LOVELY PROFESSIONAL UNIVERSITY

MANAGERIAL ECONOMICS

Edited By

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SYLLABUS

Managerial Economics

Objectives: The main objective of this course is to understand the basic economic principles of production and exchange - essential tools in making business decisions in today's global economy.

S. No.	Description
1.	***Introduction to Managerial Economics:*** Scope of Economics, Economic Principles relevant to Managerial Decisions, Relationship of Managerial Economics with Decision Sciences.
2.	***Market Demand and Supply:*** Determinants of Demand, Basis for Demand; Direct and Derived demand; Law of Demand, Law of Supply, Market Equilibrium. Consumer Behaviour.
3.	***Utility analysis:*** Cardinal and Ordinal utility, Equi-marginal utility. Indifference curve and its properties. Consumer Equilibrium with Cardinal and Ordinal approach, Consumer surplus, Price, Income and Cross Elasticities of Demand.
4.	***Production Theory:*** Production Functions with one variable and two variable inputs, Producers' Equilibrium, Expansion Path, Total, Marginal and Average Revenue curve; Law of Diminishing Returns to Factor; Returns to Scale.
5.	***Cost Analysis:*** Types of Costs; Short Run and Long Run Cost Curves; Economics of Scope and Economies of Scale. Revenue Analysis: Types of Revenue Curves and their applications.
6.	***Market Structure:*** Perfect Competition; Assumptions, Price and Output determination in Perfect Competition in Short and Long run.
7.	***Imperfect Competition:*** Monopoly–Features; Price and Output decisions; Price Discrimination.
8.	***Monopolistic Competition:*** Features; Price and Output decisions; Short and Long run Equilibrium.
9.	***Oligopoly:*** Features; Cartels and Collusions (introductory); Kinked Demand curve.
10.	***National income:*** Concepts, Methods of measuring National Income, Problems in measuring National Income, Circular Flow of Income in 2 Sector and 4 Sector model.

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Unit 1: Introduction to Managerial Economics

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Objectives

After studying this unit, you will be able to:

- Explain the nature and scope of managerial economics
- Identify the role of economics in decision making
- Discuss the concepts of economic analysis

Introduction

Countless firms have used the well-established principles of managerial economics to improve their profitability. Managerial economics draws on economic analysis for such concepts as cost, demand, profit and competition. It attempts to bridge the gap between the purely analytical problems that intrigue many economic theorists and the day-to-day decisions that managers must face. It now offers powerful tools and approaches for managerial policy-making. It will be relevant to present here several examples illustrating the problems that managerial economics can help to solve. These also explain how managerial economics is an integral part of business. Demand, supply, cost, production, market, competition, price, etc. are important concepts in real business decisions.

1.1 Meaning and Definition of Managerial Economics

Managerial Economics is a discipline that combines economic theory with managerial practice. It tries to bridge the gap between the problems of logic that intrigue economic theorists and the problems of policy that plague practical managers. The subject offers powerful tools and techniques for managerial policy-making. An integration of economic theory and tools of decision sciences works successfully in optimal decision-making in face of constraints. A study of managerial economics enriches the analytical skills, helps in the logical structuring of problems, and provides adequate solution to the economic problems.

To quote Mansfield, "Managerial Economics is concerned with the application of economic concepts and economic analysis to the problems of formulating rational managerial decisions."

According to McNair and Meriam, "Managerial economics is the use of economic modes of thought to analyse business situations."

"Managerial Economics is concerned with the application of economic principles and methodologies to the decision making process within the firm or organisation under the conditions of uncertainty," says Prof. Evan J Douglas.

Spencer and Siegelman define it as "The integration of economic theory with business practice for the purpose of facilitating decision making and forward planning by management."

According to Hailstones and Rothwel, "Managerial economics is the application of economic theory and analysis to practice of business firms and other institutions."

1.2 Nature of Managerial Economics

A close interrelationship between management and economics has led to the development of managerial economics. Management is the guidance, leadership and control of the efforts of a group of people towards some common objective. It does tell us about the purpose or function of management but it tells us precious little about the nature of the management process.

Notes

Koontz and O'Donell define management as the creation and maintenance of an internal environment in an enterprise where individuals, working together in groups, can perform efficiently and effectively towards the attainment of group goals. Thus, management is:

1. Coordination
2. An activity or an ongoing process
3. A purposive process
4. An art of getting things done by other people.

On the other hand, economics, in its broadest sense, is what economists do. Economists are primarily engaged in analysing and providing answers to manifestations of the most fundamental problem, scarcity. Scarcity of resources results from two fundamental facts of life:

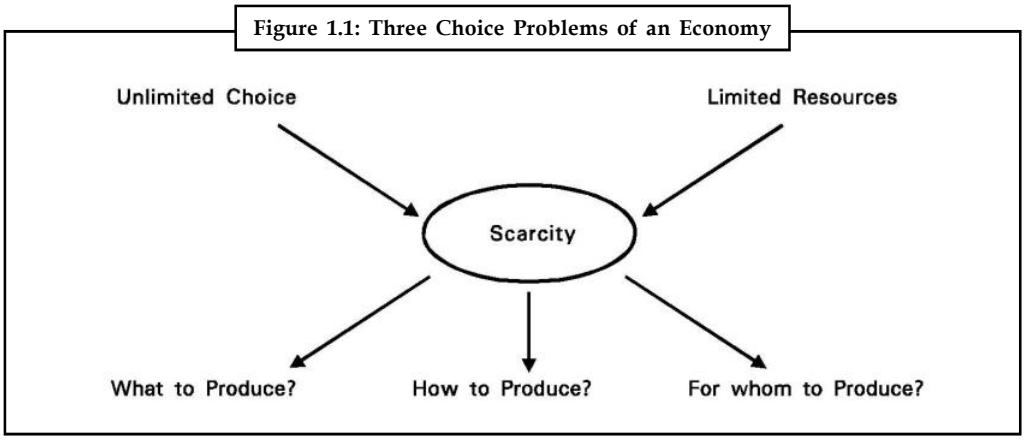
1. Human wants are virtually unlimited and insatiable, and
2. Economic resources to satisfy these human demands are limited.

Thus, we cannot have everything we want; we must make choices broadly between three areas:

1. What to produce?
2. How to produce? and
3. For whom to produce?

These three choice problems have become the three central problems of an economy as shown in Figure 1.1 Science of economics has developed several concepts and analytical tools to deal with the problem of allocation of scarce resources among competing ends.

Figure 1.1: Three Choice Problems of an Economy



Managerial economics, when viewed in this way, may be taken as economics applied to "problems of choice" or alternatives and allocation of scarce resources by the firms. Thus managerial economics is the study of allocation of resources available to a firm or a unit of management among the activities of that unit.

Did u know? **What is positive and normative analysis in economics?**

In positive economic analysis, the problem is analysed in objective terms based on principles and theories. In normative economic analysis, the problem is analysed based on value judgement.

Notes

Caselet

Importance of Economics in our Life

Economics is the study of how finite resources are consumed by demand, according to the costs imposed by their supply in relation to that demand. In other words, economics tells us that a freeze in Florida that damages the orange crop will cause the price of orange juice to change and how the price will modify demand over time.

History

Modern economic theory is said to have originated in "The Wealth of Nations," a book written by Scottish scholar Adam Smith in 1776. The theory holds that rational self interest pursued by individuals and businesses in a free market society leads to optimal economic conditions.

Significance

The study of economics helps formulate an understanding of the effects of financial actions and reactions by individuals and institutions. This understanding allows the projection of future economic conditions based on current indications.

Misconceptions

An understanding of economics assists governments in managing macroeconomic conditions such as limiting a recession by inducing recovery. However, economic theory is not foolproof because it is a social science based on the interplay between culture and money. Economic effects change as cultural customs change.

Source: www.ehow.com/facts_5899581_importance-economics-life.html

1.3 Scope of Managerial Economics

Managerial economics is concerned with the application of economic concepts and analysis to the problem of formulating rational managerial decisions. There are four groups of problem in both decision making and forward planning.

1. ***Resource allocation:*** Scarce resources have to be used with utmost efficiency to get optimal results. These include production programming, problem of transportation, etc.
2. ***Inventory and queuing problem:*** Inventory problems involve decisions about holding of optimal levels of stocks of raw materials and finished goods over a period. These decisions are taken by considering demand and supply conditions. Queuing problems involve decisions about installation of additional machines or hiring of extra labour in order to balance the business lost by not undertaking these activities.
3. ***Pricing problems:*** Fixing prices for the products of the firm is an important part of the decision making process. Pricing problems involve decisions regarding various methods of pricing to be adopted.
4. ***Investment problems:*** Forward planning involves investment problems. These are problems of allocating scarce resources over time. For example, investing in new plants, how much to invest, sources of funds, etc.

Notes

Study of managerial economics essentially involves the analysis of certain major subjects like:

1. Demand analysis and methods of forecasting
2. Cost analysis
3. Pricing theory and policies
4. Profit analysis with special reference to break-even point
5. Capital budgeting for investment decisions
6. The business firm and objectives
7. Competition.

An analysis of scarcity of resources and choice making poses three basic questions:

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

A firm applies principles of economics to answer these questions. The first question relates to what goods and services should be produced and in what quantities. Demand theory guides the manager in the selection of goods and services for production. It analyses consumer behaviour with regard to:

1. Type of goods and services they are likely to purchase in the current period and in the future, Goods and services which they may stop consuming,
2. Factors influencing the consumption of a particular good or service, and
3. The effect of a change in these factors on the demand of that particular good or service.

A detailed study of these aspects of consumer behaviour help the manager to make product decision. At some particular time, a firm may decide to launch new goods and services or stop providing a particular good or service. Knowledge of demand elasticities helps in setting up of prices in context of revenue of a firm. Methods of demand forecasting help in deciding the quantity of a good or service to be produced.

How to produce the goods and services is the second basic question. It involves selection of inputs and techniques of production. Decisions are made with regard to the purchase of items ranging from raw materials to capital equipment. Production and cost analysis guides a manager in personnel practices such as hiring and staffing and procurement of inputs. For example, the decision to automate clerical activities using PC network results in a more capital-intensive mode of production. Capital budgeting decisions also constitute an integral part of the second basic question. Allocation of available capital in long-term investment projects can be done through project appraisal methods.

Firms' third basic question relates to segmentation of market. A firm has to decide:

For whom it should produce the goods and services. For example, it has to decide whether to target the domestic market or the foreign market. Production of a premium good is another example of market segmentation. An analysis of market structure explains how price and output decisions are taken under different market forms.

Appropriate business decision making with the help of economic tools has gained recognition in view of complex business environment. Since the macroeconomic environment is dynamic, it changes over time; managerial decisions have to be reviewed constantly. In this context, concepts of consumer behaviour, demand elasticities, demand forecasting, production and cost analysis, market structure analysis and investment planning help in making prudent decisions.

Notes

Task Identify some quantitative techniques used in managerial decision-making.

1.4 Economic Principles Relevant to Managerial Decisions

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

1.4.1 Division of Labour

I put the division of labor first mainly because Adam Smith did argue that division of labor is the key cause of improving standards of living. Modern economics doesn't do much with the concept of division of labor, but two closely related concepts are important:

1. ***Returns to Scale:*** Returns to scale may be increasing, constant or decreasing. Increasing returns to scale is the case that leads to special results, and division of labor is one cause (arguably the main cause) of increasing returns to scale.
2. ***Virtuous Circles in Economic Growth:*** For Smith, a major consequence of division of labor and resulting increasing productivity was a "virtuous circle" of continuing growth. Modern "virtuous circle" theories have more dimensions, but division of labor and increasing returns to scale are among them.

1.4.2 Opportunity Cost

The idea is that anything you must give up in order to carry out a particular decision is a cost of that decision. This concept is applied again and again throughout modern economics.

1. ***Scarcity:*** According to modern economics, scarcity exists whenever there is an opportunity cost, that is, where-ever a meaningful choice has to be made.
2. ***Production Possibility Frontier:*** The production possibility frontier is the diagrammatic representation of scarcity in production.
3. ***Comparative Advantage:*** A very important principle in itself and a key to understanding of international trade the principle of comparative advantage is at the same time an application of the opportunity cost principle to trade.
4. ***Discounting of Investment Returns:*** Another application of the opportunity cost principle that is very important in itself, this one tells us how to handle opportunities that come at different times.

1.4.3 Equimarginal Principle

This is the diagnostic principle for economic efficiency. It has wide applications in modern economics. Two of the most important are key principles of economics in themselves:

1. ***The Fundamental Principle of Microeconomics:*** This principle describes the circumstances under which market outcomes are efficient.
2. ***The Externality Principle:*** It describes some important circumstances in which the markets are not efficient.

Notes

3. *Marginal Analysis:* It is also an important principle in itself and very widely applied in modern economics. There is no major topic in microeconomics that does not apply marginal analysis and opportunity cost.

1.4.4 Market Equilibrium

The market equilibrium model could be broken down into several principles — the definitions of supply, demand, quantity supplied and demanded and equilibrium, at least — but these all complement one another so strongly that there is not much profit in taking them separately. However, there are many applications and at least four important subsidiary principles:

1. ***Elasticity and Revenue:*** These ideas are a key to understanding how market changes transform society.
2. ***The Entry Principle:*** This tells us that, when entry into a field of activity is free, profits (beyond opportunity costs) will be eliminated by increasing competition. This has a somewhat different significance depending on whether competition is "perfect" or monopolistic.
3. ***Cobweb Adjustment:*** This might give the explanations when the market does not move smoothly to equilibrium, but overshoots.
4. ***Competition vs. Monopoly:*** Why economists tend to think highly of competition, and lowly of monopoly.

1.4.5 Diminishing Returns

Perhaps the best-known of major economic principles, the Principle of Diminishing Returns is much more reliable in short-run than in long-run applications, so the Long Run/Short Run dichotomy is an important subsidiary principle. Modern economists think of diminishing returns mainly in marginal terms, so marginal analysis and the equimarginal principle are closely associated.

1.4.6 Game Equilibrium

Game theory allows strategy to be part of the story. One result is that we have to allow for several kinds of equilibriums.

1. ***Non-cooperative equilibrium***
   (a) Prisoners' Dilemma (dominant strategy) equilibrium
   (b) Nash (best response) equilibrium, (but not all Nash equilibrium are dominant strategy equilibrium),
2. ***Cooperative equilibrium***
3. ***Oligopoly***

1.4.7 Measurement Principles

Economics is multidimensional, and that creates some difficulties in measuring things like production, incomes, and price levels. Some of the problems can be solved more or less fully.

1. ***Value Added and Double Counting:*** One for which we have a pretty complete solution is the problem of double counting: the solution is, use value added.

Notes

2. ***"Real" Values and Index Numbers:*** Since we measure production and related quantities in dollar terms, we have to correct for inflation. Index numbers are a pretty good workable solution, but there are some problems and criticisms.

3. ***Measurement of Inequality:*** Another issue is that the "average income" may not mean very much, because nobody is average and income is unequally distributed. Even if we cannot correct for that we can get a rough measure of the relative inequality and see where it is going.

1.4.8 Medium of Exchange

Money is whatever is generally acceptable as a medium of exchange. That means a bank, or similar institution, can literally create money, so long as people trust the bank enough to accept its paper as a medium of exchange. We might call this magical fact the Fiduciary Principle.

1.4.9 Income-Expenditure Equilibrium

Like the market equilibrium principle, but even more so, this model pulls together a number of subsidiary principles that complement one another and together constitute the "Keynesian" theory of aggregate demand. The implications of this theory are less controversial than the word "Keynesian" is — controversy has to do more with the details than the applications. Among the subsidiary principles are

1. Coordination Failure
2. The income-consumption relationship
3. The Multiplier
4. Unplanned inventory investment
5. Fiscal Policy
6. The Marginal Efficiency of Investment
7. The influence of money on interest
8. Real Money Balances
9. Monetary Policy

1.4.10 Surprise Principle

People respond differently to the same stimuli if the stimuli come as a surprise than they would if the stimuli do not come as a surprise. This new economic principle plays the key role with respect to aggregate supply that "Income-Expenditure Equilibrium" plays with respect to aggregate demand.

Rational Expectations: People don't want too many unpleasant surprises. If they use the information available to them efficiently, then they won't be surprised in the same way very often. This can lead to:

(a) Policy ineffectiveness

(b) Permanence

(c) Path Dependence

Notes

1.5 Relationship of Managerial Economics with Decision Sciences

Manageral eco helps the managers in taking various strategic decision. Demand analysis and forecasting help a manager in the earliest stage in choosing the product and in planning output levels. A study of demand elasticity goes a long way in helping the firm to fix prices for its products. The theory of cost also forms an essential part of this subject. Estimation is necessary for making output variations with fixed plants or for the purpose of new investments in the same line of production or in a different venture. The firm works for profits and optimal or near maximum profits depend upon accurate price decisions. Theories regarding price determination under various market conditions enable the firm to solve the price fixation problems. Control of costs, proper pricing policies, break-even point analysis, alternative profit policies are some of the important techniques in profit planning for the firm which has to work under conditions of uncertainty. Thus managerial economics tries to find out which course is likely to be the best for the firm under a given set of conditions.

Economics and other Disciplines

Economics is linked with various other fields of study like:

1. ***Operation Research:*** This field is used in economics to find out the best of all possibilities. Operation Research is a great aid in decision making in business and industry as it can help in solving problems like determination of facilities on machine scheduling, distribution of commodities, optimum product mix, etc.
2. ***Theory of Decision Making:*** Decision theory has been developed to deal with problems of choice or decision making under uncertainty, where the applicability of figures required for the utility calculus are not available. Economic theory is based on assumptions of a single goal whereas decision theory breaks new grounds by recognising multiplicity of goals and persuasiveness of uncertainty in the real world of management.
3. ***Statistics:*** Statistics helps in empirical testing of theory. With its help better decisions relating to demand and cost functions, production, sales or distribution are taken. Economics is heavily dependent on statistical methods.
4. ***Management Theory and Accounting:*** Maximisation of profit has been regarded as a central concept in the theory of the firm in microeconomics. In recent years, organisation theorists have talked about "satisficing" (a decision-making strategy that attempts to meet criteria for adequacy, rather than to identify an optimal solution) instead of "maximising" as an objective of an enterprise. Accounting data and statements constitute the language of business. In fact, the link is so close that "managerial accounting" has developed as a separate and specialised field in itself.

Scope of economics expands to the frontiers of big companies, both- Indian and International. Some of the real world examples are discussed below:

Example: ***Birla Yamaha - Shriram Honda and Ensuing Competition:*** With Honda acquiring a majority in Shriram Honda, arch rival Birla Yamaha now has a strong opponent to tackle. As the two companies enjoy a virtual duopoly in the potable generator set market, Honda's move to acquire management control in its Indian venture was enough to rush Birla's executives back into a huddle. RS Sharma, MD, Birla Yamaha points out, "Our competitors are now witnessing a change of management. As fresh funds are infused in the company, we will be up against stronger competition."

It is obvious that it will be difficult to understand and tackle this problem without the knowledge of concepts like duopoly, competition, etc., which are a part of micro economics.

Notes

ICI Paints and Market Leadership: ICI paints, which contributes 43 per cent to ICI Limited's 850 crores turnover, has decided to gun for number one position in the Indian paints industry. Ranking third currently, after Asian Paints and Goodlass Nerolac, it has launched a spate of activities that emanate from a new, three-pronged strategy spearheaded by its new chief executive, D Bhatnagar (May 98).

The three-pronged strategy encompasses expanding reach by revamping strategy network, making marketing strategy more consumer friendly and taking initiatives in the supply chain to ensure reach and efficiency.

The decision of the strategy, however, clearly shows how the knowledge of micro economics and its concepts like supply, competition, etc., have been used.

Siemens and "MOST": The storm clouds of the industrial slowdown have hit Siemens so hard that for the first time in its history, the company went deep into the red. Stunned by this, the German parent has chalked out a four-point rectification programme code named MOST (Maynards Operation Sequence Technique). The most important cause of the flight of Siemens has been a weak domestic demand and a severe cost-push effect on the internal front as a result of fast growth. The most important component of the rectification programme is cost reduction and improving cost structure, productivity and quality. Needless to say that cost is an important concept dealt with in detail in micro economics.

Telco and Competition: The gloomier picture of Telco can be explained in terms of concepts of micro economics integrated with other disciplines – high costs, piling inventories, a market slowdown, low demand and competition. The move of Telco to go in for automobiles has come as a result of slowdown in performance. The management admits that it is time to cut down costs severely. Similarly, Telco is gearing itself for the imminent threat of competition in the truck segment (10-tonne). The company has made this segment virtually its own with a cost advantage and introducing measures for cost control.

Performance of Multinationals: The scope of micro economics is wide. Detailed studies and evaluation can be made using it. For example, a study conducted by The Economic Times Research Bureau of 29 MNCs for the year ended June 97 says, "Increasing costs and growing competition have squeezed margins of multinational firms in India, despite an overall increase in sales volumes". Interestingly, last year's (1997) first half saw bottom lines of most Indian corporates reeling under increasing costs, higher interest rates and declining demand.

1.6 Central Problems of an Economy

Every economy faces some problems. These problems are associated with growth, business cycles, unemployment and inflation. The macroeconomic theory is designed to explain how supply and demand in the aggregate interact to concern with these four problems. Economists these very important national problems as macroeconomic problems — that is, as problems that could not be understood or solved without an understanding of the workings of the economic system as a whole. The four distinctively macroeconomic problems are:

1. Recession
2. Unemployment
3. Inflation
4. Economic Growth or Stagnation

1.6.1 Recessions, Depressions and Economic Fluctuations

The event that created modern macroeconomics was called "the Great Depression," but the general term for decreasing national production, in modern economics, is a recession.

Notes

Caution A recession is defined as a period of two or more successive quarters of decreasing production. Production is measured by a number of variables. Real Gross Domestic Product is one important measure. We will focus mainly on it.

But why do economists regard a recession as a problem?

It is not self-evident that a drop in production is a bad thing. For example, it might be that people want to enjoy more leisure, and spend less time producing goods and services. If production dropped for that reason, we would have no reason to think of it as an economic problem.

But, in some periods of recession, we have evidence that this was not what happened. In many recession periods, businesses that announced they were hiring had long lines of people who wanted to apply, with many more people than they could hire. This suggests that the people standing in line for a job had more leisure than they wanted, and would have preferred jobs and income to buy more goods and services. In the 1930's, some people sold apples or pencils in the street to get a little income, typically much less than they would have had in their old jobs. Again, this suggests that people had too much leisure and would have preferred more work and income. If this is so, then it seems that something was going wrong. In different terms, it seemed that the recession had caused unemployment.

Another possibility is that production might drop because a war or disaster had destroyed factories and other capital goods. But, in 1933, it seems very unlikely that the productive capacity of the economy could have dropped by 30%. There had been no war. And in fact, factories had been closed that could have been reopened and put to work, at the same time as many people were looking for work. Perhaps these circumstances show why the recession is regarded as a major economic problem.

Did u know? In which year "The Great Depression" occurred? It was in 1930.

1.6.2 Unemployment

Our second macroeconomic problem is unemployment. This problem is highly correlated with recession, but is distinct, and we need to look at it in its own terms. Unemployment occurs when a person is available to work and currently seeking work, but the person is without work. The prevalence of unemployment is usually measured using the unemployment rate, which is defined as the percentage of those in the labor force who are unemployed.

Economists distinguish between various types of unemployment. For example, cyclical, frictional, structural and classical, seasonal, hardcore and hidden. Real-world unemployment may combine different types. The magnitude of each of these is difficult to measure, partly because they overlap.

Unemployment is a status in which individuals are without job and are seeking a job. It is one of the most pressing problems of any economy especially the underdeveloped ones. This has macroeconomic implications too some of which are discussed below:

1. ***Reduction in the Output:*** The unemployed workforce could be utilized for the production of goods and services. Since they are not doing so, the economy is losing out on its output.
2. ***Reduction in Tax Revenue:*** Since income tax is an important part of the revenue for the government. The unemployed are unable to earn, the government loses out on the income tax revenue.

Notes

3. ***Rise in the Government Expenditure:*** The government has to give unemployment insurance benefits to the claimants. Hence the government will lose from both sides in terms of unemployment benefits and loss of tax revenue.

1.6.3 Inflation

In economics, inflation is a rise in the general level of prices of goods and services in an economy over a period of time.

A rising price level — inflation — has the following disadvantages:

1. It creates uncertainty, in that people do not know what the money they earn today will buy tomorrow.
2. Uncertainty, in turn, discourages productive activity, saving and investing.
3. Inflation reduces the competitiveness of the country in international trade. If this is not offset by a devaluation of the national currency against other currencies, it makes the country's exports less attractive, and makes imports into the country more attractive, which in turn tends to create unbalance in trade.
4. Inflation is a hidden tax on "nominal balances." That is, people who hold bonds and bank accounts in dollars lose the value of those accounts when the price level rises, just as if their money had been taxed away.
5. The inflation tax is capricious — some lose by it and some do not without any good economic reason.
6. As the purchasing power of the monetary unit becomes less predictable, people resort to other means to carry out their business, means which use up resources and are inefficient.

1.6.4 Economic Growth or Stagnation

Caution Stagnation is a period of many years of slow growth of gross domestic product, in which the growth is, on the average, slower than the potential growth in the economy.

Causes of Stagnation

1. Population growth might high.
2. Fewer people might choose to work.
3. The growth of labor productivity might slow.

Stagnation is economic growth that, while positive, is less than the potential growth of the economy. Some economists believe that stagnation is a serious problem and a cause of other problems, but since identification of stagnation depends on one's idea of the potential, it remains controversial whether the slowing we see is stagnation or a reduction of the potential.

Notes

Case Study

Decision-making at Asian Paints

Decision-making the vision of Asian Paints (India) Ltd., is to become one of the top five Decorative coatings companies worldwide by leveraging its expertise in the higher growth emerging markets, simultaneously, the company intends to build long term value in the Industrial coatings business through alliances with established global partners.

Asian Paints is India's largest paint company and ranks among the top ten decorative coatings companies in the world today, with a turnover of ₹ 20.67 billion (USD 435 million) and an enviable reputation in the Indian corporate world for Professionalism, Fast Track Growth, and Building Shareholder Equity.

The October' 2002 issue of Forbes Global magazine USA ranked Asian Paints among the 200 Best Small Companies in the World for 2002 and presented the 'Best under Billion' award, to the company. One of the country's leading business magazines "Business Today" in Feb 2001 ranked Asian Paints as the Ninth Best Employer in India. A survey carried out by 'Economic Times' In January 2000, ranked Asian Paints as the Fourth most admired company across industries in India.

Among its various other achievements, Asian Paints is the only company in India to have won the prestigious Economic Times – Harvard Business School Association of India award on two separate occasions, once in the category of "Mini-Giants" and the other in "Private sector giants".

The major decisions taken by the company which helped it to achieve the set goals were:

1. ***Consumer Focus:*** The company has come a long way since its small beginnings in 1942. Four friends who were willing to take on one of the world's biggest, most famous paint companies operating in India at that time set it up as a partnership firm. Over the course of 25 years Asian Paints became a corporate force and India's leading paints company. Driven by its strong consumer-focus and innovative spirit, the company has been the market leader in paints since 1938. Today it is double the size of any other paint company in India.
2. ***Wide Range of Products:*** Asian Paints manufactures a wide range of paints for Decorative and Industrial use. Vertical integration has seen it diversify into Speciality products such as Phthalic Anhydride and Pentaerythritol. Not only does Asian Paints offer customers a wide range of Decorative and Industrial paints, it even Custom-creates products to meet specific requirements.
3. ***International Tie-ups:*** To keep abreast of world technology and to protect its competitive edge, Asian Paints has from time to time entered into technology alliances with world leaders in the paint industry. It has a 50:50 joint venture with Pittsburgh Paints & Glass Industries (PPG) of USA, the world leader in Automotive coatings, to meet the increasing demand of the Indian automotive industry.

Table 1: Tata's Group Profile 2

In %	Group	Top 10	Top 20	Last 10
SALES	100	78	90	0.35
PAT	100	76	93	0.20
TOTAL ASSETS	100	72	87	0.80
NET WORTH	100	71	90	0.90

Contd...

Notes

Table 2: Ratios

In %	Group	Top 10	Top 20	Last 10
RONW	17.8	18.9	18.3	4.2
ROCE	7.4	77	7.8	1.9
PAT/SALES	8.9	8.7	9.2	5.5
ASSETS				

RONW = Return on Net Worth

ROCE = Return on Capital Employed

PAT = Profit After Tax

4. ***Latest Technology:*** It has also drawn on the world's latest technology for its manufacturing capabilities in areas like powder coatings and high-tech resins – thus ensuring that its product quality lives up to exacting international standards, even in the most sophisticated product categories.

5. ***Emphasis is on R&D:*** The company places strong emphasis on its own in-house R&D, creating new opportunities by effectively harnessing indigenous creativity. The Asian Paints Research & Development Center in Mumbai has acquired the reputation of being one of the finest in South Asia. With its team of over 125 qualified scientists, it has been responsible for pioneering a number of new products and creating new categories of paints. The entire decorative range of the company has been developed by the R&D team.

6. ***State of the Art Plants:*** The company boasts of state-of-the-art manufacturing plants at Bhandup in the state of Maharashtra; at Ankleshwar in the state of Gujarat; at Patancheru in the state of Andhra Pradesh; and at Kasna in the state of Uttar Pradesh. All the company's plants have been certified for ISO 9001 – the quality accreditation. All the company's plants have also received the ISO 14001 certificate for Environment Management Standard. The Phthalic Anhydride plant has been certified for ISO 9002 and ISO 14001 whereas the Penta plant has been certified for ISO 14001. The Penta plant will shortly receive its ISO 9002 certification.

7. ***Environment Friendly:*** In June 2002, Asian Paints plant in Patancheru was conferred "The Golden Peacock" award by the World Environment Foundation and the award for 'Excellence in Environment Management' by the Government of Andhra Pradesh.

8. ***Emphasis on IT:*** Asian Paints was one of the first companies in India to extensively computerize its operations. In addition to computerized manufacturing, computers are used widely in the areas of distribution, inventory control and sophisticated MIS to derive benefits of faster market analysis for better decision making. It is a continuously evolving company deriving its cutting edge from the use of innovative IT solutions. All the locations of the company are integrated through the ERP solution.

9. ***World Wide Presence:*** Asian Paints operates in 23 countries across the world. It has manufacturing facilities in each of these countries and is the largest paints company in nine overseas markets. It is also India's largest exporter of paints, exporting to over 15 markets in the Asia-Pacific region, the Middle East and Africa. In 12 markets it operates through its subsidiary, Berger International Limited and in Egypt through SCIB Chemical SAE.

Contd...

Notes

Further decisions that the company may consider are:

1. More focus on industrial paints, especially the automotive paints division
2. Manage the chemicals business more efficiently
3. Better marketing strategies to adopt top line growth in international operations
4. Reduce the input costs of production
5. Consolidate on the 'colourworld' and 'home solutions' initiatives to consolidate the leadership position in decorative paints segment.

Question

How does economics play a role in decision-making at Asian Paints?

Ans. Analysis of economic variables allows the firm to make optimal business decisions. The concepts of economics like demand, supply, production, costs and macro economic variables that affect the entire economy play a vital role in decision-making.

Source: Atmanand, *Managerial Economics*, 2nd Edition, Excel Books, New Delhi.

1.7 Summary

- Managerial Economics combines economic theory with managerial practice.
- The subject offers powerful tools and techniques for managerial policy-making.
- A close interrelationship between management and economics has led to the development of managerial economics.
- Managerial economics, may be taken as economics applied to "problems of choice" or alternatives and allocation of scarce resources by the firms.
- Managerial economics covers the four groups of problem essential in both decision making and forward planning: Resource allocation, Inventory and queuing problem, Pricing problems and Investment problems.
- A firm applies principles of economics to answer these questions: What to produce and how much to produce? How to produce? For whom to produce?
- Every economy faces some problems. These problems are associated with growth, business cycles, unemployment and inflation.
- A recession is defined as a period of two or more successive quarters of decreasing production.
- Unemployment occurs when a person is available to work and currently seeking work, but the person is without work.
- A rising price level means inflation. It has many disadvantages: uncertainty, discourage productive activity, inefficient use of resources etc.
- Stagnation is a serious problem and a cause of other problems in an economy.

1.8 Keywords

Inflation: It is a rise in the general level of prices of goods and services in an economy over a period of time.

Macroeconomics: It is study to economy as whole.

Notes

Microeconomics: It is concerned with the study of individuals firm or unit.

Recession: It is defined as a period of two or more successive quarters of decreasing production.

Stagnation: It is a period of many years of slow growth of gross domestic product, in which the growth is, on the average, slower than the potential growth in the economy.

1.9 Self Assessment

1. Fill in the blanks:
   (a) Managerial Economics is a discipline that combines economic theory with ..... .
   (b) Inflation is a ..... in the general level of prices of goods and services.
   (c) ..... studies aggregates in the economy.
   (d) Fixing ..... for the products of the firm is an important part of the decision making process.
   (e) Capital Budgeting is related to ..... investment.
2. State true or false for the following statements:
   (a) Supply theory guides the manager in the selection of goods and services of production.
   (b) Managerial economics involves selection of inputs and techniques of production.
   (c) Firm's third basic question related is to segmentation of market.
   (d) The development of a product for a particular section of society consider question for how to produce.
   (e) A choice has to be made between ends (unlimited wants) and means (limited resource).
   (f) Scarcity and efficiency does not go hand to hand in a society.
   (g) The study of managerial economics does not involve capital budgeting.
   (h) Recession os a macro economic problem.
   (i) Inflation is a hidden tax on nominal balances.
3. Choose the appropriate answer:
   (a) Which is not type of unemployment?
      (i) Cyclical (ii) Structural
      (iii) Frictional (iv) Variable
   (b) The following are the sign of inflation, except
      (i) increased prices (ii) increased purchasing power
      (iii) decreased savings (iv) decreased investment

Notes

1.10 Review Questions

1. How do you justify the fact that most of the economies in the world have registered growth even after influenced by the global meltdown?
2. What was the reason for inflation touching a two digit number in India in the first half of 2009?
3. Being a student of management, how do you think US economy could have prevented sub-prime crisis and the consequent recession?
4. Why does the entire managerial economics revolve around what to produce, how to produce, and for whom to produce? Give examples to support your answer.
5. Among recession, unemployment, inflation and economic growth or stagnation, what do you think is the biggest problem for an economy? Arrange them in a descending order of importance and support your argument with reasoning.
6. 'Managerial Economics is often used to help business students integrate the knowledge of economic theory with business practice.' How is this integration accomplished in your point of view? What role do you think does the subject play in shaping managerial decisions?
7. Analyse the relationship of Managerial Economics with the following:
   (a) Microeconomics,
   (b) Macroeconomics,
   (c) Mathematical economics, and
   (d) Econometrics.
8. Examine various approaches of managerial decision-making.
9. Following are the examples of typical economic decisions made by managers of a firm. Determine whether each is an example of what, how, or for whom to produce.
   (a) Should the company make its own spare parts or buy them from an outside vendor?
   (b) Should the company continue to service the equipment it sells or ask the customers to use independent repair companies?
   (c) Should a company expand its business to international markets or concentric in domestic markets?
   (d) Should the company replace its telephone operators with a computerised voice messaging system?
   (e) Should the company buy or lease the fleet of trucks that it uses to translate its products to markets?
10. Analyse the impact of unemployment on Indian economy.
11. What are the causes of stagnation? Explain with example.
12. What is inflation? What should India do to check its stagflation?
13. How can you define recession?
14. Discuss the principles of economics. How can managers use these principles for effective decision-making?
15. "Economics is concerned with the application of economic concepts and analysis to the problem of formulating rational individual and national decisions." Discuss.

Notes

Answers: Self Assessment

1.	(a)	management practices		(b)	rise			(c)	macroeconomics		
	(d)	prices		(e)	long term						
2.	(a)	False	(b)	True		(c)	True		(d)	True	
	(e)	True	(f)	False		(g)	False		(h)	True	
	(i)	True									
3.	(a)	(iv)	(b)	(ii)							

1.11 Further Readings

Books

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Unit 2: Market Demand

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Objectives

After studying this unit, you will be able to:

- Identify the determinants of demand
- Know the basis of demand
- State the law of demand

Introduction

Demand and supply are two most fundamental concepts in economics. Demand conveys a wider and definite meaning than in the ordinary usage. Ordinarily, demand to you would mean your desire to buy something, but in economic sense it is something more than a mere desire. It is interpreted as your want backed up by your purchasing power. Further demand is per unit of time such as per day, per week etc. Moreover, it is meaningless to mention demand without reference to price. Considering all these aspects the term demand can be defined in the following words, "Demand for anything means the quantity of that commodity, which is desired to be bought, at a given price, per unit of time."

Example: Suppose price of a pen is ₹ 10 per unit of time. At this price, people are willing to buy 100 units of that pen at a specific point of time. So, it is the demand for that pen.

Notes

2.1 Market Demand

Demand is one of the crucial requirements for the existence of any business enterprise. A firm is interested in its own profit and/or sales, both of which depend partially upon the demand for its product. The decisions which management takes with respect to production, advertising, cost allocation, pricing, etc., call for an analysis of demand.

Demand for a commodity refers to the quantity of the commodity which an individual household is willing and able to purchase per unit of time at a particular price.

Demand for a commodity implies:

1. Desire to acquire it,
2. Willingness to pay for it, and
3. Ability to pay for it.

Demand has a specific meaning. As stated earlier, mere desire to buy a product is not demand.

Example: A miser's desire for and his ability to pay for a car is not demand because he does not have the necessary will to pay for it. Similarly, a poor man's desire for and his willingness to pay for a car is not demand because he does not have the necessary ability to pay (purchasing power).

One can also think of a person who has both the will and purchasing power to pay for a commodity, yet this is not demand for that commodity if he does not have desire to have that commodity.

Demand for a commodity has to be stated with reference to time, its price and that of related commodities, consumer's income and taste, etc. Demand varies with changes in these factors.

Example: As demand for sweets go up, the demand for sugar also goes up Or as your income increases, you demand for branded clothes also goes up.

2.1.1 Determinants of Demand

The demand for a commodity arises from the consumer's willingness and ability to purchase the commodity. The demand theory says that the quantity demanded of a commodity is a function of or depends on not only the price of a commodity, but also on income of the person, price of related goods – both substitutes and complements – tastes of consumer, price expectation and all other factors. Demand function is a comprehensive formulation which specifies the factors that influence the demand for the product.

$$D_x = f(P_x, P_y, P_z, B, A, E, T, U)$$

Where,

D_x = Demand for item x

P_x = Price of item x

P_y = Price of substitutes

P_z = Price of complements

B = Income of consumer

E = Price expectation of the user

A = Advertisement Expenditure

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T = Taste or preference of user

U = All other factors

The impact of these determinants on Demand is:

1. ***Price effect on demand:*** Demand for x is inversely related to its own price.

   This can be shown as:

$$D_x \propto \frac{1}{P_x}$$

   This shows that demand for x is inversely proportional to price of x. This means – as price of x increases, the quantity demanded of x falls.

2. ***Substitution effect on demand:*** If y is a substitute of x, then as price of y increases, demand for x also increases.

   Example: Tea and coffee, cold drinks and juice etc. are substitutes.

   This can be shown as:

$$D_x \propto P_y$$

   This shows that the demand for x is directly proportional to price of substitute commodity y. This means -demand for x and price of substitute commodity y are directly related.

3. ***Complementary effect on demand:*** If z is a complement of x, then as the price of z falls, the demand for z goes up and thus the demand for x also tends to rise.

