often unrelated to basic output costs or domestic price level.

Economists have suggested marginal cost pricing as the basis of export pricing in a developing economy such as India. The marginal pricing criterion is advocated on the following counts:

- Marginal cost is a direct cost which the firm should recover from export revenue.
- It will give a lower price. Low pricing ensures better market acceptance.
- It helps in fixing the price at competitive rates.
- Profitability of exports need to be measured against direct costs rather than fixed costs incurred by the exporting firms.

Marginal cost pricing of export goods is determined as follows:

$$PX = MC + IC$$

Where, PX = price of export product

MC = marginal cost

IC = incidental export charges.

For example, *MC* of an exporting firm is Rs. 100 per unit and incidental charges including normal profit are Rs. 40 then export price is Rs. 140 per unit.

Marginal pricing, however, has following drawbacks:

- A lower price setting in a competitive environment by the firm may be contended as an act of dumping.
- A competition among the domestic exporters implies loss of foreign exchange.
- It may result into unnecessary price war.
- Once a low price is set, it will not be easy to raise it in future.

Sometimes, the country or firm may not have a competitive advantage and the world price for the product may be very low. In this case the firm may have to sell the product at below cost, (*i.e.*, at loss). In such case, the government has to provide subsidies as incentives for export promotion.

In short, there is no standard principle or specific export pricing theory to provide straight guidelines to managerial decision-making on the price front in dealing with international marketing.

Makro: Business Focus

Makro is a Dutch-based retailer company in the global economy. It has about 150 stores around the world. It has substantial operations with stores in Asian countries such as Malaysia, South Korea, Taiwan and Thailand.

The company operates membership – only warehouse discount retail stores. It supplies a wide range of products (nearly 15,000 different items) at near wholesale prices. The company used to economise its operating costs by reducing advertising expenses, expenses on interior design as well as staff. This made it possible to charge low prices in comparison to other rival discount retailers such as Carrefour (French), Wal-Mart (American) and Price Costco (American). Following the Makro's business strategy, many Asian countries have developed their own version of the warehouse discount store on a smaller scale, for instance, Cash & Carry in Malaysia, or Shinsegae Group's E-Mart in South Korea. Consumers generally benefit with lower prices and scope of wider choices under such retail business system. There is a great potential for the Makro type of retail stores in Indian metropolitan markets.

8. TRANSFER PRICING

Transfer pricing policy is associated with the multinational corporations (MNCs). Transfer pricing refers to intrafirm pricing: the pricing of products transferred from the production or sales unit of a multinational firm in one country to the another unit of the firm in another nation.

The main motives behind the intrafirm transfer pricing system are:

- Maximisation of aggregate profits
- Facilitating parent-company control and management spread.

It is observed that often the parent firm's operating management decides the transfer prices. In view of:

- the market environment
- the nature of the subsidiary firms
- the legal structure as well as administrative control and regulations
- the government policies

In practice, transfer pricing decisions are usually made through the following alternative arrangements or its mix:

- the local production cost plus a standard mark-up.
- the most efficient unit's production cost plus a standard mark-up.
- the price negotiations.

Transfer price is adjusted with taxation level of the country.

- Low transfer price is quoted in the case of high taxation. To reduce the import duties at *ad-valorem* low transfer price is quoted while shipping to high-tariff nations.
- High transfer price is quoted in the case of low taxation.

In high-income tax nations products are over-priced under the transfer price system.

9. MULTI-PRODUCT PRICING

In modern times, most firms resort to produce a variety of products in the interest of diversification and risk minimisation. When different varieties of goods are produced on a given plant and control of management, the cost function tends to be the same for all products. But, demand functions for each variety tends to be different. Say, for example, in oil exploration process, crude oil and natural gas may be produced by the firm. In this joint product cost is same, but the demand and prices would differ for oil and gas. Likewise, an electronic manufacturing firm produces television sets of different sizes and demand price conditions would be different.

Assuming a monopoly model in this case, the product maximizing pricing condition is explained in Fig. 19.1.

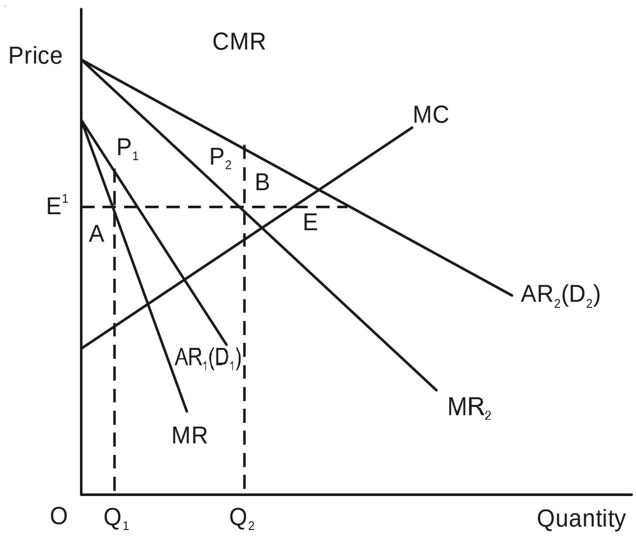


Fig. 19.1: Multi-product Pricing

In Fig. 19.1, *CMR* is the combined marginal revenue curve of aggregating MR_1 and MR_2 for product 1 and 2 in the market. Equilibrium point E is determined where $CMR = MC$. Line *E′E* pass through points A and B touching marginal revenue curves at MR_1 and MR_2. correspondingly, quantity OQ_1 and OQ_2 are determined for product 1 and 2 corresponding to demand curves D_1 and D_2 prices are determined: OP_1 for product 1 and OP_2 for product 2.

10. PREDATORY PRICING

It is the practice adopted sometimes by a discriminating monopolist. It refers to charging a price below the average variable cost in a particular market segment with a view to eliminate competitors. In transportation sector in a country, it may so happen that an established large bus company many charge very low fare, below the average cost, on a certain route where there are greater chances of competition by the small operators. The practice is continued till they are eliminated. The temporary loss from this market segment is made up by charging a higher fare in some other route where monopoly market power is strong. In the United Kingdom, for instance, some large bus operators are accused of such predatory pricing (Sloman, 2007). Predatory pricing, however, is not the same as dumping. Dumping is the phenomenon of international trade. Dumping focuses on flooding the goods at a lower prices in the foreign markets. Predatory pricing aims at elimination of the competitors on preventing the new entries in the market segment, thus, to retain the market power.

11. PRICE MATCHING

The price strategy of the firm in which the offer price advertised by the firm along with an announcement of promise to match with any lower price of a competitor. It is also termed as a low-price guarantee.

12. SKIMMING PRICING

Under this pricing strategy, the producer sets up a high price for the product taking the first moves advantage in the market before emergence of the competitors. This policy may the adapted when there are no initial rivals for the distinctive products offered by the seller in the market. Usually, the innovator initially changes a high price of the products introduced first time in the market. For example, a 37" LCD TV when introduced in the Indian market it was much highly priced exceeding Rs. 1 lakh.

Initially an innovated product is unique in the market, so the innovator changes the price much above the cost as real market price. It helps him cover up the costs as well as make a quick profit due to high profit margin. The market normally covered in the beginning. Gradually the price is lowered for a wider distribution. The market price also comes down later on due to competitors' imitations.

The skimming price strategy is successful when product is innovated/introduced first time, this is a high demand and these are a few competitors in the market.

This strategy is adapted in the initial growth stage of the product life cycle in the market situation of high demand against the market supply.

Skimming is just a short-term pricing strategy. It is a paying proposition only when the firm's product has inelastic market demand. The gain of high profit margin through high skimming price is short-lived as it encourages the entry of the rivals, thus, supply increases against the demand, eventually price tends to decline, so the profit margin too.

Mini case: DVD Players and Price Skimming

A classical example of skimming pricing is the DVD players introduced in the U.S. market at $500 in the late 1990s.

Gradually, many electronics manufactures started supplying the DVD players. Its price eventually came down to $100 in the new millennium. Now, Chinese DVD models are sold even much cheaper at less than $40.

Skimming Pricing implies the practice of 'skim the cream'. First, high price and then gradually the prices came down. It goes by the strategy of converting consumer's surplus into the producer's profits.

13. PENETRATION PRICING

This pricing strategy is opposite of the skimming pricing. Under this strategy initially low prices are deliberately set for the products. And, as the markets tend to mature, with the increasing demand subsequently, the prices are raised.

The idea is behind initial lower price is to get the buyers to try and acquainted with the products. Once the buyers accept and appreciate the newly introduced product, the seller may try to raise the price subsequently when more customers are drawn into the market and a strong demand for the product emerges.

It is an introducing offer price – a low price to stimulate demand. Penetrating pricing policy is aiming at penetrating into the market. It is a brand building tactics. It is also intended to keep the competitors away. The lower price is set in order to gain a significant market share through penetration. Market penetration pricing is successfully adopted by the firm when its cost of production is low and price elasticity of demand is high.

14. PRODUCT LINE PRICING

Under this pricing strategy, a range of complementary products are packaged together and sold at a price-suggesting a 'Value Buy' price. For example, a super market store may make a package of jams, pancake mix, syrup as a gift box. This box is in an attractive packing and economically prices compared to the aggregate of each items sold separately. Assorted biscuits box is another example of product line price. Similarly, a package price is offered for the range of cosmetic products included in a gift box.

Under this strategy the buyers are induced to purchase a great numbers of products than otherwise would do so. This increases both they the sales and the profits of the business.

15. MULTIPLE PRICING

Under this strategy discounts are given when the product is purchased in greater quantity. For example, an individual T-shirt is sold at Rs. 250 but 3 T-shirts pack is priced at Rs. 600.

Sales and profit maximising goods are fulfilled under this price strategy. It is strategy inducing the buying in bulk.

16. LOSS LEADER PRICING

Under this strategy, the seller especially, the super-market, restaurants, etc. reduce the price of one product of large stock at a much lower level even below cost, thus to attract the customers and expect them eventually to buy other high-priced product too. It is also referred to as decoy pricing.

This pricing strategy is designed to lose customers to the business. The low-priced product is called a loss leader product.

For example, a grocery stage might consider bread as a loss leader product and sell it at a cost price compared to the rival store, and the buyers when buy bread they are also likely to buy other regular price items sold by the store and eventually a good business is made. Another example is of a cloth store selling shirts and ties; here ties may to the loss leader product.

17. PREMIUM PRICING

This strategy is adapted by the firm for a unique and very quality product supplied in the market. It carries a prestige value and the buyers are generally from the elite group.

Under this strategy through profit margin is very high, a smaller quantity is being sold. In automobile sector, for instance, Ferrari is a premium car sold at a very high price.

18. OPTIMAL PRODUCT PRICING

Under this pricing strategy, the buyer is induced to pay more for some added-value on extra feature of the product. In restaurant, for instance, a regular lunch thali is priced at Rs. 100.

Whereas, special thali is priced at Rs.125 some extra food items are included. Likewise, ice-cream in corn is charged little higher than ice-cream in cup.

19. ODD/EVEN PRICING

Under the odd pricing strategy, price is quoted in decimal point. For example, Bata shoes priced at Rs. 99.90, Rs. 119.90, and Rs. 199.90 and likewise to give an impression at lower price. Here, Rs. 99.90 for example, suggests that the price is less than Rs. 100, through actually the difference is not much. Such price quotations and transactions involve more small coins and it becomes a tedious job for the counter cashier and accountants in keeping the records.

Often even prices are mentioned for the products just to create an impression that the price is not a significant factor for the products, such as designer goods.

20. SPECIFIC PRICING PROBLEM: PRACTICAL ASPECTS

Pricing is a crucial aspect of any business. In practice, however, it is the most difficult task to decide a right pricing policy. This is because, on the one hand, the market dictates price, and yet, the firm is acting as a price-maker for its own differentiated product. Unlike other functional areas of management, it is also not easy to pin down the concrete goals and measure accurate results in pricing. There is possibility for a trade-off between the level of price and the sales volume or the market share (See Figure 19.2). It is, therefore, necessary to reconcile for an optimum pricing — that is, try to get closer to a better price which can produce a tremendous effect on the business profitability.

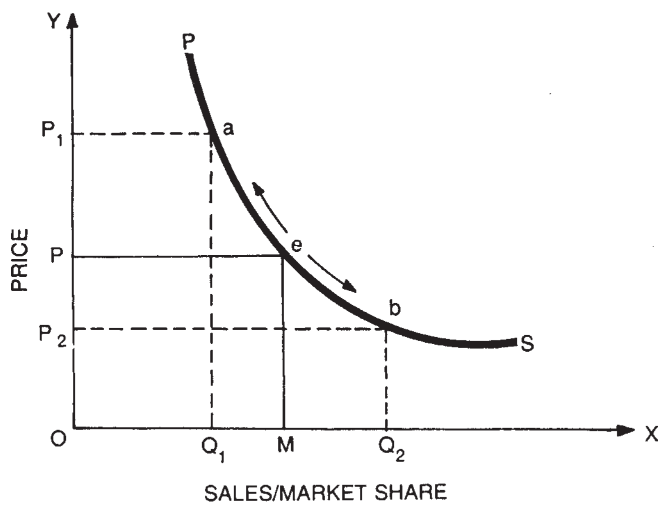


Fig. 19.2: Price-Sales Trade-Off

Pricing of product is a crucial and complex phenomenon. Right pricing decision is not an easy task. By managing better pricing, more profits can be realised. If the goal is to increase the sales volume a lowering of price is required. If the goal is to increase profits margin, an increase in price is suggested. Marn and Rusiello (1992:85), for example, empirically measured that for the 2,463 companies in the compustat aggregate, a 1 per cent increase in price realisation — assuming a steady unit sales volume — implied an improvement of profit margin by around 11 per cent on an average.

Dolan (1995:174) suggests that for improving the firm's pricing capability, the decision-makers should have their focus on the process rather than on the outcome. Examine all the considerations that play a role in determining the proper price rather than just asking what should the price be. Several interrelated issues need to be carefully and consistently managed to arrive at right pricing for the product in a monopoly blended competitive market.

A successful pricing policy complements the firm's marketing strategy. It gives a message — the marketing ideology — of the firm to the buyers. The pricing policy for Swatch watches is a classic example on this point (See Taylor, 1993).

In Figure 19.2, *PS* curve represents price-sales volume (or market share) trade-off. A high sales volume corresponds with low price and *vice versa*. Assuming equilibrium price (P) as per the market forces of demand and supply, the differentiated product's 'right' price need to be decided in the vicinity — within the range diagrammatically expressed by the circle.

Strategy Towards Better Pricing

For instance, let customers know that the company is friendly and easy to deal with and it follows one price/fixed price policy, hence, there is no scope for negotiations. Furthermore, the company's product is not just affordable, it is approachable.

The pricing process in reality involves a coordination of several dimensions and participants: such as cost estimation by the accounting department, pricing strategy formed by the marketing department, utility orientation conveyed by the sales department, supply or output capacity determined by the production department, capital budgeting process of the finance department and so on.

Usually, firms determine the cost and add profit mark-up in setting the price.

Donald (1995) enlists the following major steps to better pricing:

Mini case: Pricing Policies: New Strategies

In these days of intense competitive business situation, firms in general are more concerned with the approximate pricing policies for their products. Especially, in retail business in modern times, new strategies like 'everyday low pricing,' 'yield management' and 'price matching' have evolved in practice.

• **Everyday low pricing:**

In the American markets, retailers such as Montgomery Ward, Sears and Wal-Mart to mention a few among others, have introduced the strategy of 'Everyday Low Pricing'. Similarly, TESCO in Thailand and Malaysia tends to follow this kind of strategy.

Reduction in advertising expenses is assumed to be the major gain of this pricing strategy. In the retail business of general merchandise, the firm such as Wal-Mart Stores[1] has succeeded very well in everyday low pricing strategy on account of its customer focus as well as highly efficient distribution system and cost controlling measure in shipping and inventories.

• Yield management:

Under the 'yield management' strategy the firm charges the price in accordance with the demand fluctuations in the market. When demand is seen to be increasing, the price is raised. When the demand slacks, the price is quickly lowered to arrest the declining business yield. For this, the firm has to keep a continuous track on market situation: demand trend and the sales trends. Hotels and Airlines usually follow this strategy by keeping a track record of consumer demand, its segmentations over a period of time. A market demand differentials is seen among the tourists and executive customers of hotels and airlines.

• Price matching:

Firms may set offer prices occasionally to match with competitive market prices. In practice, however, it is observed that few buyers take the advantage of such offers. Those who do not take advantage belong to a segment of the market with greater willingness to pay more; eventually, they pay up high prices.

1. For details of Wal-Mart's success story refer to Vance S.S. and R.V. Scolt (1997). Wal-Mart: A History of Sam Walton's Retails Phenomenon, New York: Twayne Publisher.

- Assess the 'Value of Product' from customer's angle.

  [Glaxo, for instance, introduced its Zantac ulcer medication in the American market in 1983 emphasising its perceived value to the customer. It sold the drug at a 50 per cent premium over Tagamet — the rival product and within a short span of time acquired market leadership.]

- Customise the products and discriminate prices for different segments of the markets/ buyers.

  [Polaroid Corporation, for instance, followed this principle when it introduced its SX-70 instant photograph camera. In the beginning, Polaroid priced the SX-70 for the dealers at $120 per camera and the ultimate buyers had to pay around $200. Later on, to capture the wider market, it reduced the price almost by 50 per cent. Most software manufacturers also adopt the similar strategy.]

- Assess price elasticities of demand.

  [Higher price policy suits well when demand is highly inelastic. Low price policy pays a rich dividend when demand is highly elastic.]

- Create an optimal price structure.

  [This helps in determining a rational quantity discounts policy of the firm.]

- Relate the Pricing Policy to the rivals' reaction/retaliation.

  [Pricing in a modern business is just like a game of chess. Competitors are likely to react to a firm's price cut through non-price competition such as advertising or product improvement or the marketing mix: price cut + advertising + product variation.]

- Assess the buyers' emotional reaction on long-term basis.

  [The negative reaction of the majority of buyers who feel that the price is unfair can be devastating for business in the long-run.]

- Undertake revenue *vs.* cost analysis.

  [Profitability goal is to be realised through such an analysis.]

An effective rational pricing process is to be gradually evolved and cannot be just created or implemented overnight (Donald 1995:183).

21. PRICE DISSEMINATION

Price dissemination refers to information on prices of products prevailing in various markets is made widely available to the market participants, especially the suppliers. The concept is largely adopted regarding market intelligence in the agricultural sector. When the government agency undertakes price dissemination policy and programme by spreading the market knowledge above prevailing commodity prices to the farm producers, the farmers would be able to get better price for their output by supplying their output by choosing the market which pays higher price.

The Planning Commission of India in the Ninth Plan have identified the dissemination of futures prices of agricultural commodities by the Forward Markets Commission under the Price Dissemination Project.

On May 2010, under the 11th Five year plan, the Price Dissemination Project for dissemination of prices of agricultural commodities to the farmers is given a new focus and thrust by the Government of India.

The Price Dissemination Project (PDP) envisages display of spot and futures market prices of agricultural goods in the local language on a real time basis on electronic price ticker boards planned at various centres under the AGMARKNET project. The project is implemented by the Forward Markets Commission in association with the four National Exchanges in India, such as: MCX, NCDEX, NMCE and ICEX and AGMARKNET. Physical market prices of important Mandis and futures market prices to the be displayed on the price ticker boards. The main features of the PDP are:

- Focus on dissemination of prices of locally produced/traded agricultural commodities.
- Display of information in the local language.
- Real time basis.

There are some 183 ticker boards installed in various Mandies in 14 states of the country. This is intended to help all stakeholders in the agricultural sector to take advantage of informal decision on production – cropping are acreage, marketing and sourcing as well as hedging against price risks. With this Indian farmers will have enhanced bargaining power and can't fetch better price for their produce. They will be benefited in taking correct cropping decisions and post harvesting market decisions for the future prices quoted at the Exchanges are meant to provide useful inputs to them for decision-making during pre-sourcing and post-harvest periods of cultivation.

Price dissemination implies that information and knowledge about prices in the markets is a power to help gainful decision-making. The PDP in India is envisaged to empower the farm-producers with price information and to ensure that they can get the right and better price for their produce. The success of PDP depends on further initiatives and education of the farmers on this aspect. It is aurged that all the commodity market stakeholders including traders have to ensure that the interests of the farmers should be served better for the sustainable agricultural activity and business in the agrarian sector.

22. PRICE FORECASTING

Price forecasting is a complex phenomenon. Its complexity is attributed to the complexities of modern market structures. In a regulated/controlled market by the government such as in a command economy, price forecasting is virtually based on cost forecasting. In a free or competitive market economy, however, price forecasting is quite distinct from just cost forecasting.

Cost forecasting is a matter of cost function.

Price forecasting is primarily a matter of demand function with an element of uncertainty. A manager in a dynamic competitive market must try to understand the uncertainties relating to the demand position and market behaviour in reality. The results of forecasting models are mathematically based on quantitative parameters often may not prove correct predictability when the conditions and constraints are drastically and suddenly changing in a dynamic economy. Business growth and markets do not move in linearity on order. As such, price forecasting which is intimately related to demand forecasting tends to be a complex and fluctuating phenomenon.

Nonetheless, price forecasting is essential in the conduct of a modern business because profitability of the business venture is directly related to the prices in the market.

Industrialists, traders, investors need to have some idea about price behaviour in the current behaviour in the current as well as future. For this, price forecasting is necessary. Market economy is inherently subject to trade cycles and economic fluctuations are associated with price fluctuations that are not perfectly predictable in all the cases all times. Price forecasting based on historical data may turn out to be less correctly predictable or probability of outcomes may not remain the same in the long-run.

In business planning, therefore, long-term price forecasting for the short-run phases involved may not be accurate. The concept of normal price has some sense and application but what is assumed and predictable through forecasting models may lack certainty.

Often, managers are looking towards forward curves of their business growth for the purpose of price forecasting. The forward curve business model are essentially derived with forward prices determined on the bases of alternative courses of demand and supply interaction in the markets for the given product. This may help to an extent in knowing the market price volatility and prescribing policies towards risks management.

Certainly, "an educated forecast based on fundamentals of supply and demand is better than no forecast at all". (Ku Anne, *Platts Energy Business and Technology,* May 2002).

In a modern business, thus, price forecasts are widely used as the basis for input, inventory management and project finance. Since most markets in today's global arena are volatile and uncertain, therefore, no linear progress can ever be assumed.

The business managers used to adopt a range of quantitative and qualitative tools in deploying various forecasting models for short, medium and long period considerations.

In price forecasting models, transactibility, liquidity and effective demand in future are implicitly assumed. The model may involve spot-price forecasting that is , how much people will be ready to pay for the product in the future course of market. In practice, however, short-term price and business forecasts tend to be a matter of common sense and observations of the market situation rather than models. A 'Bania Buddhi' – (high common sense understanding and intution about the market behaviour such as that possessed by Dhirubhai Ambani) is required for the successful businessman in the long-term, that is essential to avoid and overcome pitfalls and risks in reality rarely captured in the historical analysis of the business forecasting models. Only a 'bania buddhi' captures well about the understanding of the interaction between the various products, location markets, regional and territorial system-wide reliability, pricing and business policies can ensure success in the operations and outcomes of the business.

Nonetheless, the importance of modeling approach in the course of modern business cannot be undermined. Econometric models have their scientific stands and utility over just intuitive decisions. Along with scientifically based forecasts of empirical business-price-profit-forecasting models, the businessman has to be precautionary against uncertainties caused by nature and human behaviour. As such, price expectations should be blended with elements of uncertainty and unpredictable risks.

To overcome biases and market emotions, however, price and business forecasts must take a long-term view of economic fundamentals and market parameters into consideration. Every forecasts need to be checked, validated and monitored by the risks manager. A CEO should see that the business in-house price forecasts must work in coordination with risk management department in order to get their model assumptions validated and can make more reliable forecasts.

Even a comparison with forecasts suggested by consultancy firm can be helpful and capturing the complexities of real market behaviour and arriving at a better judgemental decisions.

Some organisations rely on outsourcing for producing price forecasting models for their business purpose. Commercially developed models do have some benefits of cost economy and expertised job. Price forecasting models constructed by the consultancy firms are data-intensive and sophisticated in approach. Even then, model risks cannot be denied.

Elementary Price Forecasting Model

An elementary price forecasting model can be cited as under:

$$Px = f(Dx, Sx)$$

Where,

Px = Market price for product X

Dx = Market demand for product X

Sx = Market supply of product X

This economic model may be restated in econometric terms, as under:

$Px = b_0 + b_1 Dx + b_2 Sx + u$

b_0, b_1, b_2 are unknown parameters. It refers to the error terms – uncertainty elements.

In double-log form, it may be restated as:

$\text{Log } Px = b_0 + b_1 \log Dx + b_2 \log Sx + u$

This model can be elaborated taking market determinants of demand and supply of the product to capture the reality and greater reliability of price forecasting.

For practical purpose, collect historical data for price, demand and supply of product X over a given period of time. Run the regression and obtain the parameter values.

A Case Study: Illustration

Gupta R., A. Katurdi and S.M. Miller (2003) in a case study on housing prices forecasting in the U.S. used Bayesian and classical models to forecast housing prices in 20 US states. Their approach considered common factors in a Factor-Augmented Vector Autoregressive (FAVAR) or Factor-Augmented Bayesian Vector Autoregressive (FABVAR) models or Bayesian shrinkage in a large-scale Bayesian Vector Autoregressive (LBVAR) models for the period 1976-1994 as the in-sample *plus* 1995-2003 as the out-of-sample horizon data and compared the forecast performance of the alternative models.

Housing prices forecasts are useful in forecasting inflation and output. Housing investments refer to volatile component of demand and explain wealth effects on consumption.

The forecast of housing price inflation can enable policy-makers to understand the future course of macroeconomic behaviour and arrive at policy decisions.

Income (y), interest rates (R), Construction Costs (CC), Wage rate (W), Sock Prices (SP), industrial output (IO), Consumer Confidence Index (CI) among other determinants are taken into consideration for eromicy price (PH) forecasting, thus:

PH = f (Y, R, CC, W, SP, IQ, CI)

It is translated to empirical model as:

$\text{Log } PH = b_0 + b_1 Y + b_2 R + b_3 CC, b_4 W, b_5 SP, b_6 IO, b_7 (CI) + u$

MODEL QUESTIONS

1. What are the objectives of pricing policy?
2. Explain the method of cost-plus pricing. What are its limitations?
3. Discuss the major factors involved in pricing policy.

4. Describe the important pricing methods.
5. Write notes on:

(i) Cost-plus pricing	(ii) Administered prices	(iii) Price Discrimination
(iv) Skimming pricing	(v) Penetrting pricing	(vi) Loss leader pricing
(vii) Price Dissemination	(viii) Price Forecasting	

6. Perfect competition, monopoly, monopolistic competition and oligopoly are the types of market structures considered in economic analysis. Which of these types would you relate to the following markets?

(i) Foodgrains: Rice and Wheat	(ii) Stock market
(iii) Market for bus transport in Mumbai	(iv) Passenger Cars
(v) Petrol	(vi) Confectionery
(vii) Fireworks	(viii) Cigarettes
(ix) Market for ice cream in Delhi	(x) Branded fast food in Mumbai
(xi) Software in Bangalore.	

❐ ❐ ❐

Unit VII

Profit Management

Profit Management

20

CHAPTER

1. INTRODUCTION

A business firm is always profit motivated. Profit seeking is the motive force of any business undertaking. Market economy is, thus, profit-oriented. Thus, the classical economists have regarded profit maximisation as the sole objective of the business firm in a capitalist economy. In economic theory, the basic assumption is that though a rational firm seeks to maximise profit, profit seeking is not the only objective of a business. In reality, profit is not an end in itself. For the survival of the business, of course, depends on the firm's ability to earn some profit so as to keep it alive, which may not be or need not be the maximum.

Even from an egalitarian point of view, profit is not a sinful act. Reasonable profit is the righteous reward of the entrepreneur for his entrepreneurial and organisational activity. As such, a rational profit policy and planning is important for a modern business firm.

2. ROLE OF PROFIT IN THE ECONOMY

Profit is a crucial earning expected in a business. Profitability is an index of the success of business in an economy. Though, in reality, business organisations rarely avoided the objective of profit maximisation, they do expect and try for a high level of profit.

A reasonably high level of profit is essential to play its positive role in the market economy as well as the economy as whole, on various counts:

Shareholders' Benefit

Profit is the reward for shareholders. Shareholders receive high dividends when profit is high.

High Business Reputation

High dividends paid from high profit improves the image of the company in share market. Ambani; Tata, Birla and such other large business houses have earned their business reputation because of their organisation's high profitability.

High Capacity to do R&D

When substantial profit is earned by a company is earned by a company it is enabled to put more funds to reinvest in its Research and Development (R&D) programme. This makes it possible to acquire, improve and adopt better technology and enhance the efficiency scale of the firm.

Prudency Against Risks

Part of profit may be retained as reserve funds that may provide a cushion to the firm for risk-bearing and self-innovance in bad times of economic down-turn.

Ploughing Back for Growth

A high profit earnings enable the firm to invest further using own resources for the expansion and growth of the business. Retained profits would become an important source of internal finance to launch upon new capital investment projects and business enlargement.

Corporate Tax Revenue

When companies earn more profit, the government receives high yields from profit=tax.

Business Sustainability

A profit-making organisation can deal with cyclical ups and down of the business more comfort ability and remain in a sustained position in the dynamic market of the modern times.

Better Employment

A firm earning better profits can offer better employments, such as bonus, recreation facilities, high increments, etc. to the staff employed in its organisation.

Virtuous Cycle

There is a virtual cycle of risks and profit management in a dynamic earning. An enterprise expects to earn high returns from high risks involving ventures. When high profits are earned the firm gains more confidence and has capacity to bear further high risks and earn more profits.

Market Signals

Super normal profits earned by the firms imply business potentiality of growth in a dynamic market economy. It indicates serve of entry for the new firms in a competitive situation.

Resource Allocation

Usually, the rate of returns expected in the channels of business guide the producers to allocate their business resources into the production activity. For instance, if profit range is high in two wheeler than in car manufacturing, the automobile firm may shift its focus from car to two wheeler vehicles production. In plant, profit diverts scare business resources to flow where returns are expected to the be high and better. This would mean optimisation of resource allocation to meet business goals in a better way.

By and large, profit has a positive role to play in a dynamic market economy. Profit is a legitimate earnings of Genuine entrepreneurship in serving the community through want-fulfilfying activity rather than market spemation. Hence, lowest risk-taking business community deserves respect and dignity in a free economic society.

3. NATURE AND MEASUREMENT OF PROFIT

In accountancy terms; Profit = Total Business Revenue – Total Explicit Business Expenditure

In practice, profitability measurement of a business for view needs to gaze a cash flow projection at least for two years of starting a new business. Besides, profitability depends on the costs of the investment in business undertaking. That refers to how much and in what ways the business funds have been raised. The entrepreneur when brings the own money to invest its opportunity cost is to measured in terms of the prevailing interest rate on an average. A firm's business fund earning depends on the debt-equity ratio. If it borrows more through institutional finance costs and liabilities are greater than that raised through equity in shares.

Financial management is a crucial part in the measurement of profit earning.

Next comes, how the firms incurs its business expenditure. A high overhead cost reduces business profitability level. Profit depends on difference between current revenue and current business expenses. As such, break-even analysis is important in estimating the profitability aspect of a business venture.

Ultimately, price is the main factor. A high price and high demand can accure a better return against controlled costs. Pricing depends on the market situation and the firm's market influencing power. An element of monopoly through innovation and uniqueness of operation can fetch a better price to the firm than otherwise. Competitive situation has also its role. In a highly competitive market the firm can earn only normal profit. To earn super-normal profit, the firm showed also the super-normal genuinely.

4. NATURE OF PROFIT

Profit is the earning of an entrepreneur. To the economist, the most significant point about profit is that it is a residual income.

However, the term 'profit' has different connotations in the accounting sense and in the economic sense.

In the accounting sense, when total cost is subtracted from total revenue or total sales receipts of the firm, the residual is termed as profit.

Thus, *Profit = Total Revenue – Total Cost.*

In the accounting sense also, profit is measured in the same fashion. But conceptually, there is a sharp difference in its measurement.

In the accounting sense practice, when total cost is measured, only explicit costs, *i.e.,* contractual payments made to different factor inputs by the firm are considered. These include wages, salaries, expenses on raw materials, fuel and power, rents, and interest. To these inputs, cost of depreciation charges are added.

In the economic sense, when the total costs are measured, we include explicit as well as implicit costs. Implicit costs refer to costs which are to be deemed and imputed as costs when a firm uses its own capital, for which obviously no interest is payable to anybody. Similarly, the entrepreneur provides managerial service for which he does not receive any remuneration by way of salary. In a true economic sense, therefore, implicit and explicit rents are included in the cost of production. Hence,

Profit = Total Revenue – Total explicit and implicit costs.

Professors Savage and Small, therefore, define profit as "what remains of the firm's revenue after all inputs have been paid."[1] In this way, in the economic sense, profit is looked upon as a surplus, *i.e.,* a surplus of a firm's total receipts over its total costs (explicit plus implicit).

Profit is the return to entrepreneurial ability. However, a minimum sum essential to retain the entrepreneur in a given line of production is termed as 'normal profit'. This normal profit is treated as a part of the cost of production. Hence, normal profit is not true economic profit. In the true economic sense, profit, *i.e.,* economic or pure profit, is the total revenue left after all costs – explicit, including normal profit – are paid. In this sense, economic profits are residual. Thus, when economists talk of profits, they always mean economic or pure business profit, which is in excess of normal profit.

Another important feature of profit is that, being a residual income, it may even be negative. Negative profit is called loss. When total cost exceeds total revenue, there is loss or negative profit. It is only the entrepreneur who has to suffer a negative reward.

5. SOURCES OF PROFIT

Sources of economic profit are many. There exists a lack of agreement among economists about the true sources of profit and the proper functions of the entrepreneur. Different economists have emphasised different sources of profit. For instance, in the view of J. B. Clark, the origin of profit is attributed to a dynamic economy. It is held that in a purely competitive, static economy, pure profits tend to be zero. Since there is perfect general equilibrium in the economy, so in each cases, price = average cost, only normal profit is

1.Savage, C.I. and Small, J.R. Introduction to Marginal Economics, p.22.

yielded. But it is only dynamic changes like change in demand, technological advancement, etc., which cause the emergence of pure profit in a modern dynamic economy. Professor Schumpeter, on the other hand, emphasises innovation as the fundamental source of profit. Hawley considers risk-bearing as the source of profit, while F. H. Knight traces profit to uncertainty. Mrs. Robinson, Professors Chamberlin and Kalecki, however, opine that profit is determined by the degree of monopoly power enjoyed by the entrepreneur in the market for his product. Professor Keirstead, therefore, summarises all these sources of profit in the following words: "Profits may come to exist as a result of monopoly or monoposony as a reward for innovation, as a reward for the correct estimate of uncertain factors, either particular to the industry or general to the whole economy."

6. RISK AND UNCERTAINTY

Risk and uncertainty-bearing is the modern view for justification of profit.

In the history of economic ideas, there are two stages in the development of such an idea:

1. The risk-bearing theory of profit, and
2. The uncertainty-bearing theory of profit.

The former was presented by Hawley which had many shortcomings. Prof. Knight made an improvement over it and presented a refined version called 'uncertainty-bearing' theory.

The Risk-Bearing and Profit

The classical and neoclassical economists did recognise that risk is inherent in any business. J.S. Mill, for instance, mentioned about the hazard or risk of enterprise. Marshall also regarded risk-bearing as a unique function of the entrepreneur. But, it was Prof. Hawley who categorically attributed profit to the compensation payable to the entrepreneur for his risk-bearing function.

To Professor Hawley, since the entrepreneur undertakes the risks of the business, he is entitled to receive profit as his reward. In fact, the chance to make a profit induces businessmen to run the risk of loss. If there is no hope for substantial profit, no one will be willing to risk money by investing it in a business.

Profits are commensurate with risks. The more risky the business, the higher is the expected profit rate. Professor Holland has empirically investigated the rate of profit on capitalisation earned by business firms, with a view to discovering whether the spectrum of profit rates of business can be explained by the risk factor. He concludes: "The riskier the industry or firm the higher its profit rate." But, he also warns that this is a tentative finding; therefore, much remains to be refined and tested in depth.

The following criticisms have been levelled against the risk theory:

1. There can be no functional relationship between risk and profit. Those who undertake high risks in certain business may not necessarily earn high profits.

2. To some critics, like Carve, profit is based not on the entrepreneur's ability to undertake the risks of business, but rather on his capability of risk-avoidance.
3. The theory disregards many other factors attributable to profit and just concentrates on risks.

The Uncertainty-Bearing and Profit

It is a refined and improved version of Hawley's risk-bearing theory, propounded by Prof. Knight.

According to Prof. Knight, profit is the reward to the entrepreneur for uncertainty-bearing.

Profit is earned by the entrepreneur when he is capable of making successful decisions about the business under conditions of uncertainty owing to dynamic changes.

Knight defines pure profit as "the difference between the returns actually realised by the entrepreneur and the competitive rate of interest on high-class gilt-edged securities." According to Knight, pure profits are linked with uncertainty and risk-bearing. He, however, classifies risk into: (*i*) insurable risks, and (*ii*) non-insurable risks. Of the many risks involved in the business, some risks are predictable because they are certain and hence are insurable. For instance, fire, theft, flood accident, etc., are risks in business, but these can be insured. Thus, business loss arising out of such risks are covered by insurance. Hence, in a modern economy, insurable risks are not the real risks attributed to entrepreneurial functions.

True entrepreneurship lies in bearing non-insurable risks and uncertainties. Unforeseeable risks are non-insurable. According to Stonier and Hague,[2] the difference between insurable and non-insurable risks lies in the fact that there is a possibility of statistical prediction of the probability of some events while there are certain events whose probability of occurrence cannot be predicted statistically. For instance, the probability of fire or accident, in general, can be estimated quite precisely by statisticians. Hence, the insurance companies calculate the risk and offer insurance policies at premiums which cover the amount of claims they might have to pay. So, the insurance company does not bear the actual risk. Similarly, entrepreneurs avoid risks by insuring against them. Again, the insurance premiums paid by them are treated as costs of production, which are covered in the price of the product. Thus, it follows that profit cannot be the reward for such insurable risks. But there are risks which are uncertain and incalculable. Such risks being unpredictable, no insurance company would be willing to cover them. Such non-insurable risks are:

1. Demand Fluctuations: In a dynamic economy, changes in demand for a product may result from a change in the size and age structure of the population, change in fashion, change in distribution of income, etc. When demand fluctuates, the firm's revenue also changes. There cannot be insurance against these changes. A sudden decrease in demand may cause a great loss to a firm; but such losses are non-insurable.

2. Trade Cycles: In a capitalist economy, prosperity and depression are two major facets of modern business. During prosperity, a handsome profit may be reaped. But, during a

2. Stonier and Hague (4th edition) *op. cit.*, p. 359.

depression, there is overall contraction of economic activities, leading to a sudden rapid decrease in demand for goods and resources, causing widespread losses. Recession and depression lack periodicity, hence alterations in the revenue and cost conditions of firms, influenced by such phenomena, cannot be predicted nor can they be insured against.

3. Technological Changes: When technology advances, a firm has to adopt a new technology to retain its competitive strength. And technology has a direct bearing on the cost of production. Discarding old techniques, etc., leads to a loss which cannot be insured against.

4. Competition: Most of the markets are monopolistically competitive and there are no strong barriers to entry. Entry of new firms means a cut in the existing market share possessed by old firms. Competition from new rivals, then leads to a fall in price and diminution of profit. But, there cannot be any insurance against the risks of competition. Again, no one can predict when exactly a new firm will enter the market and what will be its competitive strength.

5. Structural Changes: In a dynamic economy, there are constant changes in consumer tastes, income, prices of substitutes, population growth, advertising, etc. These structural factors may continually alter the sales of firms, so that a high degree of uncertainty about business is created, which is not insurable.