   Example: Ink and pen, bread and butter etc. are complements.

   This can be shown as:

$$D_x \propto \frac{1}{P_z}$$

   This shows that the demand for x is inversely proportional to the price of complementary commodity z. This means – demand for x and price for complementary commodity y are inversely directly related.

4. ***Price expectation effect on demand:*** Here the relation may not be definite as the psychology of the consumer comes into play. Your expectations of a price increase might be different from your friends'.

5. ***Income effect on demand:*** As income rises, consumers buy more of normal goods (positive effect) and less of inferior goods (negative effect). Examples of normal goods are t-shirts, tea, sugar, noodles, watches etc. and examples of inferior goods are low quality rice, jowar, second hand goods etc.

   This can be shown as:

$$D_x \propto B, \text{ if X is a normal good.}$$

   And,

$$D_x \propto \frac{1}{B}, \text{ if X is an inferior good.}$$

Notes

6. ***Promotional effect on demand:*** Advertisement increases the sale of a firm up to a point.

   This can be shown as:

$$D_x \propto A$$

   This means that, demand for x is directly proportional to advertisement expenditure of the firm producing x. (*Note:* advertisements do not that powerful effect on demand)

Socio-psychological determinants of demand like tastes and preferences, custom, habits, etc., is difficult to explanation theoretically.

Did u know? **If there is an increase in GDP, will the demand be affected?**

Yes. An increase in GDP means that the total output of products and services have increased. Since, it represents the economy of a country, so any increase will have a positive effect on demand.

Task List a few products that are: (a) substitutes and (b) complements

2.1.2 Basis of Demand

The basic source of demand is the need of individuals. Individual need products and services and they are also willing to pay a price to acquire those products and services. The firms analyse the needs and create products and services for them. The market for a firm's product cannot be analysed without reference to the demand conditions. For a firm or an industry consisting of several firms, the extent of demand determines the size of market. Successful business firms, therefore, spend considerable time, energy and effort in analysing the demand for their products. Without a clear understanding of consumers' behaviour and a clear knowledge of the market demand conditions, the firm is handicapped in its attempt towards profit planning or any other business strategy planning.

Example: Estimating present demand and forecasting future demand constitutes the first step towards measuring and determining the flow of sales revenue and profits which generate internal resources to finance business. The stability and growth of business is linked to size and structure of demand.

Case Study

Micro Factors Affecting Demand for Tanishq Products

Price of Jewellery – Symbol of Quality Provided

Price of a commodity is known to have a direct influence on demand for it. This follows from the Law of Demand. But in the case of Tanishq jewellery this does not hold true, making it an exception to the Law. This can be explained in terms of Veblen effect, where the price of a commodity is regarded as an indicator of its quality. Sometimes certain commodities are demanded just because they happen to be expensive or prestige goods, and hence have a "snob appeal". These are generally luxury articles that are purchased by the rich as status symbols. The price of Tanishq jewellery is regarded by patrons as being the just cost of the purity and trustworthiness of the brand. Not only was Tanishq the first to offer branded jewellery in India, but it was also the first to introduce concepts such as

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testing the purity of jewellery through the Karat meter, a buyback guarantee as well as other exchange schemes. Each move by Tanishq has shown its confidence in its own product. This has in turn inspired confidence in its customers, who are loyal. Usually, when the price of gold bullion increases people tend to curb/postpone their purchases of gold ornaments. However, the demand for Tanishq jewellery is independent of this price factor because each piece of jewellery represents a promise of quality and purity, each piece is something different and new, each piece is something special. As such the income and substitution effects do not adversely affect the demand for Tanishq jewellery, and price has title impact overall. But it has also been observed that an escalation in the gold price, diamonds seem to have caught the fancy of the customer and the promotional offers are being designed to provide customers with significantly enhanced value.

Designs Offered

The average Indian has always been very discerning when it comes to the purchase of jewellery. However, with the spread of globalization customers want the best quality in terms of designs. Best quality is provide to meet the international standards. Creativity is the buzzword. Tanishq's primary customer, the urban Indian woman, has come along way. She is smart, educated, and confident of handling career and family, and looking to secure value for her money. Today's urban women no longer wear jewellery only at weddings and formal occasions. They require trendy accessories that match her attire and reflect her personality. In this context the demand is vast and widespread in terms of prices. The women of today want the best of everything and have become more and more and more selective in their choices. The brand's designs address the needs of the modern woman. Tanishq had crafted award-winning designs in 18 karat and 24 karat gold and gemstone jewellery. It's new range looks beautiful and yet is affordable and feels light.

Promotional Schemes

With cutthroat competition in the market, every company comes up with schemes to woo the customers. These offers are all the more visible during the festival season. Purchase of jewellery can happen any time of the year like - for birthdays, anniversaries, gifting, impulse purchases, etc. and of course for marriages as well. Therefore, in absolute terms, there is no lean period for jewellery - the jewellery market can be stimulated throughout the year through a host of well-designed marketing inputs. Tanishq to promote its brand comes up with all kinds of schemes like a jewellery exhibition which brings fresh talent to the forefront, launched a nationwide jewellery design competition on May 22nd 2004, 'Get Gold free with Diamonds' promotional offer across all 66 exclusive Tanishq boutiques in India. Its also specially designed the three crowns for the Ponds Femina Miss India Contest this year. It reached out to the target group through exclusive working women's meets, where well known career women spoke about issues relevant to working women. In addition, 'Tanishq Collection-G' ran joint promotions with brands such as L'Oreal and Wills Lifestyle, which it believed appeal to a similar set of consumers. Tanishq has successful stimulated demand for jewellery throughout the year through launches of new jewellery collections, a range of exchange programs and other offers (such as our recently concluded "Impure to Pure" exchange offer) and a number of in-store events. As a result of these efforts, even while the market for jewellery declined by more than 15% last year, Tanishq grew by 40% for the third successive year. Amongst the most recent initiatives of Tanishq has been the targeting of the wedding market by making special offers on wedding jewellery. This promotional scheme has had the masses thronging in, in very large numbers. It also got the 4th Annual Lycra Images Fashion Awards in the Jewellery category.

Discounts

Discounts play a major role in determining the demand for a product. Tanishq periodically offers discounts. In 2002 it offered a vast gamut of discounts in its showrooms in Bihar during the festival of Dhanteras resulting in sales of ₹ 5 crore in one particular store. During its fifth anniversary celebrations Tanishq offered discounts to customers, and the response was so overwhelming that extra security was called to handle the crowd even before the store opened. At select points of time in the year Tanishq also offers 20%-40% discount on making charges, which is also a large crowd puller.

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Guarantee

Tanishq has managed to establish its position in the market because its quality products are backed by a guarantee certificate. Each item of jewellery that is sold is accompanied by a guarantee card that states the weight of the gold/platinum as well as the cartage of the gemstones used. In case of any discrepancy the company is liable for legal action. All diamonds used are VVS certified, and the platinum is passed by the official Platinum Authority of India. 100% purity backed by an ironclad guarantee is thus the hallmark of Tanishq jewellery. This is a major demand inducer as the traditional jewelers are increasingly fudging on such things.

Question

Analyse the role of other factors (other than price of products) in influencing the demand for Tanshiq's products.

2.1.3 Direct and Derived Demand

You must have noticed that our demand for basic necessities, like demand for food, clothing and shelter, is independent of demand for any other good. On the other hand, demand for labour is dependent on our demand for houses or products and demand for mobile phones depend on our demand for communication with each other. The goods whose demand does not depend on the demand for some other goods are said to have a direct demand, while the rest have derived demand. However, there is hardly anything whose demand is totally independent of any other demand. But the degree of this dependence varies widely from product to product. Thus, the direct and derived demand varies in degree more than in kind.

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Transportation as a Derived Demand

In economic systems what takes place in one sector has impacts on another; demand for a good or service in one sector is derived from another. For instance, a consumer buying a good in a store will likely trigger the replacement of this product, which will generate demands for activities such as manufacturing, resource extraction and, of course, transport. What is different about transport is that it cannot exist alone and a movement cannot be stored. An unsold product can remain on the shelf of a store until a customer buys it (often with discount incentives), but an unsold seat on a flight or unused cargo capacity in the same flight remain unsold and cannot be brought back as additional capacity later. In this case an opportunity has been missed since the amount of transport being offered has exceeded the demand for it. The derived demand of transportation is often very difficult to reconcile with an equivalent supply and actually transport companies would prefer to have some additional capacity to accommodate unforeseen demand (often at much higher prices). There are two major types of derived transport demand:

Direct derived demand: This refers to movements that are directly the outcome of economic activities, without which they would not take place. For instance, work-related activities commonly involve commuting between the place of residence and the workplace. There is a supply of work in one location (residence) and a demand of labor in another (workplace), transportation (commuting) being directly derived from this relationship. For freight transportation, all the components of a supply chain require movements of raw materials, parts and finished products on modes such as trucks, rail or containerships. Thus, transportation is directly the outcome of the functions of production and consumption.

Indirect derived demand: Considers movements created by the requirements of other movements. The most obvious example is energy where fuel consumption from transportation

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activities must be supplied by an energy production system requiring movements from zones of extraction, to refineries and storage facilities and, finally, to places of consumption. Warehousing can also be labeled as an indirect derived demand since it is a non-movement of a freight element. Warehousing exists because it is virtually impossible to move commodities instantly from where they are produced to where they are consumed.

Transportation can also be perceived as an induced (or latent) demand which represents a demand response to a reduction in the price of a commodity. This is particularly the case in the context where the addition of transport infrastructures results in traffic increases due to higher levels of accessibility. Roadway congestion is partially the outcome of induced transport demand as additional road capacity results in mode shifts, route shifts, redistribution of trips, generation of new trips, and land use changes that create new trips as well as longer trips. However, the induced demand process does not always take place. For instance, additional terminal capacity does not necessarily guarantee additional traffic as freight forwarders are free to select terminals they transit their traffic through, such as it is the case for maritime shipping.

Source: http://people.hofstra.edu/geotrans/eng/ch1en/conc1en/derivedemand.html

2.1.4 Law of Demand

The Law of demand explains the functional relationship between price of a commodity and the quantity demanded of the commodity. It is observed that the price and the demand are inversely related which means that the two move in the opposite direction. An increase in the price leads to a fall in quantity demanded and vice versa. This relationship can be stated as "Other things being equal, the demand for a commodity varies inversely as the price".

Example: Ram is demanding a motorbike manufactured by Company A. Now, if Company A increases the price of the bike substantially, say by 10% , then Ram might change his mind and decide to buy motorbike from company B whose price is lesser or he might postpone his demand altogether.

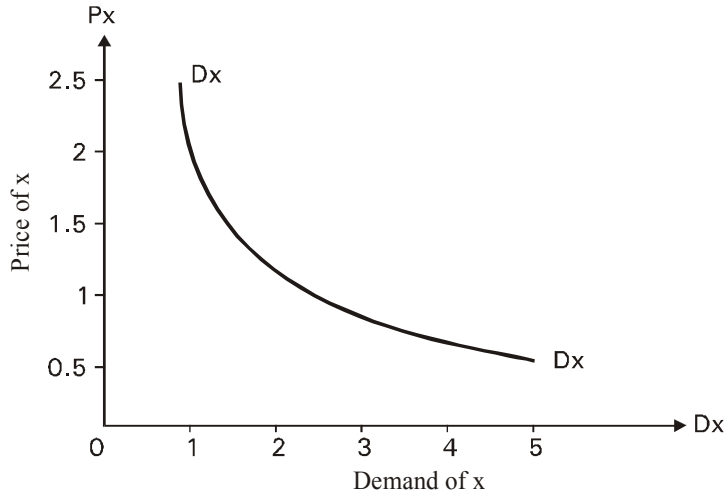
A demand curve considers only the price-demand relation, other factors remaining the same. The inverse relationship between the price and the quantity demanded for the commodity per time period is the demand schedule for the commodity and the plot of the data (with price on the vertical axis and quantity on the horizontal axis) gives the demand curve of the individual.

Example:

An Individual's Demand Schedule for Commodity X

Price x (per Unit) Px	Quantity of x demanded (in Units) Dx
2.0	1.0
1.5	2.0
1.0	3.0
0.5	4.5

Notes



Demand Curve

The Demand curve is negatively sloped, indicating that the individual purchases more of the commodity per time period at lower prices (other factors being constant).

The inverse relationship between the price of the commodity and the quantity demanded per time period is referred to as the Law of Demand.

A fall in P_x leads to an increase in D_x (so that the slope is negative) because of the substitution effect and income effect.

The first reason for the validity of downward sloping demand curve is that the lower prices bring in new buyers. Secondary, when the price of a commodity declines, the real income or purchasing power of the consumers increases which induced them to buy of this commodity. This is known as the income effect. Thirdly, when the price of a commodity falls while prices of all other goods remain constant, the commodity becomes relatively cheaper. This induces the consumers to substitute this commodity in place of other commodities which have been relatively dearer. This is known as substitution effect.

Task Do you come across instances where you see that law of demand is not being followed? Quote such instances.

Caselet

Cardamom Prices Drop on Low Demand

Cardamom prices declined in the last week of January 2011, on bearish sentiments resulting from reports of increased availability at auctions.

"It might have dropped on correction after ruling at moderately higher levels. An artificially created over supply situation also aided the price decline," dealers in Bodinayakannur said.

Upcountry demand was low as nobody was interested to buy from the declining market, Mr P.C. Punnoose, General Manager, CPMC, told Business Line.

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The average price at the individual auctions dropped to ₹ 1,220 from ₹ 1,282 over the last week of January 2011 at the KCPMC auction, he said.

Severe cold wave conditions in the north Indian states coupled with unconfirmed reports of arrival of Guatemalan cardamom in the upcountry markets led to a slow down in buying activities.

The market will improve from the first week of February, 2011 as the wedding season in north India is to begin, traders said. At the same time, arrivals also declined to about one-third of it during the peak time of the season. Besides, the quality of material arriving at the market is also inferior which the trade attributed to holding back by growers hoping the prices would move up in the coming days, they said.

Source: www.thehindubusinessline.com

2.2 Summary

- In economics demand has a specific meaning. Demand for any commodity implies: desire to acquire it, willingness to pay for it, ability to pay for it and at a particular time.
- Demand depends on not only the price of a commodity, but also income, price of related goods – both substitutes and complements – taste of consumer, price expectation and all other factors.
- According to Law of Demand, there is an inverse relationship between the price of a commodity and the quantity demanded (other things remaining equal)

2.3 Keywords

Demand Function: A comprehensive formulation which specifies the factors that influence the demand for the product

Demand: The quantity of the commodity which an individual is willing to purchase per unit of price at a particular time.

Derived Demand: Goods whose demand is tied with the demand for some other goods

Direct Demand: Goods whose demand is not tied with the demand for some other goods

2.4 Self Assessment

1. State true or false for the following statements:
   (a) Demand of petrol is direct demand.
   (b) Demand is just a want or desire to purchase a product or a service.
   (c) Demand for labour is always a derived demand.
   (d) When price of tea goes up, then the demand for coffee is likely to go up as well.
   (e) When the price of X brand of soap went up, people began buying Z brand of soap. This happened due to the substitution effect.
   (f) When the price of bread goes up, the demand for butter usually goes up.
2. Fill in the blanks:
   (a) Usually, income of the individuals and demand have a ……. relationship.
   (b) Demand for machinery in industries is a ……demand.

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(c) Shoes and socks are ……goods.

(d) The most basic source of demand is……of the individuals.

(e) The shape of the demand curve is……sloping.

2.5 Review Questions

1. Define 'demand'. Discuss different types of demand.
2. Explain the law of demand. Discuss some practical applications of law of demand.
3. Distinguish between direct and derived demand with help of suitable examples.
4. Examine the impact of increase in prices of a good on its:
   (a) Substitutes
   (b) Complements
5. "Demand for everything in this world is a derived demand." Discuss
6. It is generally believed that when fares of airlines go up, the demand for railway travel also goes up? Does this seem logical to you?
7. Explain the downward sloping shape of demand curve.
8. It was noticed that even though the price of salt went up, there was no fall in demand. Can you explain, why?
9. Explain the income effect and substitution effect with help of suitable examples.
10. Draw a demand curve based on following data- Number of units demanded of X: 35, 46, 67, 89, 90 and 120 and respective prices: ₹ 40, ₹ 45, ₹ 50, ₹ 55, ₹ 60 and ₹ 65.

Answers: Self Assessment

1.	(a)	False	(b)	False	(c)	True	(d)	True
	(e)	True	(f)	False				
2.	(a)	Positive	(b)	Derived	(c)	Complementary	(d)	Need
	(e)	Downward						

2.6 Further Readings

Books

Dr. Atmanand, *Managerial Economics*, Excel Books, Delhi.

Hague, D.C., *Managerial Economics.*

Haynes, Mote and Paul, *Managerial Economics–Analysis and Cases*, Vakils. Fellner and Simons Private Ltd., Bombay.

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Notes

Online links

http://www.netmba.com/econ/micro/supply-demand/

http://www.basiceconomics.info/supply-and-demand.php

http://ingrimayne.com/econ/DemandSupply/OverviewSD.html

http://tutor2u.net/economics/revision-notes/as-markets-equilibrium-price.html

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Unit 3: Market Supply and Equilibrium

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Objectives

After studying this unit, you will be able to:

- State the law of supply
- Explain how market equilibrium is reached

Introduction

It is true that economy runs on demand but that demand has to be fulfilled with corresponding supply as well. Say, if there is a huge demand for mobile phones in an economy, there has to be corresponding supply to fulfill that demand.

If adequate supply is not there, then the demand would not be fulfilled.

Example: You are willing to buy a tennis ball, but the shopkeepers tell you that there are no balls available in the market due to short supply.

We all do face such situations, many a times.

3.1 Market Supply

Supply is the specific quantity of output that the producers are willing and able to make available to consumers at a particular price over a given period of time. In one sense, supply is the mirror image of demand. Individuals' supply of the factors of production or inputs to market mirrors other individuals' demand for these factors. For example, if we want to rest instead of weeding the garden, we hire someone: we demand labour. For a large number of goods, however, the supply process is more complicated than demand.

Supply is not simply the number of a commodity a shopkeeper has on the shelf, such as '10 oranges' or '10 packet of chips', because supply represents the entire relationship between

Notes

the quantity available for sale and all possible prices charged for that good. The specific quantity desired to sell of a good at a given price is known as the quantity supplied. Typically a time period is also given when describing quantity supplied. For example, when the price of an umbrella is ₹100, the quantity supplied is 500 umbrellas a week.

The supply of produced goods (tangibles) is usually indirect and the supply of non-produced goods (intangibles) is more direct. Individuals supply their labour in the form of services directly to the goods market. For example, an independent contractor may repair a washing machine. The contractor supplies his labour directly.

Law of Supply

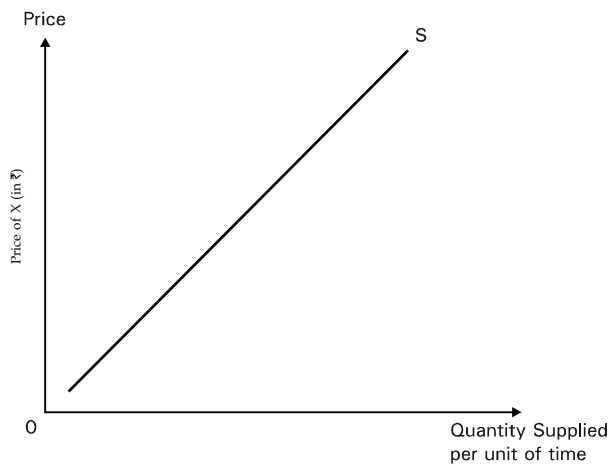
According to the Law of Supply, other things remaining constant, higher the price of a commodity, higher will be the quantity supplied and vice versa. There is a positive relationship between supply and price of a commodity.

As in the case of quantity demanded, price is the major determinant of quantity supplied. In graphical terms supply refers to the entire supply curve because a supply curve tells us how much of a commodity will be offered for sale at various prices. Quantity supplied refers to a point on a supply curve. In case, the price of a good rises, individuals and firms can rearrange their activities in order to supply more of that good to the market, substituting production of that good for production of other goods.

With the firms, there is another explanation. Assuming firm's costs are constant, higher price means higher profits (the difference between a firm's revenues and its costs). The expectation of those higher profits leads it to increase output as price rises, which is what the law of supply states.

Figure 3.1 depicts a supply curve, which is based on law of supply.

Figure 3.1: Supply Curve



The law of supply also assumes that other things are held constant. Other variables, like price of inputs used in production, technology, producers' expectations and number of producers in the market, might change, causing a shift in supply. This will be discussed in the next section.

A supply schedule is a table which lists the possible prices for a good and service and the corresponding quantity supplied.

Market supply is the summation of all individual supplies at a given price. The market supply curve is the horizontal sum of the individual supply curve.

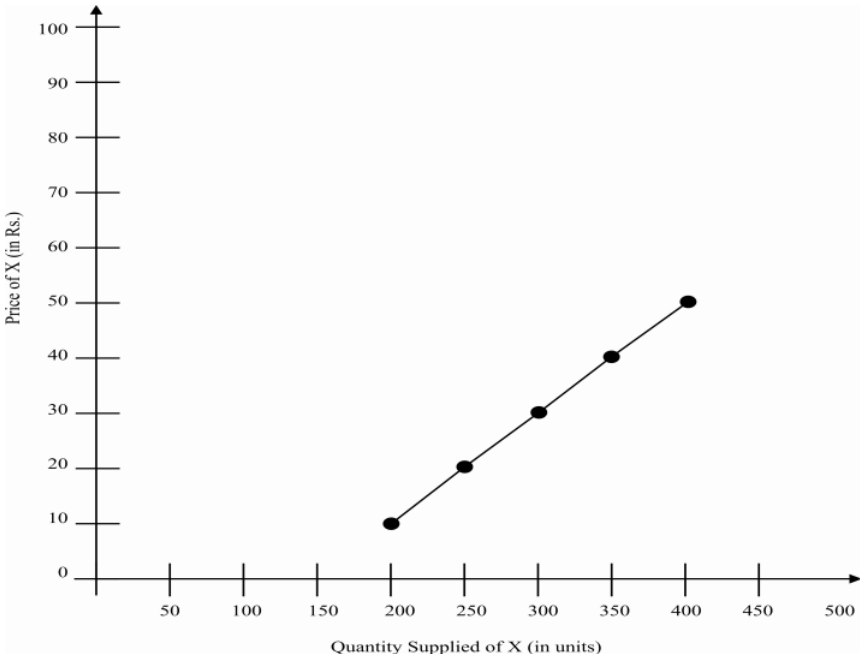
Notes

Example: From a supply schedule to a supply curve.

Let's see how a supply curve is drawn on the basis of figures given in the supply schedule.

Supply Schedule

Price of X (in ₹)	Quantity Supplied of X (in units)
10	200
20	250
30	300
40	350
50	400



From Supply Schedule to Supply Curve

Task Consider a hypothetical supply schedule for potatoes and draw a supply curve for potatoes.

Notes

Caselet

Nutmeg, Mace Prices Shoot up Amid Supply Crunch

The prices of nutmeg and mace have shot up in the Indian and international markets this year due to a supply crunch following a fall in output in the major producing country, Indonesia.

"Though India is one of the major producers of this spice, production has not matched demand," trade sources said.

The price of Indian mace in the domestic market ranges between ₹ 1,300 and ₹ 1,800 a kg depending upon the colour, while that of the imported variety is ₹ 1,400-1,450 a kg for red.

Nutmeg with the shell was fetching ₹ 350 a kg while that without shell was sold at around ₹ 600 a kg, they said.

The area under the crop went up to 16,400 hectares in 2008-09 from 11,270 hectares in 2005-06, but the output has not kept pace with the growing demand, they said.

Total production in the country is estimated at around 13,000 tonnes of nutmeg, including the shell. Once the shell weight is reduced, the net weight of the nutmeg comes down to 9,100 tonnes, while the weight of the mace is only 10 per cent of the nutmeg i.e. around 910 tonnes as against the demand of over 2,000 tonnes in the country, they said.

Meanwhile, the requirement of nutmeg has ranged between 13,000 tonnes (without shell) and 15,000 tonnes of late given its growing use in indigenous medicines/drugs, cosmetics and in various food products.

Changes in food habits following a change in lifestyles has been responsible for the rise in demand for many such commodities.

The annual growth in demand for nutmeg and mace is estimated at 5 to 10 per cent of late, they said. Whereas the production (without shells) was around 8,000 tonnes in 2008-09, with shell was at 11,362 tonnes from 16,400 hectares. The weight of the shell comes to around 30 per cent, while that of mace is 10 per cent, they said.

It is grown in the mid-lands of Kerala, especially on the banks of rivers, as it requires a deep, well-drained loamy sandy soil. Shade is required for the first two to three years. The optimal growing temperature is between 20-30°C and the annual rainfall should be between 1,500-2,500mm, Spices Board sources said.

Kerala topped in area and production (13,494 ha/11,361 tonnes) of nutmeg and mace followed by Karnataka (136 ha/1,997 tonnes) and Andaman and Nicobar Islands (79 ha/4 tonnes) in 2006-07 according to the Board.

Half the trees are male and do not produce fruit. Unfortunately, the sex of the plants cannot be determined until they are six to eight years old. However, budded plants which are able to bear fruits, are made available by the nurseries run by the Universities/ Agricultural departments at a price, they said.

The principal import markets are the European Community, the US, Japan and India. Singapore and the Netherlands are the major re-exporters.

The US is the biggest individual market for whole nutmegs. US importers prefer the East Indian type of deep brown, aromatic nutmeg and orange-red mace in their whole form.

Contd...

Notes

As the Indian production is below the demand, the country continues the import of both nutmeg and mace. Much of the imports are by the oleoresin industry, they said. During 2008-09, India imported 1,325 tonnes of nutmeg valid at ₹ 25.37 crore and 265 tonnes of mace worth ₹ 8.46 crore, they said. At the same time, the country has exported an estimated 3,275 tonnes of nutmeg and mace worth ₹ 91.87 crore. A good chunk of the Indian exports of this commodity is value-added items such as oleoresins, oil and in powdered form, they said.

Nutmeg and mace, their oleoresins and essential oils are used in the food and beverage industries. Although whole nutmeg is available, ground nutmeg is more popular. The ground form is mainly used in the food processing industry, extraction industry sources said.

Nutmeg is a standard seasoning in many Dutch dishes. Nutmeg and its oleoresin are used in the preparation of meat products, soups, sauces, baked foods, confectioneries, puddings, seasoning of meat and vegetables, to flavour milk dishes and punches. The fleshy outer cover of the fruit is crystallised or pickled or made into jellies, they said.

Mace is sold either whole or as ground spice and is used in savoury dishes. It is used to flavour milk-based sauces and processed meats such as sausages. Soups, pickles and ketchup, pickles and chutneys are also seasoned with mace. Because of its aroma, the essential oil is used as a natural flavouring extract and is employed for flavouring food products and liquors. Nutmeg oil and mace oil are used mainly in flavouring soft drinks, canned foods and meat products.

Nutmeg oil is used in cosmetics, men's perfume and toiletries due to its aromatic properties. Mace oil possesses almost identical "physico-chemical" and "organoleptic" properties as nutmeg oil. Mace oil is also used to a limited extent in perfumes and soaps. They are used in the pharmaceutical industries also, industry sources told Business Line.

Nutmeg is produced in the tropical areas of Indonesia and the West Indies. The world production of nutmeg is about 25,000 tonnes a year. The global demand is also estimated at around this level, they said.

The production of mace is about 3,000 tonnes. Indonesia and Grenada dominate production and export both products with a world market share of 75 per cent and 20 per cent respectively. The other producing countries include India, Malaysia, Papua New Guinea, Sri Lanka and a few Caribbean islands.

Source: www.thehindubusinessline.com

3.2 Market Equilibrium

Price is determined in a free market by the interaction of supply and demand. We can underline three dynamic laws of supply and demand.

1. When quantity demanded is greater than quantity supplied, prices tend to rise; when quantity supplied is greater than quantity demanded, prices tend to fall.
2. In a market, larger the difference between quantity supplied and quantity demanded, the greater the pressure on prices to rise (if there is excess demand) or fall (if there is excess supply).
3. When quantity supplied equals quantity demanded, prices have no tendency to change.

Price theory answers the question of interaction of demand and supply to determine price in a competitive market. Let's see an example, give in Table 3.1.

Notes

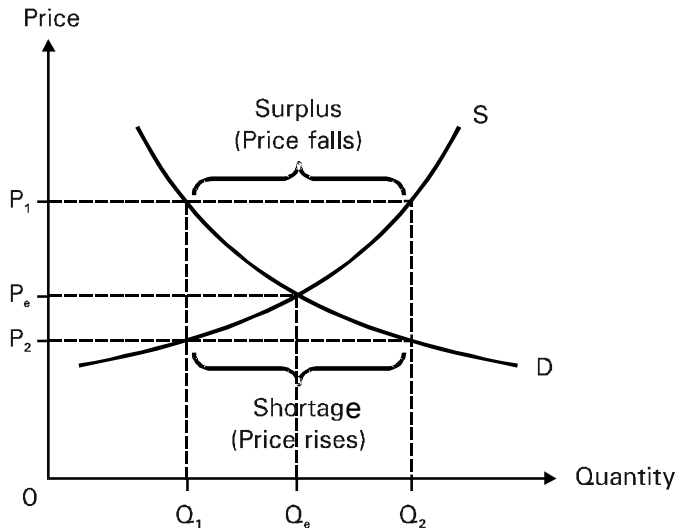
Table 3.1: Market Supply and Demand for Commodity X

Price of Commodity	Total Quantity Supplied per Month	Total Quantity Demanded per Month	Surplus or Shortage
5	12,000	2,000	+10,000
4	10,000	4,000	+6,000
3	7,000	7,000	0
2	4,000	11,000	–7,000
1	1,000	16,000	–15,000

At a price of 3 units, and only at this price, the quantity which producers are willing to produce and supply is identical to the amount consumers are willing to buy. As a result, there is neither a shortage nor a surplus of commodity X at this price. A surplus causes prices to decline and a shortage causes prices to rise. With neither shortage nor surplus at 3 units, there is no reason for the actual price of commodity X to move away from this price. This price is called the equilibrium price. *Equilibrium represents a situation from where there is no tendency to change.* It is a state of balance. Stated differently, the price of X will be established where the supply decisions of producers and demand decisions of buyers are mutually consistent.

Interaction of demand and supply to reach equilibrium is shown in Figure 3.2.

Figure 3.2: Equilibrium Point



Graphically, the interaction of supply and demand curves will indicate the equilibrium point (E).

If market price is OP_1, the quantity demanded by consumers is OQ_1, while the quantity which producers wish to supply is OQ_2. There is thus a surplus of Q_1Q_2 at this price. It is well known that a surplus leads to a downward pressure on price and so market price will fall. At the lower price of OP_2, the quantity supplied is OQ_1, while the quantity demanded is OQ_2. There is, therefore, a shortage at this price, represented by Q_1Q_2. This shortage tends to put an upward pressure on price and market price is expected to rise.

There is only one price, at which the quantity supplied is equal to the quantity demanded, there is no surplus or shortage, no rise or fall of price – OP_e. It is thus referred to as the equilibrium position.

Notes

Price Ceiling and Price Floors

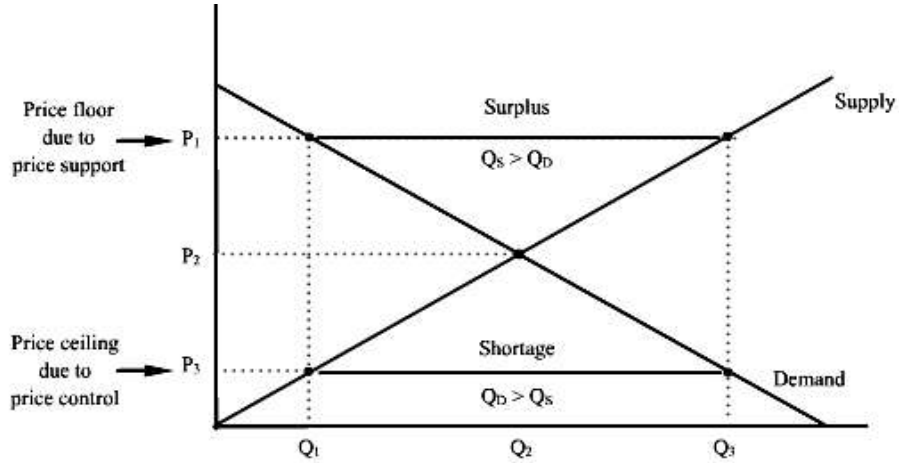
A price ceiling occurs when the price is artificially held below the equilibrium price and is not allowed to rise. There are many examples of price ceilings. Most price ceilings involve the government in some way.

Example: In many cities, there are rent controls. This means that the maximum rent that can be charged is set by a governmental agency. This rent is usually allowed to rise a certain percent each year to keep up with inflation. However, the rent is below the equilibrium rent.

If the price ceiling is above the market price, then there is no direct effect. If the price ceiling is set below the market price, then a "shortage" is created; the quantity demanded will exceed the quantity supplied. The shortage may be resolved in many ways. One way is "queuing"; people have to wait in line for the product, and only those willing to wait in line for the product will actually get it. Sellers might provide the product only to family and friends, or those willing to pay extra "under the table". Another effect may be that sellers will lower the quality of the good sold. "Black markets" tend to be created by price ceilings.

Figure 3.3 depicts the effect of price ceiling and price floor.

Figure 3.3: Price Ceiling and Price Floor



A price floor exists when the price is artificially held above the equilibrium price and is not allowed to fall. There are many examples of price floors. In some cases, private businesses maintain the price floor while, in other cases, it is the government that maintains the price floor. One price floor that was maintained by the private businesses used to be called "fair trade". In the case of fair trade, the manufacturer would set a price for the product that was above the equilibrium price. The manufacturer then told the retail stores that the price could not be lowered or the store would not be able to sell any of the manufacturer's products.

When a "price floor" is set, a certain minimum amount must be paid for a good or service. If the price floor is below a market price, no direct effect occurs. If the market price is lower than the price floor, then a surplus will be generated. Minimum wage laws are good examples of price floors.

Task Give examples from real life situations, where a price ceiling or price floor has been imposed.

Notes

Case Study

Demand - Supply and Price of Gold

Last month saw more housewives in the jewellery shops than in any month in the past. There were no big festivals, neither too many marriages. What attracted them was the fall in the price of gold. That was so the world over.

Gold prices have been falling for nearly a decade now. Last week they had drifted to their lowest in the past 18 years. The highest price in the world market was reached in 1980 when it touched $850 an ounce, almost three times the present price. Indian buyers did not experience the full impact because of the restrictions on import of gold. These have been significantly eliminated and the price behaviour in the domestic market now conforms to the international price.

The fall in the price of gold has more to do with the change in demand. Gold has many uses, Jewellery is only of them. It is an industrial metal, a form of saving for the rainy day and an international reserve asset for most central banks. The lure of gold for ornaments remains almost in tact. But as a form of saving or as reserve for the central banks, gold is no longer attractive. It is precisely this loss in trust that has caused the fall in the price of gold.

Gold has become a bad investment. Anyone would weigh an asset in terms of the return it earns, the security it gives and the ready market it enjoys. The last is the best with gold. But with the price going down; investment in gold makes no sense. An investment of ₹ 1,000 in gold in India in 1990 would have fetched today ₹ 1,120. That gives a yield of less than 3 per cent. Not worth the game.

The same investment in equity would have matured into ₹ 1,900 and in bank deposit ₹ 2,200. Gold is no longer a viable investment though the housewife may still buy gold partly for display and partly from ignorance about the alternative opportunities.

The penchant for jewellery is much more in India and West Asia than in most other countries. The world demand for jewellery was 2,807 tonnes last year. Gold that was actually mined was only 1,350 tonnes. The balance came from sales by the central banks. The bankers are hard-nosed fellows and the new generation bankers even more so. For their predecessors gold meant total security. That was not without reasons.

Countries had adopted gold standard and issue of currency had to have commensurate gold backing. The system had continued till the beginning of this century and in a modified form, even later. The final link with gold was given up in 1972, after the oil crisis, when the dollar ceased to be convertible into gold. But the gold hangover continued until the new generation bankers looked at gold only as an income generating asset. It had ceased to be one.

Over the years, the central banks had piled up huge reserves of gold. These currently exceed 37,000 tonnes – equivalent to 12 years' supply. When part of this gold began to come to the market, prices crashed. Netherlands possibly took the lead to empty the central bank coffers of gold. It sold 300 tonnes in four instalments to cut down its gold reserves by a fifth. The big shock came when Australia slashed its reserves by two-thirds. It was a shock because Australia is a major producer of gold.

Argentina came out even more boldly and sold out its entire gold reserve of 124 tonnes for about $1.5 billion. Had it continued with gold, the central bank would have lost $1.5 million for every one per cent fall in the price of gold. With the shift from gold to US treasury bonds which are rated even higher than AAA the central bank would, instead, be earning an income of $80 a year.

Contd...

Notes

The real gold hoarders are the Swiss bankers. They are conservative and gold is the most prized asset for them. However, last October, a panel of experts suggested that the banks sell out a half of their reserves in gold. The report of the panel created big waves. The fear that the central banks will unload their stocks of gold caused panic. Gold prices crashed. The fall was the highest in any single day.

It is not just the mismatch between demand and supply that forced prices to drop so sharply. Gold is a favourite with speculators. Even banks have been indulging in this lucrative activity. Quite a few American banks sold gold short in anticipation of the fall in price and earned a good packet. Speculation has made prices more volatile than what they would have been. Considering the oversupply position, it is the bears that hold the sway.

Will gold prices recover? If they do gold would be a good investment. But they won't. The demand for gold will now be almost exclusively for jewellery and, to a minor extent, for industrial use. Even that demand is dwindling because gold does not have a good resale value and has nearly ceased to be a status symbol for the rich. When most people understand this the demand for gold, even for jewellery, purposes will shrink.

For the present, it may freeze at around 2,500 tonnes. There is no demand at all from the bankers for reserves or for investment. The supply will be from the mines from which 2,300 tonnes are dug out every year. On top of that there will be sale by the central banks.

Even if 2 per cent of the world reserves are disposed off, nearly 700 tonnes of additional supply will enter the market. Again a mismatch between demand and supply is likely which will prevent prices from firming up.

Gold has little future. By and by even its use for ornaments will die out. A bad investment and no longer kept for reserve, gold will be on par with other metals. The switch will be from gold to US treasury bonds for the banks and from gold to equity for the general public. In India, gold will survive a little longer until the public is acquainted with alternative investment opportunities. Eventually, gold is bound to lose its lustre.

Table 1: World Gold Supply and Demand

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Mine production	1908	2063	2133	2159	2234	2287	2278	2273	2257	2464
Official sector sales	-	434	198	111	622	464	81	173	275	406
Old gold Scrap	394	393	530	480	487	574	615	623	640	611
Gold Loans	164	78	5	-	-	-	-	-	-	
Forward sales	126	115	222	96	156	215	158	466	30	329
Option hedging	63	-	7	15	103	-	57	92	101	18
Implied disinvestment	91	2	-	304	-	-	173	-	108	260
Total supply fabrication	2746	3085	3095	3166	3602	3541	3362	3627	3510	4254
Jewellery	1645	2039	2188	2358	2760	2553	2615	2790	2837	3328
Electronics	207	209	216	205	176	180	191	206	211	237
Official coil (sales)	130	141	123	143	93	117	80	84	63	99

Contd...