6. Changes in Government Policies: Government's economic policies — industrial, fiscal and monetary, etc., — are always uncertain and unpredictable. Changes in government's economic policies widely affect business situations; for instance, when high taxes are imposed on certain goods, people's preferences may alter, so sales of such goods may decline. If government relaxes its import policy, producers of import substitutes will face keen foreign competition, and may also experience a decline in their sales. Similarly, changes in licensing policy may alter the degree of monopoly power and sales position of many existing firms. Again, when, say, the Reserve Bank adopts a tight money policy by raising the bank and interest rates, cost conditions of many firms and their expansion project may be adversely affected.

7. Outbreak of War: War affects business in a very uncertain manner — yet, nobody can predict a war.

All these risks are uncertain and unforeseeable, and so are uninsurable. It is the main function of the entrepreneur to bear all such uncertainties of business. These uncertainties are distinct from risk, which is predictable and insurable. They coincide with risk which is unpredictable and uninsurable. Thus, all true profit is an exclusive reward to the entrepreneur for making business decisions for his firm under unpredictable, uncertain dynamic economic conditions.

In short, Knight's theory implies that:

1. Profit is the reward for uncertainty-bearing.
2. The unmeasurable risks are termed as uncertainty. These unmeasurable risks are true hazards of business.
3. Pure profit is, however, a temporal and unfixed reward. It is tuned to uncertainty. Once the unforeseen circumstances become known, necessary adjustment would be possible. Then, pure profit disappears.

Criticisms

1. Knight's theory has been criticised on the following counts:
2. In fact, it is business ability rather than atmosphere of uncertainty which leads to a high reward of profit.
3. Knight fails to distinguish between ownership and control in modern joint stock companies, where shareholders are the owners but business control is in the hands of salaried managers. The concept of profit and entrepreneurial function in such cases is not suitably exposed by the theory.
4. The theory does not suit well to expose the phenomenon of monopoly profit, when there is least uncertainty involved in a monopoly business.
5. Above all, the uncertainty element cannot be quantified to impute profit.

To sum up: "The modern theory of profit regards the entrepreneur's contribution to the process of production as that of bearing *non-insurable risks and uncertainties.*"[3]

Concluding Remarks

Pure profits are the reward for bearing risks and uncertainties. In a purely competitive market of a static economy, where the risk of uncertainty is absent, in the long-run, when industry attains equilibrium, there exists no pure profit.

Since there is no uncertainty about the future and the entrepreneur has to repeat the same process of production without any risk, there is no profit in the true sense, *i.e.,* profit as residual income. There is no residual surplus because price = average cost, and the marginal revenue product of entrepreneurship tends to be zero.[4]

It follows that in the long-run, in a static economy, there is only normal profit. There may be other implicit profit such as wages of management, when an entrepreneur himself renders the services in place of a manager, to conduct the business affairs. Again, there may be implicit interest to be earned by the entrepreneur for his own capital invested in the business. All these elements, though residual incomes as surplus or revenue over the explicit cost of the firm, should not be regarded as pure profits because these are not earned as reward for risk-taking. Pure profits are earned as the reward for the entrepreneurial function of uncertainty-bearing. Ours is a dynamic world having a high degree of uncertainty and provides a source of earning pure profits even in the long-run.

The Innovation and Profit

Schumpeter deemed profit as the reward for enterprise and innovation. In his view, the entrepreneur initiates innovation in the business and when he succeeds, he earns profit as his reward. Schumpeter emphasised this function of the entrepreneur to distinguish him from the bureaucratic executive or the manager, who simply runs an established business in a steady manner. Innovation and growth of a firm are the real job of the entrepreneur. As an innovator, the entrepreneur pursues new activities. Innovation means commercial application of new scientific inventions and discoveries. An innovator is, therefore, a businessman with a vision,

3. *Ibid.*, p. 359.
4. *Ibid.*, p. 367

originality and is bold enough to bear high risks involved in undertaking a new business. The innovator is not himself a scientist, but he successfully introduces new inventions on a commercial basis. To explain the phenomenon, we may refer to an example given by Samuelson. The scientific theory of radio wave was the brain wave of Maxwell. It was experimented upon by Hertz, and its commercial profitable use was carried out by Marconi and Sarnoff, who are the innovators in radio manufacturing.

Innovation is always purposeful. It is sought for altering cost and revenue data in a profitable manner. There are, thus, two types of innovation: (*i*) product innovation, and (*ii*) market innovation. Under product innovations, there are technical improvements, changes in the method of production and changes in the method of organisation and operation, etc., all of which affect the cost and quality of the product. When cost minimisation techniques are introduced by the firm, it can yield, at least temporarily, a high rate of profit.

Under market innovations, there are changes influencing the market demand for the firm's products. Discovery and exploitation of new market territory, introducing a new variety of product and product improvement, new modes of advertising and sales propaganda, etc., may be regarded as market innovations.

Any form of innovation leads to a profit. It is described as innovational profit. Innovational profit is not the attribute of a particular factor unit such as monopoly profit. It is uncertain and unpredictable. It is temporary in nature. An innovator who is a pioneer of the business would earn innovational profit till other firms successfully imitate him and compete for it on a large scale. Thus, innovational profits disappear when similar products enter the market. But once innovational profit is competed away by rivals and imitators, the pioneer may search for another innovation. So, again, he tends to earn innovational profit. In this way, innovational profit appears and reappears. So, these innovational profits exist continually in a modern progressive business.

Since there is a high element of uncertainty involved in innovational profit on account of imitation, new inventions, etc., we can say that innovation, as a source of profit, is nothing but a special case of risk and uncertainty-bearing.

In fact, Schumpeter's innovation theory of profit is a functional theory. Essentially, innovation implies uncertainty. Innovators earn uncertainty-induced profits. But, Knight's uncertainty theory of profit has wider connotation than Schumpeter's innovation theory, for uncertainty is involved in all business making, even when it is not concerned with innovation. The entrepreneur, thus, earns profits not only for innovation but also for bearing non-insurable risks and uncertainties in business activity.

7. PROFIT POLICY: PROFIT RESTRAINT

In practice, firms rarely seek to maximise profits. Most firms have many goals of primary importance other than profit. Instead of maximisation of profit, thus, the firms are interested in putting a limit on their profits. There are several reasons for limiting or controlling profits.

Maintaining Business Goodwill

A policy of limiting profit may be followed by a firm in order to win appreciation of consumers and earn business reputation and maintain business goodwill in the market. By keeping a low profit margin, the firm may create a good impression on the consumers and enjoy their patronage. Thus, in an inflationary situation, by restricting the profit margin, the firm may be in a position to maintain a stable price for its product which will definitely fetch consumers' appreciation. Further, keeping a high profit margin and higher prices may also involve the danger of consumer resentment. To avoid this, it is considered a wise policy to keep a low profit margin and maintain business goodwill.

Wage Consideration

If the firm maintains high profits, trade unions will demand high wages, which may inflate costs and further complicate the management problem. Thus, to avoid such happenings and to maintain good labour relations profit control is imperative.

Avoiding High Taxation and Government's Intervention

High profits may attract high taxation. Again, high profits may be taken as an index of monopoly power which may attract government's attention and investigation and its eventual control. The government may, through price control, regulation of profit, intervene, etc., so the firm may consider it to be a wise policy to aim at less than possible maximum profits.

Avoiding Risk

The risk element tends to be high under profit maximisation. Thus, to minimise risk, it is imperative not to go in for maximisation of profits but be satisfied with a reasonable profitability of the business venture.

Obstructing Potential Competition

High profitability of the business may attract new competitors to enter the field and share the market. Thus, only a fair profit may be earned by the concerned firm to discourage new entry in its production line. As Joel Dean (1976) puts it: "Competitors can invade the market as soon as they discover its profitability, find ways to shift the patents, and make the necessary development outlays in production design, production plant, technique and market penetration." For this reason, a firm may not want to show profit earnings in the business but depict a gloomy picture so that newcomers are discouraged from entering the market.

Goal of Domination and Leadership in the Market

If the firm aims to dominate the market and acquire leadership, it may seek to maximise sales and capture the market rather than maximise its profits.

Enlightened Self-interest of Survival

The firm in its own interest, for survival, would limit its profits and try to see that its existence becomes permanent in the market so that it can earn a regular flow of business income in the long term. It also implies considerations to prevent loss instead of maximum return.

Idealism and Service Motivation

A firm may adopt an idealistic approach and service motivation, so that it will not go in for profit maximisation and instead would like to serve the nation in a reasonable manner.

The firm's idea may be to provide more employment with better wages. It may look into the welfare of its workers more than the self-interest of profit maximisation. A businessman with philanthropic ideas and attitudes always tends to control the profits of his organisation.

Liquidity Preference

For a comfortable position in the business liquidity, *i.e.*, possession of cash is very important. Liquidity of the firm also depends upon the positive ratio of current assets to current liabilities.

Especially, in banking business greater emphasis is placed on liquidity rather than profitability. A bank arranges its assets in the ascending order of liquidity and descending order of profitability.

8. PROBLEMS IN PROFIT POLICY

Though a firm may seek to pursue many other objectives than profit; profit does become a part of the game. Usually, the firm does make budgeting for obtaining a planned rate of profit and would certainly try to improve its profit performance overtime, though it may not aim at profit maximisation. In practice, a firm seeks to earn a target rate of return on its investment. It, thus, encounters two major problems in determining its profit policy.

- What should be the reasonable rate of profit?
- How to determine it?

Thus, the basic problem of profit policy is to determine a profit standard through the target rate of return on investment.

9. CRITERIA FOR ACCEPTABLE PROFIT OR RATE OF RETURN ON INVESTMENT

Various criteria may be applied to determine the rate of return on investment and decide the most acceptable rate of profit. These may be enlisted as follows:

- Competitive rates of profits.
- Historical profit rate.
- Sufficient earning to protect the equity.
- Plough-back of profit rate.

Competitive Rates of Profit: The firm in its profit policy may consider the rates of profits earned by other firms in the same industry of the rates prevailing in other related industries in similar economic business conditions.

Historical Profit Rate: The firm may look into its past earnings in normal times and determine the planned rate of return for the future course of operation. The firm has to examine the impact of historical rate of profit on equity capital in the past, dividends to shareholders and the degree of competence in the market.

Sufficient Earning to Protect the Equity: The rate of return on investment should adequately protect the interest of the present shareholders, so that it has no problem in raising new equity capital for further expansion.

Plough-back of Profit Rate: The rate of return may be such that it can adequately finance growth through internal resources, *i.e.,* by plough-back of profit.

10. PROFIT PLANNING

In modern business, profit earning is not an easy task. Profitability and success of the business depends on the firm's accurate business planning and operation. Profit planning is essential in the wake of many constraints, limitations and uncertainties of modern business conditions. Profit planning is an art as well as science. It is the sign of a good business, which can make profit consistent with myriad of risk elements encountered and this is only possible with an appropriate profit planning.

- To earn profit one has to face risks and one who deals with risks successfully can make profit.
- To deal with the risks and to avoid losses one has to plan. It is the essence of profit planning.

Profit planning is an integral part of business policy and planning, Profit policy is programmed through profit planning. Profit planning gives a concrete shape to the profit policy of the firm. Profit policy is an ideal. Profit planning is a time-bound action to fulfil this ideal.

Profit is the difference between total sales revenue and total cost of production. Thus, in profit planning, to regulate the profit, sales volume and input quantity (or cost of production) are to be manipulated. In modern business, profits are, thus, controlled by adopting many sophisticated techniques such as break-even analysis, cost control, profit volume analysis and linear programming.

MODEL QUESTIONS

1. Why do firms put a limit on their profits?
2. (a) Define profits.

   (b) What are the main sources of profit?
3. "Profits are a reward for risks and uncertainty-bearing." Discuss.
4. Explain the dynamic theory of profit.

❐ ❐ ❐

Policies on Profit Maximisation

21
CHAPTER

1. MEANING OF PROFIT MAXIMISATION

In determining the equilibrium of a firm, it is assumed that the firm aims at maximisation of its profits. This assumption is fundamental to the analysis of the behaviour of a firm whose entrepreneur is assumed to act rationally. It is, therefore, necessary to define clearly the meaning of profit maximisation.

Profit in the ordinary sense is understood as the excess of the firm's total revenue of sales proceeds of a given output over its cost of production. Symbolically,

$$p = R - C$$

where, p = profit,

R = total revenue, and

C = total cost

when $R > C$, then $R - C$ is a positive value; it is called profit. If, however, $R < C$, then $R - C$ is negative, it is called loss. This is the interpretation of the term profit in the accounting sense. But when an economist calculates total cost, he includes all explicit as well as implicit costs. Economists have, therefore, two distinct notions of profit: *(i)* normal profit, and *(ii)* supernormal profit.

Normal Profit

It refers to that amount of earnings which is just sufficient to induce the firm to stay in the industry. Normal profit is, thus, the minimum reasonable level of profit which the entrepreneur must get in the long-run, so that he is induced to continue the employment of his resources in its present form.

Normal profit is the opportunity cost of entrepreneurship. It is equivalent to the transfer earnings of the entrepreneur. That means, if the entrepreneur fails to earn the normal rate of profit in the long-run, he will close down the operation of his firm and quit the industry in order to shift his resources elsewhere.

Normal profit is considered as the least possible reward which in the long-run must be earned by the entrepreneur, as compensation for his organisational services as well as for bearing the insurable business risks.

Normal profit is always regarded as a part of factor costs. Since entrepreneurial service is a factor of production, the price paid for it is the normal profit and it is to be incorporated while calculating the total cost. Of course, normal profit is the implicit money cost. Thus, in the economic sense, when the total cost (*C*) is measured, it also covers the normal profit of the firm. As such, when $R = C$, ordinarily it will be inferred that there is no profit. In the economic sense, though we may say, there is no pure business profit, but there is normal profit, which is already embedded in the total cost.

It must be remembered that the entrepreneur desires a fixed amount as normal profit, which is independent of the output. So, normal profit as a factor cost is a fixed implicit cost element.

Evidently, when output expands, total normal profit like *TFC* gets spread over the range of output. This has a bearing on the shape of the average cost curve (*AC*), as shown in Figure 21.1

Following Stonier and Hague (1966), in Figure 21.1, we have drawn two *AC* curves, one excluding normal profit-cost element (*AC*) and another by including it (*AC* + *NP*). It may be observed that as we move from left to right, the vertical distance between *AC* and *AC* + *NP* curves tend to become narrow in a steady manner. This implies that as output increases, normal profit per unit of output, diminishes. However, the total normal profit at all levels of output remains the same. Geometrically, thus, when output is *OA*, the average normal profit is *QR*. When output rises to *OB*, the average normal profit diminishes to *VW*. Total normal profit is *PQRS* in the former case and *TVWZ* in the latter case. However, $PQRS = TVWZ$.

Normal profit is measured by the difference between *AC* + *NP* and *AC* curves.

In economic theory, thus, whenever the average cost curve is drawn, the normal profit as the factor cost element of a fixed nature is always included; hence, *ATC* curve means *AC* + *NP* curve.

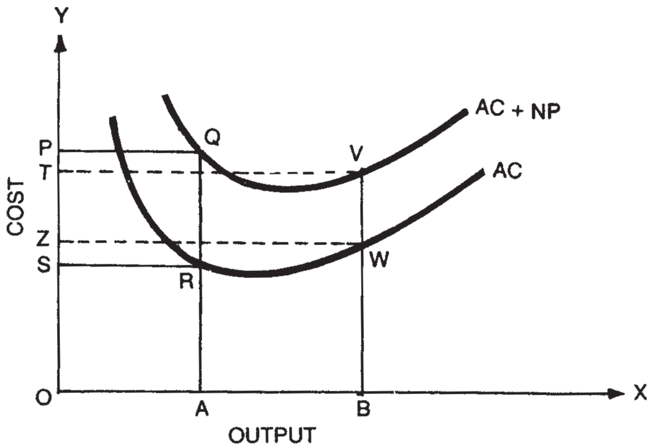


Fig. 21.1: Normal Profit and AC Curve

A theoretical importance of the concept of normal profit is for determining the industry's equilibrium. When only normal profit is earned by the existing firms, there will be no new entry in the competitive market or the industry.

Supernormal Profit

Profits in excess of normal profit are considered as supernormal. Since normal profit is included in the cost of production, supernormal profit is obtained when total revenue exceeds total costs (*i.e.*, $TR > TC$). It is also called pure business profit or "excess profit."

Supernormal profit depends on the demand conditions in the business, which are uncertain and unpredictable. Thus, supernormal profit is the reward for bearing uncertainties and unpredictable risks of business. Sometimes, in a competitive market, supernormal profit is also earned due to extraordinary efficiency on the part of the entrepreneur.

When the existing firms earn supernormal profit, new entries will be attracted to the industry, so the equilibrium of the industry is threatened.

Incidentally, when $TR > TC$, such that only a part of normal profit is earned by the firm, it is called subnormal profit. Subnormal profit is the profit below the normal profit earned when total revenue covers up explicit costs fully and a part of implicit cost of entrepreneurial services.

Profit Maximisation

From the above analysis, it follows that an entrepreneur's income consists of two elements: normal profits and surplus of total revenue over total cost, which is termed as residual income. Normal profits are the minimum income which the entrepreneur must receive if he is to continue to remain in his line of production. They are a part of the costs, and in pursuing the objective of profit maximisation, the entrepreneur does not aim at maximising normal profits. What he aims at maximising is the residual income, *i.e.,* the difference between the total revenue and the total cost, which is known as 'supernormal profit.'

A firm is said to be in equilibrium when it has no inclination to expand or to contract its output. The firm will reach such a state when it maximises its residual profits. Residual profits are the difference between total revenue and total cost. The firm will, therefore, reach equilibrium when it maximises the difference between its total revenue and total cost.

The behavioural rule of profit maximisation or the equilibrium output of the firm is explained by the Marginal Revenue-Marginal Cost equality approach (*MR: MC* Approach).

2. THE MARGINAL COST-MARGINAL REVENUE EQUALITY APPROACH

An informative and useful method of determining a firm's equilibrium output is the comparison of Marginal Cost (*MC*) with Marginal Revenue (*MR*) at each successive unit of output, instead to Total Revenue (*TR*) and Total Cost (*TC*).

The marginal cost-marginal revenue (*MR : MC*) approach clearly shows the behavioural role of profit maximisation by using price as an explicit variable.

Essentially, the *MC : MR* approach is the corollary of the *TC : TR* approach.

According to the *TR : TC* approach, at equilibrium or profit maximising level of output, the slope of *TR* curve = slope of *TC* curve. The slope of *TR* curve, *i.e.*, $\frac{\Delta TR}{\Delta Q}$ *TR* is the marginal revenue (*MR*); and the slope of the *TC* curve, *i.e.*, $\frac{\Delta TC}{\Delta Q}$ is the marginal cost (*MC*). This means, *MR* = *MC*.

Hence, the profit maximising condition may be stated as the rate of output at which the difference between *TR* and *TC* is the greatest, or the point at which *MR* = *MC*.

Let us consider a much simplified case study of a hypothetical firm under perfect competition. Assuming the prevailing market price to be Rs. 10 per unit, its revenue, and cost data are presented in Table 21.1.

Table 21.1: Revenue, Cost and Profit of a Hypothetical Competitive Firm

Market Price (Rs.) per Unit (P)	*Units of Output Sold (Q)*	*Total Revenue (Rs.) (TR = PQ)*	*Total Cost (+) (Rs.) (TC)*	*Profit or Loss (–) = (TR–TC)*	*Marginal Revenue (Rs.) (MR)*	*Marginal Cost (Rs.) (MC)*
10	0	0	10	– 10	0	0
10	1	10	16	– 6	10	> 6
10	2	20	20	0	10	> 4
10	3	30	21	+ 9	10	> 1
10	4	40	22	+ 18	10	> 1

10	5	50	25	+ 25	10	> 3
10	6	60	30	+ 30	10	> 5
10	7	70	37	+ 33	10	> 7
10	8	80	47	+ 33	10	= 10
10	9	90	61	+ 29	10	< 14
10	10	100	81	+ 19	10	< 20

According to the marginal revenue and marginal cost approach, the equality between the marginal revenue (*MR*) and the marginal cost (*MC*) of the firm is the condition of profit maximising output as well as the equilibrium of the firm. This suggests that a firm will go on expanding its output as long as every additional unit produced adds more to its total revenues than what it adds to its total costs. The firm will not produce a unit which adds more to its total costs than what it adds to its total revenues, obviously because this would put the firm to a loss. In other words, the firm will be increasing its profits by expanding its output to the level at which the marginal revenue just equals the marginal cost. It will be disadvantageous for the firm to produce an output of less than this level or more than this level, because then its total residual profits will be less than maximum.