Notes

Others	147	152	156	162	178	187	194	210	212	226
Total fabrication	2130	2541	2683	2868	3208	3037	3079	3280	3322	3890
Bar Hoarding	461	530	224	252	282	162	231	306	182	337
Official sector purchases	155	-	-	-	-	-	-	-	-	
Gold loans	-	-	-	45	85	65	52	23	5	
Forward sales	-	-	-	-	-	-	-	-	-	
Option hedging	-	15	-	-	-	35	-	-	-	
Implied investment	-	-	188	-	27	242	-	17	-	
Total demand	2746	3085	3095	3166	3602	3541	3362	3627	3510	4254
Gold Price (PM fix,$/oz)	**436.87**	**380.79**	**383.59**	**362.26**	**343.95**	**359.82**	**384.15**	**384.05**	**387.87**	

Question

Analyse the effect of demand and supply on the price of gold with the help of demand supply curves.

3.3 Summary

- Supply is the specific quantity of output that the producers are willing and able to make available to consumers at a particular price over a given period of time.
- According to the Law of Supply, more of a good will be supplied the higher its price, other things constant or less of a good will be supplied the lower its price, other things remaining constant.
- Price is determined by the two forces of demand and supply, in a free market. A point of balance, where demand equals supply is known as market equilibrium.

3.4 Keywords

Equilibrium: A state of balance.

Law of Supply: More of a good will be supplied the higher its price and vice-versa

Supply: Willingness and ability to produce a specific quantity of output available to consumers at a particular price over a given period of time.

3.5 Self Assessment

1. State true or false for the following statements:
   (a) Supply is a positive function of price.
   (b) A trader has 10 bags of cement in his store. This represents supply of cement.
   (c) A supply schedule is a table that represents the various amounts of goods available for supply at various prices.

Notes

(d) When quantity demanded is more than quantity supplied, the prices tend to fall.

(e) Price floor can be imposed by anyone in the market.

2. Fill in the blanks:

(a) As per law of supply, more goods will be supplied at ..... price.

(b) The supply curve is ..... sloping.

(c) There is only one possible price at which quantity supplied is ……. quantity demanded

(d) In price ceiling, price is purposely held……..the equilibrium price.

(e) If the market price is lower than the price floor, then …….. is generated.

(f) ……. is a position at which there is no surplus or shortage in the economy.

3.6 Review Questions

1. Using demand and supply analysis explain why the government might wish to control the price of rice below the market equilibrium price?
2. Using the supply analysis, describe the recent increase in food items worldwide.
3. Over time, the demand for wheat has shifted to the right. Why, do you think, it has occurred?
4. Analyse the impact of taxes and subsidies on the supply of cigarette and LPG
5. Assume yourself as a manager of any FMCG firm. In what ways supply analysis is important for you?
6. Consider the following simplified demand-supply functions

   Demand: $Q = 200 - 2P$

   Supply: $Q = 20 + 4P$

   What are the equilibrium price and quantity sold? (Hint: Just equate demand and supply equations)
7. Given the data below showing the demand and supply of X in a given market:

Price at X per ton (₹)	1	2	3	4	5
Demand at X per period (₹)	25	16	12	10	9
Supply at X per period (Tons)	3	3	12	14	29

   (a) What would be the free market price of X?

   (b) What would be the price if demand increased by 4 tons at every price?

   (c) What would be the effect of a government's imposing of a minimum price of ₹ 5 per ton in the original situation?
8. Discuss the concepts of price ceiling and price floor with examples.

Notes

Answers: Self Assessment

1.	(a)	True	(b)	False	(c)	True	(d)	False
	(e)	False						
2.	(a)	Higher	(b)	Upward	(c)	Equal to	(d)	Below
	(e)	Equilibrium	(f)	equilibrium				

3.7 Further Readings

Books

Dr. Atmanand, *Managerial Economics*, Excel Books, Delhi.

Hague, D.C., *Managerial Economics.*

Haynes, Mote and Paul, *Managerial Economics–Analysis and Cases*, Vakils. Fellner and Simons Private Ltd., Bombay.

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Online links

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http://www.basiceconomics.info/supply-and-demand.php

http://ingrimayne.com/econ/DemandSupply/OverviewSD.html

http://tutor2u.net/economics/revision-notes/as-markets-equilibrium-price.html

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Unit 4: Consumer Behaviour (Utility Analysis)

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Objectives

After studying this unit, you will be able to:

- Discuss the concepts of cardinal and ordinal utility
- State the concepts of equi marginal utility
- Analyse the indifference curve
- Explain the concept of consumer equilibrium and consumer surplus

Notes

Introduction

In economic theory, consumer behavior addresses the concepts of consumer preference and consumer surplus. Consumer surplus is the extra amount a consumer is willing to pay for a good, but he actually paid less for the good. A consumers' surplus can exist only within the context of the concept of diminishing marginal utility. This concept holds that, at some point, consumption of additional incremental quantities of a good will yield successively smaller increases in utility. Thus, it is assumed that an individual will be willing to pay more for the first unit of consumption than for a unit consumed at some point further along.

Notes **Utility Analysis**

The decision of a consumer depends upon the concept of individual benefit, also known as utility. If consumer gets more benefit from the product he will ready to spend more on the product and the vice-versa. Consumers are able to order their preference depending on the utility they get from the consumption of the particular product. Utility can be difficult to measure. No consumer is able to measure the utility in quantitative terms. But he can order his preference according to the satisfaction from the consumption goods. Thus, there are two class of thoughts about the measurement of utility. One states that utility can be measured in numbers or monetary terms, another says that satisfaction utility derived from the consumption of goods can only be ordered. These two distinctions are called cardinal utility and ordinal utility.

4.1 Cardinal and Ordinal Utility

Utility is an economic term referring to the total satisfaction received from consuming a good or service. For example, satisfaction you get by consuming a cup of tea is the utility of that cup of tea. If this measure is given, one may think of increasing or decreasing utility, and thereby explain economic behavior in terms of attempts to increase one's utility. Changes in utility are sometimes expressed in fictional units called utils. There are mainly two kinds of measurement of utility implemented by economists: cardinal utility and ordinal utility.

Utility was originally viewed as a measurable quantity, so that it would be possible to measure the utility of each individual in the society with respect to each good available in the society, and to add these together to yield the total utility of all people with respect to all goods in the society. Society could then aim to maximise the total utility of all people in society, or equivalently the average utility per person. This conception of utility as a measurable quantity that could be aggregated (summed up) across individuals is called cardinal utility.

Cardinal utility quantitatively measures the preference of an individual towards a certain commodity. Numbers assigned to different goods or services can be compared.

Example: For a coffee addict, a utility of 100 utils towards a cup of cappuccino is twice as desirable as a cup of tea with a utility level of 50 utils.

The concept of cardinal utility suffers from the absence of an objective measure of utility. For example, the utility gained from consumption of a particular good by 'A' will be different than 'B'.

Ordinal utility represents the utility, or satisfaction derived from the consumption of goods and services, based on a relative ranking of the goods and services consumed. With ordinal utility, goods are only ranked only in terms of more or less preferred, there is no attempt to determine how much more one good is preferred to another.

Notes

Example: You may prefer to consume or buy more apples than bananas while your friend may prefer to consume or buy more bananas than apple.

The modern economists have discarded the concept of cardinal utility and have instead employed the concept of ordinal utility for analysing consumer behaviour. The concept of ordinal utility is based on the fact that it may not be possible for consumers to express the utility of a commodity in absolute terms but it is always possible for a consumer to tell introspectively whether a commodity is more or less or equally useful as compared to another.

Example: A consumer may not be able to tell that an ice cream gives 5 utils and a chocolate gives 2 utils. But he or she can always tell whether chocolate gives more or less utility than ice cream.

This assumption forms the basis of the ordinal theory of consumer behaviour. Ordinal utility is the underlying assumption used in the analysis of indifference curves.

4.1.1 Marginal Utility Analysis

Marginal utility is an additional utility obtained from the consumption or use of an additional unit of a good. It can be put in other words as the change in total utility divided by the change in quantity. Marginal utility indicates an extra satisfaction from consuming an extra unit. Marginal utility needs to be contrasted with the related term total utility. Marginal utility is the additional amount of satisfaction obtained from consuming one additional unit of a good. Total utility is the overall amount of satisfaction obtained from consuming several units of a good. While the maximization of total utility represents the ultimate goal of consumption, the analysis of consumer behaviour gives greater emphasis on the marginal utility.

As consumer proceeds with his consumption total utility increases as more of a good is consumed, but the marginal utility decreases with the consumption of each additional unit. The decrease in marginal utility with an increase in the consumption of a good reflects law of diminishing marginal utility.

4.1.2 The Law of Diminishing Marginal Utility: Marshillian Approach

Marginal utility refers to the change in satisfaction which results when a little more or little less of that good is consumed.

The law of diminishing marginal utility says that with the increase in the consumption of a good there is a decrease in the marginal utility that person derives from consuming each additional unit of that product.

Assumptions

The basic propositions of this traditional approach are

1. ***Cardinal measure of utility:*** Utility is a measurable and quantifiable concept. A person can specify that he gets five units of utility by consuming one unit of good A etc. Utility is an imaginary unit of measuring utility.
2. ***Independent utilities:*** Utility is additive; the utilities derived from different independent goods can be added to get the measure of total utility.
3. ***Constant marginal utility of money:*** The marginal utility of money remains constant for a particular consumer when he spends money on various goods. All other commodities except money are subject to the law of diminishing marginal utility.

Notes

The "Law of Diminishing Marginal Utility" can be put in other way as total utility increases more and more slowly as the quantity consumed increases. With every additional increase in the consumption the total utility increases but at decreasing rate. It is happens due to the underlying decrease of marginal utility. The value of total utility also declines and it starts declining when the value of marginal utility gets negative. Let us explain it with an example.

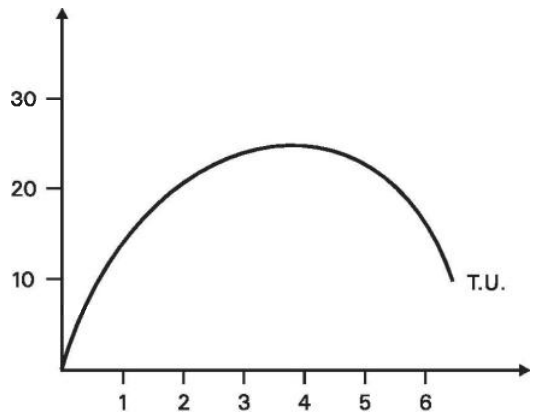
Example: When a thirsty person takes five bottles of cold drink continuously, the consumption of first bottle gives him utility, second bottle gives him lesser utility than first but his total utility increases. Third bottle gives him still less utility but increases total utility. The utility from fourth bottle may be zero as he is no more thirsty. But the fifth bottle may cause uneasiness and thus give negative utility, i.e., the total utility may now actually go down.

Task Do you think there are exceptions to the law of diminishing marginal utility? Explain your opinion with the help of examples.

Table 4.1

Bottle Consumed	Total Utility (Units)	Marginal Utility (Units)
0	0	–
1	14	14
2	23	9
3	27	4
4	27	0
5	24	–3
6	18	–6

Figure 4.1



According to the law of diminishing marginal utility when a person consumes more and more units of a good his total utility increases while the extra utility derived from consuming successive units of the good diminishes. The total utility reaches a maximum value when marginal utility approaches zero and then total utility starts declining.

Notes

4.2 Law of Equi-marginal Utility

The Law of Equi-Marginal Utility is an extension to the law of diminishing marginal utility. The principle of equi-marginal utility explains the behavior of a consumer in distributing his limited income among various goods and services. This law states that how a consumer allocates his money income between various goods so as to obtain maximum satisfaction.

Assumptions

The principle of equi-marginal utility is based on the following assumptions:

1. The wants of a consumer remain unchanged.
2. He has a fixed income.
3. The prices of all goods are given and known to a consumer.
4. He is one of the many buyers in the sense that he is powerless to alter the market price.
5. He can spend his income in small amounts.
6. He acts rationally in the sense that he want maximum satisfaction.
7. Utility is measured cardinally. This means that utility, or use of a good, can be expressed in terms of "units" or "utils". This utility is not only comparable but also quantifiable.

Principle

Suppose there are two goods 'x' and 'y' on which the consumer has to spend his given income. The consumer's behavior is based on two factors:

1. Marginal Utilities of goods 'x' and 'y'
2. The prices of goods 'x' and 'y'

The consumer is in equilibrium position when marginal utility of money expenditure on each good is the same.

Mathematically, the law can be explained by the help of the following formula:

MU of good A/ Price of A = MU of good B/ Price of B

In any case when the Marginal Utilities of the goods A and B are unequal, the consumer will purchase a combination that will give him highest Marginal Utility per dollar value of each good, in such a way that the entire budget amount is spent.

Example: A firm has a total capital of ₹ 100 million which it has the option of spending on three projects, A, B, and C. Each of these projects requires a unit expenditure of ₹ 10 million. Suppose also that the marginal productivity schedule of each unit of expenditure on the three projects is given as shown in the following table.

Units of Expenditure (₹ 10 million)

Marginal Productivity (MP)	Project A	Project B	Project C
1st	501	403	354
2nd	452	305	306
3rd	357	208	209
4th	2010	10	15
5th	10	0	12

Notes

Going by the equi-marginal principle, the firm will allocate its total resource (₹ 100 million) among the projects A, B and C in such a way that marginal product of each project is the same i.e., $MP_A = MP_B = MP_C$.

It can be seen from the above table that going, by this rule, the firm will spend 1st, 2nd, 7th, and 10th unit of finance on project A, 3rd, 5th, and 8th unit on Project B, and 4th, 6th, and 9th unit on project C. In all, it puts 4 units of its finances in project A, 3 units each in projects n and C. In other words, of the total finances of ₹ 100 million, a profit maximization firm would invest ₹ 40 million in project A, ₹ 30 million each in projects B and C.

4.3 Indifference Curves and its Properties

An indifference curve may be defined as the locus of points. Each point represents a different combination of two substitute goods, which yields the same utility or level of satisfaction to the consumer. Therefore, he/she is indifferent between any two combinations of goods when it comes to making a choice between them. Such a situation arises because he/she consumes a large number of goods and services and often finds that one commodity can be substituted for another. This gives him/her an opportunity to substitute one commodity for another, if need arises and to make various combinations of two substitutable goods which give him/her the same level of satisfaction. If a consumer faced with such combinations, he/she would be indifferent between the combinations.

Example: If a consumer is asked whether he prefers combination 1 of two goods X and Y (assuming that the market price of X and Y are fixed) or combination 2, he may give one of the following answers:

1. he prefers combination 1 to 2
2. he prefers combination 2 to 1
3. he is indifferent about combinations 1 and 2.

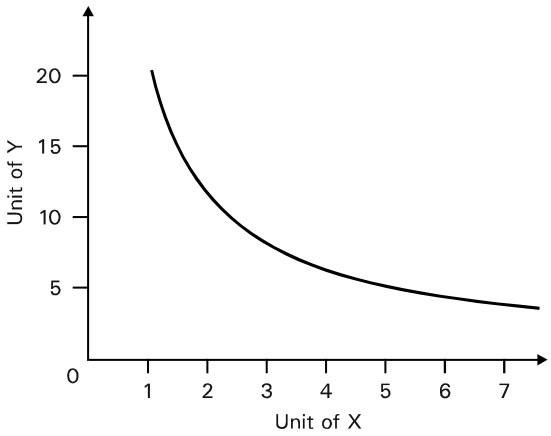
The third answer implies that the consumer prefers 1 as much as 2. There may be some more combinations of goods X and Y which are equally preferable to him. Suppose, there are five different combinations of X and Y, that gives him the same level of satisfaction (shown in Table).

Indifference Combination of X and Y Goods

Combination	Units of X	Units of Y
1	3	21
2	4	15
3	5	11
4	6	8
5	7	6

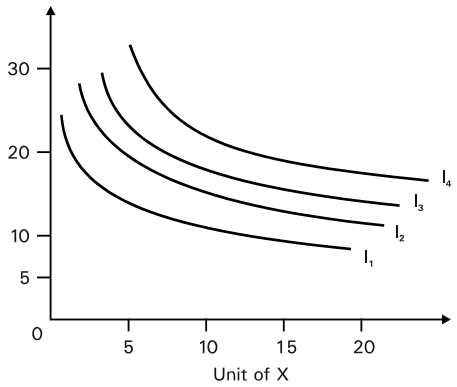
Notes

Figure below shows the indifference curve drawn on the basis of the figure give in table. It depicts, in general, all combinations of two goods which yield the same level of satisfaction to the consumer. The consumer is indifferent about any two points lying on this curve.



Indifference Curve

An indifference curve of a consumer represents a particular level of satisfaction for the consumer. A consumer may, infact, identify a large number of such curves each representing a different level of satisfaction. An indifference map gives a complete description of a consumer's tastes and preferences as shown in Figure below to show the different satisfaction levels.



4.3.1 Assumptions

The following assumptions about the consumer psychology are implicit in indifference curve analysis:

1. ***Transitivity:*** If a consumer is indifferent to two combinations of two goods, then he is unaware of the third combination also.
2. ***Diminishing marginal rate of substitution:*** The rarer the availability of a good, the greater is its substitution value. For example, water has a high substitution value as it is a scarce resource.
3. ***Rationality:*** The consumer aims to maximise his total satisfaction and has got complete market information.
4. ***Ordinal utility:*** Utility in this approach is not measurable. A consumer can only specify his preference for a particular combination of two goods, he cannot specify how much.

Notes

4.3.2 Properties of Indifference Curve

Indifference curves have the four basic characteristics:

1. Indifference curves have a negative slope
2. Indifference curves are convex to the origin
3. Indifference curves do not intersect nor are they tangent to one another
4. Upper indifference curves indicate a higher level of satisfaction.

These characteristics or properties of indifference curves, in fact, reveal the consumer's behaviour, his choices and preferences. They are, therefore, very important in the modern theory of consumer behaviour. Now, we will observe their implications.

Indifference Curves have a Negative Slope

In the words of Hicks, "so long as each commodity has a positive marginal utility, the indifference curve must slope downward to the right".

The negative slope of indifference curve implies-

1. that the two commodities can be substituted for each other
2. that if the quantity of one commodity decreases, quantity of the other commodity must increase so that the consumer stays at the same level of satisfaction.

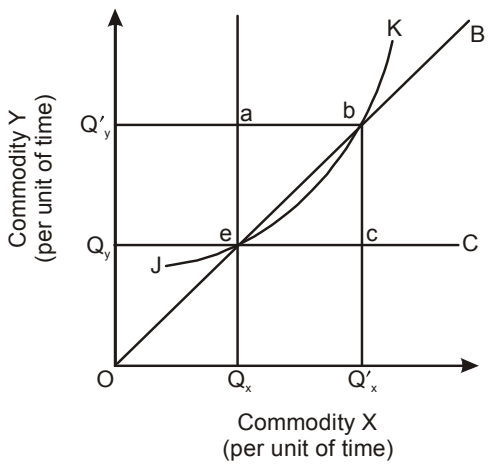
Example: Suppose you consume 10 apples and 20 bananas in a day, which gives you a particular level of satisfaction. Now, if you consume 2 apples less, without increasing the number of bananas, you will be at a lower level of satisfaction. You must consume 1 banana more, to remain at the same satisfaction level. If you don't do so, the bundle of goods (apples and bananas together) gets smaller and you will not get as much satisfaction.

The consumer's satisfaction cannot remain the same if indifference curves have a positive slope ($\Delta Y/\Delta X>0$) or if slope is equal to infinity ($\Delta Y/\Delta X>\infty$).

(***Note***: $\Delta Y/\Delta X$ gives the slope of the indifference curves)

These situations are shown in Figure 4.2 through inconsistent indifference curves.

Figure 4.2: Inconsistent Indifference Curves



Notes

Let us suppose that the consumer is initially at point *e* where he/she is deriving some utility from OQ_x of X and OQ_y of Y. If an indifference curve has a positive slope (i.e., $\Delta Y/\Delta X>0$); as shown by the line OB and curve JK, it implies that the consumer is equally satisfied with larger and smaller baskets of X and Y. This means an irrational behaviour of the consumer.

For instance, if the consumer moves from point *e* to *b*, the combination of the two goods increases by *ea* (= bc) of Y and *ec* (= ab) of X. Unless *MU* of *ea* and *ec* are equal to zero, the level of satisfaction is bound to increase whereas on an indifference curve, the total utility is supposed to remain the same. Therefore, line OB and curve JK cannot be indifference curves.

Similarly, in the case of a vertical indifference line, aQ_x, and the movement from *e* to *a* means an increase in the quantity of Y by *ea*, while quantity of X remains the same, OQ_x. If MU of $ea>0$, the total utility will increase. So is the case if an indifference curve takes the shape of a horizontal line such as Q_yC.

Indifference Curves are Convex to Origin

Indifference curves are not only negatively sloped but are also convex to the origin. The convexity of the indifference curves implies two properties:

1. The two commodities are imperfect substitutes for one another
2. The Marginal Rate of Substitution (MRS) between the two goods decreases as a consumer moves along an indifference curve. This characteristic of indifference curves is based on the assumption of diminishing marginal rate of substitution.

The assumption of diminishing MRS, as mentioned above, states an observed fact that if a consumer substitutes one commodity (X) for another (Y), his willingness to sacrifice more units of Y for one additional unit of X decreases, as quantity of Y decreases. There are two reasons for this:

1. Two commodities are not perfect substitutes for one another.
2. MU of a commodity increases as its quantity decreases and vice versa.

Therefore, more and more units of the other commodity are needed to keep the total utility constant.

Indifference Curves can neither Intersect nor be Tangent to one Another

If two indifference curves intersect or are tangent with one another, it will reflect two rather impossible conclusions:

1. that two equal combinations of two goods yield two different levels of satisfaction
2. that two different combinations – one being larger than the other-yield the same level of satisfaction.

Such conditions are impossible if the consumer's subjective valuation of a commodity is greater than zero. Besides, if two indifference curves intersect, it would mean negation of consistency or transitivity assumption in consumer's preferences.

Let us now see what happens when two indifference curves, IC and IC', intersect each other at point A (Figure 4.3).

Point A falls on both the indifference curves, IC and IC'. It means that the same basket of goods (OM of X + AM of Y) yields different levels of utility below and above point A on the same indifference curve.

Notes

The inconsistency that two different baskets of X and Y yield the same level of utility can be proved as follows.

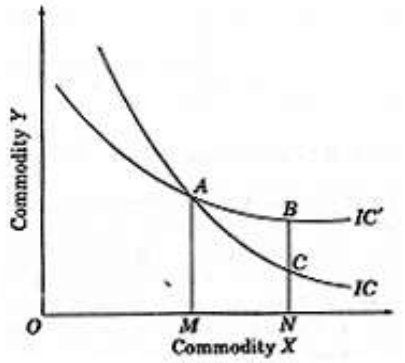
Consider two other points: point B on indifference curve IC′ and point C on indifference curve IC both being on a vertical line.

Points A, B and C represent three different combinations of commodities X and Y. Let us call these combinations as A, B and C, respectively. Note that combination A is common to both the indifference curves.

The intersection of the two indifference curves implies that in terms of utility, A=B; and A=C; therefore A=C. But if B = C it would mean that in terms of utility,

ON of X + BN of Y = ON of X + CN of Y

Figure 4.3: Intersecting Indifference Curves



Since ON of X is common to both the sides, the above equation would mean that

BN of Y = CN of Y

But Figure 4.3 shows BN> CN. Therefore, combinations Band C cannot be equal in terms of satisfaction. The intersection, therefore, violates the transitivity rule, which is a logical necessity in indifference curve analysis. The same reasoning is applicable when two indifference curves are tangent with each other.

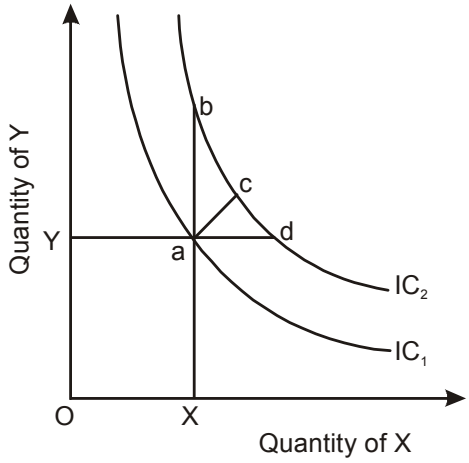
Upper Indifference Curves represent a Higher Level of Satisfaction

An indifference curve placed above and to the right of another represents a higher level of satisfaction than the lower one. In Figure 4.4, indifference curve IC_2 is placed above the curve IC_1. It represents, therefore, a higher level of satisfaction.

The reason is that an upper indifference curve contains all along its length a larger quantity of one or both the goods than the lower indifference curve. And a larger quantity of a commodity is supposed to yield a greater satisfaction than the smaller quantity of it, provided MU>0. For instance, consider the indifference curves IC_1 and IC_2 in, Figure 4.4.

Notes

Figure 4.4: Comparison between Lower and Upper Indifference Curves



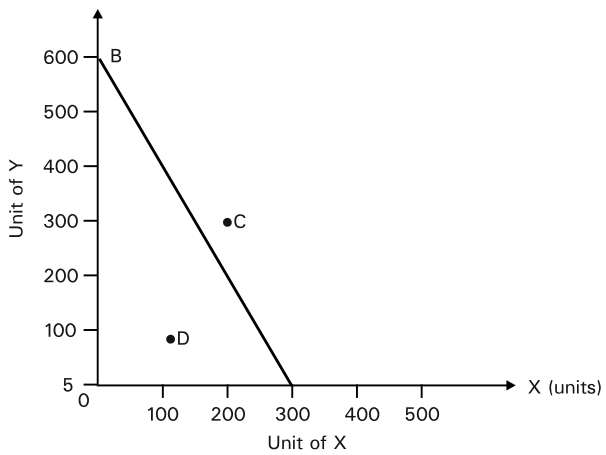
The vertical movement from point a on the lower indifference curve IC_1 to point b and Quantity of X on the upper indifference curve IC_2, means an increase in the quantity of Y by *ab*, the quantity of X remaining the same (OX). Similarly, a horizontal movement from point a to d means a greater quantity (*ad*) of commodity X, quantity of Y remaining the same (OY). The diagonal movement from *a* to *c*, means a larger quantity of both X and Y. Unless, the utility of additional quantities of X and Y are equal to zero, these additional quantities will yield additional utility.

Therefore, the level of satisfaction indicated by the upper indifference curve (IC_2) would always be greater than that indicated by the lower indifference curve (IC_1).

4.3.3 Budget Line

The budget line is also known as the price line, the consumption possibility line or the price opportunity line. It represents different combinations of two goods X and Y which the consumer can buy by spending all his income.

Example: A consumer having ₹ 1200 as income can buy 600 units of Y at ₹ 2 per unit or 300 units of X at ₹ 4 per unit as shown in Figure below. The straight line joining the two points A and B is called the budget line.



Budget Line

Notes

At any point on AB, the consumer spends all his income but point C is unattainable. At point D or any other point in DOAB he does not spend all his income.

4.4 Consumer's Equilibrium with Cardinal Approach

Caution Law of Equi-marginal Utility or the principle of Equi-marginal utility says that the consumer would maximise his utility if he allocates his expenditure on various goods he consumes such that the utility of the last rupee spent on each good is equal.

Suppose the consumer's utility function is U = u (X). The consumer buys X. His total expenditure is X. P_x.

Presumably, he wants to maximise the difference between his utility and expenditure

$$L = U(X) - X.\ P_x$$

By way of first order condition

$$\frac{dL}{dx} = \left[\frac{du}{dx} - P_x\right] = 0$$

The term $\frac{du}{dx}$ stands for marginal utility X, MU_x, and P_x stands for price of X.

Thus at equilibrium,

$$MU_x = P_x \text{ and} \qquad \ldots \text{ i}$$

$$MU_y = P_y \text{ and} \qquad \ldots \text{ ii}$$

or $$\frac{MU_x}{MU_y} = \frac{P_x}{P_y} \qquad \ldots \text{ iii}$$

Then by cross-multiplying, we get

$$MU_x.P_y = MU_y.P_x \qquad \ldots \text{ iv}$$

or $$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} \qquad \ldots \text{ v}$$

And note by definition

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = MU_m, \text{ which is constant} \qquad \ldots \text{ vi}$$

Where,

MU_m = Marginal Utility of money

MU_x, MU_y = Marginal Utility of X and Y

P_x, P_y = Unit price of X and Unit Price of Y respectively.

The proportionality rule stated above (v) is the tenet of the Law of Consumer Equilibrium. The assumption of diminishing marginal utility proportionality rule when considered along with equi marginal concept imply that a single price prevails for a commodity in the market. This is true of a perfectly competitive market.

Notes

Caselet

Should Canada Legalise Marijuana?

The war on drugs is an expensive battle, as a great deal of resources go into catching those who buy or sell illegal drugs on the black market, prosecuting them in court, and housing them in jail. These costs seem particularly exorbitant when dealing with the drug marijuana, as it is widely used, and is likely no more harmful than currently legal drugs such as tobacco and alcohol. There's another cost to the war on drugs, however, which is the revenue lost by governments who cannot collect taxes on illegal drugs. In a recent study for the Fraser Institute, Canada, Economist Stephen T. Easton attempted to calculate how much tax revenue the government of the country could gain by legalising marijuana.

The study estimates that the average price of 0.5 grams (a unit) of marijuana sold for $8.60 on the street, while its cost of production was only $1.70. In a free market, a $6.90 profit for a unit of marijuana would not last for long. Entrepreneurs noticing the great profits to be made in the marijuana market would start their own grow operations, increasing the supply of marijuana on the street, which would cause the street price of the drug to fall to a level much closer to the cost of production. Of course, this doesn't happen because the product is illegal; the prospect of jail time deters many entrepreneurs and the occasional drug bust ensures that the supply stays relatively low. We can consider much of this $6.90 per unit of marijuana profit a risk-premium for participating in the underground economy. Unfortunately, this risk premium is making a lot of criminals, many of whom have ties to organized crime, very wealthy.

Stephen T. Easton argues that if marijuana was legalized, we could transfer these excess profits caused by the risk-premium from these grow operations to the government:

If we substitute a tax on marijuana cigarettes equal to the difference between the local production cost and the street price people currently pay – that is, transfer the revenue from the current producers and marketers (many of whom work with organized crime) to the government, leaving all other marketing and transportation issues aside we would have revenue of (say) $7 per [unit]. If you could collect on every cigarette and ignore the transportation, marketing, and advertising costs, this comes to over $2 billion on Canadian sales and substantially more from an export tax, and you forego the costs of enforcement and deploy your policing assets elsewhere.

One interesting thing to note from such a scheme is that the street price of marijuana stays exactly the same, so the quantity demanded should remain the same as the price is unchanged. However, it's quite likely that the demand for marijuana would change from legalization. We saw that there was a risk in selling marijuana, but since drug laws often target both the buyer and the seller, there is also a risk (albeit smaller) to the consumer interested in buying marijuana. Legalization would eliminate this risk, causing the demand to rise. This is a mixed bag from a public policy standpoint: Increased marijuana use can have ill effects on the health of the population but the increased sales bring in more revenue for the government. However, if legalized, governments can control how much marijuana is consumed by increasing or decreasing the taxes on the product. There is a limit to this, however, as setting taxes too high will cause marijuana growers to sell on the black market to avoid excessive taxation.

When considering legalizing marijuana, there are many economic, health, and social issues we must analyze. One economic study will not be the basis of Canada's public policy decisions, but Easton's research does conclusively show that there are economic benefits in the legalization of marijuana. With governments scrambling to find new sources of revenue to pay for important social objectives such as health care and education expect to see the idea raised in Parliament sooner rather than later.

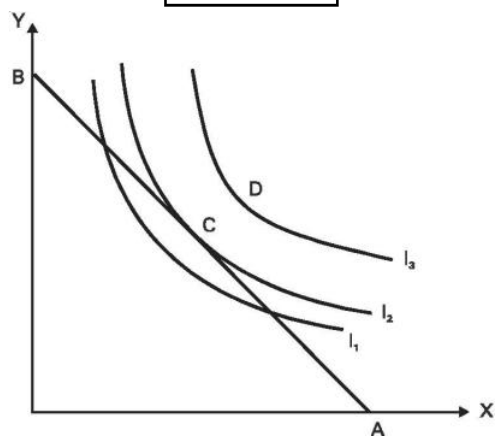
Notes

4.5 The Consumer's Equilibrium with Ordinal Approach

If we superimpose the indifference map and budget line as in Figure shown above, we find that a consumer has to decide to purchase a particular combination (C) as it falls on his budget line, though a different combination (D) would be more desirable as it will give a higher level of satisfaction. At his point of equilibrium C, the price line is touching the indifference line tangentially meaning that the slopes are equal. The slope of indifference curve indicates the marginal rate of substitution between X and Y, and the slope of budget line indicates the ratio of price of X to that of Y. Thus the principle of consumer's equilibrium works out; the marginal rate of substitution between X and Y must be proportional to the ratio of price of X to that of Y.

$$MRS_{xy} = \frac{P_x}{P_y}$$

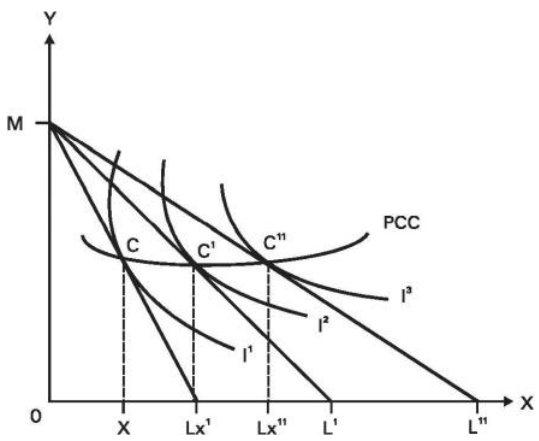
Figure 4.5



4.5.1 Changes in Price

According to the price consumption curve, if the price of X falls, the new budget or price line becomes M-L^1, as more of X can be brought out of the given budget and thus C^1 becomes the new equilibrium point. If the price of X falls again, the price of Y and budget remaining same, the new equilibrium point shifts to C^{11}. The line connecting such successive equilibrium points at C, C^1 and C^{11} is called PCC or price consumption curve.

Figure 4.6

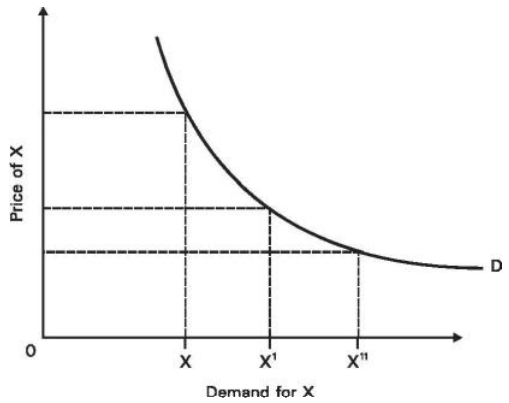


Notes

4.5.2 PCC and Demand Curve

The individual consumer demand curve for the commodity X can be derived from the price consumption curve. For example, when the price of X is given by the slope of ML, the amount of X demanded is OX^{11}; when the price of X is given by slope ML^1, OX^1 amount of X is purchased; and OX is purchased at a price of X denoted by the slope of ML^{11}. Thus the price consumption relations when taken out and plotted separately in Figure 4.7 gives the demand curve, D.

Figure 4.7



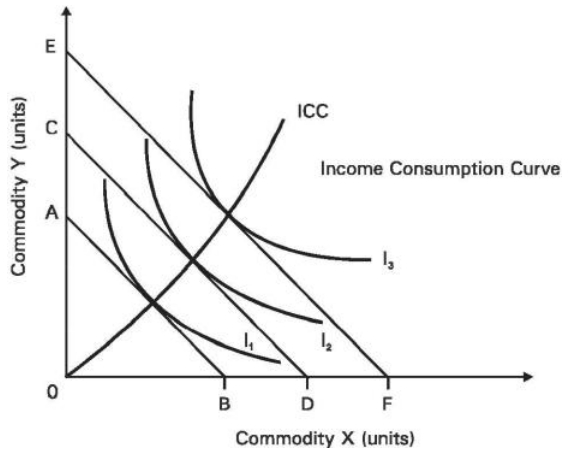
4.5.3 Income of the Consumer

When the price of the commodity X changes, the real income position of the consumer also changes and this has a considerable effect on the consumer's demand.

The traditional marginal utility analysis ignored this income-effect assumption of constant marginal utility of money spent. The indifference analysis considers this income effect, because it is an important determinant of demand.

Figure 4.8 shows three parallel budget lines corresponding to three different levels of the consumer's income which he spends on goods X and Y, the points E_1, E_2, and E_3 being the three equilibrium points. The curve joining such equilibrium points is known as the Income Consumption Curve (ICC). The slope of the budget line depends on the price ratio and hence remains constant.

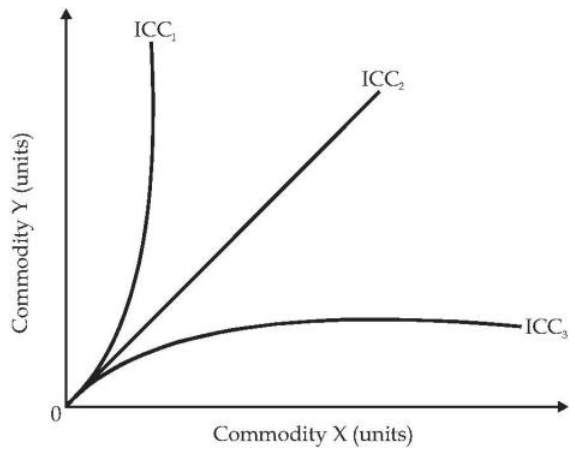
Figure 4.8



Notes

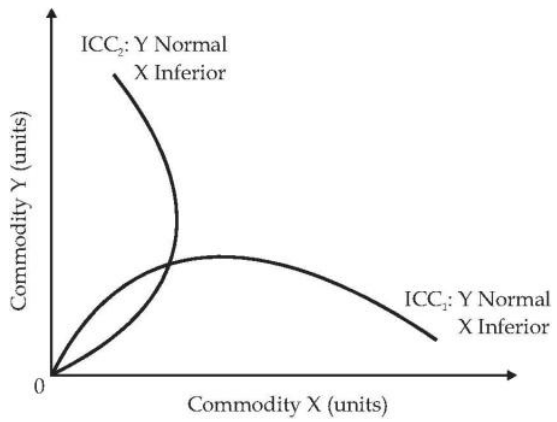
In case both commodities X and Y are normal goods the income consumption curve can take one of the shapes shown in Figure 4.9.

Figure 4.9



In case X is a normal good but Y an inferior good the income consumption curve would take the shape depicted as ICC_1 in Figure 4.10. This implies that as the income of the consumer increases he buys more of both X and Y up to a point and beyond that he buys more of X and less of Y. The curve ICC_2 in Figure 4.10 depicts the case when X is an inferior good and Y is a normal good.

Figure 4.10



4.5.4 Price of Related Goods

Almost all the goods that a consumer purchases in a market are "related goods" either by way of complementarity or substitutability. X and Y are compliments if the rise in demand of X increases the demand for Y, e.g., pen and ink, bread and butter, etc. X and Y are substitutes, if the rise in demand for x reduces the demand for Y, e.g., tea and coffee.

Notes

Did u know? Price Effect (KM) = Substitution Effect (KL) + Income Effect (LM).

The price effect can be broken up into two parts: income effect and substitution effect. Income effect occurs due to increase (decrease) in real income resulting from a decrease (increase) in the price of a commodity. Substitution effect occurs due to the consumer's inherent tendency to substitute cheaper goods for relatively expensive ones.

Task Assign a measure of utility you are putting into your various subjects. Do your study habits follow the principle of rational choice?

Case Study

Auto Industry — Economic Slowdown as a Determinant of Demand

Automobile sector is taken as the indicator of a modern and liberalised industrial India. But as of now there is not much to write in praise of this star-studded sector with gleaming Fords, Astras and Cielos. There is a gloom in this sector as on date. The economic slowdown has led to unexpected downturn in demand.

With the first quarter of the current financial year (1997-98) having ended, the ₹ 30,000 crore automobile industry has shown very little signs of a much hoped for recovery from the massive slowdown it registered last year. In fact it has shown continuous signs of a decline in growth with most segments cutting down production due to poor sales and inventory pile up. After witnessing whopping sales in 1995-96, the slowdown in the last fiscal year was viewed by many as the inevitable correction in growth. However, the continuing depressed condition has come as a dampener to the entire industry.

After becoming a blue-chip industry soon after the government liberalised the economy, the automobile industry has been growing at break-neck pace, almost to the point of being dubbed an overhead industry. The 1995-96 financial year saw the industry grow by around 30%, the luxury car segment by nearly 130 per cent. Last year the growth rates came back to normal figures, registering a decline of over 10 per cent. Worst affected was the luxury car segment – from a 132% growth rate it registered a negative growth. Though experts were quick to dismiss last year's poor performance, vis-à-vis 1995-96, as a correction, the continuing depressed conditions are beginning to worry manufacturers as inventories have started to pile up. With the general economy itself showing signs of a lethargy the chances of a speedy recovery by the automobile industry look anything but likely.

Production and sale of vehicles has registered declining growths in the first two months of the financial year according to the latest data released by the Association of Automobile Manufacturers (AIAM). The only segment that was able to register any impressive growth, both in production and sales, was the motor cycles segment. Despite the strong growth of the solitary segment, the entire automobile industry showed a declining growth.

While automobile production showed a negative two per cent growth the sales were dipping at a fraction over 0.6%. Worst affected were the scooter segment (production down 14% and sales down 9%) and mopeds (production down 13% and sales 11%).

The poor sales of heavy commercial vehicles virtually sums up the performance of the automobile industry. The industry is peculiar in the sense that most of the sales here take place through hire purchase or financing. While the three major heavy truck manufacturers

Contd...

Notes

did not cut down production in the first two months, their sales were down by a massive 19.8 per cent. The entire industry was reeling under the liquidity crunch last year. The effects of this do not seem to have worn out as evident from sales figures. With the general economy not picking up, the demand for the heavy vehicles too has come down. In such a situation a cut in production might be very pronounced in the coming months in this segment.

The light commercial vehicle segment was no different either. Boosted by the sales of Tata 'Sumo' last year, the light commercial vehicle segment has already shown signs of its inability to sustain the tempo. Though 'Sumo' continued to do well and improve its market share, the players in this segment cut down production by about two per cent. However, the effect on sales was even more significant as it dipped by nearly 9.5 per cent. No different was the case of luxury cars either. Although the car segment as a whole was able to post a growth in sales of 2.6 per cent, for the second time in a row the luxury car segment was able to grow only in single digits. Now that the base has widened much more, the days of a double digit growth in any of these segments is a near impossibility.

Table 1: Production and Sales in April-May 1996-98

	Production 1997-98	Variation 1996-97	Production 1997-98	Variation 1996-97		
HCV	216.30	211.53	2.25	154109	192272	-19.80
LCV	21870	22293	-1.89	18682	20617	-9.38
Cars	60593	60415 0.29	58850	57360	2.59	
Utility Veh.	71083	71239	-0.22	69471	69216	0.37
Scooters	189414	220645 -14.15	191457	211233	-9.37	
Motor cycles	172703	140659 22.78	168337	136916	22.93	
Mopeds	92470	10701	-13.59	89122	100969	-11.73

Question

How did slowdown affect the can industry?

4.6 Consumer Surplus

Consumer surplus is the satisfaction that a consumer obtains from a good over and above the price paid. This is the difference between the maximum demand price that buyers are willing to pay and the price that they actually pay. A related notion from the supply side of the market is producer surplus.

Example: Suppose, for example, that Rahul is willing and able to pay ₹ 30 for a packet of chips. This is his demand price. However, the going market price, the actual price that everyone pays for a packet of chips is ₹ 25. While Rahul is willing and able to pay ₹ 30, he pays only ₹ 25. He receives a ₹ 5 consumer surplus on this purchase.

A comparable surplus from the supply side of the market is producer surplus. It is the revenue that a producer obtains from a good over and above the price paid. This is the difference between the minimum supply price that sellers are willing to accept and the price that they actually receive.

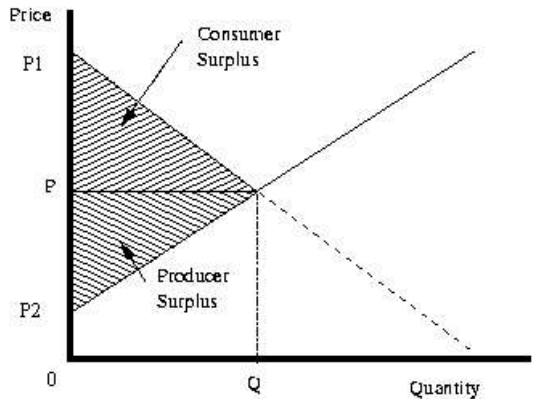
Example: Suppose that ABC Chips Producer is willing and able to accept ₹ 20 for a packet of chips. This is its supply price. This is what it needs to receive to cover production cost. However, the going market price, the actual price that everyone pays for a packet of chips is ₹ 25. While ABC Chips Producer is willing and able to accept ₹ 20, it receives ₹ 25. It receives ₹ 5 producer surplus on this sale.

Notes

A Diagrammatic Representation

The demand curve shows the quantum of demand at various potential prices, just as the supply curve shows the supply level to the market at various potential prices. For example, at too high a price like OP_1, there is no demand and at too low a price OP_2, there is no supply. Consumable quantities are indicated by the demand curve and marketable supplies are indicated by the supply curve.

Figure 4.11: Consumer and Producer Surplus



When OP gets settled as the actual equilibrium price, we can work out the area of:

1. ***Consumer's Surplus:*** The **upper triangle** represents the difference between the potential price and actual price paid by the buyers for all the units between O and Q.
2. ***Producer's Surplus:*** The **lower triangle** represents the difference between the potential price and actual price charged by the supplier for all the units between O and Q.

Note that at Qth unit of output and price P, there is neither consumer's surplus nor producer's surplus. OP is that equilibrium price at which we have zero consumer surplus and zero producer surplus.

4.7 Summary

- Marginal utility means the utility derived by consuming every next unit of same thing.
- According to the law of diminishing marginal utility when a person consumes more and more units of a good his total utility increases while the extra utility derived from consuming successive units of the good diminishes.
- Law of Equi-marginal Utility or the principle of Equi-marginal utility says that the consumer would maximise his utility if he allocates his expenditure on various goods he consumes such that the utility of the last rupee spent on each good is equal.
- Independent curve shows all combinations of two goods which yield the same level of satisfaction to the consumer. The consumer is indifferent about any two points lying on this curve.
- Budget line represents different combinations of two goods X and Y which the consumer can buy by spending all his income.
- The indifference curve analysis considers the income effect. Change in the price of commodity will change the real income position.

Notes

- Indifference curve also considers the effect of substitution goods.
- When the demand price is generally greater than the price actually paid, most consumers under most circumstances receive some surplus of satisfaction. It is known as consumer surplus.
- When the supply price is less than the price actually received, most producers under most circumstances receive some surplus of revenue. It is known as producer surplus.

4.8 Keywords

Budget line: It represents different combination of two goods which the consumer can buy by spending all his incomes

Cardinal measure of utility: Utility is a measurable and quantifiable

Marginal utility: Utility derived from every next unit

Price consumption curve: The line connecting such (drawn because of change in price) successive equilibrium points is called PCC or price consumption curve

The indifference curve: The curve at which satisfaction is equal at each point

4.9 Self Assessment

1. State true or false for the following statements:
   (a) With more units of consumption total utility increases and marginal utility also increases.
   (b) The total utility reaches a maximum value when marginal utility approaches zero.
   (c) The law of demand can be derived from the law of diminishing marginal utility.
   (d) Assumption of ordinal utility implies that utility is not measurable.
   (e) The utilities derived from different independent goods cannot be added.
   (f) Almost all the goods in a market are related goods either by way of complementarity or substitutability.
   (g) The traditional marginal utility analysis ignored the income - effect assumption of constant marginal utility of money spent.
2. Fill in the blanks:
   (a) Indifference curve represents a particular level of ..... .
   (b) Budget line is also known as the ..... .
   (c) The slope of indifference curve indicates the ..... .
   (d) The consumer is ..... about any two points on the indifference curve.
   (e) The concept of Ordinal Utility was given by ..... .
   (f) The total utility reaches a maximum value, when marginal utility approaches .....
   (g) The goal of consumption is to maximize ..... .
   (h) The law of diminishing marginal utility assumes constant marginal utility of .....

Notes

4.10 Review Questions

1. Examine how the concept of Diminishing Marginal Utility can help to explain the downward slope of the demand graph.
2. Suppose Charlie Parker CDs cost $10 apiece and Lester Young CDs cost $5 apiece. You have $40 to spend on CDs. The marginal utility that you derive from additional CDs is as follows:

   # of CDS ---------- Charlie Parker --------- Lester Young

   Have 0 buy number 1 ---------- 60 ---------- 30

   Have 1 buy number 2 ---------- 40 ---------- 28

   Have 2 buy number 3 ---------- 30 ---------- 24

   Have 3 buy number 4 ---------- 20 --------- 20

   Have 4 buy number 5 ---------- 10 --------- 10

   How many of each CD would you buy? Suppose the price of a Lester Young CD rises to $10. How many of each CD would you buy? Use this to show how the principle of rational choice leads to the law of demand.
3. Discuss the law of diminishing marginal utility with the help of an illustrate schedule and a corresponding graph.
4. Which of the following examples best shows the Law of Diminishing Marginal Utility and why?
   (a) Raina is happier after buying her fifth pair of shoes than she was after only four pairs.
   (b) A reasonably fat Motumal gets sick after eating too many Burgers.
   (c) Ramnaresh loves cheeseburgers but finds that the third burger did less to increase his happiness than the second burger did.
5. Give at least five examples to show how the law of diminishing marginal utility relates to everyday life?
6. Every utility function uniquely determines the ordinal preferences, but for any ordinal preferences, there are many utility functions that represent those preferences. Is this statement true or false? Explain with reasons.
7. Manish is a typical economics graduate student and consumes 2 goods: economics text books and coffee. He also earns a part time earning of ₹ 2000 a month. He can either spend it all on books and get 5 or on coffee and get 20 cups.
   (a) Given this information, construct the equation for Manish's budget line (put books on the x-axis and coffee on the y-axis).
   (b) The following are the bundles that Manish can afford with his income:

Books	Coffee
1	
	0
	8
2	

   In the above table, fill in the blanks with the quantities that will exhaust Manish's income.

Notes

(c) Manish gets a research grant and his income increases to ₹ 4000 a month. What is the new equation of his budget line? What if income stays constant at ₹ 2000, and the price of a book increases to ₹ 5000?

(d) Assume that prices are the same as used in part a. If the marginal utility of a book is 20, what is the marginal utility of coffee if he is maximizing his utility?

(e) Now assume that textbooks and coffee are complements for Manish. For him to consume one textbook, he needs 1 cup of coffee. How many textbooks does he consume given his income of ₹ 2000, and the prices used in part a? What if economics is so boring that Manish needs 2 coffees for every book that he consumes?

8. Discuss with example the law of marginal utility.

9. Assign a measure of utility to the study you are putting into your various courses. Do your study habits follow the principle of rational choice?

10. What assumptions would you never alter while working on the theory of individual choice and why?

11. The marginal utility of consumption of good A is 40; it changes by 2 with each change in good A consumed. The marginal utility of consumption of another good B is also 40 but changes by 3 with each change in good B consumed. The price of good A is ₹ 20 and the price of good B is ₹ 30. How many of good A and good B should you consume?

12. Why do you think that the law of Equi-marginal utility holds under perfectly competitive market.

13. The following table shows the marginal utility of your consumption of three goods, A, B and C.

Units of Consumption	MU of A	MU of B	MU of C
1	20	25	45
2	18	20	30
3	16	15	24
4	14	10	18
5	12	8	15
6	10	6	12

(a) Good A costs ₹ 80 per unit, and good B costs ₹ 40 and good C costs ₹ 120. How many units of each should be consumed with ₹ 480 to maximise utility?

(b) How will the answer change if the price of B rises to ₹ 80?

14. Explain the properties of indifference curves with the help of suitable examples.

15. Explain the concepts of consumer and producer surplus with help of an example and figure.

Answers: Self Assessment

1. (a) False (b) True (c) True (d) True
   (e) False (f) True (g) True
2. (a) satisfaction (b) price line (c) marginal rate of substitution
   (d) indifferent (e) J.R. Hicks (f) zero
   (g) total utility (h) money

Notes

4.11 Further Readings

Books

Dr. Atmanand, *Managerial Economics,* Excel Books, Delhi.

Hague, D.C., *Managerial Economics*.

Haynes, Mote and Paul, *Managerial Economics — Analysis and Cases,* Vakils. Fellner and Simons Private Ltd., Mumbai.

Introduction to Managerial Economics, Hutchinson University Library.

Malcolm P. McNair and Richard S. Meriam, *Problems in Business Economics,* McGraw-Hill Book Co., Inc.

Online links

http://www.flatworldknowledge.com/node/28303#web-28303

http://www.vazecollege.net/Micro_Economics_Part_II.pdf

http://www.oup.com/uk/orc/bin/9780199296378/01student/advanced/02indifference/

http://tutor2u.net/economics/revision-notes/as-markets-consumer-surplus.html

Unit 5: Elasticity of Demand

Notes

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Objectives

After studying this unit, you will be able to:

- Calculate price elasticity of demand
- Explain the income elasticity of demand concept
- State how cross elasticities of demand are calculated

Introduction

Elasticity is the measure of responsiveness. It is the ratio of the percent change in one variable to the percent change in another variable. The key thing to understand is that we use elasticity when we want to see how one thing changes when we change something else. How does demand for a good change when we change its price? How does the demand for a good change when the price of a substitute good changes?

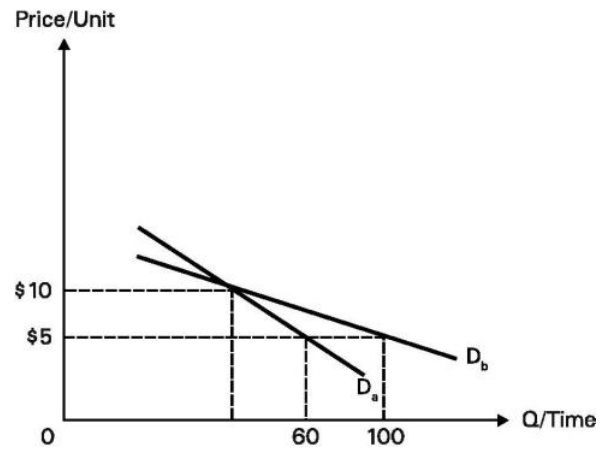
Elasticity varies among products because some products may be more essential to the consumer. A good or service is considered to be elastic if a slight change in price leads to a sharp change in the quantity demanded or supplied. Usually these kinds of products are readily available in the market and a person may not necessarily need them in his or her daily life. For example, air conditioners, televisions, movie tickets, branded clothes etc. On the other hand, an inelastic good or service is one in which changes in price witness only modest changes in the quantity demanded or supplied, if any at all. These goods tend to be things that are more of a necessity to the consumer in his or her daily life. For example, rice, potatoes, onion, salt, medicines etc.

Notes

5.1 Concept of Elasticity

The law of demand tells us that consumers will respond to a price decline by buying more of a product. It does not, however, tell us anything about the degree of responsiveness of consumers to a price change. The contribution of the concept of elasticity lies in the fact that it not only tells us that consumer's demand responds to price changes but also the degree of responsiveness of consumers to a price change. Figure 5.1 shows two demand curves. Let D_a be the demand for cheese in Switzerland and D_b be the demand for cheese in England.

Figure 5.1



At a price of $10, the quantity demanded in both countries is 60. When the price falls from $10 to $5, the quantity of cheese demanded increases in both. However, for the same change in price, from $10 to $5, the change in quantity demanded increases more in England compared to Switzerland. In other words, for the same decrease in price in the two countries, the quantity demanded responds more in England than in Switzerland.

We would describe the above situation by saying that the demand for cheese is more elastic in England than in Switzerland. Elasticity, then, is first another word for "responsiveness".

Elasticity of demand is important primarily as an indicator of how total revenue changes when a change in price induces changes in quantity along the demand curve. The total revenues of the firm will equal the price changed times the quantity sold (TR = P x Q). Naturally, total revenues received by firms are equal to total spending by consumers. If consumers buy 50 units at $10 each, then the total revenue will be $500. By simple multiplication, total revenue can always be calculated for each point in a demand schedule or diagram.

5.1.1 Classification of Demand Curves according to their Elasticities

Depending on how the total revenue changes, when price changes we can classify all demand curves in the following five categories:

1. Perfectly inelastic demand curve
2. Inelastic demand curve
3. Unitary elastic demand curve
4. Elastic demand curve
5. Perfectly elastic demand curve

Notes

Figure 5.2 helps us to explain what these five categories imply about the relationship between changes in total revenue and changes in price. It shows three different types of demand curves each having a different implication for total revenue when price is reduced form $10 to $5.

1. In the case of demand curve D_a in Figure 5.2, when the price is $10, total revenue is $500 (10 x 50). When the price changes to $5, the quantity demanded does not respond at all and remains at 50. The total revenue when the price is $5 is $250. In other words, when price decreases, total revenue decreases as well.

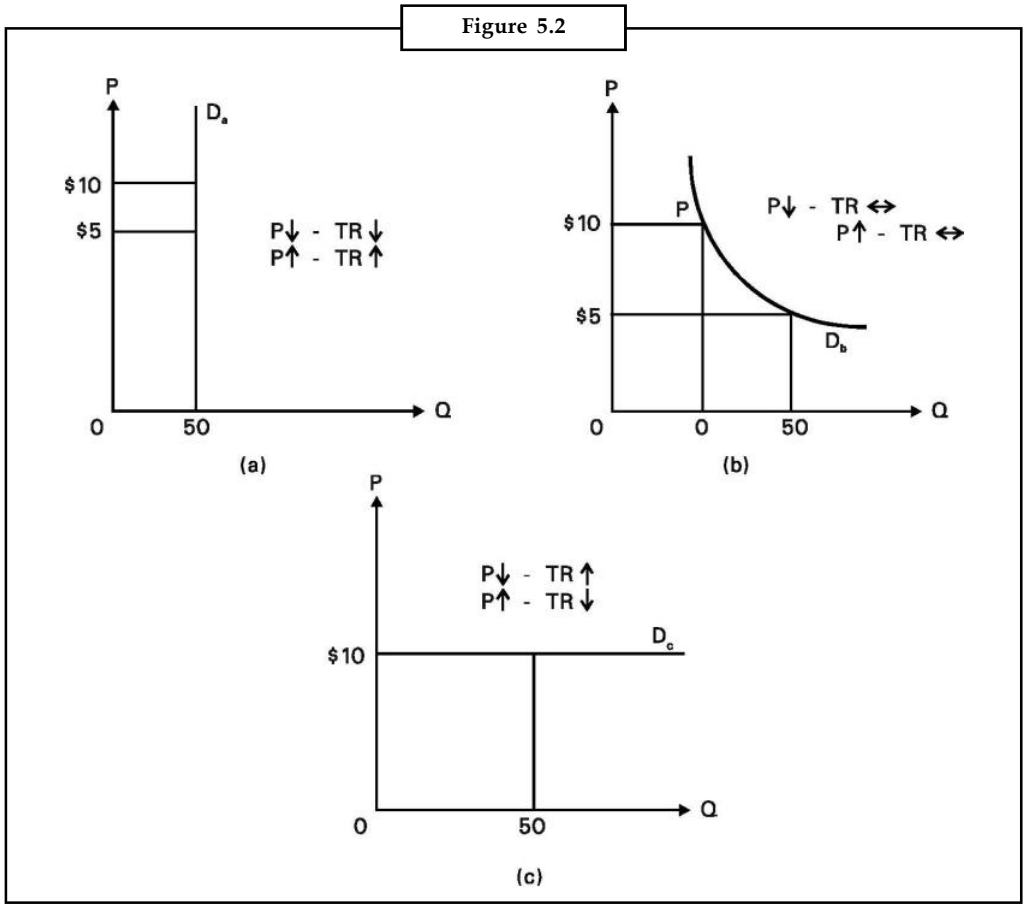
   All such demand curves where quantity demanded is totally unresponsive to changes in price are called perfectly inelastic demand curves.

   Further, such demand curves imply that when price decreases, the total revenue decreases and vice-versa.

   Finally, all such demand curves are supposed to have an elasticity coefficient, E_d, equal to 0. Elasticity coefficient is a number describing the elasticity of the demand curve.

   Life saving drugs are most likely to have demand curves which resemble perfectly inelastic demand curves. For example, a diabetic would be willing to pay almost any price to get the required amount of insulin.

Figure 5.2



2. Demand curve D_c in Figure 5.2(c) above represents another extreme case – a perfectly horizontal demand curve. When the price is $10, 50 units are being sold and the total revenue is $500. When the price falls to $5, the quantity demanded increases infinitely and so does the total revenue. On the other hand, when price rises above $10 the quantity demanded falls to Zero and total revenue also falls to zero.

Notes

Such horizontal demand curves, where quantity demanded is infinitely responsive to price changes, are called perfectly elastic demand curves.

These perfectly elastic demand curves have a property that when price decreases total revenue increases, and vice-versa.

The elasticity coefficient, E_d, is equal to infinity ($E_d = \infty$).

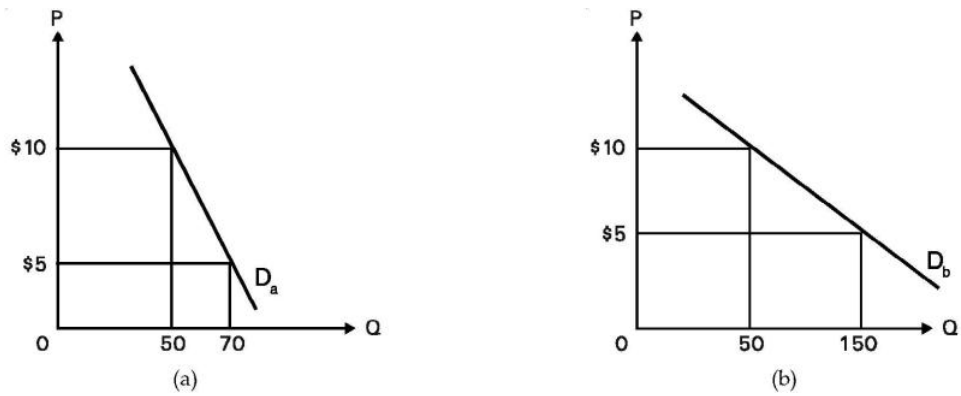
3. The demand curve D_b in Figure 5.2(b) above represents the midpoint of a spectrum where extremes are represented by the demand curves D_a and D_c.

   In the case of D_b when price decreases from \$10 to \$5, the total revenue remains unaffected at \$500, such a demand curve is said to be unitary elastic and has the property that when price increases or decreases, the total revenue remains constant. The elasticity coefficient for such demand curves is equal to one. Examples of unitary elastic demand curves occur when a person budgets a certain amount of money for, say, meat or magazines and will not deviate from that figure regardless of price. However, such cases are also unusual in that few demand curves have constant unitary elasticity.

4. Besides the three types of demand curves we have discussed there are two more types of demand curves.

   Demand curves which have an elasticity coefficient between 0 and 1 are called relatively inelastic or simply inelastic. When the price falls, the quantity demanded expands but total revenue still decreases. Figure 5.3(a) shows D_a as an example of a relatively inelastic curve.

Figure 5.3



Finally, demand curve D_b in Figure 5.3(b) is an example of a relatively elastic or simply elastic demand curve. Such demand curves have an elasticity coefficient between 1 and ∞ and have the property that when price decreases total revenue increases and vice-versa.

Believe it or not, in the real world, 99.99 per cent of the demand curves are either relatively elastic or relatively inelastic.

Table 5.1 summarises the discussion we have had so far. It tells us how the firm's total revenues (and the consumer's total expenditures) for a product will change as prices are raised or lowered. As shown in the table the value of the elasticity coefficient, E_d, can be anything from zero to infinity and each value can immediately tell us the elasticity of the demand curve at the relevant price. For instance, if a demand curve has an elasticity coefficient of 0.5 at a given price, then we know that this is an inelastic demand curve at that price.

Notes

Table 5.1

Price Elasticity of Demand (E_d)		How total revenues or expenditures are affected by price changes	
E_d Value	Term for Elasticity of Demand	Price increases	Price decreases
Zero	Perfectly inelastic	Increase proportionally with price	Decrease Proportionally with price
$0 < E_d < 1$	Relatively inelastic	Increase less than proportionally with price	Decrease less than proportionally with price
$E_d = 1$	Unitary elastic	Unaffected by price changes	
$A > E_d > 1$	Relatively elastic	Decrease but less than proportionally	Increase, but less than proportionally
∞	Perfectly elastic	Total Revenue falls to zero	Increase more than proportionally

5.1.2 Numerical Measurement of Elasticity

What does it mean when we say that the elasticity of demand is 0.5? 0.4? 2.3? To answer this question we have to examine the following definition for elasticity coefficient, E_d.

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

One calculates these percentage changes, of course, by dividing the change in price by the original price and the consequent change in quantity demanded by the original quantity demanded. Thus we can restate our formula as:

$$E_d = \frac{\dfrac{\text{Change in quantity demanded}}{\text{Original quantity demanded}}}{\dfrac{\text{Change in price}}{\text{Original in price}}}$$

This formula can also be written as:

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

Where P_0 = Original price,

P_1 = New price

Q_0 = Original quantity demanded

Q_1 = New quantity demanded

Sometimes we may also find this written as:

$$E_d = \frac{\dfrac{\Delta Q}{Q}}{\dfrac{\Delta P}{P}}$$

Where Δ is a notation used to denote change.

Notes

Let us answer a basic question about this formula: Why use percentages rather than absolute amounts in measuring consumer responsiveness? The answer is that if we use absolute changes, our impression of buyer responsiveness will be arbitrarily affected by the choice of units.

To illustrate, if the price of product X falls from $3 to $2 and consumers, as a result, increase their purchases from 60 to 100 pounds, we get the impression that the consumers are quite sensitive to price changes and therefore demand is elastic. After all, a price change of "one" has caused a change in the amount demanded of 'forty". But by changing the monetary units from dollars to pennies (why not?), we find that a price change of "one hundred" causes a quantity change of "forty", giving the impression of inelasticity. The use of percentage changes avoids this problem. The given price decrease is 33 per cent whether measured in terms of dollars or in terms of pennies. Thus, the use of percentages gives us the nice property that the units in which the money or goods are measured — ¾ bushels or tons of wheat, dollars or cents or rupees — do not affect elasticity.

Interpreting the Formula

Caution Demand is elastic if a given percentage change in price results in a larger percentage change in quantity demanded. For example, if a two per cent decline in price results in a 4 per cent increase in quantity demanded, demand is then said to be elastic. If a given percentage change in price is accompanied by a relatively smaller change in the quantity demanded, demand is inelastic. For example, if a 3 per cent change in price gives rise to a 1 per cent increase in the amount demanded, demand is said to be inelastic. The borderline case of unitary elasticity, which separates elastic and inelastic demands, occurs where a percentage change in price and accompanying percentage change in quantity demanded happen to be equal.

5.1.3 Computation of Elasticity Coefficients

We may use two measures of elasticity:

1. Arc elasticity, if the data is discrete and therefore incremental changes are measurable.
2. Point elasticity, if the demand function is continuous and therefore only marginal changes are calculable.

Example: Given the following data, calculate the price elasticity of demand when (a) price increases from ₹ 3.00 per unit to ₹ 4.00 per unit and (b) the price falls from ₹ 4.00 per unit to ₹ 3.00 per unit.

P_X (per unit)	6	5	4	3	2	1
Q_X	750	1250	2000	3250	4650	8000

$$e_p = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} \text{ or } \frac{dq}{dp} \times \frac{P}{Q}$$

(a) When price increases from ₹ 3 to Rs 4 per unit, P, the old price = ₹ 3 and Q, the old quantity (from the table) = 3250 units.

New Price = ₹ 4

New Quantity = 2000 units.

Notes

ΔP = New price – Old price = 4 – 3 = 1

ΔQ = New quantity – Old quantity = 2000 – 3250 = – 1250

Substituting,

$$e_p = (-)\frac{(-1250)}{1} \times \frac{3}{3250} = 1.15$$

(b) When price falls from ₹ 4 to ₹ 3 per unit,

P, the old price = ₹ 4

Q, the old quantity (from the table) = 2000

New price = ₹ 3

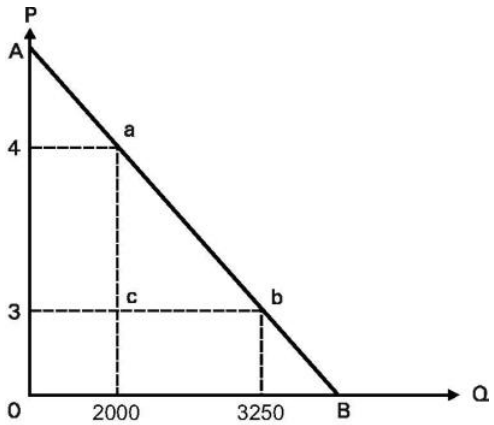
New quantity = 3250 units

ΔP = New price – Old price = 2000 – 3250 = –1250

ΔQ = 3250 – 2000 = 1250

Substituting,

$$e_p = (-)\frac{(-1250)}{1} \times \frac{4}{2000} = 2.5$$



The question is, how is it that we get different demand responses for the same range of price change? The answer is that our initial quantity demanded and price have been different. When we calculate for price fall, they are 2000 for initial quantity demanded and ₹ 4 for initial price. When we calculate it for price rise they are 3250 for initial quantity demanded and ₹ 3 for initial price. Hence elasticity tends to depend on our choice of the initial situation. However, demand response should be the same for the same finite stretch of the demand curve. To get rid of this dilemma created by the choice of the initial situations, we take the arithmetic mean of the two quantities Q and the mean of the two prices P. This gives us the concept of arc elasticity of demand.

$$\text{Arc elasticity} = \frac{\Delta Q}{Q_0 + Q_1} \times \frac{P_0 + P_1}{\Delta P}$$

$$\text{or, } e = \frac{\Delta Q}{\Delta P} \times \frac{P_0 + P_1}{Q_0 + Q_1}$$

Where Q_0 and Q_1 are the two quantities corresponding to the two points on the demand curve. Similarly P_0 and P_1 are the two prices.

Notes

The measurement of elasticity is done by two methods, namely, Geometrical Method and Arithmetical Method.

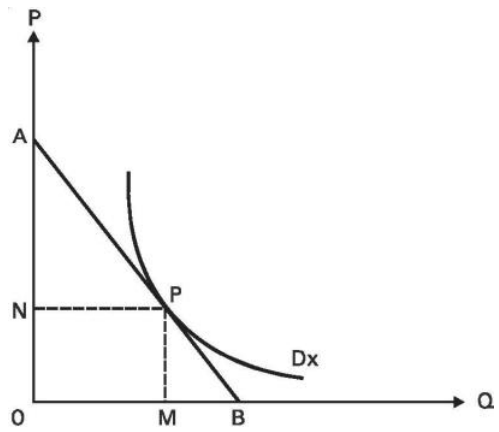
A geometrical way of measuring the elasticity at any point on a demand curve is now in order.

Consider point P on the demand curve Dx in Figure 5.4 (we have taken a non-linear demand curve). Draw a tangent line AB at point P on the demand curve. Applying point elasticity formula, it follows that the elasticity at point P is:

$$e = \frac{dQ}{dP} \times \frac{P}{Q} = \frac{\frac{dQ}{dp}}{\frac{Q}{P}}$$

$\frac{dQ}{dP}$ is the inverse of the slope of the demand curve, hence is equal to $\frac{MB}{PM}$.

Figure 5.4



Price is equal to PM and quantity is equal to OM.

$$e = \frac{\frac{MB}{PM}}{\frac{OM}{PM}} = \frac{MB}{PM} \cdot \frac{PM}{OM} = \frac{MB}{OM}$$

In other words, the price elasticity of demand is measured graphically by the ratio of the two segments of the horizontal axis identified by the intersection of the tangent to the point considered with the horizontal axis and by the perpendicular from that point to the same axis.

If we now consider the similar triangles APN and PBM then AP/PM= PB/MB (from properties of similar triangles) or MB/PN = PB/AP. Hence elasticity = MB/ON can be written as equal to PB/AP, i.e., elasticity at P is also equal to PB/AP, the ratio of the lower segment of the demand curve to the upper segment.

In the same way we can show that elasticity is equal to ON/NA (taking again similar triangles and equating the ratio of sides).

Notes

Notes

Some important factors that determine the elasticity of demand are:

1. ***Luxury or Necessity Goods:*** Luxury goods tend to have an elastic demand, while necessity goods have an inelastic demand. Purchasers can stop buying the luxury goods when their prices rise.
2. ***Percentage of Income:*** Big items in a budget tend to have a more elastic demand than small items. For example consumers may be affected by a 1 per cent rise or fall in price of a flat but are insensitive to such fluctuations in pens.
3. ***Substitutes:*** Items that can be substituted easily have a more elastic demand than those that cannot.
4. ***Time:*** The demand for a product becomes more elastic the longer the time period under consideration. It takes time to decide about another product before buying it as one develops a habit of using a particular product.

5.2 Price Elasticity of Demand

The concept of price elasticity of demand is a numerical measure of the extent to which quantity demanded responds to a change in price, other determinants of demand being kept constant.

Example: If the price of cigarettes fell by 20% and the price of salt fell by 20%, the increase in quantity demanded due to equal changes in prices would be different for salt and cigarettes. Thus salt and cigarettes are said to have a different price elasticity of demand.

Price elasticity of demand, e_p, measures the degree to which the quantity demanded responds to a change in price when all other factors that influence demand such as tastes or income are kept constant. In the example, it is extremely likely that the percentage increase in quantity demanded would be much more for cigarettes than for salt, even though the percentage decreases in price are the same. Thus price elasticity of demand allows us to compare the sensitivity of the demand for various goods for the same changes in price. From the definition:

$$e_p = (-)\frac{\text{\% change in quantity demanded}}{\text{\% change in price}}$$

Let us consider a commodity X. If its price rose, then the percentage change in price would be positive (since the new price is greater than the old price) and the denominator in the expression for e_p would be positive. However, the quantity demanded would fall and the percentage change in quantity demanded would be negative. Hence the numerator in the expression would be negative.

Thus, for most goods as quantity demanded and price have an inverse relationship, cetris paribus, e_p is always likely to be negative.

Caution

However by placing a minus sign in the formula we make e_p positive. The reason is that we want to equate "more elastic" with "more responsive". For example, let two commodities X and Y have elasticities of + 10 and +0.5 (calculated after multiplying by (–1) in accordance with the formula). The demand for commodity X is more responsive to price changes than is the demand for commodity Y, and X has a larger elasticity since +10 is greater than +0.5. Hence "more elastic" is equated with "more responsive". However, if

Notes

we did not multiply by (–1), the two elasticities would be –10 and –0.5. Since –0.5 is greater than –10 we would be likely to say that Y has a greater elasticity than X (when in fact it is the other way round). Hence without multiplying by (–1) we would not be able to substitute "more elastic" for "more responsive".

A review of the basic formula of elasticity will show that it follows from the definition of price elasticity.

$$e_p = (-)\frac{\text{\% change in quantity demanded}}{\text{\% change in price}}$$

where,

$$\text{\% change in Quantity demanded} = \frac{\text{New Quantity} - \text{Old Quantity}}{\text{Old Quantity}} \times 100$$

$$\text{and \% change in price} = \frac{\text{New Price} - \text{Old Price}}{\text{Old Price}} \times 100$$

Let P = Old price

Q = Old quantity

ΔQ = New quantity – Old quantity

ΔP = New price – Old price

$$e_p = (-)\frac{\frac{\Delta Q}{Q} \times 100}{\frac{\Delta P}{P} \times 100} = (-)\frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

Task Given the following data, calculate the price elasticity of demand when (a) price increases from ₹ 5.00 per unit to ₹ 8.00 per unit and (b) the price falls from ₹ 8.00 per unit to ₹ 5.00 per unit.

P_x (per unit)	6	5	4	3	2	1
Qx	200	350	600	850	900	1200

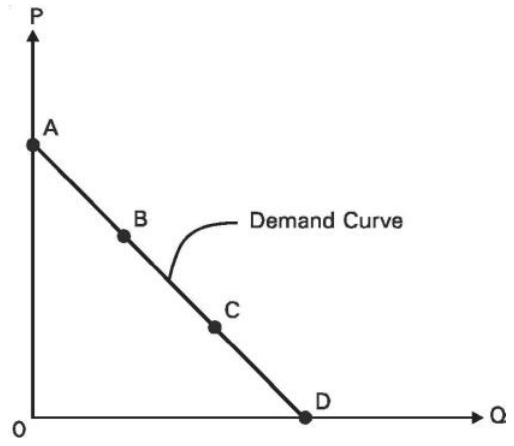
The price elasticity of a straight line demand curve varies from infinity at the price axis to zero at the quantity axis.

Consider a straight line demand curve cutting both the axes as shown in Figure 5.5. Elasticity of demand, e_p, is defined as the numerical measure of the degree to which quantity demanded responds to a change in price *ceteris paribus*.

$$e_p = (-)\frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

Notes

Figure 5.5



Now the slope of the demand curve is dP/dQ (since the demand curve is a straight line and the slope of a straight line is given by change in Y divided by change in X).

Hence the term dQ/dP in the expression for e_p is the reciprocal of the slope of the demand curve.

Since the slope of a straight line is the same throughout, the reciprocal of the slope will also be the same throughout. Thus, for any straight line demand curve, the elasticity at any point is a function of (depends upon) the P/Q ratio.

At the price axis, Q = 0 and P/Q is undefined, but as we let q approach zero, without ever reaching it, the ratio p/q increase without limit. In other words, e_p approaches infinity as q approaches 0. Thus, e_p is infinity at the price axis.

At the quantity axis, P = 0 and P/Q is zero. Thus $e_p = 0$ at the quantity axis.

By a similar reasoning we conclude that as we move down a demand curve, the p/q ratio falls steadily as p keeps decreasing and q keeps increasing. Hence the coefficient of elasticity is greater at a higher point (point B) than at a lower point (point C) since the higher point will have a greater p/q ratio and dQ/dP is inconsequential.