A firm will be in equilibrium when it produces a level of output at which the marginal cost is equal to the marginal revenue. This point is made clear in Table 21.1. Examine the *MR* and *MC* columns in this table. A comparison of the two columns show that when *MR* > *MC*, it is advantageous for the firm to produce more, as additional output sold adds to its total profit. The firm gets maximum total profit of Rs. 33 when 8 units are produced. At this stage, *MR* = *MC:* Rs. 10. A further expansion implies *MC* exceeding MR, so there is loss and reduction in total profit achieved before. Thus, a firm will stick to a production of 8 units per period of time under the given conditions. The marginal approach thus gives a determinate solution, irrespective of the nature of data, whether discrete or continuous.

Thus, the equilibrium point is the intersection point of the *MR* curve and the *MC* curve, as shown in Figure 21.2.

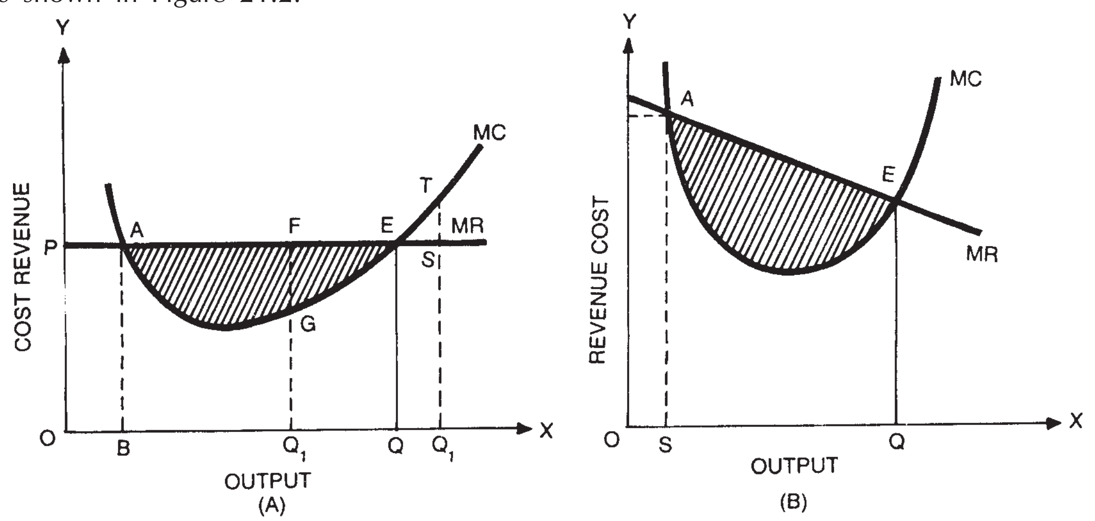


Fig. 21.2: Behavioural Rule of Profit Maximisation

In Figure 21.2, *MR* is the marginal revenue curve and *MC* is the marginal cost curve. *MC* intersects *MR* from below at point *E*. At this point *B*, *MC* = *MR*, when the *OQ* of output is produced. *OQ* is the equilibrium output, yielding maximum profits. Diagrammatically, the area underlying the *MR* curve measures the total revenue of the output and the area underlying the *MC* curve measures the total costs. The difference between *TR* and *TC* is thus measured by the area *AGEF*, which is the profit area. The area is obtained when the firm produces *OQ* level of output at which *MR* = *MC* and the profits appear to be maximum. Supposing the firm is producing less, say, up to OQ_1, then by increasing output further, the firm is in a position to add to its total profit, measured by the area *FGE*, because *MR* > *MC*.

Profit is maximised when *MR* = *MC*. Thus, equilibrium point is determined where *MC* curve intersects *MR* curve from below.

The addition to total profit is possible until *MR* = *MC*. The firm will profit by increasing its output so long as its *MR* > *MC*. Once *MR* = *MC*, further production means *MC* > *MR*. As shown in the diagram, when the firm produces *OQ* units of output *MC* > *MR*, *i.e.*, loss amounting to the area *EST*. Apparently, to produce up to OQ_2 level of output is not a paying proposition for the firm and it will find it advantageous to reduce the level of output back to *OQ*. Thus, the point at which *MR* = *MC* is the maximum profit position; it is the equilibrium point. Again, for the firm under perfect competition *MR* = Price. Thus, either *P* = *MC* or *MR* = *MC* can be regarded as the equilibrium condition in the case of a competitive firm.

Essential Conditions

Equating marginal cost with marginal revenue is the behavioural rule of profit maximisation. A rational entrepreneur, as such, will fix his output so as to equate marginal revenue with marginal cost in any market situation, purely competitive, less competitive or non-competitive (monopoly). In graphical terms, the equilibrium point is set at the point of intersection between the *MC* curve and the *MR* curve.

The equality of marginal revenue and marginal cost is the first-order rule and necessary condition of profit maximisation. But, it is not by itself sufficient to assure a firm's equilibrium or profit maximisation. The second order and significant condition is that at an equilibrium point, the *MC* curve should intersect the *MR* curve from below and not from above. This implies that after the equality between *MR* and *MC*, the marginal cost must be increasing with further output. Prof. Samuelson (1985), calls it the 'best-profit point.'

If the *MC* curve cuts the *MR* curve from above, the intersection point is not an equilibrium point by yielding the maximum profit, because then beyond this equality point, *MC* would be less than *MR* and it would be profitable for the firm to expand its output.

In Fig. 21.2 (A) and (B), *A* and *E* are two intersection points at which *MR* = *MC*. But point A is not the profit maximising position. It is rather the break-even point. When a firm expands its product further from *OB*, it can yield residual profits. Thus, at point *E*, once again *MR* = *MC*, at which the firm maximises its profits. A further expansion of output puts the firm in loss, since after point *E*, *MC* > *MR*. Therefore, when the *MC* curve is U-shaped at the point of equilibrium, it must intersect the *MR* curve from below, and not from above, to maximise the profit. In other words, the true equilibrium point is one at which the *MC* curve cuts the *MR* curve from below and after that it is not possible for it to be less than the *MR* curve.

To sum up, the firm's equilibrium or profit maximisation conditions are:

- **First Order Condition:** *MR* = *MC*. Graphically, it is the point of intersection of the *MC* curve and the *MR* curve.
- **Second Order Condition:** *MC* must be rising with further expansion of output. Graphically, the *MC* curve must intersect the *MR* curve from below.

Profit Maximisation Problem: A Hypothetical Case Study

A practical significance of marginal analysis is highlighted by the following hypothetical business problem on profit-maximisation. Sai Baba Plastic Works is a small firm producing buttons. It is seeking profit maximisation. At the prevailing market price, say Rs. 12 per box it can sell as many buttons as it produces. It has, however, a limited capacity of a single manufacturing plant. It is operating at full capacity on all working days, except Sundays. If it has to work on Sunday, the firm has to pay overtime (double) wage rates to the workers. As such, the marginal costs of production on weekdays remain constant, but tend to be higher on Sundays.

Suppose, the firm gets a contract from 'Big Boss' a garment producing firm to supply the buttons with its brand name and ready to pay Rs. 18 per box for weekly order of 1,000 boxes. The firm's full capacity daily output is 1,000 boxes, which it can sell at Rs. 12 per box in the market. The firm's weekly fixed costs amount to Rs. 1,000 (rent + interest + insurance). Variable costs is Rs. 10 per box (raw materials Rs. 5 + labour cost Rs. 5).

Assuming no cost difference between ordinary and brand name imposed buttons, what should be the output determination by the firm? Should the firm produce more by working on Sundays?

The rational decision can be guided by the marginal approach of profit maximisation rule suggested by the economic theory.

In this case, the marginal costs (MC) remain constant at Rs.10 for the normal working days —Monday to Saturday. On Sunday, however, the MC tends to be Rs. 15 per box. (Rs. 5 raw materials costs and Rs. 10 labour cost).

The rational approach to the business lies in doing the most cost effective activity first on MC consideration of the supply side; while the most revenue enhancing output should be sold first looking to the demand side.

As such, the firm should produce brand name buttons first to cater to the high-priced order at Rs.18. Thereafter, decision should be made on whether it is worthwhile to work on Sunday to produce ordinary buttons.

In this case, the marginal revenue initially for six days tend to be higher than the marginal cost. (Monday: MR = Rs. 20 > MC = Rs. 10, other five days Tuesday through Saturday MR = Rs. 12 > MC = Rs. 10). But, on Sunday the marginal cost (Rs. 15) tends to be higher than the marginal revenue (Rs. 10); therefore, on Sunday the firm should not work.

The two alternative situations in this case can be reviewed as under:

[1] The firm operates on 6 days: Monday to Saturday.

Day	*Output (Q)*	*Price (P) (TVC)*	*Total Revenue (TR)*	*Total Variable Cost*
Monday	1000*	18	18,000	10,000
Tuesday	1000	12	12,000	10,000
Wednesday	1000	12	12,000	10,000
Thursday	1000	12	12,000	10,000
Friday	1000	12	12,000	10,000
Saturday	1000	12	12,000	10,000
Weekly Total			78,000	60,000

*with brand-name

In this case

∴ Total Cost = TFC + TVC

= 1,000 + 60,000 = Rs.61,000

p = TR – TC

∴ p = 78,000 – 61,000 = Rs.17,000 per week

[2] The firm operates on 7 days including Sunday

For Monday to Saturday total revenue and total cost should remain the same.

On Sunday variable cost per box is Rs. 15, therefore, total variable cost for 1,000 boxes:

$15 \times 1{,}000$ = Rs.15,000

Against this, total revenue is Rs. 12,000. Hence, there is a loss by Rs. 3,000.

Alternatively speaking, profits when the firm operates for 7 days will be measured as:

TR = Rs.78,000 (Monday to Saturday output sold) + Rs.12,000 (Sunday's out-sold)

= Rs. 90,000

TVC = Rs. 60,000 (Monday to Saturday) + Rs.15,000 = Rs.75,000

TC = Rs.1,000 (TFC) + Rs.75,000 = Rs.76,000

p = TR – TC

∴ p = 90,000 – 76,000 = 14,000

It follows that when the firm operates for 6 working days its weekly profit is Rs. 17,000 but it tends to be less (at Rs. 14,000) when it works on Sunday as well. The right decision, therefore, is: do not operate on Sunday. The weekly equilibrium output, therefore, will be 60,000 boxes of buttons.

3. MC = MR APPROACH IN REALITY

Economic theory implies that decision-making for profit maximization goal of the firm is simple enough: it is achieved when marginal cost and marginal revenue become equal. Does this mean that, in reality, the business firms do measure the marginal costs and marginal revenues and determine their output level? In actual practice, most business firms are, however, unaware of these economic concepts. Though economic theory is logical in suggesting $MC = MR$ approach to profit maximisation, it does not describe in reality the problem which actually works for the profit making decision of the business firm in the real world.

Nonetheless, one should not jump to conclude that economic theories are totally unrealistic and have no applicable use. In defence of economic theory in this regard one may say that theory is generally never intended to be descriptively realistic. It is the view held by the neo-classical school of thought. The fruitfulness of the theory is to be evaluated by and large, by the accuracy of its conditional predictions — under the framework of its model. For instance, if price and quantity vary in accordance with the adjustment process implied by the theory then one should accept the model to the useful in explaining the real behaviour. It follows that even though business firms really are not aware of the concepts and estimates of marginal costs and revenues, in practice, they still behave in accordance to the principle as if they are aware of it. Further, the theory assumes profit maximisation goal in explaining firm equilibrium, but in practice whether profit is really maximised or not is of as much importance as the fall — that profit serves as an incentive to produce and a firm does produce till some profit is available and obviously will cease to produce more when it is not profitable.

Business decisions, by and large are, profit-oriented in practice. In this context, explicit, ignorance of the businessmen about marginal costs and revenues carries not much importance, when his behaviour actually establishes the fact as suggested by the theory in an implied way. The crucial point is that business firms do assume that a particular course of action only can help in having maximum profit (or, at least better profitability of the venture — which may be considered as a sort of profit maximisation in a loose sense of reality). Such behaviour of business towards profit maximisation is explained in theoretical terms as equating MC with MR.

Optimal Pricing Policy

In revenue analysis, the following simple direct relation between price (P), price elasticity or demand (ep) and marginal revenue (MR) is detected:

$$MR = P\,(1 + 1/ep)$$

Profit maximising condition is:

$$MC = MR$$

$$MC = P\,(1 + 1/ep)$$

The profit maximising or optimal price is obtained, thus,

$$P = MC/(1 + 1/ep)$$

- **Illustration**

For product *X*, price elasticity is estimated to be – 2.5. The marginal cost of producing X is Rs. 30. Determine the optimal price in this case.

Solution:

Given particulars:

$MC = 30$

$ep = -2.5$

$\therefore \pi = 30/(1 + 1/- 2.5)$

$= 30/(1 - 0.4) = 30/0.6 = \text{Rs. } 50$

When marginal cost is Rs. 30, but *ep* is – 1.25, then,

$\pi = 30/(1 + 1/-1.25) = 30/0.2 = \text{Rs. } 150$

4. AN ESTIMATION PROBLEM

Hypothetical firm data are given as under:

(i) $P = 10 - 0.3Q$

(ii) $TC = 6 + 4Q + 0.7Q^2$

where,

P = price, Q = output and TC = total cost

Determine profit maximising output level, also price, a total revenue, total cost and profit at this optimum level.

Solution:

Let π = profit

$\pi = (TR) - (TC)$

$TR = P.Q$

$\therefore TR = Q(10 - 0.3Q)$

$= 10Q - 0.3Q^2$

$\therefore \pi = (10Q - 0.3Q^2) - (6 + 4Q + 0.7Q^2)$

$= 10Q - 0.3Q^2 - 6 - 4Q - 0.7Q^2$

$= 6Q - Q^2 - 6$

To maximise profit, we require

$$\frac{d\pi}{dQ} = 0$$

$$\therefore \frac{d\pi}{dQ} = 6 - 2Q = 0$$

$\therefore 2Q = 6 \therefore Q = 3$

Price:

$$P = 10 - 0.3Q$$

$$\therefore P = 10 - 0.3 \times 3 = 9.1$$

$$TR = PQ = 9.1 \times 3 = 27.3$$

$$TC = 6 + (4 \times 3) + (0.7 \times 0.3 \times 0.3)$$

$$= 18.063$$

$$\pi = 273 - 18.063 = 9.24$$

MODEL QUESTIONS

1. Explain and illustrate the $MC = MR$ approach to profit maximisation.
2. Is the theory of profit maximisation logically perfect?
3. What is meant by normal profit?
4. Do firms really equate their marginal cost with marginal revenue in practice?

Problems

1. Determine profit maximising output, when:

   $P = 20 - 0.6Q$

   $TC = 12 + 8Q + 1.4Q^2$

2. Determine Firm's equilibrium level of output under:

   $TC = 6 + 4Q + 0.7Q^2$

   $TR = 10Q - 0.3Q^2$

   How much is the profit earned?

❐ ❐ ❐

Unit VIII

Capital Budgeting

Capital Budgeting

22
CHAPTER

1. INTRODUCTION

Project planning is the main and most practical branch of Managerial Economics.

A project refers to a scheme for investing resources. A project, thus, implies capital project or capital investment. It is also referred to as capital expenditure.

Capital expenditure decision is always there and important in any business or for any organisation. For example, a bank is planning to install a computer system for its operational work, a printing press is considering to adopt desktop printing technology, the Central Railway is thinking to extend the Harbour line trains up to Borivali; and so on pertaining to a capital expenditure decision, thus, involving project planning.

There are capital projects that generates returns for a longer time, usually more than a year. New operation plants, factory buildings, company's transport vehicles are the examples of capital projects. Capital projects involve capital (long-term) investment.

Basic Characteristics of a Project

Following are the characteristic features of a project:

- It involves a current and near future outlay of funds called 'capital expenditure.'
- It is non-routine.
- It is non-repetitive.
- It is one-off undertaking.
- It is discrete with time, financial and technical goals.
- It is essentially a long-term phenomenon.

- It considers a flow of benefits (monetary as well as non-monetary) to be yielded in future.

2. MEANING AND SIGNIFICANCE OF PROJECT PLANNING

Project planning is essentially a long term planning of proposed capital outlays on a scheme. It relates to long-term investment decisions.

Project planning implies a process of conceiving, generating, evaluating and selecting the most profitable investment proposal or project. It involves a plan for the investment of funds. It deals with major issues like:

- The process of determining the worthiness of investment projects in consideration.
- The anticipated rate of returns from these projects.
- The cost of capital.
- The availability of capital funds, the amounts of which can be allocated by the firm.

Project planning is a means for:

- Organising the work of the project.
- Deciding who does what, when, how and where.
- Determining the resources required.
- Allocating the given resources on a time-phased basis.
- Assigning and defining responsibilities of the different departments involved in the process.
- Integrating and co-ordinating the entire process.
- Controlling the whole scheme.
- Estimating the time for the completion of the project.

Need for Project Planning

Project planning or capital expenditure planning is of the utmost significance to any organisation, for several reasons:

- Capital expenditure decisions have long term effects. They provide the framework for the course of future actions and performance.
- Huge outlays are involved in a project. So, utmost care is needed. It requires capital budgeting.
- Capital expenditure decisions once taken are not easily reversible. This is because, the capital expenditure once incurred cannot be withdrawn without incurring heavy losses — as there may be scrapping of the capital equipment. Thus, project planning is essential to avoid a wrong capital investment decision.

- The investment on capital assets is sunk which influences the conduct of business over a long period of time.
- Long-term investment decisions involve a higher degree of risk and uncertainty. Therefore, it should be carefully done through project planning.
- Project planning involves capital budgeting to avoid losses.
- Project planning helps in achieving control as well as flexibility over the business in the long run.
- It can assure optimal utilisation of the project planning or planning capital expenditure (on fixed assets) is to direct the flow of capital funds into specific uses and manage it with a view to earn maximum returns on investment.
- It serves as an index of the firm's performance in business and reveals its anomalies, if any.

3. THE PROBLEM AND DIFFICULTIES OF PROJECT PLANNING

A business cannot survive unless it makes a profit. Profit provides an incentive and also serves as a guide in project planning.

The fundamental problem of project planning is choosing from among alternative investment opportunities in consideration. A rational choice would be to select the most profitable investment projects from the given set.

This is not an easy task. It involves various considerations and prerequisites on practical side.

Further, there are many difficulties associated with the taking of capital expenditure decisions. To mention a few of them:

- There is a problem of measuring the costs and benefits involved in a particular project. Especially, intangible benefits and costs are difficult to measure.
- Even tangible benefits accruing in future cannot be measured with certainty due to dynamic nature of the economy.
- When costs and benefits in money terms are measured over a period of time, comparison is not valid under inflationary conditions. For, during inflation, the value of rupee does not remain the same.
- Inadequate information due to lack of statistical records may also pose a problem. Incomplete information would mean incomplete analysis, which does not help in deriving reliable and relevant conclusions.
- Budgetary limits and considerable expenses required in collection of data are also a major problem in the project planning exercise. A small firm, therefore, finds it difficult to undertake capital budgeting/project planning worth the name.
- In practice, thus, the project planning is not at all simple. It involves many complexities. Hard thinking, research, careful planning and huge expenditure are required in finding suitable investment projects and arriving at a rational decision.

4. STAGES OF PROJECT PLANNING

Project planning is a complex process. It consists of several stages from conceiving and deciding about an investment project to its implementation, operation and evaluation. The major steps involved in a systematic project planning may be, thus, split out as under:

- Search for new investment proposals.
- Project classification.
- Analysis of costs and benefits:
  - (i) Estimating cash flows.
  - (ii) Computing the cost of capital.
- Measurement of investment worth.
- Feasibility study.
- Decision-making: selection.
- Implementation.
- Performance review.

Search for New Investment Proposals

The Project Planning process begins with the creating of new ideas of investment proposals. The management has to discover the new investment opportunities which are to be compared for deciding the most profitable investments.