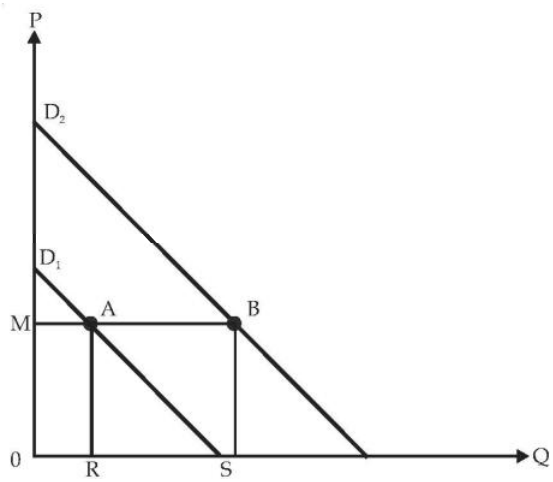
Two parallel straight line demand curves have a different elasticity at each price.

Explain why the (proposition above) is true?

Let D_1 and D_2 be two parallel straight line demand curves, and let the (same) price at which their elasticities are being compared be OM (Figure 5.6).

Notes

Figure 5.6



Elasticity of demand, e_P, is defined as the numerical measure of the degree to which quantity demanded responds to a change in price, ceteris paribus. From the definition,

$$e_P = (-).\frac{dQ}{dP}.\frac{P}{Q}$$

Since the slope of a demand curve is dP/dQ, the term dQ/dP in the expression for e_P is the reciprocal of the slope of a demand curve. Also, as the two demand curves are parallel, it follows that their slopes and hence the reciprocals of their slopes are the same.

Thus at any given price level the elasticities of the straight line demand curves can be compared by comparing their corresponding quantities.

At point A (demand curve D_1) the quantity demanded is OR and at point B (demand curve D_2, but at the same price as A) the quantity demanded is OS. Since OS > OR the P/Q ratio is greater in the case of D_1. Hence point A has a higher elasticity than point B or the demand curve further away from the origin is less elastic at each price than the one closer to the origin.

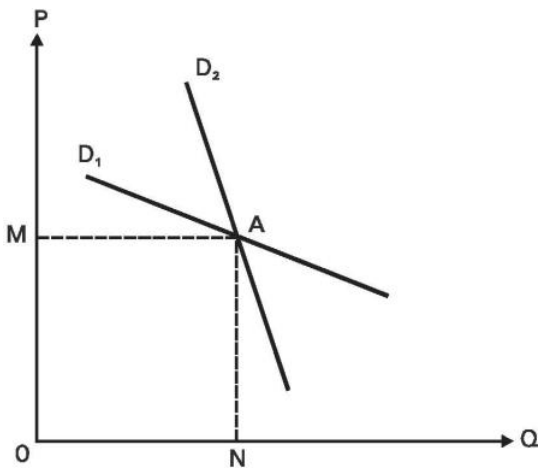
The elasticities of two intersecting straight line demand curves can be compared at the point of intersection merely by comparing slopes, the steeper curve being less elastic.

Let two straight line demand curves, D_1 and D_2, having different slopes, intersect each other at A, as in Figure 5.7.

At the point of intersection, price (P) and quantity (Q) are the same for both demand curves. Hence the P/Q ratio is the same for both demand curves at the point of intersection (point).

Notes

Figure 5.7



Since the slope of a demand curve is dP/dQ, the term dP/dQ in the expression for e_p is the reciprocal of the slope. For both demand curves, since P/Q is the same, the elasticities can be compared by comparing dQ/dP.

As D_1 is steeper than D_2, dQ/dP for D_1 is less than that for D_2. (Remember that dQ/dP measures the reciprocal of the slope). Hence D_2 (the steeper curve) is less elastic than D_1.

Arc Elasticity

The geometrical method of measurement of price elasticity of demand is applicable only for infinitesimal changes in price. If price changes appreciably then we use the arc elasticity of demand. Arc elasticity is calculated with the help of the following formula:

$$e_p = \frac{\Delta Q}{\Delta P} \cdot \frac{(P_1 + P_2)/2}{(Q_1 + Q_2)/2} = \frac{\Delta Q}{\Delta P} \cdot \frac{(P_1 + P_2)/2}{(Q_1 + Q_2)/2}$$

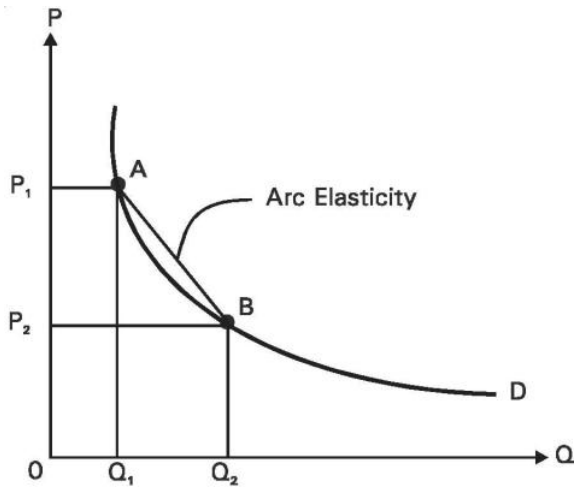
Where P_1 and Q_1 are initial price and quantity, P_2 and Q_2 are new price and quantity and ΔP and ΔQ are the changes in price and quantity respectively.

The arc elasticity is a measure of average elasticity, that is, the elasticity at the midpoint of the chord that connects the two points (A and B) on the demand curve defined by the initial and new price levels. The measure of arc elasticity is an approximation of the true elasticity of the section AB of the demand curve. The more convex to the origin the demand curve is, the poorer the linear approximation attained by the arc elasticity formula.

Caution It would be observed that the only difference between this formula and the point elasticity formula is in the use of the average quantities and average prices. A basic limitation of the point elasticity formula relates to the use of the base. If in Figure 5.8 we have to measure elasticity of demand between the points A and B by the percentage method, it is difficult to say which one of those will make a better base. The choice will be entirely arbitrary. The problem can be solved by using average prices and average quantities.

Notes

Figure 5.8



Caselet

Price Gouging takes you Home

Picture this. It is raining and you are caught inside a mall after a long shopping expedition. The auto drivers want twice the "normal" fare to take you home. Is life unfair? Or is pure economics at play?

You know that price is determined by demand and supply. If demand goes up with supply remaining same, prices ought to go up. And we know that the rain has increased the demand for autos — people who would have otherwise walked or travelled by public transport now want to hire an auto. The increased demand ought to increase the hire charges, considering the supply of autos remain the same.

This does not, however, consider fairness of the price. You may argue that several people who cannot afford to hire an auto for the twice the "normal" fare will be priced out of the market. That is, of course, partially true.

If the rates are way too high, very few will hire the auto. This denies the auto drivers a good chance to make more money. The sensitivity to price (or elasticity of demand) will ensure that there is no intense price gouging.

The question still remains: Should auto drivers charge higher prices during rainy days or such other market conditions? Suppose autos ply only on metered rate. You will agree that driving on rainy days is more difficult than driving on other days. The risk for the auto driver is higher but his return (metered fare), the same. There is, hence, no incentive for auto drivers to work on rainy days. This would drive several autos out of the market. It means you can hire an auto at "normal" fare… if you are lucky enough to get one!

So, consider price gouging (or call it free market pricing if you will) as a means to keep the autos' supply high… enough to get you home, if you agree on the price. This does not, of course, justify unfair prices on regular days as well!

Source: www.thehindubusinessline.com

Notes

5.3 Income Elasticity

The income elasticity of demand (e_i) is similar to the concept of price elasticity of demand. Just as price determines price elasticity, so does income, another determinant of demand, determine income elasticity.

The income elasticity of demand is a numerical measure of the degree to which quantity demanded responds to a change in income, other determinants of demand being kept constant.

For example, let there be two goods, clothing and salt. Let the consumers income increase by 5%. Then the percentage change (increase) in quantity demanded would be different for clothing and different for salt (the percentage increase in quantity demanded for clothing is likely to be much higher than that for salt). Thus, clothing and salt are said to have a different income elasticity of demand. Thus, for the same percentage increase in income (i.e., 5%) the percentage increase in the quantity demanded for different goods is different. Income elasticity of demand provides us with a numerical measure of this difference.

Thus, income elasticity of demand allows us to compare the sensitivity of the demand for various goods for the same change in income. From the definition,

$$e_i = \frac{\text{\% change in quantity demanded}}{\text{\% change in income}}$$

The income elasticity of a commodity may be positive (the usual or likely case) or negative, depending on whether the good is normal or inferior.

A normal good is one where a percentage increase in income ceteris paribus causes a percentage increase in quantity demanded and vice-versa. Thus for normal goods (e.g., clothing, cigarettes) income and quantity demanded vary in direct proportion ceteris paribus due to which the income elasticity of demand is positive.

An inferior good is one where a percentage increase in income ceteris paribus, causes a percentage decrease in quantity demanded and vice-versa. Thus for inferior goods (e.g., cheap whisky, artificial jewellery, imitation shoes, etc.) income and quantity demanded vary in an inverse proportion ceteris paribus due to which the income elasticity of demand is negative.

When $e_i = 1$, the good is said to have unitary income elasticity; when $e_i > 1$, the good is said to be income elastic, and so on. Remember when e_i is negative, the good is an inferior good.

5.4 Cross Elasticity of Demand

Caution The cross elasticity of demand (e_c) is a numerical measure of the degree to which quantity demanded of a good responds to changes in the prices of other commodities, the other determinants of demand being kept constant.

Let there be two goods X and Y. If the price of Y changes (increases or decreases), this may have an effect on the quantity demanded of good X. The concept of cross elasticity provides a numerical measure of the percentage change in quantity demanded due to a change in price of other commodities. It measure the degree to which quantity demanded is a function of the price of all other commodities. From the definition,

$$e_c = \frac{\text{\% change in quantity demanded of good X}}{\text{\% change in price of good Y}}$$

Notes

Example: If X and Y (say butter and bread) are complements, e_c will be negative. If the price of bread rose ceteris paribus, there would be a decrease in the quantity demanded of bread and a decrease in the quantity demanded of butter. Thus, for complements, a change in price of one good ceteris parbius causes the quantity demanded of the complements to move in the opposite direction. If there is a percentage increase in the price of bread, the denominator in the formula would be positive. Similarly, if there is a percentage decrease in the quantity of butter, the numerator in the formula would be negative. Hence, e_c is negative for complements.

If X and Y (say tea and coffee) are substitutes, e_c will be positive. If the price of coffee rose ceteris paribus, there would be a decrease in the quantity demanded of coffee and an increase in the quantity demanded of tea as consumers would readily "substitute" tea for coffee. Thus, for substitutes the price change of one good ceteris paribus causes the quantity demanded of the substitute to move in the same direction. If there is a percentage increase in the price of coffee, the denominator in the formula would be positive. Similarly, if there is a percentage increase in the quantity demanded of tea, the numerator in the formula would be positive. Hence, e_c is positive for substitutes.

The higher the numerical magnitude of cross elasticity, the greater is the degree of complementarity/substitution between the two goods. Thus, theoretically the value of cross elasticity ranges from minus infinity (- ∞) for perfect complements to plus infinity (+ ∞) for perfect substitutes.

$$e_c = \frac{dQ_x}{Q_x} \div \frac{dP_x}{P_x}$$

$$= \frac{dQ_x}{dP_x} \cdot \frac{P_x}{Q_x}$$

Notes

Applications of Elasticity

The concept of elasticity has a wide range of applications in economics. In particular, an understanding of elasticity is fundamental in understanding the response of supply and demand in a market.

Some common applications of elasticity include:

1. ***Effect of changing price on firm's revenues:*** If the demand for the product is price inelastic, the firm would not want to lower its price since that would reduce its total revenue, increase its total costs and this will give it lower profits.

2. ***Analysis of incidence of the tax burden and other government policies:*** In economics, tax incidence is the analysis of the effect of a particular tax on the distribution of economic welfare. Tax incidence is said to "fall" upon the group that, at the end of the day, bears the burden of the tax. The key concept is that the tax incidence or tax burden does not depend on where the revenue is collected, but on the price elasticity of demand (and price elasticity of supply). For example, a tax on orange farmers might actually be paid by owners of agricultural land or consumers of oranges.

3. ***Effect of international trade and terms of trade effects:*** Marshall-Lerner Condition gives a technical reason why a reduction in value of a nation's currency need not immediately improve its balance of payments. The condition states that, for a currency devaluation to have a positive impact on trade balance, the sum of price elasticity of exports and imports (in absolute value) must be greater than 1.

Contd...

Notes

4. Analysis of consumption and saving behavior: the way consumers respond to the change in prices or other determinants of demand, determines their consumption pattern and savings pattern. For example, a consumer purchases 2 bottles of cold drinks instead to 4, when price rose from ₹ 10 to ₹ 15. Other things remaining constant, he is saving more money than before.

5. If the elasticity of the firm's sales with reference to advertisement expenditure is positive and higher than for its expenditure on product quality and customer service, then the firms would find it more beneficial to concentrate its sales efforts on advertising rather than on product quality and customer service.

Case Study

Student's Dilemma

A small state university is faced with a critical financial problem. At present tuition rates, the university is loosing ₹ 5 crore per year. The head of the university urges that there should be a 25% increase in tuition fee. Based on the total students enrolled, he projects that this increase would cover the ₹ 5 crore deficit in revenues. Student leaders protest but it falls on deaf ears. Students realise that their only hope is to demonstrate that the tuition hike is not in the best interest of the university. What can they do?

Students find a journal article that discusses the price elasticity of demand for college education. The author estimates that the elasticity of enrollment at state universities is –1.3 with respect to tuition charges. That is, a 1% increase in tuition would decrease enrollments by 1.3%. The data are current. Based on the elasticity estimate, the students calculate that the proposed tuition hike of 25% would decrease enrollment by 32.5%. This would result in a decrease in total revenue even after tuition increase.

The university is given this information and it is forced to withdraw its proposed hike and find alternative ways to meet the deficit.

Question

Evaluate the ultimate decision of the university to withdraw the proposed hike.

Source: Atmanand, Managerial Economics, 2nd Edition, Excel Books.

Case Study

The Perks of Pump Avoidance

Ralph Vartabedian

Higher gasoline prices are cleaning out the wallets of motorists, but there may be a silver lining: Traffic is somewhat lighter on the heavily congested freeways and surface streets of Southern California.

It only makes sense that the sharply higher prices at the pump are leading some people to avoid discretionary trips with their cars, carpooling when possible and shifting to public transportation.

Contd...

Notes

Although there are no hard data yet, a broad range of experts say there is evidence that people are buying less gasoline and finding ways to avoid using their cars, contributing to less congestion on the roads.

"We have noticed that volumes are lighter than normal," said Frank Quon, deputy director of Caltrans freeway operations for Los Angeles County. "We haven't done a study. But we aren't experiencing as much congestion, and travel times are shorter."

Quon said the effect was most likely related to higher gasoline prices and the tail end of spring break in schools, which causes somewhat lighter traffic.

A relatively small change in traffic volume can have a big effect on freeway speeds. That's because freeway speeds tend to remain stable as volume increases until the point when lanes become saturated. Then speeds drop sharply.

The effect was illustrated in Southern California during the 1984 Summer Olympics, when fewer drivers were on the road.

Meanwhile, Southland public transportation agencies are reporting that ridership has jumped in the first months of 2005 — up between 3% and 12%, depending on the system.

Anecdotally, a lot of people I talk to say they are seeing the effect every day, which has cut their commute times dramatically. Normally jammed freeways are mysteriously wide open.

If people are indeed cutting back on driving, avoiding discretionary trips, car pooling and using public transportation, it should mean that gasoline sales volumes are dropping.

John Felmy, chief economist at the American Petroleum Institute, the Washington, D.C., trade group that represents the oil industry, says that wholesale deliveries of gasoline across the nation are down slightly.

"Some of the preliminary information we have in the last few weeks indicates that gasoline demand appears to be down a little bit," Felmy said.

Gasoline prices are up 51 cents a gallon this year across the nation, averaging $2.24 per gallon, Felmy said. That's a 29% increase in price. California prices are higher, averaging $2.63 a gallon last week.

Question

In this article you can find estimates of both short run and long run elasticities of gasoline demand. Find out the latter by reading carefully and applying the tools you have learnt in this unit .

Source: Los Angeles Times, May 4, 2005

5.5 Summary

- Elasticity of demand tells the degree of responsiveness of consumer to a price change. It is measured as:

$$e_d = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

- The arc elasticity is a measure of average elasticity, that is, the elasticity at the midpoint of the chord that connects the two points (A and B) on the demand curve defined by the initial and new price levels.
- The income elasticity of demand is a numerical measure of the degree to which quantity demanded responds to a change in income, other determinants of demand being kept constant.

Notes

- The cross elasticity of demand is a numerical measure of the degree to which quantity demanded of a good responds to changes in the prices of other commodities, the other determinants of demand being kept constant.
- An understanding of elasticity is fundamental in understanding the response of supply and demand in a market.

5.6 Keywords

Arc elasticity: It computed if the data is discrete and therefore incremental change is measurable.

Cross elasticity: Degree to which demand for one product is affected by the price of another product.

Demand elasticity: Elasticity used to show the responsiveness of the quantity demanded of a good or service to a change in its price.

Elasticity: It measures the degree of responsiveness of demand/supply to change in price.

Point elasticity: It computed if demand function is continuous and therefore only marginal changes are calculable.

5.7 Self Assessment

1. Fill in the blanks:
   (a) Elasticity of demand measures responsiveness of demand of a commodity to …….., …… and ..... .
   (b) Such horizontal demand curves, where quantity demanded is infinitely responsive to price changes, are called ..... .
   (c) Demand curves which have an elasticity coefficient as 1 are called ..... .
   (d) All such demand curves where quantity demanded is totally unresponsive to changes in price are called ..... .
   (e) The demand is ..... in the long run.
2. State true or false for the following statements:
   (a) If we go by the Law of Demand, the price elasticity for most goods would be negative.
   (b) The price elasticity of a straight line demand curve varies from zero to infinity.
   (c) When the income elasticity is equal to 1, the good is said to be income inelastic.
   (d) When the income elasticity is negative, the good is an inferior good.
   (e) For complementary goods, the cross elasticity will always be positive.

5.8 Review Questions

1. Discuss the factors that determine elasticity of demand.
2. Explain price elasticity of demand with help of examples.
3. Assume that our current consumption of paperback books is 1000 per year at the average price of ₹ 1.50 per book. The estimated coefficient of price elasticity is 0.75. The price increase is 50 paise per book. Calculate the change in the quantity of books demanded, other things being equal.

Notes

4. The market demand function of a commodity is represented by $Q_A = 20 - 2P_A - 0.5\,P_B + 0.01\,Y$, where Q_A is the quantity demanded of A, P_A is the price of A, P_B is the price of B, and Y is the consumer's income. Calculate price and cross elasticities of demand for A when $P_A = 5$, $P_B = 10$ and $Y = 1000$.

5. When the price of good X falls from ₹ 10 to ₹ 9, the demand for good Y increase from 20 Kg. to 25 Kg.

   (a) What is the cross elasticity of demand of good Y for good X?

   (b) Are goods X and Y compliments or substitutes?

6. You are given market data that says when the price of pizza is ₹ 60, the quantity demanded of pizza is 80 slices and the quantity demanded of cheese bread is 120 pieces. When the price of pizza is ₹ 30, the quantity demanded of pizza is 100 slices and the quantity demanded of cheese bread is 100 pieces.

   (a) Can the Price-Elasticity of Demand be calculated for either good?

   (b) If so, calculate the Price Elasiticity of Demand for each product.

7. Consider the markets for screw-gauge and vernier caliper. You study survey data and observe that if a screw-gauge costs ₹ 50, 100 screw-gauges are demanded. You also observe that if a screw-gauge cost ₹ 30, 150 vernier calipers are demanded and if a screw-gauge cost ₹ 40 then 100 vernier calipers are demanded. If a vernier caliper costs ₹ 20, 125 vernier calipers are demanded.

   (a) Can the Price-Elasticity of Demand be calculated for either good?

   (b) If so, calculate the Price Elasiticity of Demand for each good.

8. As a business manager, how do you find the demand elasticity to be useful? Also, can you forecast you revenues in case you know the demand elasticity?

9. Examine the concept of price elasticity of demand. Which of the two methods of measuring it is preferred by you and why?

10. When an individual's income was ₹ 2000, the demand for rice was 10kg. An increase of ₹ 500 in the individual's income leads to a fall in the demand of rice by 2kg. Assuming that the price of rice remained constant, what is the income elasticity of demand for rice?

11. Think and state one situation where a business manager will use promotional elasticity to make business decisions.

12. Discuss cross elasticity of demand, prove its utility for business managers.

13. What will be the impact of price elasticity of the demand on the following product ranges available in the Indian market: (a) edible oil (b) computer hardware.

Answers: Self Assessment

1. (a) Price, income of consumers and price of other goods

   (b) Perfectly elastic (c) Unit elastic

   (d) Perfectly elastic (e) More elastic

2. (a) True (b) True (c) False

   (d) True (e) False

5.9 Further Readings

Notes

Books

Dr. Atmanand, *Managerial Economics*, Excel Books, Delhi.

Dominick Salvatore, *Managerial Economics*, Thomson.

Haynes, Mote and Paul, *Managerial Economics – Analysis and Cases*, Vakils. Fellner and Simons Private Ltd., Bombay.

Malcolm P. McNair and Richard S. Meriam, *Problems in Business Economics*, McGraw Hill Book Co., Inc.

Yogesh Maheshwari, *Managerial Economics*, Prentice Hall

Online links

http://economics.about.com/cs/micfrohelp/a/priceelasticity.htm

www.quickmba.com/econ/micro/elas/ped.shtml

ingrimayne.com/econ/elasticity/Elastic1.html

Notes

Unit 6: Production Theory

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Objectives

After studying this unit, you will be able to:

- Describe production function with one and two variables
- State the concept of producers equilibrium and expansion path
- Explain the behaviour of total, average and marginal revenue curves

Introduction

The production analysis of the firm brings into focus the process of production and related costs of production. We must take inputs into consideration applied for production and resulting into output. There are different methods to produce a commodity. The firm has to identify the technically efficient production processes for avoiding any wastage of resources. These technically efficient production processes provide a choice for choosing the least-cost process.

Major portion of goods and services consumed in a modern economy are produced by firms. A firm is an organisation that combines and organises resources for the purpose of producing

goods and services for sale at a profit. The most important reason for a firm or business enterprises exist is that firms are specialised organisation devoted to manage the process of production.

6.1 Meaning of Production

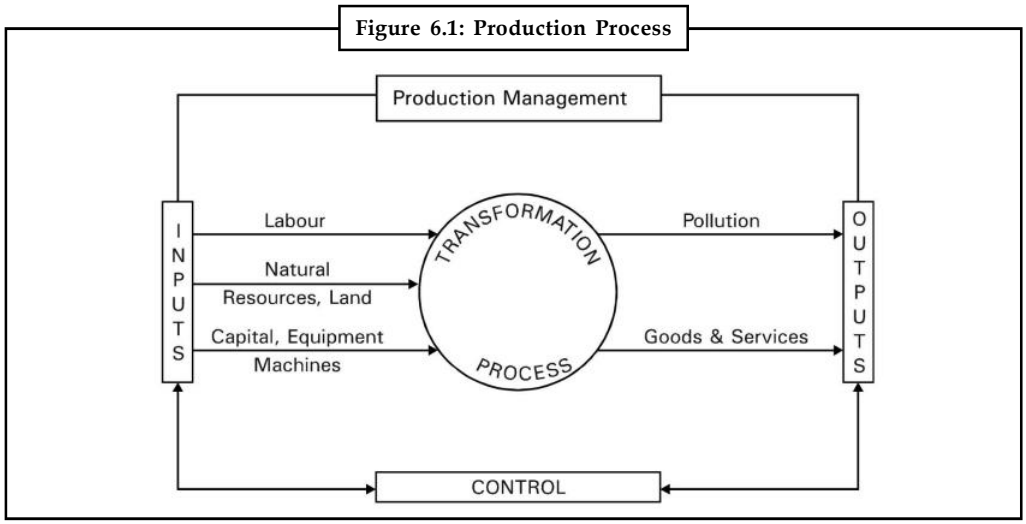
Production refers to the transformation of inputs or resources into outputs or goods and services. Production is a process in which economic resources or inputs (composed of natural resources like labour, land and capital equipment) are combined by entrepreneurs to create economic goods and services (outputs or products).

Firms are required to take different but interrelated production decisions like:

1. Whether or not to actually produce or shut down?
2. How much to produce?
3. What input combination to use?
4. What type of technology to use?

Figure 6.1 depicts a simple production process.

Figure 6.1: Production Process



In fact, production theory is just an application of constrained optimization technique. The firm tries either to minimize cost of production at a given level of output or maximize the output achievable with a given level of cost.

Inputs are the resources used in the production of goods and services and are generally classified into three broad categories – labour, capital and land or natural resources. They may be fixed or variable.

Fixed Inputs are those that cannot be quickly changed during the time period under consideration except, perhaps at a very great expense, (e.g., a firms' plant).

Variable Inputs are those that can be changed easily and on very short notice (e.g., most raw materials and unskilled labour).

The time period during which at least one input is fixed is called the, short run, while the time period when all inputs are variable is called, the long run. The length of the long run depends on the type of industry, e.g., the long run for a dry cleaning business may be a few weeks or months. Generally, a firm operates in the short run and plans increases or reductions in its scale of operation in the long run. In the long run, technology generally improves so that more output can be obtained from a given quantity of inputs, or the same output can be obtained from fewer inputs.

Notes

6.2 Production Function with One Variable Input

A production function is a function that specifies the output of a firm, an industry, or an entire economy for all combinations of inputs. In other words, it shows the functional relationship between the inputs used and the output produced.

Mathematically, the production function can be shown as:

$$Q = f(X_1, X_2 \ldots\ldots\ldots\ldots\ldots\ldots X_K)$$

where Q = Output, X_1 ..... X_K = Inputs used.

For purposes of analysis, the equation can be reduced to two inputs X and Y. Restating,

$$Q = f(X, Y)$$

where Q = Output

X = Labour

Y = Capital

A more complete definition of production function can be:

'A production function defines the relationship between inputs and the maximum amount that can be produced within a given period of time with a given level of technology'.

A production function can be stated in the form of a table, schedule or mathematical equation. But before doing that, two special features of a production function are given below:

1. Labour and capital are both unavoidable inputs to produce any quantity of a good, and
2. Labour and capital are substitutes to each other in production.

A form of production functions is the Constant Elasticity of Substitution, **CES function**,

$$Q = B[gL^{-h} + (1 - g)K^{-h}]^{-1h}$$

where h > –1 and B, g and h are constants.

If h is assumed to be a variable, then the above function may be called the variable elasticity of substitution, **VES function**.

Still another form is the fixed proportion production function also called the **Leontief function.** It is represented by

$Q = \text{minimum}\left[\frac{K}{a}, \frac{L}{b}\right]$, where a and b are constants and 'minimum' means that Q equals the smaller of the two ratios.

Finally there is a very simple **linear production function.** Assuming that the inputs are perfect substitutes so that all factors may be reducible to one single factor, say, labour, L, than the linear production function may be,

Q = aL, where 'a' is the constant term and L stands for labour.

In order to analyse the relationship between factor inputs and outputs, economists classify time periods into short runs and long runs.

Notes

Before further discussion it is necessary to conceptualize three terms: total product, average product and marginal product.

1. Total product is the total quantity produced by that many units of a variable factor (i.e., labour). For example, if on a farm 2000 Kg. of wheat were produced by 10 men, the total product would be 2000 Kg.
2. Average product is the total output divided by the number of units of the variable factor (or the number of men). Thus AP = TP/L. On the same farm, the average product would be 2000/10 = 200 Kg.
3. Marginal product is the change in total output resulting from the change (using one more or one less unit) of the variable factor. If an eleventh man is now added to this farm and the output rose to 2,100 Kg, the marginal product (of labour) would be 100 Kg. Thus, MP = d(TP)/dL.

For a two-input production process, the total product of labour (TP_L) is defined as the maximum rate of output coming up from combining varying rates of labour input with a fixed capital input $(\bar{K})$. (***Note:*** A bar over K or over any other variable means, that variable has been fixed, and therefore is no more variable.)

$$TP_L = f\ (\bar{K}, L)$$

and total product of capital function is

$$TP_K = f\ (K, \bar{L})$$

Marginal product (MP) is the change in output per unit change in the variable input. Thus the marginal product of labour and capital is

$$MP_L = \frac{\Delta Q}{\Delta L}$$

$$MP_K = \frac{\Delta Q}{\Delta K}$$

For the Cobb-Douglas production function, $Q = AK^aL^b$

The marginal products are

$$MP_K = \frac{dQ}{dK} = aAK^{a-1}L^b \text{ and } MP_L = \frac{dQ}{dL} = bAK^aL^{b-1}$$

Average product (AP) is total product per unit of variable input. It is found by dividing the rate of output by rate of variable input, i.e.,

$$AP_L = \frac{TP_L}{L} \text{ and } AP_K = \frac{TP_K}{K}$$

By holding the quantity of input constant and changing the other, we can derive TP of the variable input.

Example: By holding capital constant at one unit (K = 1) and increasing units of labour used from 0 to 6 units, we get total product of labour as in column (2) in Table.

Notes

TP, MP and AP of Labour

(1) Labour (No. of workers)	(2) Output or TP	(3) MP of Labour	(4) AP of Labour	(5) Output Elasticity of Labour
0	0	-	-	-
1	3	3	3	1
2	8	5	4	1.25
3	12	4	4	1
4	14	2	3.5	0.57
5	14	0	2.8	0
6	12	-2	2	-1

Marginal product (MP) of labour (MP_L) is the change in total product or extra output per unit change in labour used. Average product of labour (AP_L) equals total product divided by the quantity of labour used.

$$MP_L = \frac{\Delta TP}{\Delta L}$$

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

Output elasticity of labour (E_L) measures the percentage change in output divided by percentage change in quantity of labour used.

$$E_L = \frac{\%\Delta Q}{\%\Delta L}$$

or

$$E_L = \frac{\Delta Q / Q}{\Delta L / L} = \frac{\Delta Q / \Delta L}{Q / L} = \frac{MP_L}{AP_L}$$

This means that from zero units of labour (and with K = 1), TP or output grows proportionally to the growth in the labour input. For the second unit of labour E_L = 1.25 (that is, TP or output grows more than proportionally to the increase in L), and so on.

Short Run and Long Run Production Function

The above features show that some quantity of both the inputs is required to produce a given quantity of output. A two input long run production function for quantities of labour and capital upto 10 units can be expressed as in Table 6.1.

Notes

Table 6.1: Long Run Production Function

Labour (L)	Capital (K)										
	0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
0	0	0	0	0	0	0	0	0	0	0	0
1	0	5	15	35	47	55	62	61	59	56	52
2	0	12	31	49	58	66	72	77	72	74	71
3	0	35	48	59	68	75	82	87	91	89	87
4	0	48	59	68	72	84	91	96	99	102	101
5	0	56	68	76	85	92	99	104	108	111	113
6	0	55	72	83	91	99	107	112	117	120	122
7	0	53	73	89	97	104	111	117	122	125	127
8	0	50	72	91	100	107	114	120	124	127	129
9	0	46	70	90	102	109	116	121	125	128	130
10	0	40	67	89	103	110	117	122	126	129	131

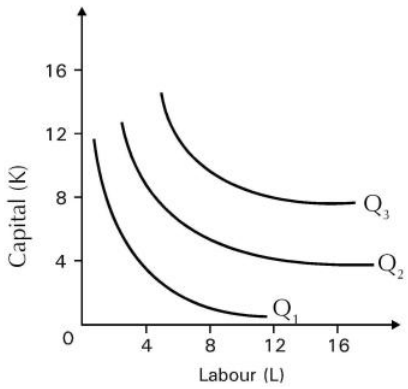
If capital was the fixed input in the short run, then each column of the table represents a short run production function with respect to a specific quantity of the fixed (Capital) input.

Example: For K = 2, the short-run production function would be as in Table.

Short Run Production Function

Labour (L)	0	1	2	3	4	5	6	7	8	9	10
Output (Q)	0	15	31	48	59	68	72	73	72	70	67

The above functions can be shown on a two dimensional diagram with a family of production curves, one for each production level. Figure below gives such a representation for two selected levels of production, Q = 91 and Q = 122. Table shows that there are four alternative ways of producing 91 units and three for producing 122 units of output.



Long Run Production Function

Notes

Task Consider any one manufacturing company and note down its production in units for the last 5 years. Also try to find out what inputs do they use in their production.

6.3 Production Function with two Variable Inputs

A firm may increase its output by using more of two variable inputs that are substitutes for each other, e.g., labour and capital. There may be various technical possibilities of producing a given output by using different factor combinations. Which particular factor combination will be actually selected by the firm depends both on the technical possibilities of factor substitution as well as on the prices of the factors of production.

The technical possibilities of producing an output level by various combinations of the two factors can be graphically represented in terms of Isoquants (dealt with in this chapter later).

Caselet

Real World — Advantages of Just-in-time Production

During the 1950s and 1960s, the Toyota Motor Company originated and developed the just-in-time system of production which has had an enormous effect in Japan and elsewhere. According to this system, materials, parts and components are produced and delivered just before they are needed. One advantage is that inventories of parts and of work in process are reduced considerably, but this is only part of the story. In addition, the time and cost required to change from the production of one part or model to another are reduced, thus cutting costs and enabling the firm to produce small lots economically.

A careful comparison of an automobile plant using the just-in-time system with an automobile plant not using it resulted in the following data:

	Plant using just-in-time System	Plant not using just-in-time System
Cars produced per day	1,000	860
Total factory workers	1,000	2,150
Workers per car per day		
Direct labour	0.79	1.25
Overhead personnel	0.21	1.25
Total	1.00	2.50

The above data reveals the following:

1. Yes – the number of cars produced per day divided by the number of workers is 1.0 in the plant using the just-in-time system but only 0.4 in the plant not using the just-in-time system.
2. The average product of labour – the number of cars produced per day divided by the number of workers – is the reciprocal of the number of workers per car per day. Thus, the average product of overhead workers is 1/0.21 = 4.76 using the just-in-time system, but 1/1.25 = 0.8 without it. On the other hand, the average product of workers engaged in direct labour is 1/0.79 = 1.27 using the just-in-time system, but 1/1.25 = 0.8 without it. Clearly the percentage increase in average product is greater for overhead workers than for direct labour.

Contd...

Notes

3. One reason why the just-in-time system decreases overhead labour considerably is that the time required for planning and management is reduced because changeovers are faster.
4. The firm's isoquants shifted inward to the origin.

6.4 Producer's Equilibrium

Before discussing the concept of producer's equilibrium, we must discuss the concepts of Isoquants, marginal rate of technical substitution and isocost line. After learning these concepts, you will be able to understand the concept of producer's equilibrium better.

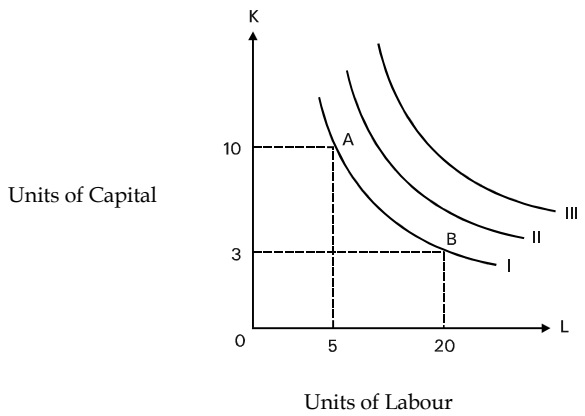
6.4.1 Isoquants

Isoquants are a geometric representation of the production function. The same level of output can be produced by various combinations of factor inputs. Imagining continuous variation in the possible combination of labour and capital, we can draw a curve by plotting all these alternative combinations for a given level of output. This curve which is the locus of all possible combination is called the 'isoquant'.

Any quantity of a good can be produced by using many different combinations of labour and capital (assuming both can be substituted for each other). An isoquant or an iso-product curve is the line which joins together different combinations of the factors of production (L, K) that are physically able to produce a given amount of output.

Suppose isoquant refers to 100 Kg. of output. This output can be produced by a large number of different combinations of labour and capital. All the different combinations for the same amount of output would lie on the same isoquant.

Example: 10 units of capital and 5 units of labour (A) provide the same output as 3 units of capital and 20 units of labour input (B). The firm can choose any one of these combinations (A or B) or any other combination which lies on the same isoquant to get 100 Kg. of output. The isoquant does not tell us the combination of factor inputs the firm actually uses; (that combination is based on process of the factors) but shows the technically possible combinations of factor inputs that are required to produce a given level of output. Isoquant I has been drawn by joining these combinations of labour and capital inputs which give out the same amount of total produce i.e., 100 Kg. Points like A which require more capital but less labour represent capital intensive methods of production. Points like B, which require less capital and more labour represent labour intensive methods of production.



Notes

For movements along an isoquant, the level of output remains constant and the ratio of capital to labour changes continuously. However, a movement from the isoquant to another means that the level of output changes.

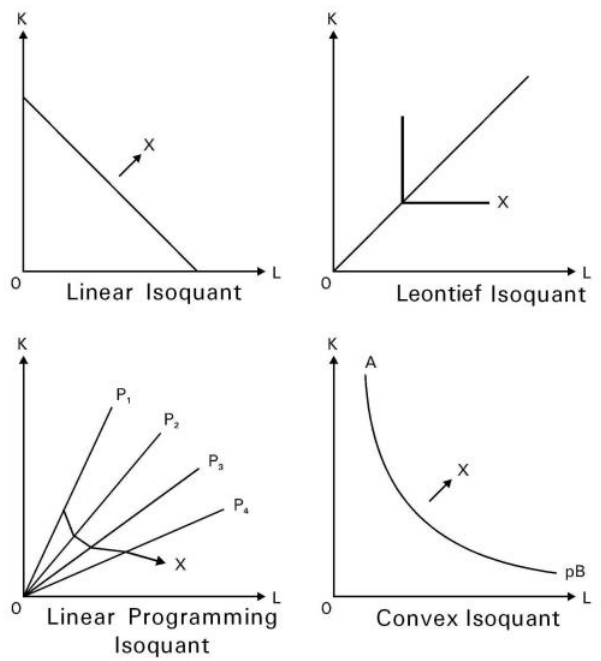
Types of Isoquants

The production isoquant may assume various shapes depending on the degree of substitutability of factors. The types are discussed in Table 6.2 and the matching graphs are shown in Figure 6.2.

Table 6.2: Types of Isoquants

Types of Isoquants	Description
Linear Isoquants	This type assumes perfect substitutability of factors of production. A given commodity may be produced by using only capital, or only labour, or by an infinite combination of K and L.
Input-output Isoquants	This assumes strict complementarity, that is, zero substitutability of the factors of production. There is only one method of production for any one commodity. The isoquant takes the shape of a right angle. This type of isoquant is called "Leontief isoquant."
Kinked Isoquants	This assumes limited substitutability of K and L. There are only a few processes for producing any one commodity. Substitutability of factors is possible only at the kinks. It is also called "activity analysis isoquant" or "linear-programming isoquant" because it is basically used in linear programming.
Smooth, Convex Isoquants	This form assumes continuous substitutability of K and L only over a certain range, beyond which factors cannot substitute each other. This isoquant appears as a smooth curve convex to the origin.

Figure 6.2: Types of Isoquants



Notes

Marginal Rate of Technical Substitution

Marginal Rate of Technical Substitution (MRTS) is the amount by which the quantity of one input has to be reduced ($-\Delta x_2$) when one extra unit of another input is used ($\Delta x_1 = 1$), so that output remains constant ($y = \bar{y}$).

$$MRTS(x_1, x_2) = -\frac{\Delta x_2}{\Delta x_1} = \frac{MP_1}{MP_2}$$

where MP_1 and MP_2 are the marginal products of input 1 and input 2, respectively.

Along an isoquant, the MRTS shows the rate at which one input (e.g. capital or labour) may be substituted for another, while maintaining the same level of output. The MRTS can also be seen as the slope of an isoquant at the point in question.

Isocost Line

If a firm uses only labour and capital, the total cost or expenditure of the firm can be represented by:

$$C = wL + rK$$

where C = total cost

w = wage rate of labour

L = quantity of labour used

r = rental price of capital

K = quantity of capital used

The equation shows that the total cost of the firm (C) is equal to the sum of its expenditures on labour (wL) and capital (rK). This equation is a general one of the firm's isocost line or equal-cost line. It shows the various combinations of labour and capital that the firm can hire or rent at a given total cost.

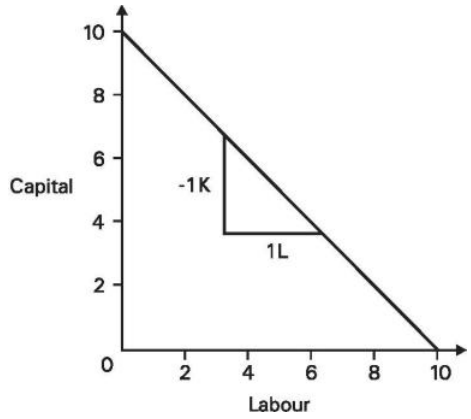
Example: If C = 900 units, w = 10 units and r = 10 units, the firm could either hire 10 L or rent 10 K or any combination of L and K shown on isocost line AB in figure. For each unit of capital the firm gives up, it can hire one additional unit of labour. Thus the slope of the isocost line is - 1.

By subtracting wL from both sides of the equation above and then dividing by r, we get the general equation of the isocost line in the following more useful form:

$$K = \frac{C}{r} - \frac{wL}{r}$$

where C/r is the vertical intercept of the isocost line and -w/r is its slope. Thus for C=100 units and w=r=10 units, the vertical intercept is c/r = 100/10=10K, and the slope is -w/r = -10/10 = -1. A different total cost by the firm would define a different but parallel isocost line, while different relative input prices would define an isocost line with a different slope.

Notes



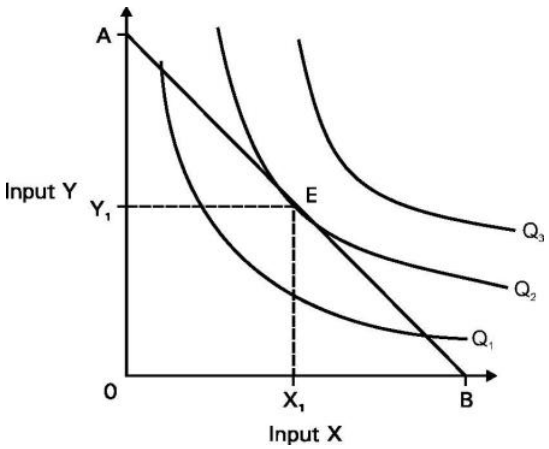
Isocost Line

6.4.2 Concept of Producer's Equilibrium

The theory of production may be viewed from two angles which are dual to each other. A firm may decide to produce a particular level of output and then attempt to minimise the cost of total inputs or it may attempt to maximise its output subject to a cost constraint.

A firm spends money on two inputs only, X and Y. It decides its budget and knows the price of each of the inputs which remains constant. If the firm spends all its budget it can buy either OB units of input X or OA units of input Y or a combination of X and Y represented by a point lying on the straight line AB in Figure 6.3. The line AB is the budget line of the firm.

Figure 6.3: Optimum Factor Combination



The slope of the budget line or the isocost line will be $-\frac{OA}{OB}$, where

$$OA = \frac{\text{Cost}}{\text{Price of Y}} \text{ and } OB = \frac{\text{Cost}}{\text{Price of X}}$$

Notes

Therefore, slope of AB = $-\frac{OA}{OB}$

$$= \frac{\text{Price of X}}{\text{Price of Y}} = -\frac{P_X}{P_Y}$$

The negative sign indicates negative slope. In absolute terms, the slope of the budget line is equal to the price ratio of the two inputs.

The budget line of the firm has been superimposed on its isoquant map. The firm would be in equilibrium at a point where an isoquant is tangent to the budget line AB, i.e., point E. Thus in equilibrium, the firm produces on the isoquant Q_2 and uses OX_1 units of input X and OY_1 units of input Y. At point E, the slope of the isoquant Q_2 is equal to the slope of the budget line, i.e., the marginal rate of technical substitution of X and Y is equal to the ratio of prices of two inputs.

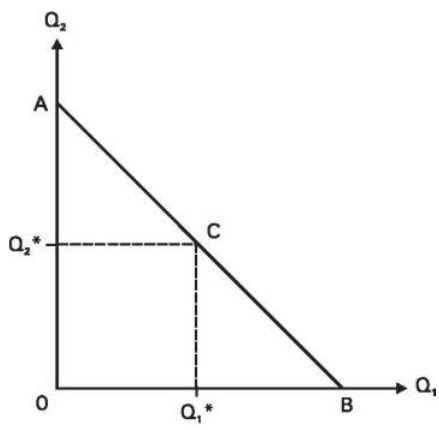
Thus $\quad MRTS_{XY} = \frac{MP_X}{MP_Y} = \frac{P_X}{P_Y}$

Thus, to minimise production costs (or to maximise output for a given cost outlay), the extra output or marginal product spent on labour must be equal to the marginal product per unit spent on capital.

6.5 Expansion Path

The case of a firm producing 1000 units of output using 10 units of capital and 10 units of labour (at point a) with input prices w=2 and r=2 is shown in Figure 6.4 using isoquants and isocosts.

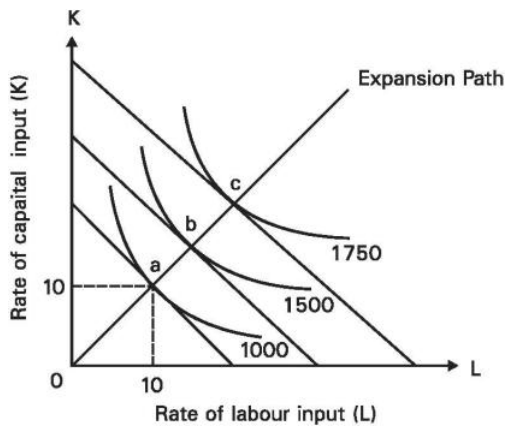
Figure 6.4



Thus the cost of this input combination is 40 units. At point a, the 1000 unit isoquant is tangent to the 40 unit isocost line. If the firm wants to increase its output or expand its production, it will move to point b if 1500 units are to be produced and then to point c if 1750 units of output are to be produced. In general, the firm expands by moving from one tangency or efficient production point to another. These efficient points represent the expansion path.

Notes

Figure 6.5



An expansion path is formally defined as the set of combinations of capital and labour that meet the efficiency condition $\frac{MP_L}{MP_K} = \frac{P_L}{P_K}$.

An equation for the expansion path can be determined by first substituting the marginal product functions and input prices into the efficiency condition, and then by solving for capital as a function of labour. If the production function is $Q = 100\ K^{½}\ L^{½}$, the corresponding marginal product functions are:

$$MP_L = \frac{dQ}{dL} = \frac{50K^{1/2}}{L^{1/2}}$$

6.6 Total, Marginal and Average Revenue

Revenue is the amount generated from sale of goods or services, or any other use of capital or assets, associated with the main operations of firm before any costs or expenses are deducted. In economics, we have three types of revenues-total revenue, average revenue and marginal revenue-which are discussed in subsequent subsections.

6.6.1 Total Revenue (TR)

Total revenue is the total money received from the sale of any given quantity of output.

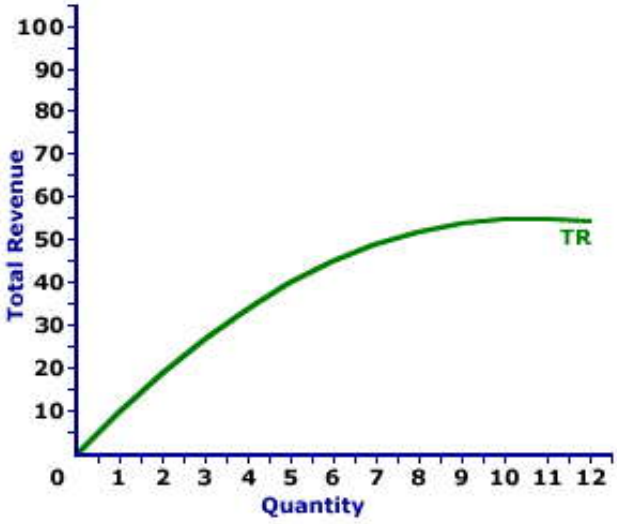
The total revenue is calculated by taking the price of the sale times the quantity sold, i.e.

TR = Price × Quantity.

Example: If price is ₹ 10 and quantity sold is 100, then total revenue would be ₹ 1000.

Figure depicts a total revenue curve.

Notes



Total Revenue Curve

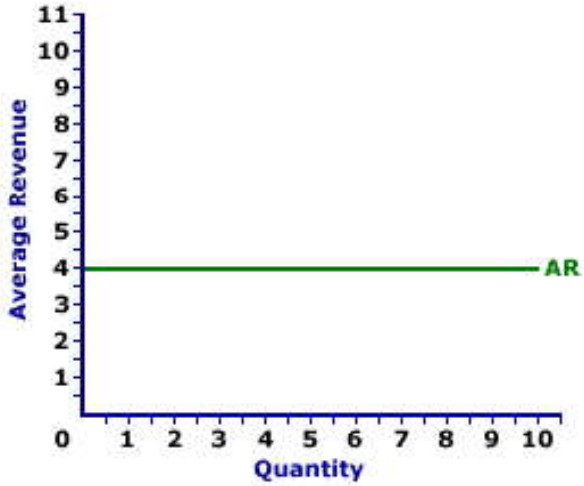
6.6.2 Average Revenue (AR)

Average revenue is the revenue received for selling a good per unit of output sold. It is calculated by dividing total revenue by the quantity of output, i.e.

AR= TR/Quantity

Average revenue often goes by a simpler and more widely used term- price. Using the longer term average revenue rather than price provides a connection to other related terms, especially total revenue and marginal revenue. When compared with average cost, average revenue shows the amount of profit generated per unit of output produced. Average revenue is often shown by an average revenue curve, shown in Figure 6.6.

Figure 6.6: Average Revenue Curve (Under Perfect Market)



Notes

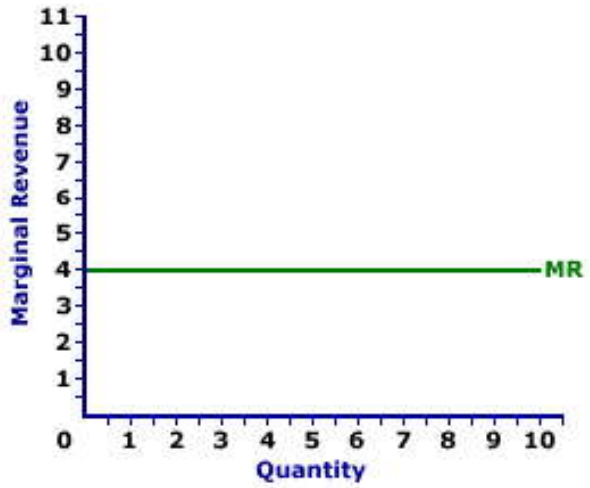
6.6.3 Marginal Revenue (MR)

Marginal revenue is the change in total revenue resulting from a change in the quantity of output sold. Marginal revenue indicates how much extra revenue a firm receives for selling an extra unit of output. It is found by dividing the change in total revenue by the change in the quantity of output. Marginal revenue is the slope of the total revenue curve and is one of two revenue concepts derived from total revenue. The other is average revenue. To maximize profit, a firm equates marginal revenue and marginal cost.

MR = Change in TR/Change in Quantity

Figure 6.7 depicts a MR curve under perfect market.

Figure 6.7: MR Curve



Task If price of a unit of good X is ₹ 35 and total quantity sold is 230. Find the total revenue, average revenue and the marginal revenue? Can all the three values be found with the given data?

Case Study

Cotton Board over Estimated Production

The Southern India Mills' Association (SIMA) said the Cotton Advisory Board (CAB's) has over estimated the production and under estimated the consumption. According to industry experts any further export of cotton would surpass the quantity decided by Group of Ministers by two lakh bales.

J Thulasidharan, chairman, SIMA said that CAB, at its first meeting held on January 6, 2011 has estimated the cotton production as 32.9 million bales and consumption as 27.5 million bales (including 2 million bales of non-mill consumption), retained the exportable surplus as 5.5 million bales and thus reducing the closing stock to 4.45 million bales as against the Group of Ministers (GoM) promised quantity of 5 million bales.

Contd...

Notes

He said, "CAB has over estimated the production and under estimated the consumption, textile mills would be forced to curtail their production for want of raw cotton from July onwards resulting abnormal increase in cotton and yarn price." CAB has reported, cotton production in the northern region (Punjab, Haryana and Rajasthan) will be less than 4 million bales, which has been endorsed by the ginning and trading community. In the past several years, Maharashtra farmers have been selling sizable kapas in Gujarat to fetch higher income whereas in the current season, since the farmers are realising good prices in Maharashtra itself, trading of kapas to Gujarat has come down drastically. This will result in Gujarat crop to less than 10 million bales, he said, Thulasidharan said, in Maharashtra, both production and quality, has been affected from the fact of large scale arrivals of low micronnaire cotton. "This in turn is an indication of severe crop damage in this state, therefore Maharashtra crop would be only around 8 million bales as against the CAB estimate of 9.2 million bales".

On extra long staple (ELS) cotton production, he said, erratic weather condition and unseasonal rains have seriously affected the crop in Karnataka and Madhya Pradesh.

Total DCH production may not cross even 125,000 bales, out of which sizeable quantity of arrivals is in the hands of exporters due to recent export clearance and grant of additional quota. With abnormally high ELS cotton prices (280 to 285 cents for PIMA and GIZA 88), Indian spinning sector will have serious setback in fine and superfine counts, said Thulasidharan.

He further said the hoarding of ELS cotton by the exporters has increased the DCH 32 cotton price from ₹ 53,000 per candy to ₹ 70,000 in a span of 10 days (spot prices), an increase of 24 per cent.

Thulasidharan estimated cotton production for the season 2010-11 will be only around 30.9 million bales. As far as cotton consumption is concerned, he stated, that Textile Commissioner Office has already estimated at 27.5 million bales for the current cotton season. "Non-submission of data to the Textile Commissioner's office is a handicap in arriving at the consumption figure. If the consumption of non-reporting mills and also the capacity being added in the spinning sector, the requirement including non-mill consumption would exceed 28.5 million bales."

"Viewing the production and consumption data, any further export of cotton would seriously affect the entire textile value chain. Even with the current cotton position, mills will face shortage of cotton from July onwards thus resulting in abnormal increase in yarn prices, ultimately affecting the common man".

The Association has sought the ministry of textiles to take up the matter suitably with the commerce and agriculture ministries and restrict the cotton export at 5.5 million bales and pointed out that the permitted quantity of export of cotton has already exceeded the quantity decided by Group of Ministers by 200,000 bales.

Question

Do you think that the estimates of Cotton Board are logical? Is it easy for the Board to estimate production and therefore estimate the total revenue and the marginal revenue?

Source: www.business-standard.com

Notes

6.7 Summary

- Production means conversion of inputs or resources into usable commodities or services.
- Inputs are the resources used in the production of goods and services and are generally classified into three broad categories — labour, capital and land or natural resources.
- Production is a process in which economic resources or inputs are combined by entrepreneurs to create economic goods and services.
- An expansion path is formally defined as the set of combinations of capital and labour that meet the efficiency condition.
- Isoquants are a geometric representation of the production function. Various combinations of factor inputs can produce the same level of output.
- The marginal rate of technical substitution of L for K (denoted by $MRTS_{L,K}$) is defined as the number of units of input K that a producer is willing to sacrifice for an additional unit for L so as to maintain the same level of output

6.8 Keywords

Isoquants: These are a geometric representation of the production function

Kinked isoquant: This assumes limited substitutability of capital and labour.

Marginal revenue product of labour: Marginal product of labour times the marginal revenue from the sale of extra output produced

Production function: A function that states the maximum amount of an output that can be produced with a certain combination of inputs, within a given period of time and with a given level of technology

Production: Transformation of inputs into output

6.9 Self Assessment

Fill in the blanks:

1. Production refers to the ..... of inputs or resources into output of goods and services.
2. ..... are the resources used in the production of goods and services and are generally classified into three broad categories-labour, capital and land or natural resources.
3. ..... are those that can be varied easily and on very short notice.
4. The time period during which at least one input is fixed is called the ..... .
5. Mathematically, the production function can also be shown as: ..... .
6. The MPP of factor is a change in ..... resulting from a change in a factor of production.
7. Linear isoquant assumes ..... substitutability of factors of production.
8. Kinked isoquant assumes ..... substitutability of factors of production.
9. Kinked isoquant assumes ..... substitutability of capital and labour.
10. Average Revenue is, generally, also referred to as ……

Notes

6.10 Review Questions

1. Which of the following statements best describes the general form of a production function and why?
   (a) It is a purely technological relationship between quantities of input and quantities of output.
   (b) It represents the technology of an organisation, sector of an economy.
   (c) Prices of inputs or of the output do not enter into the production function.
   (d) It is a flow concept describing the transformation of inputs into output per unit of time.
2. A firm has a production function of the following form Q = K + 2L Where Q is output, K is the capital input and L is the labour input per time period. The wage rate and the rental rate on capital is ₹ 50 per unit. Find out the cost minimising output.
3. A firm faces the following long run cost function:

$$TC = q^3 - 40q^2 + 450q$$

   Calculate the quantity (q) and the average cost (AC), when the latter will be at its minimum.
4. From the information given below calculate the average and marginal product of labour.

Land (acres)	5	5	5	5	5	5	5	5
Labour (number of men)	0	1	2	3	4	5	6	7
Total product (kg.)	0	3	8	12	15	17	17	16

5. If a firm moves from one point on a production isoquant to another, which of the following will not happen and why?
   (a) A change in the ratio in which the inputs are combined.
   (b) A change in the marginal products of the inputs.
   (c) A change in the rate of technical substitution.
   (d) A change in the level of output.
6. "The marginal rate of technical substitution is numerically equal to the negative of the slope of an isoquant." Comment.
7. Can Isoquants be drawn in different shapes? Examine their characteristics.
8. Calculate the total cost of production, if only two inputs are used- labour and capital. Consider the following data: Cost of labour= ₹ 50/unit, price of capital= ₹ 500, number of labour used= 35 and capital used 45.
9. Show that the different relative input prices would define an isocost line with a different slope.
10. Show that the ratio of marginal products is equal to the ratio of price.

Answers: Self Assessment

1. Transformation
2. Inputs
3. Variable Inputs
4. Short Run
5. $Q = f(X_1, X_2 \ldots\ldots\ldots\ldots X_k)$
6. output

Notes

7. perfect
8. limited
9. limited
10. Price

6.11 Further Readings

Books

Dr. Atmanand, *Managerial Economics*, Excel Books, Delhi.

H.Craig Patersen, *Managerial Economics*, Prentice Hall

Malcolm P. McNair and Richard S. Meriam, *Problems in Business Economics*, McGraw-Hill Book Co., Inc.

Paul G. Keat, *Managerial Economics*, Pearson Education

Online links

faculty.lebow.drexel.edu/McCainR/top/Prin/txt/MPCh/firm4a.html

ingrimayne.com/econ/TheFirm/ProductionFunct.html

http://www.docshare.com/doc/211217/PRODUCER-EQUILIBRIUM

Unit 7: Laws of Production

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7.1 Law of Diminishing Returns to Factor (Law of Variable Proportions)

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7.3 Summary

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Objectives

After studying this unit, you will be able to:

- Discuss law of diminishing returns to factor and returns to scale
- Explain the law of returns of scale

Introduction

In this unit, we will discuss the laws of production. In the short run, the law of diminishing returns states that as we add more units of a variable input (i.e. labour or raw materials) to fixed amounts of land and capital, the change in total output will at first rise and then fall. Diminishing returns to labour occurs when marginal product of labour starts to fall. This means that total output will still be rising - but increasing at a decreasing rate as more workers are employed. In the long run, all factors of production are variable. How the output of a business responds to a change in factor inputs is called returns to scale.

7.1 Law of Diminishing Returns to Factor (Law of Variable Proportions)

If all inputs of a firm are fixed and only the amount of labour services differs, then any decrease or increase in output is achieved with the help of changes in the amount of labour services used. When the firm changes the amount of labour services only, it changes the proportion between the fixed input and the variable input. As the firm keeps on changing this proportion by changing the amount of labour, it experiences the law of variable proportion or diminishing marginal returns. This law states that,

As more and more of the factor input is employed, all other input quantities remaining constant, a point will finally be reached where additional quantities of varying input will produce diminishing marginal contributions to total product.

Notes

This underlines the short run production function. It can be shown in a Table 7.1 and Figure 7.1 as follows.

Table 7.1: Production Function with One Variable Input

Number of Labour Units (L) (1)	Total Product of Labour (TP_L) (2)	Average Product of Labour (AP_L) (3 = 1 + 2)	Marginal Product of Labour (MP_L) (4)
1	100	100	–
2	210	105	110
3	330	110	120
4	430	107.5	100
5	520	104	90
6	600	100	80
7	670	95.7	70
8	720	90	50
9	750	83.3	30
10	760	76	10

In Table 7.1 labour is assumed to be the only variable input. Columns 1 and 2 together represent the production function of the firm. Column 3 shows the average combination of labour units involved. Column 4 lists the amount of increase in output as a result of each additional unit of labour, e.g., the marginal physical product of 5th unit of labour is the total physical product of 5 units of labour minus the total physical product of 4 units. Column 4 shows that the marginal physical product starts decreasing from 4th unit of labour onward. If labour units employed increase beyond 10, the marginal physical product will become zero and later become negative. The stage from where the marginal physical product starts decreasing shows the law of diminishing returns or law of variable proportions.

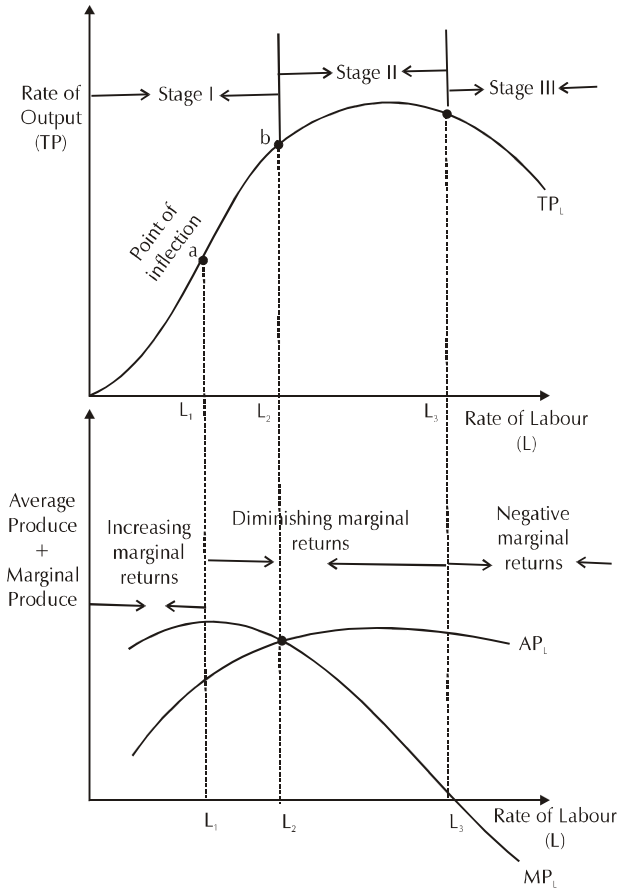
MP begins to fall before the AP does. The reason is that the AP attributes the increase in TP equally to all the units of the variable factor whereas the MP, by definition, attributes the increase in TP to the marginal unit of the variable factor.

If the MP is greater than the AP, the AP rises and if the MP is less than the AP, then the AP falls. For example if the batsman's next (or marginal) score is greater than his average score, then his average score rises and if his next (or marginal) score is less than his average score, the average score falls.

From this it follows, that when the MP is equal to the AP, the AP is at its maximum. The reason is that when AP is increasing, MP is above AP, pulling it up; when the AP is at its maximum and constant, AP is equal to MP; when AP is falling, MP is below AP, pulling it down.

Notes

Figure 7.1



7.1.1 Three Stages of Production

Diminishing returns to a factor can be graphically understood with the help of total and marginal product curves. In Figure 7.1, the TPP curve rises first to an increasing rate in stage I and later at a diminishing rate in stage II. At stage II, the TPP remains constant. Thus, the total output increases more than proportionately until X units of labour are employed; between X units and Y units of labour used, the total output rises with every additional unit of labour but this increase is less than proportionate. If labour units increase beyond level Y, the total output eventually starts decreasing. Correspondingly when TPP is rising at an increasing rate, MPP and APP curves are rising; and when total product is rising at a diminishing rate, the MPP and APP curves are declining. At Y, where TPP becomes constant, the MPP becomes zero, and additional labour beyond Y makes MPP negative. These three phases of TPP curve are called the three stages of production and are summarized in Table 7.2.

No firm will choose to operate either in Stage I or Stage III. In Stage I the marginal physical product is rising, i.e., each additional unit of the variable factor is contributing to output more than the earlier units of the factor; it is therefore profitable for the firm to keep on increasing the use of labour. In Stage III, marginal contribution to output of each additional unit of labour is negative; it is therefore, not advisable to use any additional labour. Even if cost of labour used is zero, it is still unprofitable to move into Stage III. Thus, Stage II is the only important range for a rational firm in a competitive situation. However, the exact number of labour units hired can be found only when the corresponding data on wage rates is available.

Notes

Table 7.2: Stages of Production

Total Physical Product	Marginal Physical Product	Average Physical Product	Additional Information
Stage I Increases at an increasing rate	Increases and reaches its maximum	Increases (but slower than MPP)	Fixed inputs grossly under utilised, specialisation and team work cause APP to increase when additional input is used
Stage II Increases at a diminishing rate and becomes maximum	Starts diminishing and becomes equal to zero	Starts diminishing	Specialisation and teamwork continue and result in greater output when additional input is used, fixed input is being properly utilised
Stage III Reaches its maximum, becomes constant and then starts declining	Keeps on declining and becomes negative	continues to diminish but must always be greater than zero	Fixed inputs capacity is reached, additional input causes output to fall

7.1.2 Optimal use of Variable Input

It is important for the firm to decide how much labour it should use in order to maximize profits. The firm should employ an additional unit of labour as long as the extra revenue generated from the sale of the output produced exceeds the extra cost of hiring the unit of labour, i.e., until the extra revenue equals the extra cost.

Thus, if an additional unit of labour generates ₹ 300/- in extra revenue and costs an extra ₹ 200 then it pays for the firm to hire this unit of labour as its total profit increases. This is an example of application of the general optimization principle.

The extra revenue generated by the use of an additional unit of labour is called the Marginal Revenue Product of Labour (MRP_L). This equals the Marginal Product of Labour (MP_L) times the Marginal Revenue (MR) from the sale of the extra output produced. Thus,

$$MRP_L = (MP_L)\,(MR)$$

The extra cost of hiring an additional unit of labour or Marginal Resource Cost of Labour (MRC_L) is equal to the increase in the total cost to the firm resulting from hiring the additional unit of labour. Thus,

$$MRC_L = \frac{\Delta TC}{\Delta L}$$

A firm should continue to hire labour as long as $MRP_L > MRC_L$ and until

$$MRP_L = MRC_L$$

This is applicable to any variable input and not just labour.

Notes

Task Production manager of a company estimates that their production process is currently characterises by the following production functions:

$$Q = 72x + 20x^2 - x^3$$

1. Determine the equation for the MP and AP of the variable factor.
2. What is the MP when seven units of the variable input are employed?

Case Study

Productivity Side of Indian Industries

Companies that attend to productivity and growth simultaneously manage cost reductions very differently from companies that focus on cost cutting alone and they drive growth very differently from companies that are obsessed with growth alone. It is the ability to cook sweet and sour that undergrids the remarkable performance of companies like Intel, GE, ABB and Canon.

In the slow growth electro-technical business, ABB has doubled its revenues from $17 billion to $35 billion, largely by exploiting new opportunities in emerging markets. For example, it has built up a 46,000 employee organisation in the Asia Pacific region, almost from scratch. But it has also reduced employment in North America and Western Europe by 54,000 people. It is the hard squeeze in the north and the west that generated the resources to support ABB's massive investments in the east and the south.

Everyone knows about the staggering ambition of the Ambanis, which has fuelled Reliance's evolution into the largest private company in India. Reliance has built its spectacular rise on a similar ability to cook sweet and sour. What people may not be equally familiar with is the relentless focus on cost reduction and productivity growth that pervades the company.

Reliance's employee cost is 4 per cent of revenues, against 15-20 per cent of its competitors. Its sales and distribution cost, at 3 per cent of revenues, is about a third of global standards. It has continuously pushed down its cost for energy and utilities to 3 per cent of revenues, largely through 100 per cent captive power generation that costs the company 4.5 cents per kilowatt-hour; well below Indian utility costs, and about 30 per cent lower than the global average.

Similarly, its capital cost is 25-30 per cent lower than its international peers due to its legendary speed in plant commissioning and its relentless focus on reducing the weighted average cost of capital (WACC) that, at 13 per cent, is the lowest of any major Indian firm.

A Bias for Growth

Comparing major Indian companies in key industries with their global competitors shows that Indian companies are running a major risk. They suffer from a profound bias for growth. There is nothing wrong with this bias, as Reliance has shown. The problem is most look more like Essar than Reliance. While they love the sweet of growth, they are unwilling to face the sour of productivity improvement.

Nowhere is this more amply borne out than in the consumer goods industry where the Indian giant Hindustan Lever has consolidated to grow at over 50 per cent while its labour productivity declined by around 6 per cent per annum in the same period. Its strongest competitor, Nirma, also grew at over 25 per cent per annum in revenues but maintained its labour productivity relatively stable. Unfortunately, however, its return on capital

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Notes

employed (ROCE) suffered by over 17 per cent. In contrast, Coca Cola, worldwide, grew at around 7 per cent, improved its labour productivity by 20 per cent and its return on capital employed by 6.7 per cent.

The story is very similar in the information technology sector where Infosys, NIIT and HCL achieve rates of growth of over 50 per cent which compares favourably with the world's best companies that grew at around 30 per cent between 1994-95. NIIT, for example, strongly believes that growth is an impetus in itself. Its focus on growth has helped it double revenues every two years. Sustaining profitability in the face of such expansion is an extremely challenging task.

For now, this is a challenge Indian infotech companies seem to be losing. The ROCE for three Indian majors fell by 7 per cent annually over 1994-96. At the same time IBM Microsoft and SAP managed to improve this ratio by 17 per cent.

There are some exceptions, however. The cement industry, which has focused on productivity rather than on growth, has done very well in this dimension when compared to their global counterparts. While Mexico's Cemex has grown about three times fast as India's ACC, Indian cement companies have consistently delivered better results, not only on absolute profitability ratios, but also on absolute profitability growth. They show a growth of 24 per cent in return on capital employed while international players show only 8.4 per cent. Labour productivity, which actually fell for most industries over 1994-96, has improved at 2.5 per cent per annum for cement.

The engineering industry also matches up to the performance standards of the best in the world. Companies like Cummins India has always pushed for growth as is evidenced by its 27 per cent rate of growth, but not at the cost of present and future profitability. The company shows a healthy excess of almost 30 per cent over WACC, displaying great future promise.

BHEL, the public sector giant, has seen similar success and the share price rose by 25 per cent despite an indecisive sensex. The only note of caution: Indian engineering companies have not been able to improve labour productivity over time, while international engineering companies like ABB, Siemens and Cummins Engines have achieved about 13.5 per cent growth in labour productivity, on an average, in the same period.

The pharmaceuticals industry is where the problems seem to be the worst, with growth emphasised at the cost of all other performance. They have been growing at over 22 per cent, while their ROCE fell at 15.9 per cent per annum and labour productivity at 7 per cent.

Compare this with some of the best pharmaceutical companies of the world – Glaxo Wellcome, SmithKline Beecham and Pfizer –who have consistently achieved growth of 15-20 per cent, while improving returns on capital employed at about 25 per cent and labour productivity at 8 per cent. Ranbaxy is not an exception; the bias for growth at the cost of labour and capital productivity is also manifest in the performance of other Indian pharma companies. What makes this even worse is the Indian companies barely manage to cover their cost of capital, while their competitors worldwide such as Glaxo and Pfizer earn an average ROCE of 65 per cent.

In the Indian textile industry, Arvind Mills was once the shining star. Like Reliance, it had learnt to cook sweet and sour. Between 1994 and 1996, it grew at an average of 30 per cent per annum to become the world's largest denim producer. At the same time, it also operated a tight ship, improving labour productivity by 20 per cent.

Despite the excellent performance in the past, there are warning signals for Arvind's future. The excess over the WACC is only 1.5 per cent, implying it barely manages to satisfy its investors expectations of return and does not really have a surplus to re-invest

Contd...

Notes

in the business. Apparently, investors also think so, for Arvind's stock price has been falling since Q4 1994 despite such excellent results and, at the end of the first quarter of 1998, is less than ₹ 70 compared to ₹ 170 at the end of 1994.

Unfortunately, Arvind's deteriorating financial returns over the last few years is also typical of the Indian textile industry. The top three Indian companies actually showed a decline in their return ratios in contrast to the international majors. Nike, VF Corp and Coats Viyella showed a growth in their returns on capital employed of 6.2 per cent, while the ROCE of Grasim and Coats Viyella (India) fell by almost 2 per cent per annum. Even in absolute returns on assets or on capital employed, Indian companies fare a lot worse. While Indian textile companies just about cover their WACC, their international rivals earn about 8 per cent in excess of their cost of capital.

Questions

1. Is Indian companies running a risk by not giving attention to cost cutting?
2. Discuss whether Indian Consumer goods industry is growing at the cost of future profitability.
3. Discuss capital and labour productivity in engineering context and pharmaceutical industries in India.
4. Is textile industry in India performing better than its global competitors?

7.2 Returns to Scale (Law of Returns to Scale)

If all inputs are changed at the same time (possible only in the long run), and suppose are increased proportionately, then the concept of returns to scale has to be used to understand the behaviour of output. The behaviour of output is studied when all factors of production are changed in the same direction and proportion.

In the long run, output can be increased by increasing the 'scale of operations'. When we speak of increasing the 'scale of operations' we mean increasing all the factors at the same time and by the same proportion. For example, in a factory, in the long run, the scale of operations may be increased by doubling the inputs of labour and capital. The laws that govern the scale of operation are called the laws of returns of scale.

The laws of returns to scale always refer to the long run because only in the long run are all the factors of production variable. In other words, only in the long run is it possible to change all the factors of production. Thus the laws of returns to scale refer to that time in the future when changes in output are brought about by increasing all inputs at the same time and in same proportion.

Returns to scale are classified as follows:

1. ***Increasing Returns to Scale (IRS):*** If output increases more than proportionate to the increase in all inputs.
2. ***Constant Returns to Scale (CRS):*** If all inputs are increased by some proportion, output will also increase by the same proportion.
3. ***Decreasing Returns to Scale (DRS):*** If increase in output is less than proportionate to the increase in all inputs.

For example, if all factors of production are doubled and output increases by more than two times, then the situation is of increasing returns to scale. On the other hand, if output does not double even after a cent per cent increase in input factors, we have diminishing returns to scale.

Notes

The general production function is

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

If land, K, and labour, L, is multiplied by h and Q increases by λ, we get,

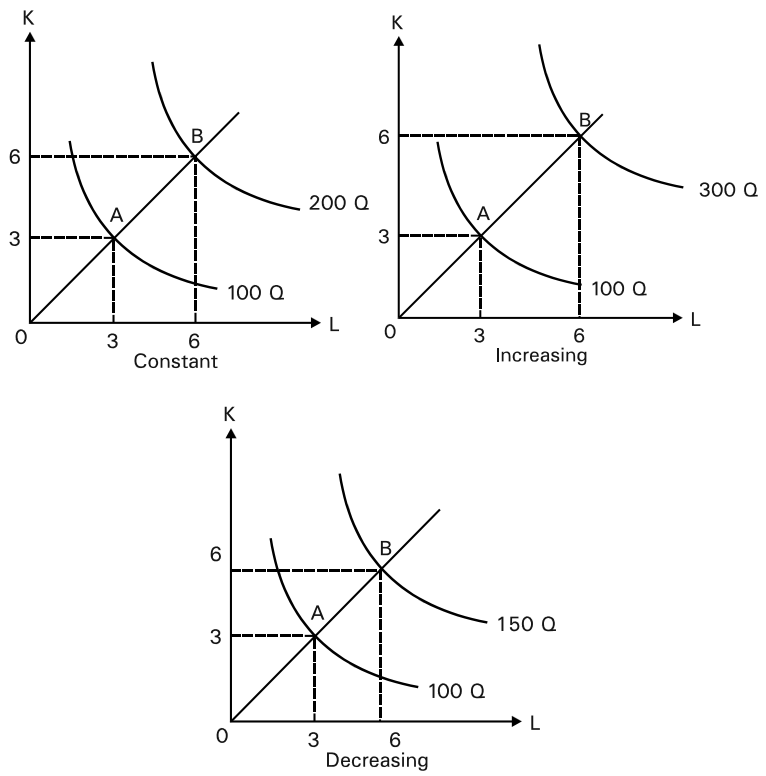
$$\lambda Q = f(hL, hK)$$

We have constant, increasing or decreasing returns to scale, respectively depending upon, whether $\lambda = h$, $\lambda > h$ or $\lambda < h$.

For example, if all inputs are doubled, we have constant, increasing or decreasing returns to scale, respectively, if output doubles, more than doubles or less than doubles.

The firm increases its inputs from 3 to 6 units (K, L) producing either double (point B), more than double (point C) or less than double (point D) output (Q) as shown in Figure 7.2.

Figure 7.2: Returns to Scale



Increasing returns to scale arise because as the scale of operation increases, a greater division of labour and specialization can take place and more specialised and productive machinery can be used. Decreasing returns to scale arise primarily because as the scale of operation increases, it becomes more difficult to manage the firm. In the real world, the forces for increasing or decreasing returns to scale often operate side by side, with the former usually overpowering the latter at small levels of output and the reverse occurring at very large levels of output.

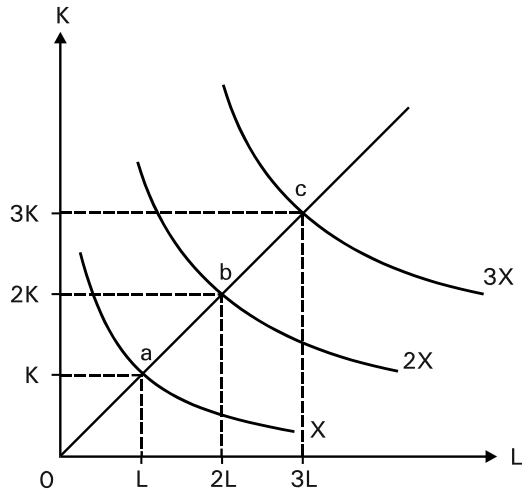
If all the factors of production are increased in a particular proportion and the output increases in exactly that proportion then the production function is said to exhibit CRS. Thus if labour and capital are increased by 10% and the output also increases by 10% then the production function is CRS.