Regarding this project, a businessman has to identify investment opportunities from the enormously vast field. This is not an easy task. As Prof. Prasanna Chandra (1987, p. 31) puts it: "Identification of investment opportunities calls for understanding the environment in which one operates, sensitivity to emerging investment possibilities, imaginative analysis of a variety of factors, some tangible and some intangible, and a modicum of luck."

Following Prasanna Chandra (1987:31), we may suggest that a businessman while searching for investment proposals should have the following considerations:

- Acquaintance with governmental regulatory framework such as industrial policy, the Competition Act, 2002, Export Import policies, Corporate taxation and incentives, etc.
- Analysis of the performance of the existing industries especially, an examination of their profitability and capacity utilisation aspects would indicate the scope for further investment in the field.
- Many project ideas can be detected from the analysis of input output framework of different industries as well as trends of exports and imports in the country. Likewise, a careful study of the government's plan outlays and guidelines to industries issued by the government from time to time can be of great help in searching the new investment proposals.
- Among other things, a knowledge of commercial geography, investigation of local materials and resources, a study of economic and social trends for tracing the determinants of demand for

various goods/services, awareness of new technological advancements, participation in trade and industrial fairs at national and international levels, a zeal for modification, adaptation, renovation, etc., can immensely benefit the prospective entrepreneur in his project planning.

In short, the firm's R&D Department must constantly search out new products, improvements in the qualities of the existing products, marketing, organisational, technological and other innovations.

Project Classification

In Project planning, usually projects are classified into the following categories, for a careful capital expenditure analysis:

- **Replacement for maintenance.** Capital investment needed for replacing the worn-out or damaged equipments and machineries.
- **Replacement for cost reduction.** Investment pertaining to replacing old obsolete equipment by new equipment under the process of modernisation.
- **Expansion of existing products.** Investment required for increasing the output of the existing products.
- **Expansion of existing markets.** Investment pertaining to expansion of distributional channels of the existing markets.
- **Innovations.** Investment necessitated for innovations, such as producing a new product, exploiting new market territories, improvement in organisational methods, etc.
- **Environmental investments.** Investments required to deal with problems like safety devices, labour agreements, factory environment, etc.
- **Others.** All others which are not covered by the above stated categories.

Quite often, the last two categories of investment are dealt with separately from regular capital budgeting owing to the complexities involved in their evaluation. (Hirschey and Pappas, 1998, p. 495).

Analysis of Costs and Benefits

In financial terms, an investment project is viewed as a stream of costs and benefits. The analysis of costs and benefits of a capital expenditure involves: *(i)* estimating cash flows, and *(ii)* computing the cost of capital.

- **Estimating cash flows:** The estimation of cash flows associated with investment projects is a significant but very complicated step in the process of capital budgeting or project planning. The management has to forecast changes in cash flows which may emerge from each investment project. Cash flows refer to changes in revenues and costs of capital.

The estimation of cash flows in capital expenditure planning is not an easy job. It involves the search for obtaining information from accounting as well as engineering data. There are also many techniques and methodologies used in cash flow analysis. A suitable method is to be selected which is a very difficult task.

In cash flow analysis, a number of key variables and their relationships are to be examined. Cash flows should be constructed on an incremental basis and after tax basis. Depreciations are to be excluded from the cash flows.

- **Computing the cost of capital:** The project planning also involves a method of computing the cost of capital which will consider the availability of funds at the firm's disposal.

The Measurement of Investment Worth

Then follows the measurement of investment worth in the project planning process. It requires to find a common denominator into which all investment inputs on expected cash/profits flows be converted. Such a common denominator is essential for comparison and ranking of different investment proposals. When the future profit flows occur at different points for different investment projects, no direct comparison would be possible; therefore, it is necessary to convert the flows into comparable common units. The criteria for measuring investment worth are based on the discounting principle.

Feasibility Study

It is necessary to examine the feasibility of the identified project.

The feasibility study requires a preliminary project analysis regarding the financial, marketing, technical and economic aspects of the project. It helps in determining the viability of the project. The feasibility study implies a detailed analysis about costs, means of financing, location, technology to be used, requirement and availability of factor inputs, demand potentiality, sales revenue expected, profitability etc.

A feasibility report is thus a part and parcel of the project planning, serving as a guide for decision-making.

Decision Making

After ranking different investment proposals in terms of their relative profitability and feasibility criteria, the next step is to choose, *i.e.,* to decide about the project to be undertaken for execution.

Selection of suitable project to meet the objective in consideration is an important aspect of project planning.

Implementation

For implementation of the selected investment proposal for an industry it needs to be formulated into a concrete project. It involves many aspects such as designing of the plant, choice of machineries and equipment, construction of the plant building and installation of machineries, arrangement for other requirements, training of the staff and ultimately commissioning of the plant.

Performance Review

Performance review is the post-completion audit of the working of the project in execution. There is the need for continuous monitoring of the projects, (while being executed). When this is not done there is inevitably over-run and disaster. It implies a systematic review of the results of capital expenditure. Under performance review of the project, its actual operation is evaluated in comparison with the projected ideas.

The performance review is useful in preventing future cases of over-optimism, over-expansion, imbalances and such other business problems in long-term planning. It, thus, helps in arriving at cautious decision making in the future, for proper planning and control of the activities of a project.

5. INVESTMENT CRITERIA

The measurement of 'investment worth' is a very important aspect of project planning. For appraising the relative worth or profitability of alternative investment proposals, several criteria have been proposed. Of these, the most commonly adopted investment criteria are:

- Payback Period Method,
- Discounted Present Value Method, and
- Internal Rate of Return.

Payback Period Method

The payback period method, also called payout period method, is a very simple and commonly used method of project evaluation.

It is a non-discounting criterion. The payback period method measures the length of time required to recover the original investment outlay from the annual cash inflow expected from the investment project. Thus:

$$\boxed{\text{Payback Period} = \frac{\text{Initial Investment Outlay}}{\text{Annual Cash Inflow}}}$$

For example, if an investment project requires an outlay of Rs. 1,00,000 and results in the cash inflow of Rs. 20,000 per annum, its payback period is: 1,00,000 ÷ 20,000 = 5 years.

When there are several investment proposals, the payout period of each will be calculated and they would be ranked. Those projects will be preferred which yield quick results, *i.e.*, which have a shorter payback period.

In this criterion, usually some years may be specified as the maximum acceptable payback period *(PBP)*. Suppose x years are accepted as worth considering, whereas projects having $PBP > x$ years are rejected.

Example. Projects *A, B, C, D, E* and *F* involve initial cash outlays of Rs. 5 lakhs, 4 lakhs, 6 lakhs, 7 lakhs, 6 lakhs and 6 lakhs, respectively. Project *A* generates a constant annual cash inflow of Rs. 1 lakh, project *B* generates 50 thousand, *C* generates 1.5 lakhs, *D* generates 70 thousand, *E* generates 2 lakhs, *F* generates 1 lakh, respectively. Which is the most desirable project on the basis of the payback period criterion? Adopting 5 years as the maximum acceptable payback period, which projects are worth considering?

Solution: We shall first measure the payback period (*PBP*) of each project as follows:

$$\text{Project A's } PBP = \frac{5}{1} = 5 \text{ years}$$

$$\text{Project B's } PBP = \frac{4}{0.5} = 8 \text{ years}$$

$$\text{Project C's } PBP = \frac{6}{1.5} = 4 \text{ years}$$

$$\text{Project D's } PBP = \frac{7}{0.7} = 10 \text{ years}$$

$$\text{Project E's } PBP = \frac{6}{2} = 3 \text{ years}$$

$$\text{Project F's } PBP = \frac{6}{1} = 6 \text{ years}$$

Thus: *(i)* On the basis of the payback period criterion, Project *E* is the most desirable one.

(ii) Adopting 5 years as the maximum acceptable payback period, Project *A*, *C* and *E* are deemed worthwhile.

If annual cash inflows are not constant we have to sum up the annuities and see when it becomes equal to the initial outlay. The following example clarifies the point.

Example. Projects *A* and *B* involve cash outlays of Rs. 5,00,000 each. Project generates cash inflows of Rs. 1,00,000, Rs. 1,15,000, Rs. 1,25,000, Rs. 1,60,000, Rs. 2,00,000 in the first, second, third, fourth and fifth years, respectively. Whereas, project *B* generates Rs. 1,40,000, 1,60,000, 2,00,000, 1,70,000 and 1,00,000, respectively.

On the basis of payback period criterion, which project will be chosen?

Solution:

Year	*Cash-flow of Project A*	*Cumulative Sum*	*Cash-flow of Project B*	*Cumulative Sum*
0	5,00,000	—	– 5,00,000	—
1	1,00,000	1,00,000	1,40,000	1,40,000
2	1,15,000	2,15,000	1,60,000	3,00,000

3	1,25,000	3,40,000	2,00,000	5,00,000
4	1,60,000	5,00,000	1,70,000	6,70,000
5	2,00,000	7,00,000	1,00,000	7,70,000

From the columns of cumulative sum, we can see that project *A* takes 4 years, while project *B* takes 3 years to recover the initial cash outlay of Rs. 5,00,000. Therefore, on the basis of *PBP* criterion, project *B* will be chosen.

Merits. Following are the major advantages of the payback period criterion:

- It is simple and easy to calculate.
- It eases the problem of liquidity of the firm by stressing quick recovery.
- It favours less risky projects which generate higher rates of returns in the earlier years than those which have high gestation period.

Drawbacks. Following are major limitations of the *PBP* criterion.

- It does not consider profitability of the project.
- It ignores changes in cash flows.
- It disregards the time value of money. It simply adds up annuities without appropriate discounting. This means there is a violation of the basic rule of financial analysis.
- It overemphasises the liquidity aspect of a project.
- It does not consider other objectives of the firm, such as scales maximisation, etc.
- It does not pay attention to cash inflows after the payback period. There may be a project generating better rates of returns after the *PBP* which might have been rejected under this criterion. To illustrate the point: suppose there are two projects *A* and *B* generating annual returns as under:

Year	*Project A*	*Project B*
0	50,000	50,000
1	30,000	20,000
2	20,000	25,000
3	10,000	20,000
4	5,000	15,000

As per the *PBP* method, project *A* is preferred because it takes only 2 years for recovery while project *B* takes more than 2 years. But, if we see post *PBP* returns, in third and fourth years, project *B* yields Rs. 20,000 and Rs. 15,000 as against Rs. 10,000 and Rs. 5,000 in the case of *A*. Even then, *B* is rejected.

Despite such drawbacks, the *PBP* criterion is widely adopted in practice, for the following reasons:

- It is the most suitable criterion when the firm is in urgent need of cash and wants immediate liquidity.
- It is a quasi-break-even point analysis.
- The payback period is somewhat reciprocal for the internal rate of return when a project is of long duration and yielding a constant annuity.
- It reveals information regarding the rate at which the risks and uncertainty associated with a project can be resolved. (Chandra, p. 235)

Discounted Present Value Method

The discounted present value of a project is measured by taking a discounted sum of the stream of net income (the cash-flows) during the expected life time of the project.

Thus:

$$DPV = \frac{R_1}{(1+c)} + \frac{R_2}{(1+c)^2} + \frac{R_3}{(1+c)^3} + \ldots + \frac{R_n}{(1+c)^n}$$

where *DPV* = discounted present value

R = annual return

n = life of the project

c = discount rate. Here, interest rate or cost of capital is taken as the discount rate.

Having measured the *DPV*, the net present value (*NPV*) is calculated as under:

$NPV = DPV - I$

(where, *I* stands for the initial investment outlay of the project).

Illustration. Initial investment expenditure of firm is Rs. 55,000,00. Its discounted present value is Rs. 50,000,00. Then:

NPV = Rs. 60,000,00 – Rs. 55,000,00 = Rs. 5,000,00. Hence, the project is acceptable.

For choosing the project on this criterion, the decision rate is:

1. If *NPV* is positive, the project is acceptable.
2. If *NPV* is negative, the project is to be rejected.
3. If *NPV* is zero, there is indifference position in the choice.

Merits. This method has the following advantages:

- It takes into account the complete income stream during the life time of the project.
- It reckons the time value of money.

- It is possible to estimate and compare combined *NPV* of two or more projects associated in packages of investment proposals.

Limitations. Following are its major limitations:

- It is grossly affected by the different discount rates. Thus, in one situation if a project is preferred on account of positive *NPV*, it may be rejected if higher discount rate is taken and *NPV* turns out to be negative.
- It is an absolute measure. It may, therefore, not be very meaningful to those entrepreneurs who want to consider the rate of return on their investments.

Internal Rate of Return

This method of evaluating a project is based on the technique of discounting cash flow. It is similar to the Keynesian concept of marginal efficiency of capital.

The internal rate of return is the rate of return or the discount rate which equates the discounted present value of its expected future marginal yields with the investment cost of project. In symbolic terms:

$$\frac{R_1}{(1+r)} + \frac{R_2}{(1+r)^2} + \ldots + \frac{R_n}{(1+r)^n} = I$$

where, R = expected annual cash flow.

I = investment cost of project.

n = life time of the project.

r = internal rate of return.

In economic sense, the internal rate of return (*IRR*) may mean either: *(i)* the rate of return on the unrecovered investment balance in the project, or *(ii)* the rate of return earned on the initial investment made in the project. According to Prof. Prasanna Chandra (1987, p. 251), the first interpretation of *IRR* is more realistic.

Merits

- It recognises the time value of money.
- It deals with the whole range of the annual returns earned during the life time of the project.
- It provides a meaningful consideration to the entrepreneurs in their decision making process.

Limitations

- The *IRR* criterion makes no distinction between lending and borrowing.
- There may not be a unique *IRR* in a project. There may be multiple rates of return. Then, it becomes a very complex phenomenon.

- It is not a suitable method for ranking the projects having substantially different investment costs.

6. DECISION-MAKING RULES

General rules in arriving at a rational capital expenditure decision are:

- Equate benefits and rate of return.
- Equate efforts and costs of capital funds.
- Appraise all investment proposals within the limits of available funds.
- Rank the projects.
- Select those projects in which rate of return exceeds the cost of capital.

The decision rules in project planning are not just pertaining to the profitability ranking order of the projects. In reality, many more considerations are involved in actual practice.

- **Urgency.** The businessman has to see the urgency of the project. Many times profitability aspects are disregarded when there is an emergency situation arising for a particular type of investment outlay. For example, when a machinery breaks down, it requires immediate repairs which cannot be postponed for buying a vehicle for the factory.
- **Certainty of income.** A project yielding low but certain income may be preferred at a time against a high income yielding project with great uncertainty.
- **Intangible factors.** Business reputations, psychic income, effect of a project on the employees' morale, etc., may be weighed high against mere profitability consideration. Entrepreneur's liking and temperament are also equally important in the selection of a project.
- **Budgeting constraints.** A project may be highly profitable, but may have to be rejected if it involves a high initial cost which is beyond the financial capacity of the firm.

Indeed, project planning is an art, and there cannot be a straight or readymade solution to it in any field.

MODEL QUESTIONS

1. (a) What is meant by project?

   (b) What are its main features?
2. Give the meaning and significance of project planning.
3. What are the problems and difficulties associated with project planning?
4. Describe the stages or phases of project planning.
5. Briefly explain the major investment appraisal criteria.

6. Explain the following investment criteria for the evaluation of projects:
   (a) Payback period method
   (b) Discounted present value method
   (c) Internal rate of return.
7. Explain the payback period method of appraising capital expenditure projects. What are its merits and demerits?

Problems

1. XYZ Co. has got up to Rs. 20,000 to invest. The following proposals are under consideration:

Project	*Initial Outlay (Rs.)*	*Annual Cash Flow (Rs.)*	*Life (Years)*
A	10,000	2,500	5
B	8,000	2,600	7
C	4,000	1,000	15
D	10,000	2,400	15
E	5,000	1,125	15
F	6,000	2,400	6

   (a) Rank these projects in the order of their desirability under the payback period method.
   (b) Which projects would you recommend?
2. A firm's initial investment is Rs. 60,000,00 on a project. Its discounted present value is Rs. 58,000,00. Is this project acceptable? Why?
3. Krishna Corporation seeks to invest Rs. 20,00,000. The following investment proposals are under consideration. The cost of capital for their firm is estimated to be 15%.

Project	*Initial outlay Rs.*	*Annual Cash Flow Rs.*	*Life of Project (Years)*
A	1,00,000	2,50,000	10
B	7,00,000	2,00,000	8
C	3,00,000	60,000	20
D	5,00,000	1,50,000	10
E	5,00,000	1,20,000	2-0

   Using Payback method, determine a right choice.

Project Work

Review case studies or collect informations on Project Planning and Capital Budgeting of some Industrial Houses like Ambani, Tata and Birla.

❒ ❒ ❒

Unit IX

Macroeconomics and Business

Business Cycles and Business Policies

23
CHAPTER

1. INTRODUCTION

The economic progress of capitalist countries has been marked by periodical and frequent fluctuations in the tempo of economic activity in investments, in output, in income and in employment. These economies are constantly experiencing such changes. The dynamic forces operating in the capital economy create various kinds of business or economic fluctuations. Some are abrupt, isolated and discontinuous. Some are continuous, lasting for long periods of time in the same direction while some are rhythmic and recurring in nature. Thus, according to their typical characteristics, fluctuations or movements in economic activity are commonly classified as: *(1)* secular trends; *(2)* seasonal fluctuations; *(3)* cyclical fluctuations; and *(4)* random fluctuations. However, among these, cyclical fluctuations have attracted the major attention of economists, as they create significant disturbances in the functioning of the economic system and their causation is not easily perceived.

Cyclical Fluctuations

Cyclical fluctuations are wave-like changes in economic activity characterised by recurring phases of expansion and contraction.

These oscillating movements take the shape of waves from peak to trough and from trough to peak as illustrated in Fig. 23.1. One complete period of such oscillation is called a cycle. Cycles have a free rhythm and are irregular. But they exhibit a recognised pattern of recurrent expansions and contractions.

2. FEATURES OF A BUSINESS CYCLE

The term "business cycle" or "trade cycle" in economics refers to the wave-like fluctuations in the aggregate economic activity, particularly in employment, output and income. In other words, trade cycles are ups and downs in economic activity. A trade cycle is defined in various ways by different economists. For instance, Mitchell defined a trade cycle as a fluctuation in aggregate economic activity. According to Haberler, "The business cycle in the general sense may be defined as an alternation of periods of prosperity and depression, of good and bad trade."

The business cycle refers to the cyclical variation in economic activity. Economic activity is empirically captured in terms of the rate of growth of gross domestic product (GDP), per capita income, level of employment, inflation rate and interest rates – referred to as macro-economic variables. These variables are not constant, but fluctuate over time.

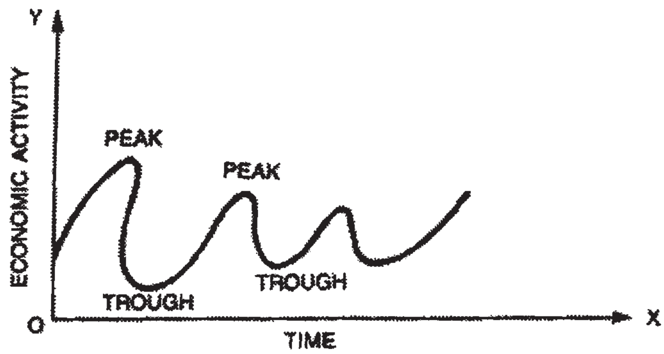


Fig. 23.1: Cyclical Fluctuations

The following features in a trade cycle are worth noting:

(i) A trade cycle is a wave-like movement.

(ii) Cyclical fluctuations are recurrent in nature.

(iii) Expansion and contraction in a trade cycle are cumulative in effect.

(iv) Trade cycles are all-pervading in their impact.

(v) A trade cycle is characterised by the presence of a crisis, *i.e.*, the peak and the trough are not symmetrical, that is to say, the downward movement is more sudden and violent than the change from downward to upward.

(vi) Though cycles differ in timing and amplitude, they have a common pattern of phases which are sequential in nature.

3. PHASES OF A BUSINESS CYCLE

A business cycle is commonly divided into four well-defined and inter-related recurring phases:

- Prosperity phase — expansion or the upswing.
- Recessionary phase — a turn from prosperity to depression (or upper turning point).
- Depressionary phase — contraction or downswing.