If you look at Figure 7.3, to produce X units of output, L units of labour and K units of capital are needed (point a). If labour and capital are now doubled (as is possible in the long run), so that

Notes

there are 2L units of labour and 2K units of capital, the output is exactly doubled i.e., equals 2X (point b). Similarly, trebling input achieves treble the output and so on.

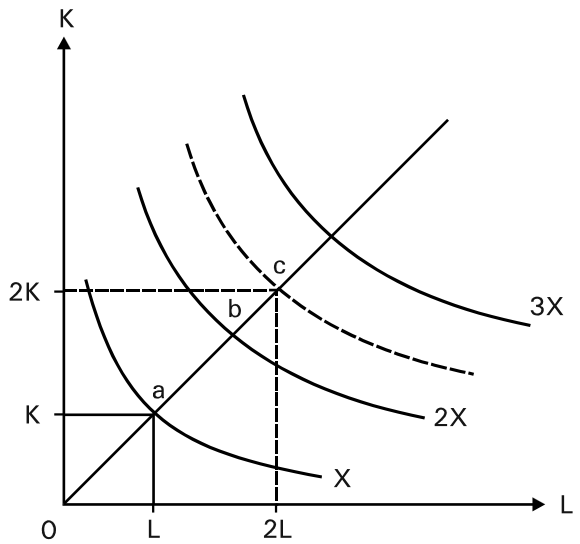
Figure 7.3: CRS Production Function



If all the factors of production are increased in a particular proportion and the output increases by more than that proportion then the production function is said to exhibits IRS. For example, in many industrial processes if all inputs are doubled, factories can be run in more efficient and effective ways, there by actually more than doubling output. This is shown in Figure 7.4. To produce X units of output, L units of Labour and K units of output are needed. If labour is doubled to 2L units and capital to 2K units, an output greater than 2X is produced (point c lies on a higher isoquant than point b).

If the factors of production are increased in a particular proportion and the output increases by less than that proportion than the production function is said to exhibit DRS. For example, if capital and labour are increased by 10% and output rises by less than 10% the production function is said to exhibit decreasing returns to scale.

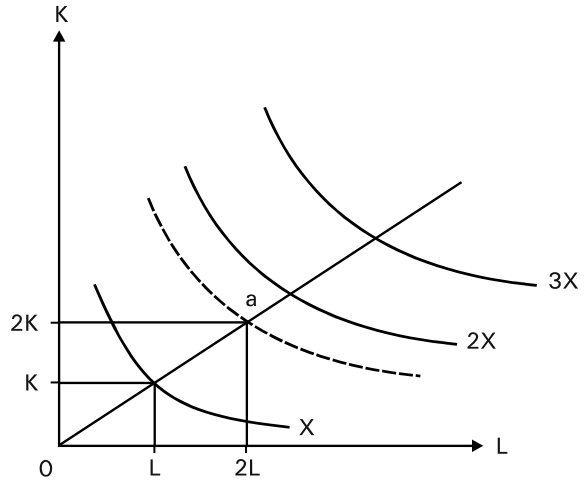
Figure 7.4: IRS Production Function



Notes

If you look at Figure 7.5, to produce X units of output L units of labour and K units of capital are required. By doubling the input, the output increases by less than twice its original level. For example, if inputs are 2L and 2K, output level 'a' is reached, which lies below the one showing 2X.

Figure 7.5: DRS Production Function



It is also necessary for students to know the causes for increasing and decreasing returns to returns to scale.

Task Production managers of a company estimate that their production process is currently characterised by the following short run production function:

$$Q = 72X + 15X^2 - X^3$$

where Q = tonnes of boxes produced per production period and X = units of variable input employed per production period.

Graphically illustrate the production function, indicating the following:

1. the range of increasing returns
2. the range of decreasing returns.

Notes

Causes of Increasing and Decreasing Returns to Scale

Causes of Increasing Returns to Scale

Increasing returns to scale are due to technical and/or managerial indivisibilities. One of the basic characteristics of advanced industrial technology is the existence of mass production methods. Mass production methods (like the assembly line car industry) are processes available only when the level of output is large. They are more efficient than the best available processes for producing small levels of output. For example, increasing returns of scale may happen because each worker has specialised in performing a simple

Contd...

Notes

repetitive task rather than many different tasks. As a result labour productivity increases. In addition, a larger scale of operation may permit the use of more productive specialised machinery, which was not practically possible on a lower scale of operation.

Cause of Decreasing Returns to Scale

The most common causes are "diminishing returns to management". The management is responsible for the coordination of the activities of the various sections of the firm. Even when authority is given to individual managers (production manager, sales manager, etc.) the final decisions have to be taken by the board of directors. As the output grows, top management becomes finally overburdened and hence less efficient in its role as coordinator and ultimate decision-maker. Although advances in management science have developed endless management techniques, it is still a commonly observed fact that as firms grow beyond the appropriate optimal, management diseconomies come in. These may result because as the scale of operations increases, communication difficulties make it more and more difficult to run the business effectively.

Another cause for decreasing returns may be found in the exhaustible natural resources: doubling the fishing fleet may not lead to a doubling of the catch of fish; or doubling the plant in mining or an oil extraction field may not lead to a doubling of output.

Caselet

Apache Aims to Double Adidas Shoe Production

Apache Footwear India, the manufacturer for Adidas shoes in India, aims to double production of shoes from its special economic zone (SEZ) here to 8 lakh pairs a month by 2014.

At present, about four lakh pair of shoes are produced every month from the SEZ, located in Mambattu village of Nellore district.

"We have a target to double the production of shoes to 8 lakh pairs per month by 2014," Apache Footwear General Manager Phillip Chen said.

The company's SEZ, spread over 314 acres, recorded a turnover of ₹ 240 crore in 2010 and provides employment to about 6,300 people.

The company also plans to set up a development centre and supply centre in the state. These centres would help reduce the time taken for production of shoes.

"We are expecting that the turnover will increase to ₹ 300 crore this year," Chen said, adding that a proposed supplier park will help the firm bring down the lead time for production from two months at present to just five days.

Apache exports its shoes mainly to Europe, the US and Russia.

Chen said the firm is also trying to convince Adidas to buy raw material from India. "We are importing the entire raw material mainly from China, Vietnam and Indonesia," he added.

Germany-based Adidas is a leading sports apparel and equipment manufacturer.

Source: www.business-standard.com

Notes

7.3 Summary

- The law of variable proportion of says that as more and more of the factor input is employed, all other input quantities remaining constant, a point will eventually be reached where additional quantities of varying input will yield diminishing marginal contributions to total product.
- Returns to scale are classified as: (a) Increasing Returns to Scale (IRS), (b) Constant Returns to Scale (CRS) and (c) Decreasing Returns to Scale (DRS).

7.4 Keywords

Fixed inputs: Inputs that cannot be readily changed during the time period under consideration

Inputs: Resources used in the production of goods and services

Long-run: The time period when all inputs become variable

Short-run: The time period during which at least one input is fixed

Variable inputs: Inputs that can be varied easily and on very short notice

7.5 Self Assessment

Fill in the blanks:

1. As we added more and more of variable input to a fixed input, the amount of extra product will.....
2. Under decreasing return to scale increase in output is ..... than proportionate to the increase in input.
3. Increasing return to scale are due to ..... and/or managerial indivisibilities.
4. Technical indivisibilities cause..... returns to scale.
5. In the long run, output can be ..... by increasing the scale of operations.
6. As per Law of Variable Proportions, when MP is equal to AP, AP is at its…….
7. In the third stage of Law of Diminishing Returns, there are …….marginal returns.
8. A sensible firm would like to operate in the……stage of production.
9. In ……stage of production, any additional input employed would lead to a fall in output.
10. In……..returns to scale, the proportionate increase in input is not equal to the proportionate change in output.

7.6 Review Questions

1. Examine the importance of the law of diminishing returns. What do you think to be its causes and effects?
2. Are diminishing returns to a factor inevitable? Give reasons.
3. Give your comment on second stage of production.
4. Can labour productivity never increase when total production is falling? Discuss.
5. Analyse the day to day situations around you and provide evidence against the hypothesis of constant returns to scale.

Notes

6. Suppose the production function for widgets has the form

$$Q = q(K,L) = 50K^{0.3}L^{0.7}$$

Where q is the quantity of tools per day, K is the quantity of capital input, and L is the quantity of labor input per day.

(a) Does this production function have increasing, constant, or decreasing returns scale?

(b) What is the marginal product of capital when the firm is suing 5 units of capital and 1 unit of labour?

(c) What is the marginal product labor when the firm is using 5 units of labor and 1 unit of capital?

(d) What is the total output when the firm is using 5 units of capital and 5 units of labor? Draw an isoquant representing this level of output.

(e) What additional information would you need to determine which of the combinations on your isoquant is "best"? That is what would you want to know to choose the best combination of labor and capital to use in your production process?

7. "Technical and/or managerial indivisibilities cause increasing return to scale." Give your opinion.

8. Discuss returns to scale with the help of examples.

9. Bring out the difference between increasing, decreasing and constant returns to scale with the help of suitable figures only.

10. Comment on the role of specialization in increasing returns to scale.

Answers: Self Assessment

1.	fall off	2.	less	3.	technical
4.	increasing	5.	increased	6.	Maximum
7.	Negative	8.	Second	9.	Third
10.	Increasing and Decreasing				

7.7 Further Readings

Books

Dr. Atmanand, *Managerial Economics*, Excel Books, Delhi.

H.Craig Patersen, *Managerial Economics*, Prentice Hall

Malcolm P. McNair and Richard S. Meriam, *Problems in Business Economics*, McGraw-Hill Book Co., Inc.

Paul G. Keat, *Managerial Economics*, Pearson Education

Online links

faculty.lebow.drexel.edu/McCainR/top/Prin/txt/MPCh/firm4a.html

http://www.docshare.com/doc/211217/PRODUCER-EQUILIBRIUM

ingrimayne.com/econ/TheFirm/ProductionFunct.html

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Unit 8: Cost Analysis

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Objectives

After studying this unit, you will be able to:

- Discuss various types of costs
- Explain the behaviour of short run and long run cost curves
- State the concept of Economies of scales and economies of scope
- Discuss the revenue curves and their applications

Introduction

The cost which a firm incurs in the process of production of its goods and services is an important variable for decision making. Total cost together with total revenue determines the profit level of a business concern. In order to maximise profits a firm endeavours to increase its revenue and lower its costs. To this end, managers try to produce optimum levels of output, use the least cost combination factors of production, increase factor productivities and improve organisational efficiency.

Notes

8.1 Cost Concepts

Costs play a very important role in managerial decisions involving a selection between alternative courses of action. It helps in specifying various alternatives in terms of their quantitative values. The kind of cost to be used in a particular situation depends upon the business decisions to be made. Costs enter into almost every business decision and it is important to use the right analysis of cost. Hence, it is important to understand what these various concepts of costs are, how these can be defined and operationalised. This requires the understanding of the two things, namely, (i) that cost estimates produced by conventional financial accounting are not appropriate for all managerial uses, and (ii) that different business problems call for different kinds of costs.

Future and Past Costs

Futurity is an important aspect of all business decisions. Future costs are the estimates of time adjusted past or present costs and are reasonably expected to be incurred in some future period or periods. Their actual incurrence is a forecast and their management is an estimate. Past costs are actual costs incurred in the past and they are always contained in the income statements. Their measurement is essentially a record keeping activity.

Incremental and Sunk Costs

Incremental costs are defined as the change in overall costs that result from particular decisions being made. Incremental costs may include both fixed and variable costs. In the short period, incremental cost will consist of variable cost — costs of additional labour, additional raw materials, power, fuel, etc. — which is the result of a new decision being taken by the firm. Since these costs can be avoided by not bringing about any change in the activity, incremental costs are also called avoidable costs or escapable costs. They are also called differential costs.

Sunk cost is one which is not affected or altered by a change in the level or nature of business activity. It will remain the same whatever the level of activity.

Example: The most important example of sunk cost is the amortisation of past expenses, e.g., depreciation.

Out-of-Pocket and Book Costs

Out-of-pocket costs are those that involve immediate payments to outsiders as opposed to book costs that do not require current cash expenditure.

Example: Wages and salaries paid to the employees are out-of-pocket costs while salary of the owner manager.

If not paid, it is a book cost. The interest cost of owner's own fund and depreciation cost are other examples of book costs. Book costs can be converted into out-of-pocket costs by selling assets and leasing them back from the buyer.

Replacement and Historical Costs

Historical cost of an asset states the cost of plant, equipment and materials at the price paid originally for them, while the replacement cost states the cost that the firm would have to incur if it wants to replace or acquire the same asset now.

Notes

Example: If the price of bronze at the time of purchase, say, in 1974, was ₹ 15 a kg and if the present price is ₹ 18 a kg, the original cost of ₹ 15 is the historical cost while ₹ 18 is replacement cost. Replacement cost means the price that would have to be paid currently for acquiring the same plant.

Explicit Costs and Implicit or Imputed Costs (Accounting Concept of Cost and Economic Concept of Cost)

Explicit costs are those expenses which are actually paid by the firm (paid-out-costs). These costs appear in the accounting records of the firm. On the other hand, implicit costs are theoretical costs in the sense that they go unrecognised by the accounting system. These costs may be defined as the earnings of those employed resources which belong to the owner himself.

Actual Costs and Opportunity Costs

Actual costs mean the actual expenditure incurred for acquiring or producing a good or service. These costs are the costs that are generally recorded in books of account, for example, actual wages paid, cost of materials purchased, interest paid, etc.

Notes The concept of opportunity cost occupies a very important place in modern economic analysis. The opportunity costs or alternative costs are the returns from the second best use of the firm's resources which the firm forgoes in order to avail itself of the returns from the best use of the resources. To take an example, a farmer who is producing wheat can also produce potatoes with the same factors. Therefore, the opportunity cost of a quintal of wheat is the amount of the output of potatoes given up. Thus, we find that the opportunity cost of anything is the next best alternative that could be produced instead by the same factors or by an equivalent group of factors, costing the same amount of money. Two points must be noted in this definition. Firstly, the opportunity cost of anything is only the next best alternative foregone. Secondly, in the above definition it is the addition of the qualification "or by an equivalent group of factors costing the same amount of money".

Direct (or Separable or Traceable) Costs and Indirect (or Common or Non-traceable) Costs

There are some costs which can be directly attributed to the production of a unit of a given product. Such costs are direct costs and can easily be separated, ascertained and imputed to a unit of output. This is because these costs vary with the output units. However, there are other costs which cannot be separated and clearly attributed to individual units of production. These costs are, therefore, classified as indirect costs in the accounting process.

Shut-down and Abandonment Costs

Shut-down costs are required to be incurred when the production operations are suspended and will not be necessary if the production operations continue. When any plant is to be permanently closed down, some costs are to be incurred for disposing off the fixed assets. These costs are called abandonment costs.

Notes

Private and Social Costs

Economic costs can be calculated at two levels: micro-level and macro-level. The micro-level economic costs relate to functioning of a firm as a production unit, while the macro-level economic costs are the ones that are generated by the decisions of the firm but are paid by the society and not the firm. Private costs are those which are actually incurred or provided for by an individual or a firm for its business activity. Social cost, on the other hand, is the total cost to the society on account of production of a good. Thus, the economic costs include both private and social costs.

Above are the some concepts of costs. But the important cost concepts which play crucial role in managerial decision-making are as follows:

8.2 Fixed and Variable Costs

There are some inputs or factors which can be adjusted with the changes in the output level. Thus, a firm can readily employ more workers if it has to increase output. Likewise, it can secure and use more raw materials, more chemicals, without much delay, if it has to expand production. Thus, labour, raw materials, chemicals are the factors which can be readily varied with the change in output. Such factors are called variable factors. On the other hand, there are factors such as capital equipment, building, top management personnel which cannot be readily varied — it requires a comparatively long time to make variations in them. The factors such as capital equipment, building, which cannot be readily varied and require a comparatively long time to make adjustment in them are called fixed factors. Therefore, fixed costs are those which are independent of output, i.e., they do not change with changes in output. These costs are a "fixed" amount which must be incurred by a firm in the short run, whether the output is small or large. Fixed costs are also known as overhead costs and include charges such as contractual rent, insurance fee, maintenance costs, property taxes, interest on the capital invested, minimum administrative expenses such as manager's salary, watchman's wages, etc. Thus, fixed costs are those which are incurred in hiring the fixed factors of production whose amount cannot be altered in the short run.

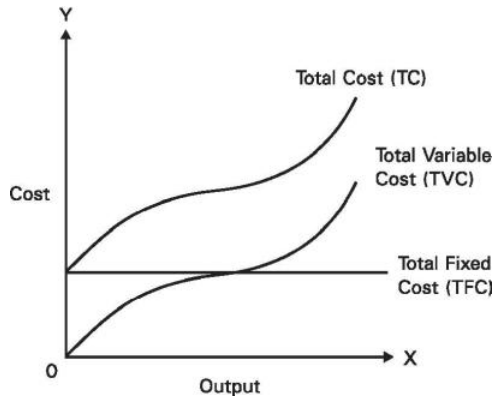
Variable costs, on the other hand, are those costs which are incurred on the employment of variable factors of production whose amount can be altered in the short run. Thus, the total variable costs change with changes in output in the short run. These costs include payments such as wages of labour employed, the price of the raw material, fuel and power used, the expenses incurred on transporting and the like. Variable costs are also called prime costs. Total cost of a business firm is the sum of its total variable costs and total fixed costs. Thus, TC = TFC+TVC.

In Figure 8.1, output is measured on the X-axis and cost on Y-axis. Since the total fixed cost remains constant whatever the level of output, the total fixed cost curve (TFC) is parallel to the X-axis. This curve starts from a point on the Y-axis meaning thereby that the total fixed cost will be incurred even if the output is zero. On the other hand, the total variable cost curve (TVC) rises upward showing thereby that as the output is increased, the total variable costs also increase. The total variable cost (TVC) starts from the origin which shows that when output is zero the variable costs are also nil. It should be noted that total cost is a function of the total output, the greater the output, the greater will be the total cost. In symbols, we can write:

$$TC = f(q)$$

Notes

Figure 8.1: Short Run Total Cost Curve



Total cost curve (TC) has been obtained by adding up 'vertically' the total fixed cost curve and total variable cost curve because the total cost is a sum of total fixed cost and total variable cost. The shape of the total cost curve (TC) is exactly the same as that of total variable cost curve (TVC) because the same vertical distance always separates the two curves.

8.3 Short Run and Long Run Costs

The short run is a period of time in which the output can be increased or decreased by changing only the amount of variable factors such as labour, raw materials, chemicals, etc. In the short run the firm cannot build a new plant or abandon an old one. If the firm wants to increase output in the short run, it can only do so by using more labour and more raw materials. It cannot increase output in the short run by expanding the capacity of its existing plant or building a new plant with larger capacity. Long run, on the other hand, is defined as the period of time in which the quantities of all factors may be varied. All factors being variable in the long run, the fixed and variable factors dichotomy holds good only in the short run. In other words, it is that time-span in which all adjustments and changes are possible to realise.

Short run costs are those costs that can vary with the degree of utilisation of plant and other fixed factors. In other words, these costs relate to the variation in output, given plant capacity. Short run costs are therefore, of two types: fixed costs and variable costs. In the short run, fixed costs remain unchanged while variable costs fluctuate with output. Long run costs in contrast are costs that can vary with the size of the plant and with other facilities normally regarded as fixed in the short run. In fact, in the long run there are no fixed inputs and therefore, no fixed costs, i.e., all costs are variable.

8.3.1 Short Run Average Costs and Output

The cost concept is more frequently used both by businessmen and economists in the form of cost per unit or average cost rather than as totals. We, therefore pass on to the study of short run average cost curves.

Short Run Average Fixed Cost (AFC)

Average fixed cost is the total fixed cost divided by the number of units of output produced. Therefore,

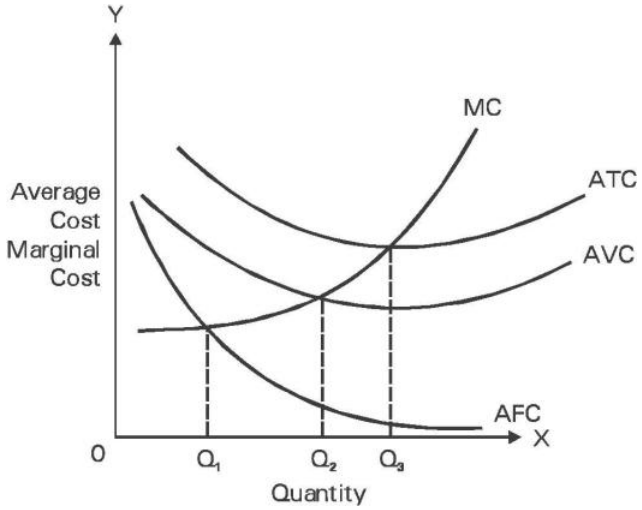
$$AFC = \frac{TFC}{Q}$$

where Q represents the number of units of output produced.

Notes

Thus, average fixed cost is the fixed cost per unit of output. Since total fixed cost is a constant quantity, average fixed cost will steadily fall as output increases. Therefore, average fixed cost curve slopes downward throughout its length. As output increases, the total fixed cost spreads over more and more units and, therefore, average fixed cost becomes less and less.

Figure 8.2: Per Unit Output Cost Curve



Average Variable Cost (AVC)

Average variable cost is the total variable cost divided by the number of units of output produced. Therefore,

$$AVC = \frac{TVC}{Q}$$

Thus, average variable cost is the variable cost per unit of output.

We know that the total variable cost (TVC) at any output level consists of payments to the variable factors used to produce that output. Therefore TVC= $P_1V_1 + P_2V_2 + \ldots P_n V_n$ where P is the unit price and V is the amount of the variable input. Average variable cost for a level of output (Q), given P is:

$$AVC = \frac{TVC}{Q} = \frac{PV}{Q} = \left[P\frac{V}{Q}\right]$$

The term V is the number of units of input divided by the number of units of output. Since the average product (AP) of an input is the total output divided by the number of units of input (V),

so we can write,

$$\frac{V}{Q} = \frac{1}{Q/V} = \frac{1}{AP}$$

$$AVC == P\left[\frac{V}{Q}\right] = P\left[\frac{1}{VP}\right]$$

That is, average variable cost is the price of the input multiplied by the reciprocal of the average product of the input. We know that due to first increasing and then decreasing marginal returns to the variable input, average product initially rises, reaches a maximum and then declines. Since average variable cost is 1/AP, the average variable cost normally falls, reaches a minimum and then rises. It first declines and then rises for reasons similar to those operating in case of TVC. This is shown in Figure 8.2.

Notes

Average Total Cost (ATC)

The average total cost or what is called simply average cost is the total cost divided by the number of units of output produced. Therefore,

$$ATC=\frac{TC}{Q}$$

Since the total cost is the sum of total variable cost and total fixed cost, the average total cost is also the sum of average variable cost and average fixed cost.

This can be proved as follows:

$$ATC = \frac{TC}{Q}$$

Since $TC = TVC+TFC$

Therefore, $ATC=\frac{TVC+TFC}{Q}$

$$=\frac{TVC}{Q}+\frac{TFC}{Q}$$

$$= AVC + AFC$$

Average total cost is also known as unit cost, since it is cost per unit of output produced.

8.3.2 Short Run Marginal Cost (MC) and Output

Marginal cost is the addition to the total cost caused by producing one more unit of output. In other words, marginal cost is the addition to the total cost of producing n units instead of n-1 units.

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

In symbols, marginal cost is rate of change in total cost with respect to a unit change in output, i.e.,

$$MC=\frac{d(TC)}{dQ}$$

where d in the numerator and denominator indicates the change in TC and Q respectively.

It is worth pointing out that marginal cost is independent of the fixed cost. Since fixed costs do not change with output, there are no marginal fixed costs when output increases in the short run. It is only the variable costs that vary with output in the short run. Therefore, marginal costs are, in fact, due to the changes in variable costs.

$$MC=\frac{d(TVC)}{dQ}$$

The independence of the marginal cost from the fixed cost can be proved algebraically as follows:

$$\begin{aligned} MC_n &= TC_n - TC_{n-1} \\ &= (TVC_n + TFC) - (TVC_{n-1} + TFC) \\ &= TVC_n + TFC - TVC_{n-1} - TFC \\ &= TVC_n - TVC_{n-1} \end{aligned}$$

Notes

Hence, marginal cost is the addition to the total variable costs when output is increased from n-1 units to n units of output. It follows, therefore, that the marginal cost is independent of the amount of fixed costs.

In Table 8.1, MC is the slope of the TC curve. As TC curve first rises at a decreasing rate and later on at an increasing rate, MC curve will also, therefore, first decline and then rise.

Table 8.1: The Relationship between MC, AC and TC

Unit of Goods Produced (1)	Total Cost TC (2)	Average Cost AC=TC/units produced (3 = 2/1)	MC = [(TC_n) – (TC_{n-1})] (4)
10	5000	500	
11	5300	481.82	300
12	5550	462.5	250
13	5700	438.46	150
14	5950	425.0	250
15	6350	423.33	400

Advantage of TC: break-even analysis profit of firm

Advantage of AC: calculating per unit profit of a firm

Advantage of MC: to decide whether a firm needs to expand or not

Caution The properties of the average costs (AVC, AFC, ATC) and marginal costs can briefly be described as follows:

1. AFC declines continuously, approaching both axes asymptotically.
2. AVC first declines, reaches a minimum and rises thereafter. When AVC attains minimum, MC equals AVC.
3. As AFC approaches asymptotically the horizontal axis, AVC approaches ATC asymptotically.
4. ATC first declines, reaches a minimum and rises thereafter. When ATC attains its minimum, MC equals ATC.
5. MC first declines, reaches a minimum and rises thereafter — MC equals AVC and ATC when these curves attain their minimum values. Furthermore, MC lies below both AVC and ATC when they are declining; it lies above them when they are rising.

The laws governing costs are the same as the laws governing productivity. When output is increased in the short run, it can only be done by increasing the variable input. But as more and more of a variable input is added to a fixed input, the law of diminishing marginal productivity enters in. Marginal and average productivities fall.

Notes

Case Study

PSEs: You Decide

There has been much debate about public sector enterprises (PSEs) ever since Chidambaram set up the Disinvestment Commission under G V Ramakrishna. Some speak of restructuring before disinvestment, others the reverse, and yet others hang on to their socialist shibboleths. This column is no place to evaluate the debate, except to say that the raison d'etre for State intervention — externalities and market failure — have been long debased by having PSEs in hotels, textiles, cement, bread, aerated water, leather, bicycles, tyres, photo-films and virtually everywhere else where markets work perfectly well. Instead, let us discuss some incontrovertible evidence about the performance of PSEs so that readers can come to their own conclusions.

Facing the Facts

The facts about centrally owned PSEs that are presented here are culled from two reputable sources (i) the Public Enterprises Survey, which is published annually and covers 240 odd PSEs excluding banks, financial institutions and insurance companies, and (ii) the annual accounts of 500 top private sector manufacturing companies, ranked by sales. The analysis is from research that was undertaken for the Organisation for Economic Cooperation and Development.

Fact Number 1

In the last 10 years, these 240 PSEs have never earned returns exceeding 5 per cent of capital employed. In other words, a taxpayer is better off putting hard-earned money in one-year fixed deposits (see Chart A). Indeed, compared to the government's 365 day treasury bills, the PSEs have consistently given negative returns that exceed 6 percentage points.

Fact Number 2

On the whole, these PSEs are far less profitable than comparable private sector companies. In the last five years, the difference in net profits as a percentage of sales between PSEs as a whole and the private sector has been substantial, as Chart B shows.

The divergence is even more dramatic if one nets out of the 14 PSEs which form the state-owned petroleum monopoly. Today, the difference in profitability between the private sector and non-petroleum PSEs is a staggering 6 percentage points.

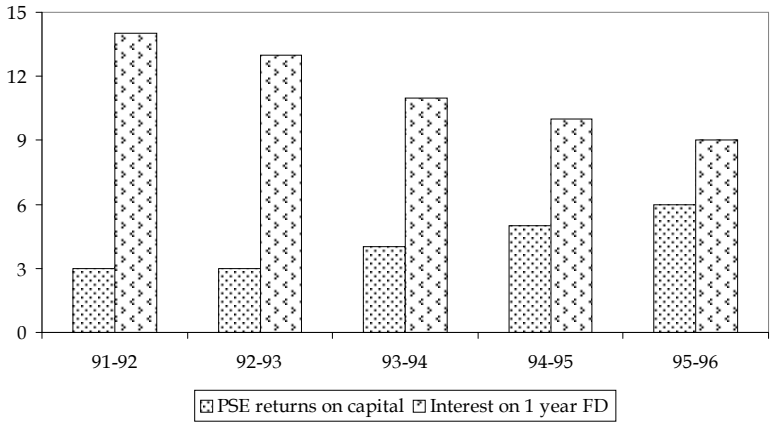


Chart A: PSEs don't give much, do they?

Contd...

Notes

"So what?" comrades Surjeet and Yechuri would say. After all, PSEs were set up to augment the capital stock of the nation, promote balanced economic growth, foster employment and create centres of technical and managerial excellence. These involve social benefits, and only a benighted, Western-trained economist to the right Genghis Khan could use private profit calculus to evaluate the contribution of our PSEs. Fair enough. Let us not look at profitability, that base capitalist concept. Instead, let us look at costs, which even Enver Hoxha would have desired to minimise.

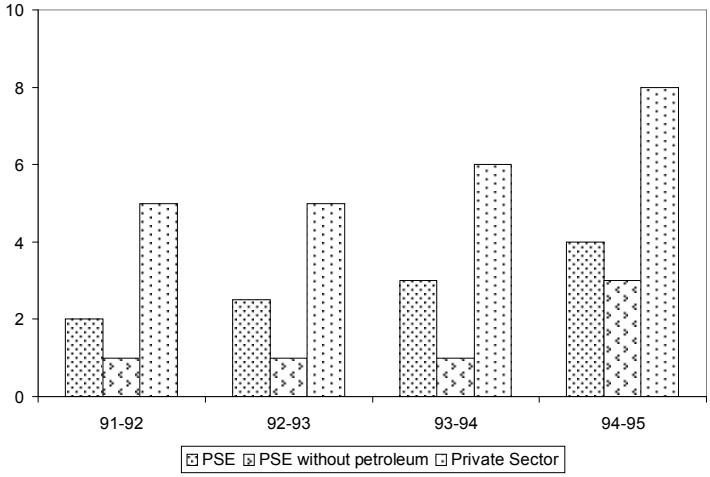


Chart B: Net Profit as % of Sales

Fact Number 3

PSEs as a whole are worse off even in terms of cost per rupee of sales. Chart C shows that PSEs suffer from an almost eight-point disadvantage in terms of fixed costs as a percentage of sales; the non-petroleum PSEs are worse off to the tune of almost 20 points.

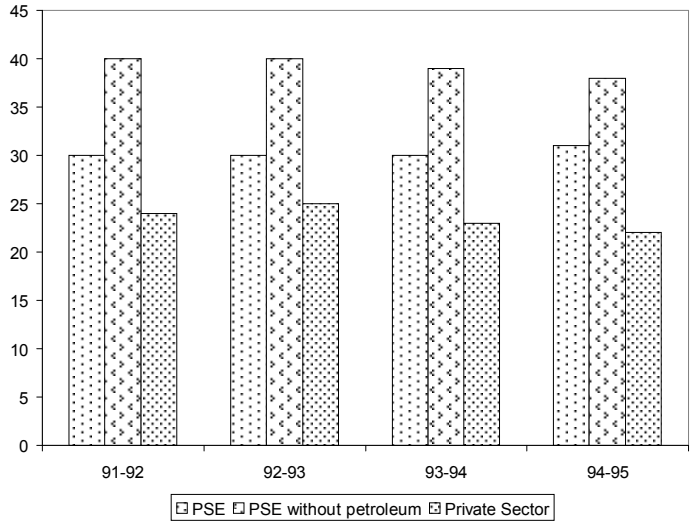


Chart C: Fixed Cost as % of Sales

Thanks to higher fixed costs (over-staffing, greater interest costs, etc.), PSEs fare poorly in average total costs. They are at least 5 points off compared to the private sector companies

Contd...

Notes

and over 9 points off if one excludes the petroleum monopolies. How long can most of these firms survive competition in such a state? Isn't it a crime not to take a decision one way or the other? You decide.

Question

What is the reason of U-shaped average cost curve in this case?

Source: Business India, 97.

8.3.3 Costs in the Long Run

The long run is a period of time during which the firm can vary all its inputs. None of the factors is fixed and all can be varied to expand output. Long run is a period of time sufficiently long to permit changes in the plant, that is, in capital equipment, machinery, land, etc., in order to expand or contract output. The long run cost of production is the least possible cost of production of producing any given level of output when all inputs are variable including the size of the plant. In the long run there is no fixed factor of production and hence there is no fixed cost.

If $Q = f(L, K)$

$TC = L.P_L + K.P_K$

Given factor prices and a specific production function, one can draw an expansion path which gives the least costs associated with various levels of output which in fact yields the long run total cost schedule/curve. LTC is an increasing function of output. The rates of change in these two variables are not known unless the qualitative relationship is quantified. If one recalls the concept of returns to scale and assumes fixed factor prices, one could see three things:

1. When returns to scale are increasing, inputs are increasing less than in proportion to increases in output. It follows that total cost also must be increasing less than in proportion to output. This relationship is shown in Figure 8.3(a).
2. When returns to scale are decreasing, total cost increases at a faster rate than does output. This relationship is shown in Figure 8.3(b).
3. When returns to scale are constant, total cost and output move in the same direction and same proportion. This is also shown in Figure 8.3(c).

Thus, depending upon the nature of returns to scale, there will be a relationship between LTC and output, given factor prices. It is generally found that most industries and firms reap increasing returns to scale to start with which are followed by constant returns to scale which give place to decreasing returns to scale eventually. In this case, the long run total cost function first would increase at a decreasing rate and then increase at an increasing rate as shown in Figure 8.4. Such a total cost function would be associated with a U-shaped long run average cost function.

From LTC curve we can derive the firm's long run average cost (LAC) curve. LAC is the long run total cost (LTC) divided by the level of the output (Q). That is,

$$LAC = \frac{LTC}{Q}$$

Similarly, from the LTC curve we can also derive the long run marginal cost (LMC) curve. This measures the change in LTC per unit change in output and is given by the slope of the LTC curve. That is,

$$LMC = \frac{\Delta TC}{\Delta Q} \quad \text{or} \quad \frac{d(LTC)}{dQ}$$

Notes

The relationships among the long run total cost, long run marginal cost with respect to output are explained in the following table and Figure 8.5.

Figure 8.3(a): Increasing Returns in Scale

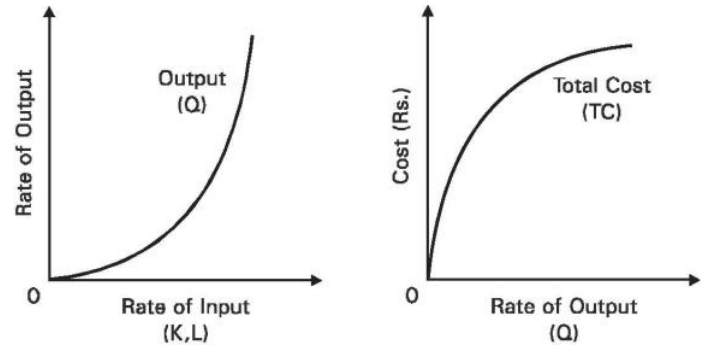


Figure 8.3(b): Decreasing Returns in Scale

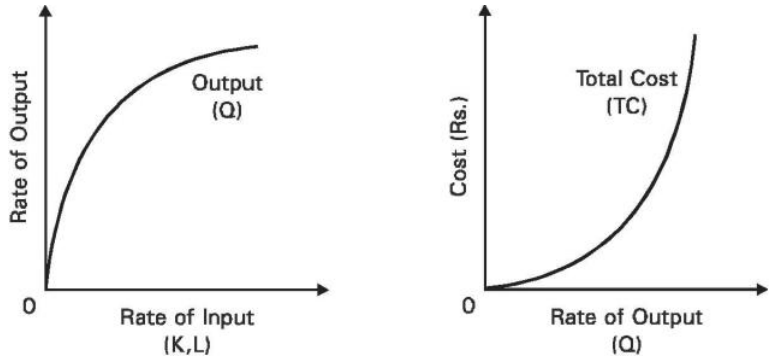
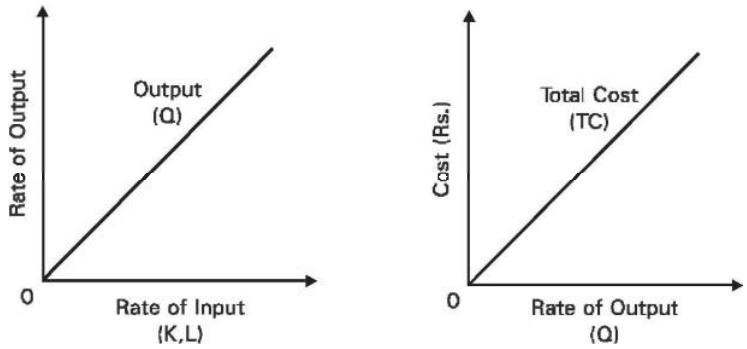
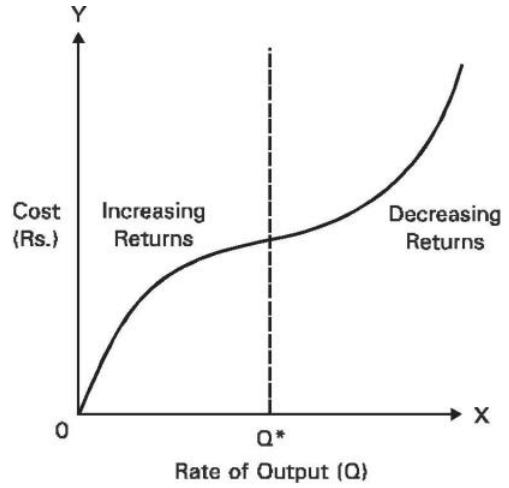


Figure 8.3(c): Constant Returns to Scale



Notes

Figure 8.4



The graphs of above relationships are provided in Figure 8.5.

Did u know? **Can average cost curve be stair shaped or L-shaped?**

Economic theory often mentions U-shaped nature of average cost curve, but in reality, we come across various other types like the stair-shaped one, L-shaped learning curve or flat bottomed average cost curve. To take care of these empirical situations, the modern theory of costs has been developed.

Table 8.2

Q	LTC	LAC	LMC
0	0	-	-
5	25	5.00	5
10	45	4.50	4
15	60	4.00	3
20	85	4.25	5
25	120	4.85	7
30	180	6.00	12

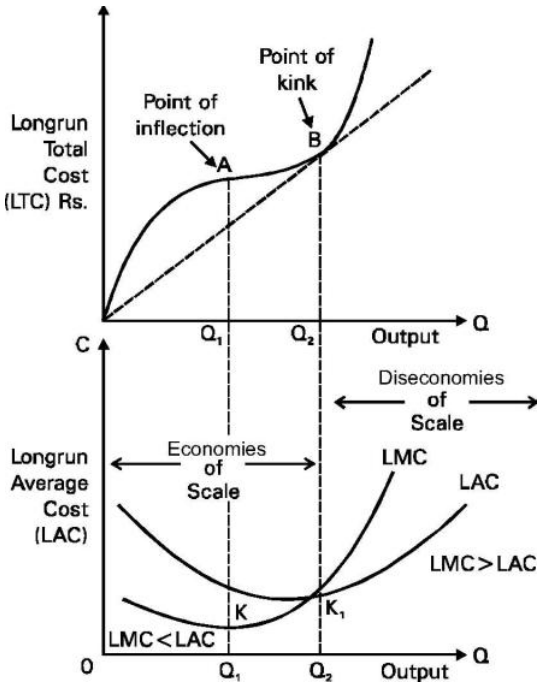
The LTC curve gives the least total cost for various levels of output when all the factors of production are variable. Its shape is such that the curve is first concave and then convex as looked from the output axis. As seen above its shape follows from the operations of the varying degrees of returns of scale, given the factor prices.