- Revival or recovery phase — the turn from depression to prosperity (or lower turning point).

The above four phases of a trade cycle are shown in Fig. 23.2. These phases are recurrent and follow a regular sequence. This means that when prosperity ends, recession starts; depression follows recession; recovery follows depression; prosperity comes after recovery and in turn gives way to recession. Thus, each phase always appears when the immediately preceding phase has run its course. It should be remembered that no phase has any definite periodicity or time interval.

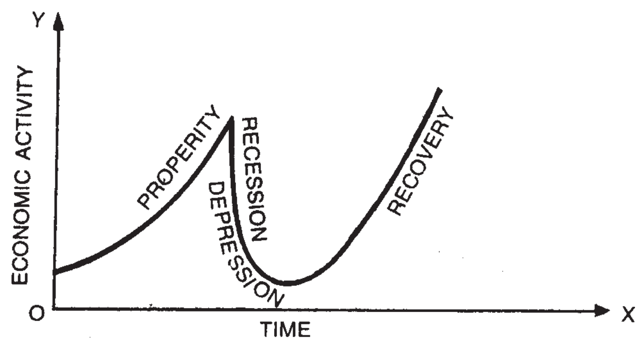


Fig. 23.2: The Phases of a Trade Cycle

Prosperity Phase

Haberler defines prosperity as "a state of affairs in which the real income consumed, real income produced and level of employment are high or rising and there are no idle resources or unemployed workers or very few of either."

As Haberler points out, the characteristic features of prosperity are *(i)* a high level of output and trade, *(ii)* a high level of effective demand; *(iii)* a high level of employment and income; *(iv)* a high marginal efficiency of capital; *(v)* a price inflation; *(vi)* arising structure of interest rate; *(vii)* a large expansion of bank credit; *(viii)* overall business optimism, and *(ix)* tendency of the economy to operate at almost full capacity along its production possibility frontier.

In the expansionary phase of the business cycle, following events occur:

- Income level tends to rise.
- Unemployment rate declines.
- Industrial growth rate accelerates.
- Actual output level exceeds the potential output level.
- Investment increases.
- Investors become optimistic and more enthusiastic.
- Consumption tends to rise.

- Consumer demand for goods and services in the market tend to increase, even at the rising prices.
- Prices tend to rise and provide greater incentives for business expansion.
- Interest rates rise.
- Share price index tends to rise.
- Bullish tendency spreads.
- Foreign portfolio as well as direct investments (FD) capital inflows — tend to increase in an open economy.
- Money supply increases.
- There is a risk of 'over-heating' of the economy.

In Indian context, cyclical variations essentially refer to the growth rates of economic activity and not so to the level of economic activity. That is to say, the growth rates fluctuate even through the Indian economy in growing continuously. [See the *Economics Times*, 2003]*

The prosperity phase comes to an end when the forces favouring expansion become progressively weak. Bottlenecks begin to appear at the peak of prosperity. In fact, the profit-inflation and over-optimism which increase the tempo, carry with them the seeds of self-destruction. In view of high profits and business optimism, entrepreneurs invest more and expand further. But scarcity of resources, particularly, the shortage of raw materials and labour, causes bottlenecks and business calculations go wrong. Hence, entrepreneurs become over-cautious and the peak of prosperity and their over-optimism pave the way to over-pessimism. Thus, prosperity digs its own grave.

Recessionary Phase

When prosperity ends, the recession begins. Recession relates to a turning point rather than a phase. It lasts relatively for a shorter period of time. It marks the point at which the forces that make for contraction finally win over the forces of expansion. Liquidation in the stock market, repayment of bank loans and the decline of prices are its outward symptoms. The stock market is the first to experience the downfall as there will be sudden and violent changes in the prevailing atmosphere. During a recession, businessmen lose confidence. Everyone feels pessimistic about the future profitability of investment. Hence, investment will be drastically curtailed and production of capital goods industries will fall.

During the recessionary phase, the banking system and the people in general try to attain greater liquidity. Therefore, credit sharply contracts. Business expansion stops, orders are cancelled and workers are laid off. There is a general drive to contract the scale of operations, leading to increase in unemployment; thus, income throughout the economy falls. Reduced income causes a decrease in aggregate expenditure and thus, the general demand falls, in turn, prices, profit and business decline.

* Economic Times (2003): Economics for Managers, CD Rom, Times Multimedia India, Mumbai.

In India the Economic Times (ET), in collaboration with the National Council for Applied Economic Research (NCAER), constructs a business confidence index (BCI) for the country, on the basis of a survey of the business sentiment and publishes on a quarterly basis in the *Economic Times*.

Depressionary Phase

During a depression, the most deplorable conditions prevail in the economy. Real income consumed, real income produced and the rate of employment fall or reach subnormal levels due to idle resources and capacity.

As Haberler points out, the characteristic features of a depression are the reverse of prosperity: *(i)* shrinkage in the volume of output, trade and transactions; *(ii)* rise in the level of unemployment; *(iii)* price deflation; *(iv)* fall in the aggregate income of the community (especially wages and profits); *(v)* fall in the structure of interest rates; *(vi)* curtailment in consumption expenditure and reduction in the level of effective demand; *(vii)* collapse of the marginal efficiency of capital and decline in the investment demand function; *(viii)* contraction of bank credit, etc.

In short, a depressionary period is characterised by an overall curtailment of aggregate economic activity and its bottom. Thus, depression and prosperity differ in degree rather than in kind. In the former economic activity is at its trough, while in the latter, economic activity is at its peak.

However, a depression cannot be regarded as a permanent feature of an economy. In fact, the very forces which cause the depression are themselves self-defeating. For during a depression, businessmen postpone replacement of their plant and machinery and consumers postpone the purchase of durable goods. Hence, the need for replacement and the purchase of durable goods gradually accumulate. Hence, after a period of time, there will be a moderate increase in the purchase of durable goods on the consumer's part and replacement of plant and machinery on the part of producers. This will call for an increase in production, in turn leading to an increase in employment, income and aggregate effective demand. Banks will be anxious to expand credit by reducing the rate of interest. Gradually, pessimism vanishes and optimism develops and economic activity once again gathers momentum thus, a stage of recovery sets in.

Recovery Phase

The revival or recovery phase refers to the lower turning point at which an economy undergoes change from depression to prosperity. With an improvement in demand for capital goods, recovery sets in. When the demand for consumption goods rises or when the capital stock increases, the demand for capital goods will rise and new investment will be induced. Such induced investment will cause a rise in employment and income. The increased income in turn will lead to a rise in consumption which will push up the demand further which in turns leads to a rise in prices, profits, further investment, employment and income. Once the expansionary movement starts, this is how it gathers momentum. During the revival period, level of employment output and income slowly and steadily improve. Stock markets become more sensitive during this period. A bullish atmosphere will prevail on the stock exchanges. An increase in stock prices favours expansion and hastens revival. The expectations of the entrepreneurs improve and business optimism leads to the stimulation of development investment. The wave of recovery, once initiated, begins to feed upon itself. Thus, during a recessionary period, the expansionary process will be self-reinforcing and if it is continued for some time, the economy will find itself in a position of rising level income output and employment. When this happens, revival slowly emerges into prosperity and the cycle repeats itself.

A business cycle is a complex phenomenon which embraces the entire economic system. It can scarcely be traced to any single cause. Normally, a business cycle is caused and conditioned by a number of factors, both exogenous and endogenous. A brief review of important trade cycle theories has been attempted in the following sections.

4. ECONOMIC INDICATION

A business cycle is a complex phenomenon which embraces the entire economic system. It can scarcely be traced to any single cause. Normally, a business cycle is caused and conditioned by a number of factors, both exogenous and endogenous. Exogenous forces are those which are external to the economic system, *e.g.*, war, innovation, population movement, territorial development, etc. These are temporary shocks.

Endogenous factors are integral to the economic structure. They are the forces which operate from within the economic system. As such, they include economic variables like the volume of bank credit, liquidity preference behaviour, the price level, interest rate, the elasticity of supply of production factors, marginal propensity to consume, marginal efficiency of capital, etc. These factors are primarily responsible for the periodic wave-like movements — the cycles. (Hamberg, D.: *Business Cycles.)*

Various theories have been expounded by different economists to explain the causes of a trade cycle, the symptoms of which are alternating periods of prosperity and depression. Different explanations have been advanced stressing one or a few factors at a time.

Thus, in order to get a comprehensive idea of such a complex phenomenon, it becomes necessary for us to review certain important explanations provided by eminent trade cycle theorists.

The twentieth century economists, however, became more conscious about the need to study the cyclical fluctuations. Although between 1900 and 1930, a large number of economists studied and explained the business cycles, they kept the business cycle theory outside the framework of general economic theory. The general economic theory continued to operate under assumption of full employment, whereas business cycle theories were propounded to explain why the economy generates fluctuations in employment and output. It was Keynes who in his book *General Theory of Employment, Interest and Money* published in 1936, tried to integrate these two sets of economic doctrines by discarding the assumption of full employment.

Monetary Phenomenon

R.G. Hawtrey describes the trade cycle as a purely monetary phenomenon, in this sense that all changes in the level of economic activity are nothing but reflections of changes in the flow of money.

Thus, he holds firmly the view that the causes of cyclical fluctuations were to be found only in those factors that produce expansions and contractions in the flow of money —

money supply. Hence, the ultimate cause of economic fluctuations lies in the monetary system.

According to Hawtrey, the main factor affecting the flow of money — money supply — is the credit creation by the banking system. To him, changes in income and spending are caused by changes in the volume of bank credit. The real causes of the trade cycle can be traced to variations in effective demand which occur due to changes in bank credit. Therefore, "the trade cycle is a monetary phenomenon, because general demand is itself a monetary phenomenon."

He points out that it is the rate of progress of credit development that determines the extent and duration of the cycle, thus, "when credit movements are accelerated, the period of the cycle is shortened." This implies that if credit facilities do not exist, fluctuation does not occur. So, by controlling credit, one can control fluctuations in the economic activity.

He further maintains that although the rate of progress of cycles may be influenced by non-monetary causes, these factors operate indirectly and through the medium of the credit movement. For example, a non-monetary factor such as optimism in a particular industry can affect activity directly, but it cannot exert a general influence on industry unless optimism is allowed to reflect itself through monetary changes, *i.e.,* through increased borrowing. On these grounds, Hawtrey regarded trade cycle as a purely monetary phenomenon.

The gist of Hawtrey's theory is that the inherent instability in bank credit causes changes in the flow of money which in effect leads to cyclical variations. An economic expansion is caused by the expansion of bank credit and the economic crisis occurs no sooner the credit creation is stopped by the banking system; thus, a contraction of credit leads to a depression.

The Monetary Sequence of a Trade Cycle

Basically, Hawtrey's theory dwells upon the following postulates:

(1) The consumers' income is the aggregate of money income = national income or community's income in general.

(2) The consumers' outlay is the aggregate of money spendings on consumption and investment.

(3) The consumers' total outlay constitutes community's aggregate effective demand for real goods and services. Thus, general demand is a monetary demand.

(4) The wholesalers or traders have strategic position in the economy. They are extremely sensitive in their stock hoarding business to the changes in the rate of interest.

(5) The changes in the flow of money are usually caused by the unstable nature of bank credit. Hence, bank credit has a unique significance in Hawtrey's cyclical model.

According to Hawtrey, changes in business activity are due primarily to variations in effective demand or consumers' outlay. It is the total money income that determines consumers' outlay. The stability of the whole economic system follows from the establishment of monetary equilibrium. Under monetary equilibrium:

(i) consumers' outlay = consumers' income;

(ii) consumption = production;

(iii) cash balances of consumers and traders remain unchanged;

(iv) bank credit flow is steady;

(v) market rate of interest = the profit rate;

(vi) wages (as money costs) and prices on the whole are equal (this means normal profit margin and the normal rate of productive activity); and

(vii) there is no net export or import of gold.

Hawtrey contends that such a monetary equilibrium situation is one of extremely delicate balance, which can be easily dislocated by any number of causes and when disturbed, tends to move into a transitional period of cumulative disequilibrium. He emphasised that primarily it is unstable nature of the credit system in the economy that causes changes in the flow of money and disturbs the monetary equilibrium. In this connection he feels that the discount rate or interest rate exerts a great influence.

The Expansion Phase

A typical expansion phase, according to Hawtrey, might proceed along the following lines.

The expansion phase of the trade cycle is brought about by an increase of credit and lasts so long as the credit expansion goes on. A credit expansion is brought about by banks through the easing of lending conditions along with a reduction in the discount rate, thereby reducing the costs of credit.

By lowering their lending rates, banks stimulate borrowing. Such a reduction in the interest rate is a great stimulus to wholesalers (or traders). According to Hawtrey, traders are in a strategic position as they tend to carry their large stocks primarily with borrowed money. Moreover, traders usually mark their profits as fraction of the value of a large turnover of goods. Hence, a small change in the interest rate affects their profits to a disproportionately large extent. Thus, they are very sensitive to change in the rate of interest.

Traders are induced to increase their stocks — inventories— when the interest rate falls. Hence, they give large order to the producers; the increased orders of traders causes the producers to raise their level of production and employment. This in turn leads to an increase in income and monetary demand. "Thus the whole amount of the funds created by the bank is received as income, whether profits, wages, rents, salaries, or interest, by those engaged in producing the commodities."(Hawtrey, 1970, p. 90) Evidently, the increased production leads to an expansion of consumers income and outlay.

This means increased demand for goods in general, and traders find their stocks diminishing. These result in further orders to producers, a further increase in productive activity, in consumers' income and outlay, and in demand, and a further depletion of stocks. Increased activity means increased demand, and increased demand means increased activity. This leads to a cumulative expansion, set up, fed and propelled by the continuous expansion of bank credit.

Hawtrey further states: "Productive activity cannot grow without limit. As the cumulative process carries one industry after another to the limit of productive capacity, producers begin to quote higher and higher prices." (Hawtrey, 1970, p. 162). Thus, when prices rise, traders have a further incentive to borrow and hold more stocks in view of the rising profits. The rising prices operate in the same way as falling interest rates and the spiral of cumulative expansion is accelerated further. This means that there are three important factors which influence credit expansion by banks. These are: *(i)* the rate of interest charged by the banks; *(ii)* traders' expectations about the price behaviour; and *(iii)* the actual magnitude of their sales. The rate of interest is determined by the banks. Traders' expectations depend on general business conditions and their psychology. Actual magnitude of sales depend on the net effect of the first two upon the consumers' outlay. In short, "Optimism encourages borrowing, borrowing accelerates sales, and sales accelerate optimism." (Hawtrey, 1970, p. 347)

Financial Crisis (Recession)

According to Hawtrey, prosperity comes to an end when credit expansion ends.

As banks go on increasing credit, their cash funds deplete and they are forced to curtail credit and raise interest rates in order to discourage the demand for new loans. Due to the shortage of gold reserves, the central bank — as lender of the last resort — has to set a limit on the accommodation to commercial banks. Eventually, the central bank will start contracting credit by raising the bank rate. Thus, the drain of cash from the banking system ultimately results in an acute shortage of bank 'reserve', so that the banks not only refuse to lend any more, but actually are compelled to contract. It is interesting to note that in Hawtrey's view a drain upon the cash reserves of the banking system is caused by the public. For a rise in consumers' income generally would lead to an increase in the cash holding (unspent margins) by the public. This happens when the wages rise and consequently wage-earners' demand for cash rises. Thus, what ultimately limits the expansion of credit is the absorption of money in circulation, mainly by wage earning classes.

Moreover, under the international gold standard, if expansion is taking place rapidly in a country, it will lose gold to other countries due to excessive imports. Eventually, the central bank will have to adopt a restrictive policy.

Contraction Phase (Depression)

The recessionary phase merges with depression due to the growing shortages of credit. The contraction of credit exerts a deflationary pressure on prices and profits and on consumers' income and outlay. High rare of interest charged by banks discourages traders to hold large stocks and their demand for credit decreases. Prices start falling, profits also drop. Accordingly, traders further reduce stocks and stop ordering goods. Producers in turn will curtail output and employment. The income of the factors of production will decline. When consumers' income and outlay decrease, effective demand decreases, stocks and output decrease, prices fall, profits fall and so on-a cumulative downswing develops.

In a nutshell, it is the contraction of effective demand reflected in reduced outlay by consumers and increased holding of cash balances in view of a large credit curb that causes a vicious circle of deflation leading to severe depression.

Recovery

During a depression, as traders experience slackening in the demand for their goods, they will try to dispose of goods at whatever low price they get and repay bank's loans. When loans are liquidated, money gradually flows from circulation into the reserves of bank. As depression continues, banks will have more and more idle funds. The credit creating capacity of banks increases and in order to stimulate borrowing, banks lower the interest rate. Traders will now be stimulated to increase their inventories and the whole process of expansion will be once again set in motion. The central bank now helps by lowering the bank rate and adopt open market purchases of securities so that cash is pumped into banks improving their lendable resources. And when the purchase of securities is carried far enough, the new money will find an outlet. Hawtrey believes that the ordinary measures of monetary instruments such as bank rate policy and open market operations may help in bringing about a revival.

In Hawtrey's view, this cyclical behaviour is fundamentally a monetary phenomenon. He does not deny that non-monetary causes (such as invention, discovery, bumper crops, etc.) may affect productive activity but he feels that their effects will be synchronised only with monetary effects. Non-monetary causes have no periodicity; the periodicity that appears in trade cycles is due to monetary effects, and it can be surmounted by an appropriate banking policy. According to Hawtrey, it is only the inherent instability of bank credit that causes fluctuations in business and turn them into rhythmic changes. Abolish the instability of bank credit by an appropriate bank policy and the trade cycles will disappear.

A Critical Appraisal

No doubt, Hawtrey's theory is perfectly logical in its basic concept of a self-generating cycle of cumulative process of expansion and contraction. One of the most striking features of Hawtrey's theory is his explanation of the period of a cycle, *i.e.,* his explanation of the turning points of expansion and contraction.

Hawtrey, in his analysis, however, exaggerates the significance of wholesalers, ignoring the capital goods industries and all other sectors of the economy.

Some critics have pointed out that monetary inflation and deflation are not causes, as Hawtrey expounds, but the result of trade cycles. In fact, credit expansion follows business expansion, and once it takes place, it would accelerate business activity. So monetary deflation is preceded by business contraction.

The role of bank credit in the economic system is over-emphasised by Hawtrey. It is true that finance is the backbone of business and bank credit plays an important role in it, but it does not mean that banks are always the leaders of economic activity.

Hawtrey asserts that changes in the flow of money are the sole and adequate cause of economic fluctuations. But, a trade cycle, being a complex phenomenon, cannot be attributed to a single cause. There are various non-monetary endogenous and exogenous factors, besides monetary factors which influence economic activity. Thus, it is incorrect to say that trade cycles are a purely monetary phenomenon.

Monetary Over-investment

The gist of the monetary over-investment theory is that the working of the monetary system brings about over-investment in the economy, causing crises and depressions. The best known exponent of this theory is the Austrian economist, F.A. Hayek. Broadly speaking, Hayek's theory centres on the analysis of equilibrium between production of capital goods and consumption goods. When the structure of production is in equilibrium, production of capital goods and consumption goods takes place in exactly the same proportion as the distribution of monetary demand by consumers between consumption and saving. It implies that the productive resources are distributed between production of capital goods and consumption goods in the same proportion as the saving and expenditure on consumption goods. According to Hayek, cyclical fluctuations are the result of the shortening and lengthening of the process of production that are brought about by an expansion in money supply, causing the market rate of interest to fall below the natural or equilibrium rate of interest. A fall in interest rate leads to changes in the structure of production.

Thus, in Hayek's analysis, the failure of the banking system to keep the supply of money neutral causes trade cycles. And, therefore, the correct remedy to end trade cycles is to have a "neutral money policy". To achieve this, Hayek suggests that the money supply be kept constant under normal conditions and necessary changes be made only to offset changes in the velocity of money circulation or to adjust monetary supply to the changes in transactions demand for money.

Hayek's theory is based on the assumption that the full utilisation of investment in the capital goods sector would reduce the resources used in the production of consumer goods. But in a situation in which resources are primarily utilised, investment and consumption are complementary rather than competitive. Thus, the fundamental assumption of the theory is incorrect as resources are never fully employed.

Moreover, Hayek's theory wrongly assumes that the increasing demand for consumer goods causes a shortening of the process of production and hence a decline in the capital goods investment. He fails to see that increase in consumption demand may mean a higher marginal efficiency of capital which in turn will stimulate investment rather than retard it. The theory does not, however, explain the major phases of cyclical process, particularly the contraction phase. Therefore, Hayek's theory, like Hawtrey's over-emphasises the monetary cause of disturbances and underestimates the effects of other non-monetary factors which are equally responsible for cyclical fluctuations.

Non-monetary Over-investment

To some extent, this theory like Hayek's also postulates that an excessive amount of investment causes a boom, and over-investment ultimately leads to a depression. Unlike Hayek, however, the exponents of this theory do not lay too much emphasis on the role of monetary factors. They regard the monetary system as a part of the response mechanism in the process of a trade cycle, but not as a causative factor. According to this theory, trade cycles are caused by real capital (investment goods) rather than money.

Under-consumption (or Over-saving)

According to another group of economists like Malthus, Sismondi, Marx and Hobson, the root cause of a trade cycle is over-saving or under-consumption which is due to the existing unequal distribution of wealth in the community. Among the under-consumption theorists, Hobson's analysis of the trade cycle in noteworthy. The central idea of Hobson's theory is that during the course of economic prosperity, profiteers share a larger part of increased income than the wage-earners. Thus, relatively, inequality of income in the community increases. The large-income recipients, however, will consume only a portion of their income and save the rest. Thus, saving in the economy will increase. Hobson explains that the undue exercise of the habit of saving would not enrich the community but would impoverish it, because such large amount of saving gives rise to a greater volume of capital formation which in turn produces larger quantities of consumption goods. But, in view of the increasing inequality of income and rising saving, the amount of consumption taking place in the economy will not be sufficient to lift all the goods brought to the market, and a decline sets in. Thus, a boom cannot last long because of the limitations of the community's power of consumption on account of inequalities of income. In short, the originating cause of depression is under-consumption.

The Psychological Factor

Certain economists like J.S. Mill, Beveridge and Pigou have expounded a theory of trade cycles which emphasises the importance of psychological factors. Pigou presents a complete explanation of a trade cycle by combining psychological factors with economic influences. In his view the core of industrial fluctuations (*i.e.,* trade cycles) may be found in the waves of "over-optimism" and "over-pessimism" in the business community leading to the tendency of the heavy goods industries to expand and contract by a greater amount in relation to the consumer goods industries. According to Pigou, the psychological errors of optimism and pessimism give rise to a trend of business fluctuations in a pervasive manner. Business optimism and pessimism are interacting forces, for one the business community realises that it has made an error of optimism, it then tries to correct it by commiting errors of pessimism. Eventually, thus, each phase of the cycle generates, in turn, a state of psychology which sets in motion the forces which cause a reversal of the prevailing situation, which again in the process will cause another reversal and so on. Consequently, a wavelike movement in economic activity occurs.

The Innovation Theory

The innovation theory of a trade cycle is propounded by J.A. Schumpeter. He regards innovations as the originating cause of trade cycles. The term "innovation" should not be confused with inventions. Inventions, in ordinary parlance, are discoveries of scientific novelties. Innovation is the application of such inventions to actual production (*i.e.,* exploiting them). It is innovations that are subject to cyclical fluctuations, not inventions. Innovation, thus, in economics means the commercial application of inventions like new techniques of production, new methods of organisation, novel products, etc.

Schumpeter regards trade cycles as the offspring of economic progress in a capitalist society. Cyclical fluctuations are inherent in the economic process of industrial production.

When there are internal changes taking place on account of innovation, the development process begins. Schumpeter classifies innovation into five categories as follows:

(i) Introduction of new type of goods.

(ii) Introduction of new methods of production.

(iii) Opening of new markets.

(iv) Discovering of new sources of raw materials.

(v) Change in the organisation of an industry, like the creation of a monopoly, trust, or cartel or breaking up of a monopoly, cartel, etc.

Innovation, however, does not arise spontaneously. It must be actively promoted by some agency in the economic system. Such an agent, according to Schumpeter, is an "entrepreneur", entrepreneurs are innovators.

To carry out his innovative function, the entrepreneur needs two things. First, he must have the technical knowledge to produce new products or new services. Second, since the introduction of innovation presupposes the diversion of the means of production from the existing to new channels, the entrepreneur must also possess the power of disposal over the factors of production. The necessary command over the productive factor is provided by the monetary factor in the form of credit. The entrepreneur secures funds for his project not from saving out of his own income but from the borrowings from the bank or financial institution.

Thus, money capital and bank credit play a significant role in the Schumpeterian theory. According to Schumpeter, credit is important only insofar as the innovation is concerned in the context of a progressing economy, and only if the innovator requires credit to carry on his function, *i.e.,* innovative activity. In the absence of innovation, in a circular flow of money economy, where Say's Law of Market operates in toto, no credit is required.

The strategic factors in the Schumpeterian theory are, thus, *(i)* innovations and *(ii)* entrepreneurs. Innovations brought about by entrepreneurs disturb the circular flow of stationary economy, so the development is a dynamic, discontinuous, cyclical process. Schumpeter attributes the swarm-like appearance of entrepreneurs to the cyclical nature of economic progress. In his view, the cyclical upswing starts when entrepreneurs start investing in the commercial applications of their innovative ideas. This may start gradually when a few leading entrepreneurs with drive come into the field. But once these few innovators have demonstrated the profitability of their ventures, others will imitate and follow suit. With a few leaders smoothening the path, the original innovators are soon followed by a swarm-like appearance of entrepreneurial activity. Schumpeter assumes that innovating activity is helped by the banking systems' readiness to give credit. The "swarm-like" appearance of entrepreneurial activity naturally raises the volume of investment which in turn raises income, employment and output. Thus, the prosperity phase gathers momentum and the economy moves up, away from the neighbourhood of equilibrium.

In short, the clustering of innovations creates a discontinuous disturbance in the economy. It will lead to an overwhelming outflow of new products when all these innovations are beginning to have their full effect. When the market is flooded with new products, their prices fall and profit margins decline. On the other hand, the credit-financed innovations bid up the factor prices and so the costs of production rise.

New innovations will now cease. Hence, prosperity will end and recession begins. At this stage, credit deflation also ensues with the persistent tendency of new firms to utilise the sales receipts of their new products to repay their bank loans. This tends to put the old firms in a difficult position of readjustment and adaptation. For, when credit deflation sets in, the flow of money stream into the economy will slacken hence the demand for revenues of the old firms, making their position still more awkward; so the recession is aggravated further. Schumpeter describes this process as "auto-deflation" implying thereby that commercial banks play only a passive role in the process.

The recession in the economic system is caused by the stoppage of innovations and the slackening of entrepreneurial activity. He stresses that innovations halt not because there is lack of inventions, but because the economic environmnet is not favourable for further innovation. When there is overproduction in the prosperity period, general prices decline, reducing the profit margins. The disappearance of profit margins of new investment makes innovations financially unattractive.

Further, during an economic crisis, expectations are dampened under conditions of uncertainty. Since the clustering of innovations in the prosperity period had led the economy to a very disequilibrated state, all values and estimates in the system change now. This makes the accurate planning of new investments extremely difficult. So, the economic situation so developed acts as a deterrent to the planning and formation of new enterprises.

However, Schumpeter's theory of trade cycles is imperfect. It suffers from many drawbacks such as:

(*i*) His theory is highly institutional: it requires the existence of a typical institutional framework of society for its validity. He considers entrepreneurs as mere innovators. Further, he overemphasises the role of the entrepreneur, thereby creating a very strong personal element in the path of industrial progress.

(*ii*) Schumpeter artributes trade cycles to the phenomenon of innovations only. But, the trade cycle being a complex phenomenon cannot be attributed to a single factor alone.

(*iii*) Schumpeter unrealistically assumes that innovations are financed solely by means of bank credit. They must be financed out of voluntary savings. Moreover, major innovations generally require long-term credit, whereas the banking system usually grants only short-term loans.

Marginal Efficiency of Capital

Keynes never enunciated an exclusive trade cycle theory. Nevertheless, he made a significant contribution to it. According to him, a trade cycle occurs due to the fluctuations in the rate of changes in the marginal efficiency of capital. In his own words, "The trade cycle is best regarded as being occasioned by a cyclical change in the marginal efficiency of capital, though complicated and often aggravated by associated changes in the other significant short-period variables of the economic system."

A broad idea of Keynes's theory may be visualised in the following lines: the expansion phase of the cycle is occasioned by a high value of marginal efficiency of capital, a rapid increase in the rate of investment would take place. Thus, employment and income would also increase. Through the multiplier effect, there would be multiple increase in income in relation to each increment in new investment outlay. Thus, a cumulative rising trend occurs during the expansionary phase. In this period, businessmen are optimistic about the future, expecting higher and higher profits. Therefore, business activity progressively expands. The process of cumulative economic expansion, thus, goes on and on till the peak level of boom is reached.

As expansion enters the boom stage, certain economic forces come into operation which tend to lower the marginal efficiency of capital due to two reasons. First, as more built up in the capital goods investment occurs, the supply prices of the capital assets increase. This happens because the cost of production of new capital assets increases as shortages and bottlenecks of materials and labour develop during the course of expansion. Second, the yields or returns on the capital assets tend to fall below the expectation level as more and more capital goods are built up (which lead to increased competition and falling prices). Both these factors will combine to depress the marginal efficiency of capital. Businessmen are always very sensitive to a decline in the marginal efficiency of capital and will adjust their activities accordingly — hence, a decline in investment.

Thus, according to Keynes, the collapse of the marginal efficiency of capital is a predominant cause of the crisis. The collapse of the marginal efficiency of capital being sudden, the change from an upward to a downward tendency takes place suddenly (the down-turn, *i.e.,* a crisis, is always, therefore, sharp), and in this respect, it differs from the lower turning-point (revival) which occurs imperceptible (the up-turn is, thus, rather flatter).

Just as contraction is due to the collapse of the marginal efficiency of capital, so also a revival takes place only when the marginal efficiency of capital gradually recovers from its low level. In contrast to the fall in the marginal efficiency of capital, which is sudden, its recovery takes time. The time necessary for recovery of the marginal efficiency of capital is determined by the durability of capital assets and the carrying costs of surplus stocks which largely influence the period of their liquidation.

Prof. Hansen summarises in a scholarly fashion the essentials of Keynes's discussion of a trade cycle as follows:

(1) Fluctuation in the rate of investment constitute a cycle.

(2) Fluctuations in the marginal efficiency of capital cause fluctuations in the rate of investment. Thus, the primary factor responsible for trade cycle is the marginal efficiency of capital.

(3) Fluctuations in the rate of interest, though having a significant role to play usually reinforce and supplement the primary factors (*i.e.,* changes in the marginal efficiency of capital).

(4) Fluctuations in the marginal efficiency of capital are mainly due to: *(i)* changes in the prospective yield of capital assets, and *(ii)* changes in the supply price.

(5) At the peak of the boom, the prospective yields decline due to growing abundance (and, therefore, lower marginal productivity) of capital goods. This being an objective fact, it in turn induces a wave of pessimistic expectations (a psychological factor).

(6) In the absence of fiscal policy, a variable rate of interest may be useful as a means to stabilise the cycle.

Keynes, however, preferred the maintenance of a low rate of interest in conjunction with other more radical measures like fiscal policy to regularise the cycle.

The real contribution of Keynes's theory of employment to the trade cycle analysis lies in the explanation of turning points of the cycle. Prior to his general theory, an explanation of the lower and upper turning points was perhaps the most difficult task of the trade cycle analysis. Most trade cycle theories usually conceived of some limiting factors like bottlenecks, limits to credit expansion, etc., as an explanation for the turning points of the cycle. After Keynes's theory, however, such an explanation lost its importance. Keynes provided the explanation of the turning points by introducing the concept of consumption function, which indicates that the marginal propensity to consume being less than unity, the expenditure on consumption goods does not increase in proportion to the increase in income. This automatically sets a limit to the expansion of the output of consumption goods and may lead to over-production during the boom period. This fact alone reacts upon the marginal efficiency of capital which tends to decline at the peak of the boom.

However, Keynes's theory of trade cycles is criticised on many grounds. It has been said that his theory fails to provide a proper explanation of the phenomenon; it also does not explain why the change in the rate of interest occurs in such a way as to produce the observed variations in the rate of investment. Moreover, in Keynes's opinion, the marginal efficiency of capital depends on the psychology of the entrepreneurs, and psychological shifts cause fluctuations in the marginal efficiency of capital. But Keynes neglected the real factors underlying these psychological shifts in explaining the crisis Prof. Hazlitt, however, criticises Keynes for attributing the down-turn to a "sudden collapse in the marginal efficiency of capital." According to Hazlitt, the term "marginal efficiency of capital" is very vague and ambiguous.

Multiplier and Acceleration Interaction

Prof. Hicks tries to provide a more adequate explanation of trade cycles by combining the multiplier and acceleration principles. According to him, "the theory of acceleration and the theory of multiplier are the two sides of the theory of fluctuations, just as the theory of demand and the theory of supply are the two sides of the theory of value."

In the Hicksian model, the following concepts play an important role.

(1) The warranted rate of growth.

(2) Induced and autonomous investment.

(3) The multiplier and the accelerator.

The warranted rate of growth is defined as the rate of growth which will sustain itself in congruity with the equilibrium of saving and investment. Thus, when real investment in an economy is in line with real saving, the economy is said to be growing at a warranted rate of growth. According to Hicks, the interaction of the multiplier and the accelerator causes economic flucuations around the warranted rate of growth.

Hicks considers two types of investments *viz.*, autonomous and induced. Autonomous investment is that which is independent of changes in the level of output (income). That is to say, it is not a function of the changes in the level of output. Thus, autonomous investment is not related to the growth of the economy. According to Hicks, "public investment, investment which occurs in direct response to inventions, and much of the 'long-range' investment which is only expected to pay for itself over a long-period — all of these can be regarded as autonomous investment." He assumes that investment increases at a regular rate so that it remains in progressive equilibrium if it were not disturbed by extraneous forces.

On the other hand, induced investment is that which depends on changes in the level of output (income). Thus, it is a function of the economy's growth rate. This induced investment is central to Hicks's theory of cycles, for the operation of the acceleration principle, a key factor depends on it. An increase in output (consequent upon a permanent increase in demand) from one period to the next causes a "hump" in investment, *i.e.,* expansion of capital stock (induced investment) which, then, interacts through the multiplier. This is Hick's accelerator.

According to Hicks, an expansionary phase starts in the economy when there is an autonomous increase in investment due to exogenous factors like technological improvements, territorial developments or population changes. This new autonomous investment will generate an enlarged amount of income, once again under the multiplier effect. Likewise, a super cumulative process of income generation and investment expansion based on the "interaction of the multiplier and the accelerator" will be encountered in a free economy. It is interesting to note that economists use the term "leverage effect" to denote the full enlarged rise in income that occurs as a result of autonomous investment, and the combined multiplier-accelerator leverage is termed as the "super-multiplier".

According to Hicks, the process of interaction of the multiplier and accelerator will continue to operate till the expansion of economic activity (measured in terms of income and employment) reaches the "full employment ceiling point" of the economy. In other words, the upper limit to the expansion of income and employment is determined by the level of full employment in the economy. In a dynamic economy, however, there will be an expanding or rising ceiling and, therefore, it takes much longer time than in a static society to reach the ceiling point; but once the ceiling point is reached, the cycle will undergo a downward movement.

After the upper turning point has been reached, a surplus capacity appears, and therefore, investment declines. With each decline in investment, due to the backward operation of the multiplier, income and consumption expenditure fall further. In Hicks's view, there is a marked asymmetry in one respect between the upswing that takes place after the lower turning point and the downswing that follows the upper turning point. During the upswing, an increase in consumption induces an increase in additional investment in capital goods so that there is a positive acceleration effect operating together with the multiplier effect. On the other hand, during a contractionary phase, the accelerator effect becomes inoperative because investment cannot fall below zero and disinvestment cannot exceed the replacement requirements. Disinvestment in fixed capital can only take place only by a cessation of gross investment, thus, the adjustment of fixed capital to a decline in the level of output and income takes place only by a slow process of wearing out, and hence, must take considerable time. Once this condition is reached, a further fall in output can induce no further disinvestment in fixed capital, at least not immediately. Thus, during the downswing, the extent to which the decline in investment can be carried is not determined according to the accelerator relation (as it is determined during the upswing) but by the magnitude of excess capacity. During the downswing, the place of the accelerator is taken by something which behaves quite differently — something which can best be treated as a downward adjustment in autonomous investment.

Hicks's view that while the upswing is the result of the combined action of multiplier and accelerator, the downswing is largely a product of the multiplier alone, the accelerator remaining in operative for the most part. Hicks describes it as a "mere ghost" of what it was in the boom. He gives two reasons for this:

(1) The reduction of fixed capital can take place only by the process of its wearing out. Thus, it is only the rate of depreciation of capital goods and not the accelerator ratio that can determine the reduction of the capital assets.

(2) The working capital may also be prevented from declining in the proportion suggested by the acceleration coefficient. Businessmen may hold back their stocks rather than sell them at a loss.

In Hicks's opinion, since the induced investment tends to be negative during a depression, the lower turning point or recovery is initiated solely by the operation of the autonomous investment.

During a depressionary phase, there is some production, but much below the economy's production possibility frontier in terms of the existing capital stock. However, during the process of production, equipment tends to depreciate and maintain the plant capacity, the worn out capital assets have to be replaced. This is provided for out of existing surplus plant capacity. Therefore, at the end of each time period, the excess or surplus plant capacity is less than what it was at the beginning of this period. Ultimately, all the excess plant capacity will be used up. And, provision for further replacement of worn-out capital has to be made by fresh investment. The need to replace the worn-out equipment acts as a stimulant to the economy during a depression. During a depression, thus, a stage is reached when the amount of disinvestment turns out to be less than the amount of autonomous investment so that there will be an increase in the net investment expenditure. And once there is an increase in net investment, income, output and expenditure tend to increase in a multiplier fashion with which the accelerator also will join hands. Thus, the interaction to the multiplier and accelerator will lead to a cumulative expansion in the economy. And the cycle will move on the path of prosperity.

In Hicks's opinion, the analysis of the upper turning point of a cycle is not so easy. However, he provides an explanation of the upper turning point by adopting the concept of natural rate of growth as developed by Prof. Harrod. According to Harrod, the natural rate of growth is one which is permitted under the constraint of the increase in population, capital accumulation, development of technology and the given work-leisure preference pattern. This is the production ceiling beyond which the economy cannot afford to expand.

According to Hicks, cycles have weak endings and strong endings. Cycles with weak endings are called free cycles and cycles with strong endings are called constrained cycles. A free cycle with a weak ending takes place when the interaction between the multiplier and the accelerator is not very strong so that economy moves along the path of production ceiling set by the natural rate of growth. In such a cycle, the upper turning point occurs. A constrained cycle, a cycle with a strong ending, takes place when the interaction between the multiplier and the accelerator is strong enough to lead the economy along the path of expansion until the restraint determined by the production ceiling is reached. The course of the expansion phase is constrained by the production ceiling set by the natural rate of growth. No further expansion beyond this ceiling is possible. And when the production ceiling is reached, the expanding force of the multiplier and the accelerator becomes inadequate for the expansion to continue any longer; the most that the expansion path can do is to creep along to the ceiling. But Hicks opines that the economy cannot do so for more than a very limited time, because, "when the path has countered the ceiling, it must (after a little while) bounce off from it, and begin to move in a downward direction" According to Hicks, this downward movement is inevitable because initial burst of autonomous investment is supposed to be short-lived at this point, the upper turning point is finally and fully reached.

In spite of its various merits, the Hicksian theory of trade cycle suffers from the following weaknesses. Its fundamental shortcoming is that Hicks assumes a fixed value of the multiplier during the fixed phases of the cycles. Here he seems to follow Keynes blindly, regarding the stable consumption function. Empirical studies of modern economists, however, reveal that the marginal propensity to consume is not constant in relation to the cyclical changes in income. As the economy passes from one cyclical phase to another, the multiplier changes.

Kaldor points out that the vulnerable point of the Hicksian theory is the use of the crude and misleading acceleration principle. This principle assumes that investment generated by a change in output is some coefficient of the change of output that is independent of the absolute size of the change. In reality, however, the rate of expansion of firms conforms to their financial resources, and they cannot take advantage of the large investment opportunities during the prosperity phase as assumed by Hicks. The Hicksian explanation of the phenomenon of trade cycles was highly mechanical and in the real world, movements do not take place so mechanically as has been depicted by Hicks. Therefore, Hicks's theory is regarded as inadequate as it fails to stress the psychological forces arising from future uncertainty and expectations which play an important part in the dynamic capitalist economy.

It follows that opinions differ widely about the cause of cycles. According to a large and influential school of thought, trade cycles are mainly due to unwarranted credit expansion. A trade cycle is thus regarded solely as a monetary phenomenon. On the other hand, a majority of economists give various non-monetary, rather than monetary, factors as the real cause of trade cycles. Some like Schumpeter assert that fluctuations in innovative activity are the main causes of cycles. Some stress on psychological factors like waves of optimism and pessimism which cause oscillations in business activity. Some attribute cycles to over-investment. To some others, it is due to over-saving; to others it is due to lack of savings. Some opine that it is the mischief of the varying rates of interest, and some to the varying rate of profits. Economists like Keynes explain that it is due to fluctuations in the marginal efficiency of capital, while economists like Hicks and Samuelson regard it as being due to interactions of the multiplier and the accelerator. However, a large majority of economists are agreed upon the fact that the changes in investment are the most important of the factors causing trade cycles.

In fact, however, modern economists tend to describe the trade cycle as a cycle of investment activity. The consumption function being regarded more or less as a stable phenomenon in the short run, the most variable factor in the economy is investment, which is fluctuating and volatile to a degree, causing cyclical variation. Thus, variations in investment together with variations in induced consumption are the sources of a trade cycle.

Many Economists have agreed upon this point. But as to why fluctuations occur in the investment activity is again a controversial point. Various explanations have been advanced on this point. To some economists, it is because of an excessive tendency to save, while to some others, it is due to bursts of invention; some, on the other hand, regard it as phenomenon of excessive accretion to equipment during the period of gestation. Some call it the result of increased profits in a period of rising prices. Economists like Hicks consider it the effect of the accelerator and the multiplier and the interaction of both, while Keynes and Hansen regard it as a consequence of fluctuations in the marginal efficiency of capital. Haberler, however, suggests that although there is no common agreement on the determinants of the upper and lower turning points of a cycle, there seems to be considerable harmony in the various operations and explanations about the nature of cumulative process of expansion and contraction.

We may conclude that trade cycles being a complex phenomenon are caused and conditioned by various factors — monetary, non-monetary, exogenous and endogenous — and it is not easy to attribute it to any one single factor. Different cycles at different times are caused by different factors. Every cycle in the economic history of a country is to be analysed individually. Thus, we cannot draw generalisations from a particular factor as the fundamental cause of trade cycles. Thus, the trade cycle may be regarded as an unsolved riddle.

5. ADVERTISING BUDGET PRODUCT POLICY AND BUSINESS CYCLES — A MANAGERIAL INSIGHT

An understanding of cyclical trends in the economy is useful for the managers in deciding the course of advertising expenses, time to time.

1. During recessionary situation, the firms need to increase advertising expenditure for inducing the buyers to spend more on articles of comforts and luxuries that have high income elasticity of demand.
2. During property period the firms need to increase advertising expenditure on those goods which have high advertising elasticity, so that sales increase and business profits multiply. Advertising expenditure helps in manipulating demand in favour of the company's product. In oligopoly market or even under monopolistic competition, it works. Further, an increasing scale of advertising during good business period, helps in achieving cost economy too.

3. The firm can launch value-for-money brands products during slump period. This is because under tight money situation, the consumer would appreciate and welcome reasonably priced utility oriented new products.

6. ECONOMIC INDICATION AND FORECASTING FOR BUSINESS

For the successful and risk-managed business, the manager should understand the cyclical behaviour – phases and magnitudes of trade cycles in the markets and global economy.

A prosperity phase indicate the period of business expansion. It should be properly viewed to adopt expanding business planning for growth.

When crisis occurs, in the economic downturn, appropriate measures should be taken to minimise the losses of the firm.

The manager must watch and look for the micro benefits from the macro measures of the government stimulus policy and programme.

A business forecasting is to be envisaged for the growth and control of the business in the light of the business cycles occurring in to the domestic and global markets.

Waves of business optimism and pessimism should be clearly understood on the road map of the economic path and the course of business.

Project management and inventory management in the course of business should be implemented in light of cyclical trends and associated business forecasting.

During recession, the firm has to remain patient and bearish in its approach when there is a wave business pessimism, but should not go to the extreme of business shut-down condition. Bear the losses and continue with optimistic view of betterment in future and take the advantage when the opportunities are emerging. Be bullish at the bottom of bearish tendency during recession. Be courageous. Be rational rather than remaining emotional when there is a bad business situation. Find out the ways to improve. Be creative. Be innovative. Be positive.

Often stock prices and exchange market indices are taken to judge the economic situation and business prospects. But, it is equally true that wise and timely macro-economic policies of the government can rescue the business. Therefore, business manager has to understand the implications of macro policies – such as monetary policy, interest rates, fiscal policy – tax-cut and government expenditure, debt scenario and budget deficits – on the business behaviour along with business forecasting.

Business forecasting based on historical data and past experience is a ex-post phenomenon, whereas macro policies are ex-ante in approach. An understanding of both with a business policy-mix would be a paying proposition.

To Decision-making

- Market economy is inherently unstable. It is characterised with cyclical variations.
- A business cycle contains business expansion and business contraction.

- Each business cycle is a historical entity by itself.
- Economic crisis refers to sudden end of the peak of prosperity. It is followed by business downturn.
- A firm's advertising budget should be co-ordinated with cyclical trends.

MODEL QUESTIONS

1. What is a trade cycle? Describe the various phases of a trade cycle.
2. What are business cycles? Explain how they are caused?
3. Why cyclical fluctuations occur in income and price?
4. Discuss the view that the business cycle is a purely monetary phenomenon.
5. Examine the role played by:

   (a) Innovation,

   (b) Change in investment,

   (c) Money in a trade cycle.
6. Critically examine Keynes's explanation of the trade cycles.
7. State and critically discuss Hicks's theory of trade cycles.

❐ ❐ ❐

Input-output Analysis

24

CHAPTER

1. INTRODUCTION

Modern economic activities are interdependent. Economic system as such may be viewed as a set of industries having mutual inter-relationship. The relationship exists in the buying process of some industries as input, the output of some other industries and selling their output to other industries in the framework of economic organisation.

Let us consider a very simple economy as our model, having only two industries: “manufacturing” and “agriculture.” These two industries sell a portion of their products to households and a portion to one another as raw material. For instance, “agriculture” may sell fruits directly to consumers, but also sell them to “manufacturing” for jam making. In the first case, fruits constitute part of what is called “final output.” In the second case, the “output” cannot be called “final” because it is used as “input” of “manufacturing” contributing to the manufacture of jam which is a “final output” of the manufacturing industry. Similarly, “manufacturing” sector may sell D.D.T. and other insecticides to households for killing bed-bugs but also supply insecticides to “agriculture” for pest and insect control in which D.D.T. and other insecticides serve as “input.” The technique, which enables us to capture detailed picture of such interdependent economic activities is known as “inter-industry” or “Input-output” analysis.

Prof. W.W. Leontief was a pioneer in the field of input-output analysis. He has devised the matrix form of representation for analysing the complicated web of inter-industry relation or dependence. Input-output analysis, in fact, analyses the interdependence of the economic organisation. It exposes the pattern of movements of intermediary goods between various industries.

The main objects of input-output analysis are:

- **Comprehension.** To have a complete comprehensive and concise account of what is happening in the economy.
- **Reflecting the nature of interdependence.** To know inter-industry output relationship. This would enable the planners in deciding which sector is strategic for the economy how much is to be allocated in this and other sectors. In particular, the input-output table may be used to determine the requirements of capital, skilled labour, foreign exchange, fuel, power and the other factors for the whole of any given plan or for any particularproject within the plan.
- **Testing device.** Moreover, input-output analysis is of great help in testing the internal consistency of a programme or plan with a view to locate and remove bottlenecks.
- **Prediction.** To predict the gross output needed in the various sectors of economic activities in order to achieve an objective like say maximum profit, maximum growth rate, optimal level of employment, maximum savings, etc.
- **Tool of analysis.** As a tool of economic analysis it provides a deep insight in preparing economic policies — for economic forecasting in developed countries and for economic planning or programming in developing nations.

The main sources of information which may be used in construction of input-output tables consist of the accounts of business activities. This information is obtained through the census of production. Additional information may also be received from the government budgets and other records.

2. ASSUMPTIONS IN INPUT-OUTPUT ANALYSIS

For analytical simplification, a number of assumptions are usually made in input-output analysis. The important ones are as follows:

- There is a single primary input.
- A single homogeneous product is turned out by each industry. Here, a single product may sometimes, be taken as a composite product made of several items in fixed proportions.
- A typical industry in the system sells inputs to other industries, to consumers, government and foreign countries. Obviously, the sales to consumers, government and exports do not go as input. These are just sales. However, the final demand is supposed to be from consumers only.
- Input-output relations are always linear. Hence, direct proportionality is assumed.
- Technical co-efficients in the production process being constant, there is constant returns to scale.
- A firm achieves equilibrium when its total input = total output. Inventories will either be accumulated or exhausted when input is more than output or otherwise.

- The nature of input-output relation is purely technical. It does not reflect any market equilibrium conditions.
- The input-output analysis is ex-post static analysis of the data obtained.
- Inter-industry transactions are measured in terms of money rather than physical units. This is simply because money is a convenient and universal unit used for measuring and totalling inputs and outputs of different industries.

3. THE TRANSACTION MATRIX

An input-output analysis is based upon the construction of the transaction matrix. Matrix refers to a set of row and columns. A transaction matrix represents, usually in monetary or sometimes in quantitative terms, all the transactions of an economic system. These economic transactions are visualised as the web of inter-industry transactions in the form of output of each industry as distributed among: *(a)* the invertor's sector to different industries as intermediary goods or raw materials and *(b)* the final demand sector, in which the demand for its produce is directly from consumers intended for consumption only.

According to Leontieff, an input-output matrix may be set up either in the open or closed form. In the closed system the final demand is not considered separately. For transactions of household sector are taken into consideration, as an industry. The open system is preferred by many. This is because under this along with other sectors or industries we have an additional sector with additional input which is not an output of any other industry. It is a primary input. Labour is such an additional input. Further, the final demand is separately treated in an open system.

Below a single open Leontieff matrix has been illustrated. We assume only two sectors: *(i)* agriculture, and *(ii)* industry and the consumers to represent final demand.

Table 24.1: Matrix I

(Rs. in billion)

Output	*Inter-industry*		*Final Demand*	*Total Output*
Input	*Agriculture*	*Industry*	*Sector (Consumers)*	*(Sales)*
Agriculture	4	4	2	10
Industry	4	8	8	20
Consumers' Primary Input	2	8	—	10
Total Input (Cost)	10	20	10	40

It can be seen that, each row in this table presents the balancing equation of the output of an industry from the sales point of view and each column indicates the input of an industry from the purchase point of view.

By reading row thus:

Value of input of industry = Value of sales to agriculture
+ Value of sales to industry
+ Value of final sales to consumers
= Rs. 4 + 8+ 8 = 20 billion

Similarly, by reading the column thus:

Value of input of industry = Value of purchase from agriculture
+ Value of purchase from industry
+ Value of purchase from the consuming sector
= Rs. 4 + 8 + 8 = 20 billion

Some information can be obtained for other sectors — agriculture and consumer.

Thus, total value of output of agriculture is Rs. 10 billion.

In case of household or consumer sector, however we may find that it sells nothing to itself. But it has primary input labour to be sold to agriculture and industry at Rs. 2 and 8 billion, respectively = Rs. 10 billion total which is in fact the sum of wages and salaries earned by the household sector.

From an input-output table we can easily measure:

$$\text{Technical coefficient of a sector or industry} = \frac{\text{Industry's (or sector's) input}}{\text{Industry's (or sector's) total output}}$$

For matrix 1, thus we can calculate the following technical coefficients.

Table. 24.2

(Rs. in billion)

	Agriculture	*Industry*
Agriculture	$\frac{4}{10} = 0.4$	$\frac{4}{20} = 0.2$
Industry	$\frac{4}{10} = 0.4$	$\frac{8}{20} = 0.4$
Primary input	$\frac{20}{10} = 0.2$	$\frac{8}{20} = 0.4$

The technical coefficients represent the linear relationship between the input and output of each industry or sector. Besides, a technical coefficient indicates the number of units of an industry's output required as input by a given industry to produce one unit of output, therefore, it is also described as marginal input coefficient of production.

Since they represent technological relations, technical coefficients are calculated regarding production only. They are obviously not calculated for final demand or consumer's sector.

The technical coefficients are usually formated through a matrix. For instance, in case of two industries the technology matrix may be written as:

$$X = \begin{bmatrix} & x_{11} & x_{12} & \\ & & x_{12} & x_{12} \\ 1 & -x_{11} & -x_{21} & 1-x_{12} - x_{22} \end{bmatrix}$$

Thus, using the data from Table 31.1 we have

$$X = \begin{array}{l} \text{Agriculture} \\ \text{Industry} \\ \text{Primary input} \end{array} \begin{bmatrix} 0.4 & 0.2 \\ 0.4 & 0.4 \\ 0.2 & 0.4 \end{bmatrix}$$

For:

$x_{11} = 0.4$ $x_{12} = 0.2$ $x_{21} = 0.4$ $x_{22} = 0.6$

Thus:

$1 - x_{11} - x_{12} = 1 - 0.4 - 0.4 = 0.3$

$1 - x_{12} - x_{22} = 1 - 0.2 - 0.4 = 0.4$

We may now write equations of supply side and demand side as follows:

If we put a = agriculture

b = industry

c = primary input or labour

Then, supply side equation is:

$a = 0.4 + 0.4b + 0.2\ a$; $b = 0.2a + 0.4b + 0.4a$

(Take aggregate column-wise technological matrix coefficients).

Similarly, for the demand side we have to add value of final demand from consumer together with internal use and use by other sectors for each sector. Thus:

$a = 0.4a + 0.2b + 100$ and $b = 0.\ 4a + 0.4b + 400$

(Take aggregate row-wise technological matrix co-efficients and row-wise final demand from the input-output matrix).

We thus, get two simultaneous equations on demand side with two unknowns A and I. By solving them, we can find the value of A and I. Thus:

$a = 4a + 0.2b + 2$; $b = 0.4a + 0.4b + 8$

$\therefore\ 0.6a - 0.2b = 2$; $-\ 0.4a + 0.6b = 8$, Multiplying both the equations by 10

$6a - 2b = 20$ ... (i)

$-4a + 6b = 80$ ... (ii)

Multiplying (i) by 2 and (ii) by 3

$12a - 4b = 40$ and $-12a + 18b = 240$

$\therefore$ $14b = 280$ $\quad b = 20$

Now, $6a - 2b = 20$ $\quad 6a - 2 \times 20 = 20$

$\therefore$ $6a = 40 + 20 = 60$ $a = 10$

$\therefore$ a = Rs. 10 billion, b = Rs. 20 billion

4. A GENERAL FORMULATION OF INPUT-OUTPUT MODEL

For practical consideration of an input-output matrix in general, a conceptual framework in an abstract form has been presented as under:

Generally, an economy may be divided into *n* forms of productive activities covered by *n* industries. It is assumed that each industry produces one product and each product is produced by only one industry. A broad skeleton of such table is as under:

Table 24.3: Inter-industry Transaction Matrix

Producing Industries	*Using Industries*					*Final Use*
	1	*2*	*3*	*j*	*n*	
1	X_{11}	X_{12}	X_{13}	X_{1j}	X_{1n}	y_1
2	X_{21}	X_{22}	X_{23}	X_{2j}	X_{2n}	y_2
3	X_{31}	X_{32}	X_{33}	X_{3j}	X_{3n}	y_3
i	X_{il}	X_{i2}	X_{i3}	X_{ij}	X_{in}	$y_{\underline{i}}$
n	X_{nl}	X_{n2}	X_{n3}	X_{nj}	X_{in}	y_n
Gross value	V_1	V_2	V_3	V_j	V_n	

From the table, it is evident that an industry *j* produces commodity X_j by using up the inputs X_{ij} (where, $i = 1$ to n) V_n thus creates a surplus of V_j .

Further when a part of X_i is consumed in the inter-industry system, the remaining part of Y_j is left for the final use or consumption.

In the table above, thus —

X_{ij} = the value of product *i* used in industry *j*.

X_j = the value of output in industry *j*.

Vi = the value added in industry *j* – *i.e.,* surplus.

Y_i = the value of production *i* used for final consumption.

The above table can be split further. In particular, there is a tradition to break up the final use column into five components:

[i] Private consumption (*p*); *[ii]* Public consumption (*G*); *[iii]* Exports (*E*); *[iv]* Gross investment (I_g) and *[v]* Net addition to stock, *i.e.,* capital formation (I_k). It constitutes the demand side (*D*) of the economy. To this, for an economy, a supply side column (*s*) is also added which is composed of two elements *[1]* output (*O*) and *[2]* imports (*M*).

Table 24.4: A Comprehensive Sectoral Accounts Matrix

Producing Sector	*Using Sector*	*Final Use (D) Demand Component*	*(Supply)*
1	2 i n (P + G) = C	I_g I_k E M O	

The sectoral accounts displayed in Table 31.4 reveal the following balances:

1. Total supply equals to total demand:

$$X_1 + M_i = (X_{11} + X_{12} + ... + X_{in}) + (C_i + I_g^{\,i} + I_{ki} + E_i)$$

$$\therefore X_i = (X_{11} + X_{12} + ... X_{in} + C_i + Ig^i + I_{ki} + E_i) - M_i$$

Here i = 1to n and M_i stands for the value of product i imported.

Thus:

$$X_n + M_n = \overset{n}{\underset{j=1}{S}} X_{nj} + C_n + I_{gn} + I_{kn} + R_n$$

2. Production equals cost plus surplus.

$$X_j = X_{1j} + ... + X_{nj} + V_j$$

- **Problem of product-mix.** There is the problem of product-mix when a particular sector produces a variety of products. Here, the difficulty arises of classifying inputs. A solution to this problem is that: an input should be treated as originating from the sector which produces it to a major extent.
- **Improper records.** Collection of data on wages and salaries, depreciation etc. also poses many practical difficulties due to lack of proper records, indifference of people, and inefficiency of statistical staff in a backward country.

Similarly, the row of value added by manu-facture is decomposed into: *[i]* wages and salaries (*w*), *[ii]* depreciation (*d*) and *[iii]* the remaining surplus (*s*).

Thus, a table giving a completely consistent system of sectoral accounts may be drawn as shown in Table 24.4.

Here,

C = Consumption in private and public sector ($P + G$).

I_g = Gross investment.

I_k = Net addition to stock of capital.
E = Export.
O = Output gross domestic product.
w = Wages.
b = Depreciation.
s = Surplus.

The construction of such a table is based on the following assumptions:

(i) There is uniqueness of sector and commodity.

(ii) There is constant return to the scale.

(iii) For valuation, prices are stated either in producer's price or purchaser's price and all information about prices is made in uniform prices.

However, for many purposes, a table in producer's price is superior to that in a purchaser's price. For, a table based on purchaser's price is likely to be a loss table. But in a country like India, where any kind of information on distributive margin is so inadequate, purchaser's statements seem to be better. Thus, there are hardly two to three tables of Indian sectoral account stated in producer's prices. Mostly, these tables are found in terms of purchaser's prices.

To Decision-making

- Technical coefficient of an industry is measured by the ratio of Industry Input to Industry Output.
- In a closed input-output matrix, the final demand is not treated separately.
- In an open input-output matrix, the final demand is considered separately.

MODEL QUESTIONS

1. State the assumptions in input-output analysis.
2. Explain and illustrate the transaction matrix.

❐ ❐ ❐