The relationship between LAC and LMC follow from that of LTC curve. Both LAC and LMC are U-shaped. Further, the following relationships hold good:

1. At the point of inflection on LTC curve (A), LMC takes the minimum value.
2. At the point of kink of LTC curve (B) — where the slope of the straight line from origin to the LTC curve is the minimum — LAC assumes the minimum value.
3. LAC is the least when LMC = LAC.
4. LAC curve is falling when LMC < LAC
5. LAC curve is rising when LMC > LAC.

Notes

Figure 8.5



Task

Fill in the blanks in the following table:

Output	TFC	TVC	TC	MC	AFC	AVC	ATC
1	100	50					
2				30			
3						40	
4			270				
5							70

8.4 Total Cost, Average Cost and Marginal Cost

Total cost includes all cash payments made to hired factors of production and all cash charges imputed for the use of the owner's factors of production in acquiring or producing a good or service. Thus, total cost of a firm is the sum total of the explicit plus implicit expenditures incurred for producing a given level of output. For example, a shoe maker's cost will include the amount he spends on leather, thread, rent for his workshop, wages, interest on borrowed capital, salaries of employees, etc., and the amount he charges for his services and his own funds invested in the business.

Average cost is the cost per unit of output assuming that production of each unit of output incurs the same cost. That is, it is obtained by dividing the total cost by the total quantity produced. If TC=100 and X=10, AC = 10.

Marginal cost is the extra cost of producing one additional unit. At a given level of output, one examines the additional costs being incurred in producing one extra unit and this yields the

Notes

marginal cost. For example, if the total cost of a firm is ₹ 5,000 when it produces 10 units of a good but when 11 units of the good are produced, it increases to ₹ 5,300 then the marginal cost of the eleventh unit is ₹ 5,300 – 5,000 = ₹ 300. In other words, marginal cost of nth units (MC_n) is the difference between total cost of nth unit (TC_n) and total cost of n-1th unit (TC_{n-1}).

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

The relationship between MC, AC and TC is shown in the following table.

Table 8.3

Units of goods produced (1)	Total Cost (TC) (2)	Average Cost (3 = 2/1)	Marginal Cost (TC_n–TC_{n-1}) (4)
10	5,000	500	-
11	5,300	481.82	300
12	5,550	462.5	250
13	5,700	438.46	150
14	5,950	425.00	250
15	6,350	423.33	400

The total cost concept is useful in break-even analysis and in finding out whether a firm is making profits or not. The average cost concept is significant for calculating the per unit profit of a business concern. The marginal and incremental cost concepts are needed in deciding whether a firm needs to expand its production or not. In fact, the relevant costs to be considered will differ from one situation to the other depending on the problem faced by the manager.

Example: **The Cost of Producing Rings** **(₹)**

Output (1)	Fixed Costs (TFC) (2)	Variable Costs (TVC) (3)	Total Costs (TC) (TFC+TVC) (4)	Average Fixed (TC) Costs (AFC=FC/ Output) (5)	Average Variable Costs (AVC=VC/ Output) (6)	Average Costs (ATC= AFC+AVC) (7)
4	50	50	100	12.50	12.50	25.00
5	50	60	110	10.00	12.00	22.00
10	50	100	150	5.00	10.00	15.00
11	50	106	156	4.54	9.64	14.18
17	50	150	200	2.94	8.82	11.76
18	50	157	207	2.78	8.72	11.50
21	50	182	232	2.38	8.67	11.05
23	50	200	250	2.17	8.70	10.87
24	50	210	260	2.08	8.75	10.83
28	50	250	300	1.79	8.93	10.72
29	50	265	315	1.72	9.14	10.86
32	50	350	400	1.56	10.94	12.50

TC = FC + VC
ATC = TC/Q
AFC = FC/Q
AVC = VC/Q
ATC = AFC + AVC

Notes

Managerial economics devotes a great deal of attention to the behaviour of costs. Total cost varies directly with output. The more output a firm produces, the higher will be its production cost and vice versa. This is because increased production requires increased use of raw materials, labour, etc., and if the increase is substantial even fixed inputs like plant and equipments and managerial staff may have to be increased. The relationship between cost and output is rather important.

Caselet

Input Costs and Profit Levels of Maruti Udyog Ltd. (MUL)

Maruti currently dominates India's small car market and has a share of more than 80 per cent in its overall car market. MUL, a 50:50 joint venture between the Indian Government and Japan's Suzuki Motors Corporation posted net profit of ₹ 6510 crores in 1997-98 (April-March) compared with ₹ 5,100 crores in the previous year. But MUL could find it difficult to maintain its profit levels because of soaring input costs and a slowdown in the market. Input costs had risen substantially due to the imposition of a special additional duty, an increase in levies on cold rolled steel and a restriction on reclaims of value-added tax to 95 per cent of the amount. Due to the slowdown in the market and increasing competition, it will be very difficult to pass on the cost increase to customers, thus, leading to a squeeze on margins.

8.5 Economies of Scale

A larger plant will lead to lower per unit cost in the long run. However, beyond some point, successive larger plants will mean higher average costs. Exactly, why is the long run ATC curve U-shaped, needs further explanation.

It must be emphasised, first of all, that the law of diminishing returns is not applicable here for it presumes that one resource is fixed in supply and also that in the long run resource prices are variable. Also, we assume that resource prices are constant in the short run. The U-shaped long run average cost curve is explainable, thus, in terms of "economies and diseconomies" of large scale production.

Economies and diseconomies of scale are concerned with the behaviour of average cost curve as the plant size is increased. Economies of scale explain the down sloping part of the long run AC curve. As the size of the plant increases, LAC typically declines over some range of output for a number of reasons. The most important is that, as the scale of output is expanded, there is greater potential for specialisation of productive factors. This is most notable with regard to labour but may apply to other factors as well. Other factors contributing to declining LAC include ability to use more advanced technologies and more sophisticated capital equipment, managerial specialisation, opportunity to take advantage of lower costs for some inputs by purchasing larger quantities, effective utilisation of by-products, etc.

But after sometime, expansion of a firm's output may give rise to diseconomies, and therefore, higher per unit cost. Further expansion of output beyond a reasonable level may lead to problems of over crowding of labour, managerial inefficiencies, etc., pushing up per unit cost.

All these are examples of internal economies and diseconomies of scale arising due to the firm's own expansion. According to Marshall, external economies and diseconomies of scale may arise due to the expansion of industry as a whole.

Notes

Example: Improved infrastructure facilities due to industrial expansion may lead to reduction in per unit cost of production in all the firms in an industry.

8.6 Economies of Scope

According to the concept of economies of scale, cost advantages follow from the increase in volume of production or what is called the scale of output. According to the concept of economies of scope, such cost advantages may follow from variety of output–product diversification within the given scale of plant. If the same plant can produce multiple products, there is the scope for a lot of cost savings because of joint use of inputs. Broad banding policy enables manufacturers to exploit economies of scope through product diversification.

Example: Escorts produces four wheelers from the same plant for two wheelers with small adjustments.

Instead of increasing the scale of production of an existing product, the firm can now add new and newer products if the size and type of plant allow this scope. In this process, the firms will have access to scope economies in place of scale economies. In certain processes, the firm can plan wisely to exploit both types of economies simultaneously.

8.7 Types of Revenue Curves and their Applications

We have already discussed the shapes of the revenue curves in the previous unit. Just to refresh your memories, we will define the terms once again.

Total revenue (TR) is the total money received from the sale of any given quantity of output during a given period of time. (TR= P × Q, where P is the Price per unit and Q is the total quantity sold)

Average revenue (AR) is the total receipts from sales divided by the number of units sold, i.e., AR= TR/Q. It plays a major role in the determination of a firm's profit. The 'per unit profit' of a firm is determined as average revenue minus average (total) cost. A firm generally seeks to produce the quantity of output that maximises profit. (We will discuss this concept in subsequent units.)

Marginal Revenue is the revenue associated with one additional unit of production. Marginal revenue is calculated as:

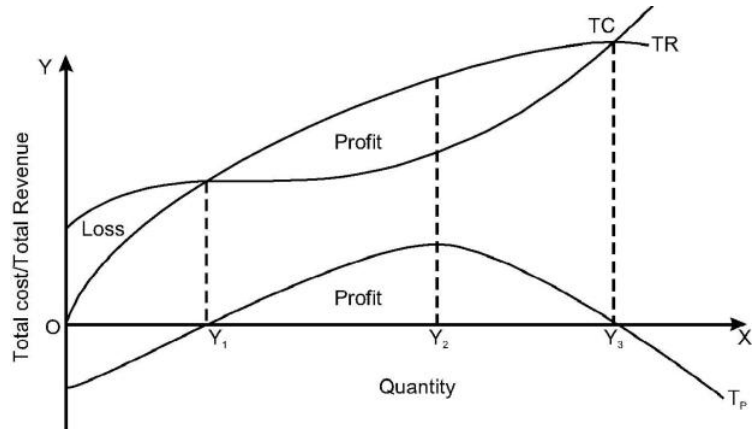
$$MR_n = TR_n - TR_{n-1}$$

Break-even Analysis

Many of the planning activities that take place within a firm are based on anticipated level of output. The study of the interrelationship among firm's sales, costs and operating profits at various level of output levels is known as cost-volume profit analysis or break-even analysis. This analysis is often used by business executive to determine the sales volume required to break even and total profits and losses at different output levels. For illustrating the breakeven analysis. It is assumed that the cost and revenue curves are non-linear as shown in Figure 8.6. Total revenue is equal to the number of units of output sold multiplied by the price per unit. The concave form of revenue curve implies that the firm can sell additional units of output only by lowering the price. The total cost curve is based on traditional approach of relationship between cost and output in short-run.

Notes

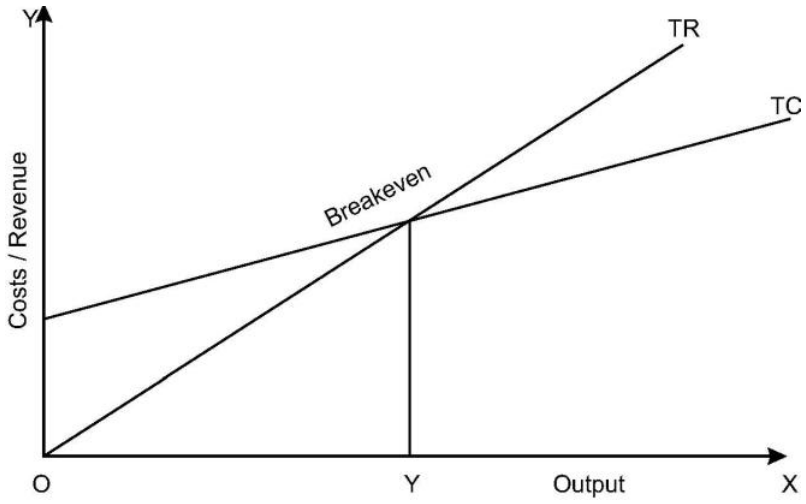
Figure 8.6: Break-even Analysis by using Non-linear TC and TR Curves



The difference between total revenue and total cost at any level of output represents the total profit or loss that will be realised. The total profit (TP) at any level of output is given by vertical distance between the total revenue (TR) and total cost (TC) curves. A breakeven situation (zero profit) occurs whenever total revenue equals total cost. In Figure, breakeven condition occurs at two different output level- Y_1 and Y_3. Below an output level Y_1 losses will incurred because TR < TC. Between Y_1 and Y_3 profits will be obtained because TR > TC. An output level above Y_3, losses will occur again because TR < TC. Total profit are maximised within the range of Y_1 to Y_3, where the vertical distance between the TR and TC curves is greatest, that is at an output level of Y_2.

For practical decision making the non-linear revenue output and cost output relationship of economic theory are generally replaced by linear functions. The breakeven analysis based on linear function is shown in Figure 8.7

Figure 8.7: Break-even Analysis by using Linear TC and TR Curves



Here TR is a straight line assuming that firms change a constant selling price P per unit of output. In case of cost curve, total cost is taken as sum of fixed cost which are independent of the output level plus the variable costs which increases at a constant rate per unit of output. In this case the breakeven analysis occurs at point Y_b in Figure 8.7 where TR and TC intersect. If a firm's output

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level is below this breakeven point that is If TR < TC, it incurs operating losses. If firm's output level is above this breakeven point that is if TR > TC it realises operating profits. Algebraically, it can be defined as:

Total revenue is equal to the selling price per unit times the output level.

$$TR = P \times Y$$

Total cost is equal to fixed cost plus variable cost, where the variable cost is the product of the variable cost per unit times the output level.

$$TC = TFC + AVC \times QY$$

Now break-even output level is that level where profit is zero.

$$TR = TC.$$

$$P \times Y = TFC + AVC \times Y$$

$$P \times Y - AVC \times Y = TFC$$

$$Y (P - AVC) = TFC$$

$$Y = \frac{TFC}{P - AVC}$$

8.8 Summary

- Costs enter into almost every business decision and it is important to use the right analysis of cost. Different business problems call for different kinds of costs such as future and past costs, incremental and sunk cost, out of pocket and book costs, replacement and historical costa etc.
- Fixed costs are those costs which do not very with the change in the level of output in the short run. Variable costs change with output levels.
- The short run is a period of time in which the output can be increased or decreased by changing only the amount of variable factors such as labour, raw materials, chemicals, etc. Long run, on the other hand, is defined as the period of time in which the quantities of all factors may be varied.
- There are short run average fixed cost and variable cost as well as long run average costs.
- Total cost is the sum of total of the explicit plus implicit expenditure. Average cost is the cost per unit of output. Marginal cost is the extra cost of producing one additional unit.
- Economies of scope are reductions in average costs attributable to an increase in the number of goods produced.

8.9 Keywords

Abandonment costs: Costs incurred for disposing of the fixed assets, when any plant is to be permanently closed down.

Book costs: Costs that do not require current cash expenditure.

Direct costs: Costs which can be directly attributed to the production of a unit of a given product.

Explicit costs: Expenses which are actually paid by the firm (paid-out-costs).

Implicit costs: Theoretical costs which go unrecognized by the accounting system.

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Incremental costs: Costs that are defined as the change in overall costs that result from particular decision being made.

Indirect costs: Costs which cannot be separated and clearly attributed to individual units of production.

Opportunity costs: The return from the second best use of the firm's resources which the firm forgoes in order to avail itself of the return from the best use of the resources.

Shut-down costs: Costs incurred when the production operations are suspended and will not be incurred, if the production operations continue.

Sunk costs: Costs that are not affected or altered by a change in the level or nature of business activity.

Variable costs: Costs which are incurred on the employment of variable factors of production whose amount can be altered in the short-run.

8.10 Self Assessment

1. State true or false for the following statements:
   (a) Past cost are unadjusted historical cost data which have been recorded in the books.
   (b) Incremental costs include only variable cost.
   (c) Replacement costs means the price that would have to be paid currently for acquiring the same plant.
   (d) Explicit costs cannot be regarded as paid out costs.
   (e) Actual costs are also called absolute costs or outlay costs.
   (f) Average cost is obtained by dividing the total cost by the total quantity produced.
   (g) Fixed costs can be altered in short run.
   (h) Social cost is the total cost to the society on account of production of a good.
2. Fill in the blanks:
   (a) Shut-down costs are required to be incurred when the production operations are ..... .
   (b) Economic costs can be calculated at two levels ..... .
   (c) Marginal cost is the extra cost of producing ..... .
   (d) AVC first ..... , reaches a minimum and rises thereafter.
   (e) Implicit costs are the costs which go unrecognized by the ..... .
   (f) Capital equipment is a ..... factor.
   (g) The total cost concept is useful in ..... analysis.
   (h) Direct costs are ..... costs.

8.11 Review Questions

1. What type of cost is depreciation – Direct cost or Indirect cost? Support your argument with reasons.
2. What types of costs would you incur if you have to organise a musical concert in your city?

Notes

3.

Output (units)	2,000	4,000	5,000
Cost per unit	₹ 100	£100	£80

Explain which type of cost the above figures represent.

4. A liberal arts college created a new business school. The overhead items – library, registrar, classrooms and offices – were already in place or substantially so. No additional central administration personnel had to be added at first, only faculty and staff for the new school. The cost of these positions, plus the modest marketing budget, were more than offset by the new b-school's tuition income in the second year of operation. There was every indication that enrollment, and tuition, would grow.

   Shortly after the school's creation, the college's provost decided it would be a good idea to embark on a cost-allocation exercise. Provost and CFO decided on a "fair" formula that allocated central administration overhead according to each school's use of office, classroom, and laboratory square footage. Suddenly, the business school, still ramping up its enrollment, didn't look so good. It more than covered its incremental cost, but barely paid back its allocated cost in the current year. Its newly hired dean had been promised the full attention of the college's fundraising office. After all, the b-school's revenue was "free" in terms of incremental cost, and who wouldn't want more of that? After the cost-allocation project, however, the college's president decided one of its older, better-established schools deserved a higher fundraising priority.

   What do you think was the problem with the college? How can it be rectified?

5. Raman has a widget producer with one widget producing machine that costed him ₹ 1000 last year. He wants to see if he should buy an appliance that paints the widgets yellow, fetching ₹ 100 more per widget. But he has no idea if this is a good investment. In your evaluation of the investment, do you include the cost of the widget machine? Why/why not?

6. Why do increasing opportunity costs exist? Illustrate with examples.

7. Why are variable costs more relevant than fixed costs in short-term decision-making?

8. With the increase in output of the firms, their average total cost and average variable cost curves come closer and closer to each other but never meet. Why?

9. Show the circumstances where the marginal cost is constant throughout but the average cost is falling.

10. Can the short run average total cost ever be less than the long run average total cost?

11. The output and total cost data for a firm are given below. Work out the following costs: TFC, TVC, AFC, AVC, ATC and MC at various levels of output.

Units of output	0	1	2	3	4	5	6	
Total Cost (₹)		120	180	200	210	225	260	330

12. Suppose that the short run costs for a paintbrush manufacturer are given by the expression:

    $TC = 100+2Q+0.01\,Q^2$

    (a) What are the fixed costs of this manufacturer?

    (b) What are the total costs, average cost, average variable cost and marginal cost at 50 and 100 units of output?

    (c) At what output is average cost the minimum?

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13. Suppose that labour costs ₹ 10 per unit and capital costs ₹ 5 per unit. The least cost combinations of capital and labour are as follows:

Output	100	200	300	400	500	600	700
Labour	5	6	8	10	13	18	24
Capital	10	12	14	20	28	38	54

Prepare the table showing long run total cost, long run average cost and long run marginal cost.

14. If machines were variable and labour fixed, how would the general shapes of the short run average cost curve and marginal cost curve change?
15. If average productivity falls, will marginal cost necessarily rise? How about average cost?
16. Discuss the concept of economies of scale and economies of scope. Give suitable examples.
17. Examine the relevance of the concept of revenue in break even analysis.

Answers: Self Assessment

1. (a) True (b) False (c) True (d) False
   (e) True (f) True (g) False (h) True
2. (a) suspended (b) micro level and macro level
   (c) one additional unit (d) declines
   (e) accounting system (f) fixed
   (g) break even (h) traceable

8.12 Further Readings

Books

Curwen, *Managerial Economics,* Macmillan.

Dr. Atmanand, *Managerial Economics,* Excel Books, Delhi.

Earl Heady, *Economics of Agricultural Production and Resource Use,* Prentice Hall.

Online links

en.wikipedia.org

http://economicswebinstitute.org/glossary/costs.htm

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Unit 9: Market Structure – Perfect Competition

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Objectives

After studying this unit, you will be able to:

- State the assumptions of perfect competition
- Discuss the price and output determination under perfect competition

Introduction

The function of a market is to enable an exchange of goods and services to take place. A market is any organisation whereby buyers and sellers of a good are kept in close touch with each other. It is precisely in this context that a market has four basic components (i) consumers (ii) sellers (iii) a commodity (iv) a price. Price determination is one of the most crucial aspects in micro-economics. Business managers are expected to make perfect decision based on their knowledge and judgment. Since every economic activity in the market is measured as per price, it is important to know the concepts and theories related to pricing under various market forms.

Perfect competition is a market structure characterised by a complete absence of rivalry among the individual firms. Thus, perfect competition in economic theory has a meaning diametrically opposite to the everyday use of this term. In practice, businessmen use the world competition as synonymous to rivalry. In theory, perfect competition implies no rivalry among firms.

Notes

9.1 Assumptions of Perfect Competition

In a perfectly competitive market structure there is a large number of buyers and sellers of the product and each seller and buyer is too small in relation to the market to be able to affect the price of the product by his or her own actions. This means that a change in the output of a single firm will not perceptibly affect the market price of the product. Similarly, each buyer of the product is too small to be able to extract from the seller such things as quantity discounts and special terms.

The model of perfect competition is based on the following assumptions:

1. ***Large numbers of sellers and buyers:*** The industry in perfect competition includes a large number of firms (and buyers). Each individual firm, however large, supplies only a small part of the total quantity offered in the market. The buyers are also numerous so that no monopolistic power can affect the working of the market. Under these conditions each firm alone cannot affect the price in the market by changing its output.

2. ***Product homogeneity:*** The technical characteristics of the product as well as the services associated with its sale and delivery is identical. There is no way in which a buyer could differentiate among the products of different firms. If the products were differentiated the firm would have some discretion in setting its price. This is ruled out in perfect competition.

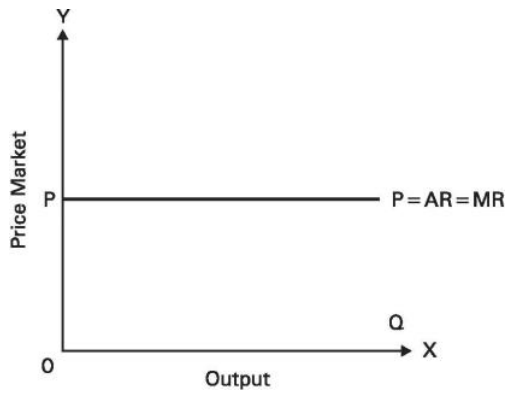
   The assumption of large number of sellers and of product homogeneity implies that the individual firm in pure competition is a price-taker: its demand curve is infinitely elastic, indicating that the firm can sell any amount of output at the prevailing market price.

3. ***Free entry and exit of firms:*** There is no barrier to entry or exit from the industry. Entry or exit may take time but firms have freedom of movement in and out of the industry. If barriers exist, the number of firms in the industry may be reduced so that each one of them may acquire power to affect the price in the market.

4. ***Profit maximisation:*** The goal of all firms is profit maximisation. No other goals are pursued.

5. ***No government regulation:*** There is no government intervention in the market (tariffs, subsidies, rationing of production or demand and so on are ruled out).

Figure 9.1



The above assumptions are sufficient for the firm to be a price-taker and have an infinitely elastic demand curve. The market structure in which the above assumptions are fulfilled is called pure competition. It is different from perfect competition, which requires the fulfilment of the following additional assumptions.

Notes

6. ***Perfect mobility of factors of production:*** The factors of production are free to move from one firm to another throughout the economy. It is also assumed that workers can move between different jobs. Finally, raw materials and other factors are not monopolised and labour is not organised.

7. ***Perfect knowledge:*** It is assumed that all the sellers and buyers have complete knowledge of the conditions of the market. This knowledge refers not only to the prevailing conditions in the current period but in all future periods as well. Information is free and cost less.

Market Condition

The assumptions of perfect competition imply that a particular relationship exists between the firm and its market.

Figure 9.2(a) shows the market demand curve for a product. It shows the total amount of this product demanded by consumers at different prices. It is a normal downward sloping demand curve showing that for the industry as a whole quantity demanded increases as price falls.

Figure 9.2: Relationship between the Market and the Firm in Perfect Competition

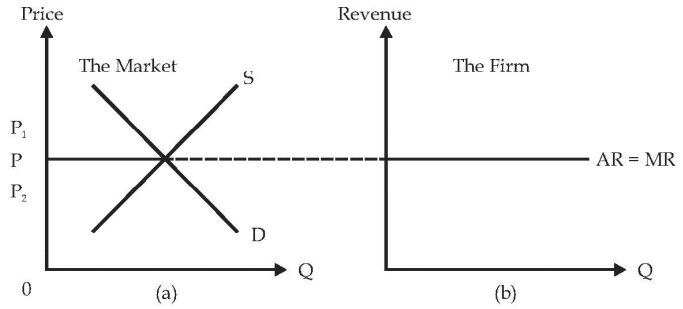


Figure 9.2(b) shows the seller perceived demand curve which is horizontal, i.e., it is perfectly elastic demand with respect to price. It hits the vertical axis at the current market price, P. Two factors are stopping the producer from charging a price such as P_1, which is higher than P-perfect knowledge and homogeneous product. If a higher price is charged, customers would know immediately that a lower price is available elsewhere, and that the product for sale at the lower price is a perfect substitute for the more expensive product. The producer is also not undercutting its rivals and charging a price, P_2 which is lower than P. The firm's output is small compared to the industry as a whole and so its entire output can be sold at the current market price of P. At a price lower than P the firm would not maximise its profit. Thus, over any feasible range of output, the demand curve for the product of the individual firm is perceived to be horizontal.

Notes

Equilibrium of the Firm

Firms aim to maximise profit and they can be in equilibrium only when they achieve this. For all firms, profit maximisation is achieved when marginal revenue, (MR), equals marginal cost (MC). If MR>MC, the firm adds more to revenue than it does to costs by increasing output and sales. When this happens profits will rise. On the other hand, if MR<MC, the firm adds more to costs than it does to revenue by expanding output and sales. When this happens profits will fall. It follows thus, that the firm is in equilibrium when MC=MR.

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Notes

Equilibrium of the Industry

The industry is in long run equilibrium when a price is reached at which all firms are in equilibrium (producing at the minimum point of their LAC curve and making just normal profits). Under these conditions there is no further entry or exit of firms in the industry, given the technology and factor prices. At the market price P, the firms produce at their minimum cost, earning just normal profits. The firm is in equilibrium because at the level of output Q

LMC = SMC= P = MR

This equality ensures that the firm maximises its profit.

At the price P, the industry is in equilibrium because profits are normal and all costs are covered so that there are no incentives for entry or exit.

Task Analyze stock market on the basis of the features of perfect market. Do you find it close to the perfect market?

9.2 Price and Output Determination under Perfect Competitive Firm

9.2.1 Short Run Analysis of a Perfectly Competitive Firm

The aim of a firm is to maximise profits. In the short run some inputs are fixed and these give rise to fixed costs which have to be incurred whether the firm produces or not. Thus, it pays for the firm to stay in business in the short run even if it incurs losses. Thus, the best level of output of the firm in the short run is the one at which the firm maximises profits or minimises losses.

This is possible when the marginal revenue (MR) of the firm equals its short run marginal cost (MC). As long as MR exceeds MC, it pays for the firm to expand output because by doing so the firm would add more to its total revenue than to its total costs. On the other hand, as long as MC exceeds MR, it pays for the firm to reduce output because by doing so the firm will reduce its total cost more than its total revenue. Thus, the best level of output of any firm is the one at which MR=MC.

Caution Since, a perfectly competitive firm faces a horizontal or infinitely, elastic demand curve, P=MR, so that the condition for the best level of output can be restated as one of which P=MR =MC. This can be seen in figure diagrammatically and with calculus as follows.

A firm usually wants to produce the output that maximises its total profits. Total profits (T) are equal to total revenue (TR) minus total costs (TC). That is,

$$\pi = TR - TC \qquad .... (1)$$

where TR and TC are all functions of output (Q).

Taking the first derivative of p with respect to Q and setting it equal to zero gives

$$\frac{d\pi}{dQ} = \frac{d(TR)}{dQ} - \frac{d(TC)}{dQ} = 0 \qquad .... (2)$$

Notes

so that

$$\frac{d(TR)}{dQ} = \frac{d(TC)}{dQ} \quad \text{... (3)}$$

Equation (3) indicates that in order to maximise profits, a firm produces where marginal revenue (MR) equals marginal cost (MC). Since for a perfectly competitive firm, P is constant and TR = (P).(Q) so that

$$\frac{d(TR)}{dQ} = MR = P$$

the first order condition for profit maximisation for a perfectly competitive firm becomes P = MR = MC.

The second order condition for profit maximisation requires that the second derivative of p with respect to Q be negative. That is

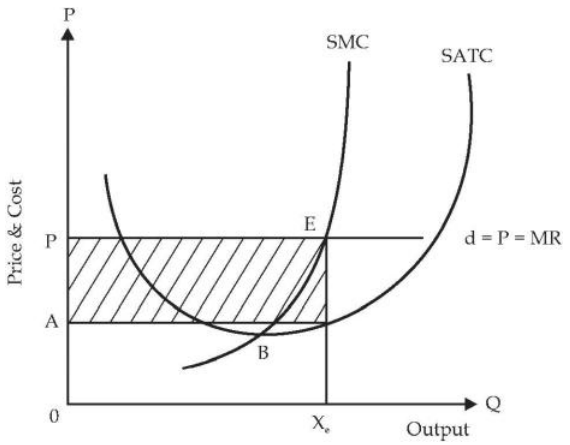
$$\frac{d^2\pi}{dQ^2} = \frac{d^2(TR)}{dQ^2} - \frac{d^2(TC)}{dQ^2} < 0 \quad \text{.... (4)}$$

$$\frac{d^2(TR)}{dQ^2} < \frac{d^2(TC)}{dQ^2} \quad \text{.... (5)}$$

According to equation (5) the algebraic value of the slope of the MC function must be greater than the algebraic value of the MR function. Under perfect competition, MR is constant (MR curve is horizontal). So that equation (5) requires that the MC curve be rising at the point where MR=MC for the firm to maximise its total profits.

The top panel of Figure 9.3 shows d which is the demand curve for the output of a perfectly competitive firm. The marginal cost cuts the SATC at its minimum point. The firm is in equilibrium (maximises its profits) at the level of output defined by the intersection of the MC and the MR curves (point E in Figure 9.3). To the left of E profit has not reached its maximum level because each unit of output to the left of X_e brings revenue greater than its marginal cost. To the right of X_e each additional unit of output costs more than the revenue earned by its sale so that a loss is made and total profit is reduced.

Figure 9.3



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The fact that a firm is in short run equilibrium does not necessarily mean that it makes excess profits – whether the firm makes excess profits or losses depends on the level of the ATC at the short run equilibrium. If the ATC is below the price at equilibrium (Figure 9.4), the firm earns excess (equal to the area PABE). If, however, the ATC is above the price (Figure 9.5), the firm makes a loss (equal to the area FPeC). In the latter case the firm will continue to produce only if it covers its variable costs. Otherwise it will close down, since by discontinuing its operations the firm is better off: it minimises its losses. The point at which the firm covers its variable costs is called "the closing down point". In Figure 9.6 the closing down point of the firm is denoted by point W. If price falls below P_w the firm does not cover its variable costs and is better off if it closes down.

Figure 9.4

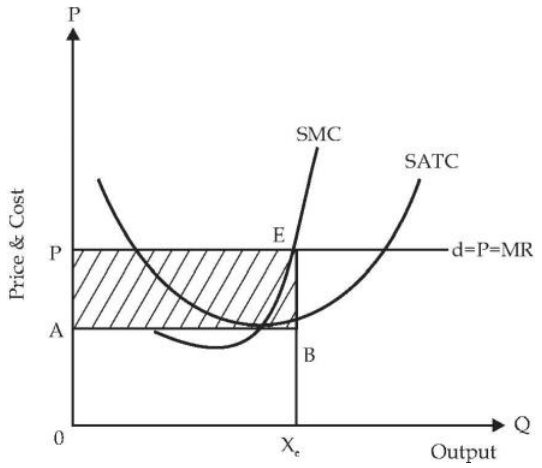

Figure 9.5

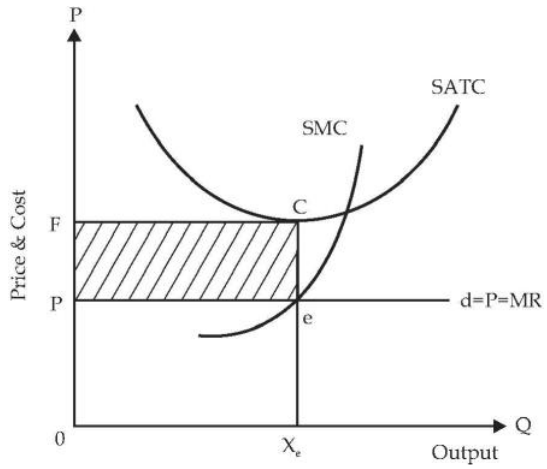

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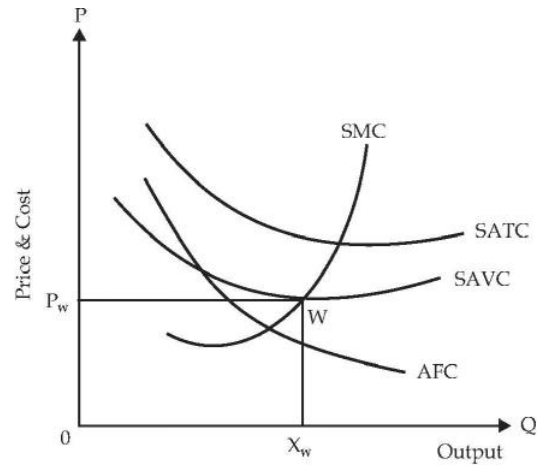
Figure 9.6



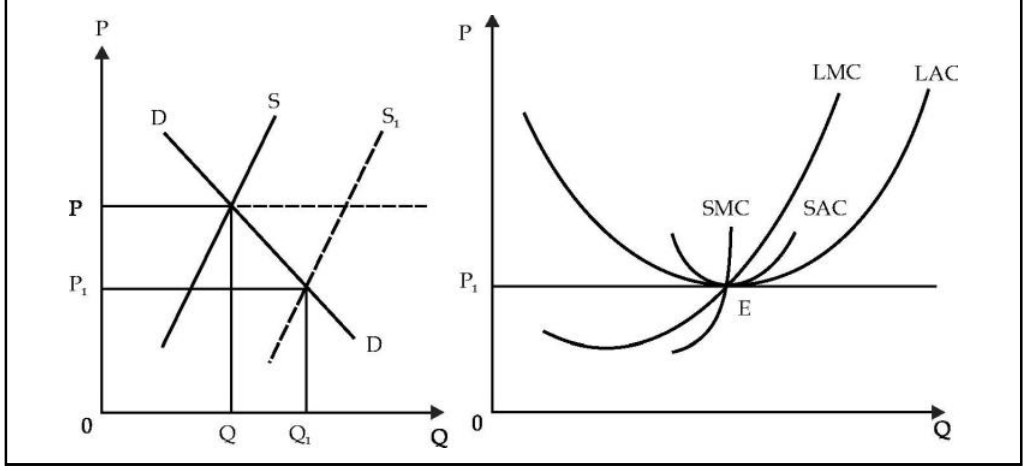
Did u know? All firms in the industry have the same minimum long run average cost. This, however, does not meant have all firms have the same efficiency.

9.2.2 Long Run Analysis of a Perfectly Competitive Firm

In the long run, all inputs and costs of production are variable and the firm can construct the optimum or most appropriate scale of plant to produce the best level of output. The best level of output is one at which price P=LMC equals the long run marginal cost (LMC) of the firm. The optimum scale of the plant is the one in which short run average total cost (SATC) curve is tangent to the long run average cost of the firm at the best level of output. If existing firms earn profits, however, more firms enter the market in the long run. This increases the market supply of the product and results in a lower product price until all profits are squeezed out. On the other hand, if firms in the market incur losses, some firms will leave the market in the long run. This reduces the market supply of the product until all firms remaining in the market just break-even. Thus, when a competitive market is in long run equilibrium, all firms produce at the lowest point on their long run average cost (LAC) curve and break-even. This is shown by point E in Figure 9.7.

Notes

Figure 9.7



The condition for the long run equilibrium of the firm is that the marginal cost be equal to the price and to the long run average cost.

$$LMC = AC = P$$

At equilibrium the short run marginal cost is equal to the long run marginal cost and the short run average cost is equal to the long run average cost. Thus, given the above equilibrium condition, we have

$$SMC = LMC = LAC = SAC\ P = MR$$

This implies that at the minimum point of the LAC the corresponding (short run) plant is worked at its optimal capacity so that minimum of LAC and SAC coincide. On the other point, the LMC cuts the LAC at its minimum point and the SMC cuts the SAC at its minimum.

Example: For a firm operating in a perfectly competitive market, the following data are available

$$\text{Price } P = AR = MR = ₹\ 20/\text{- unit}$$

Total cost function is $C = 8 + 17Q - 4Q^2 + Q^3$

Let us find out the profit maximising output and the maximum profit.

Marginal cost will be available if the first derivative of the total cost function is obtained. Thus,

$$MC = \frac{d(C)}{dQ} = 17 - 8Q + 3Q^2$$

Maximum profit will be earned when

MC and MR are equal:

$$20 = 17 - 8Q + 3Q^2$$

Solving this equation gives two values for Q as –1/3 and 3. Obviously, negative output cannot be produced; hence at Q = 3, the firm will maximise profits. Total revenue will be ₹ 60 and total cost ₹ 50. The maximum profit at the output of 3 units is ₹ 10.

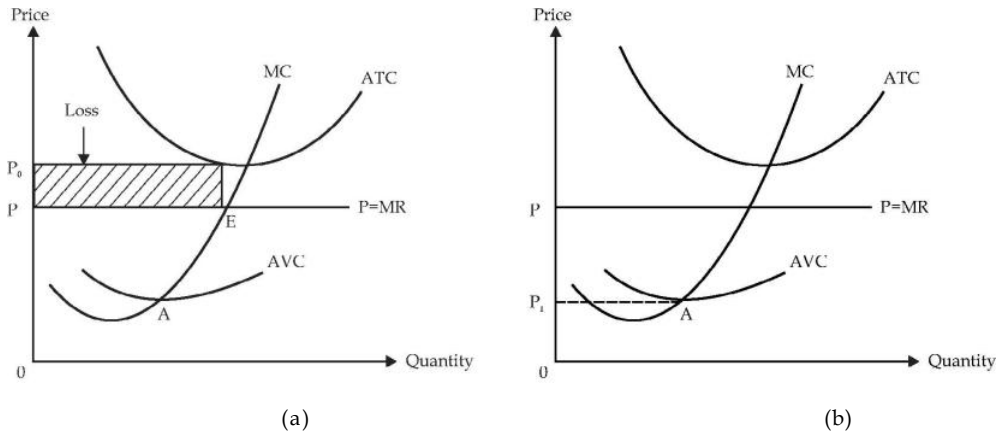
Notes

9.2.3 Shut-down Decision

The supply curve of a competitive firm is its marginal curve. It is that part of the marginal cost curve which is above the average variable cost curve.

At a price P, the firm is incurring a loss, but it does not shut down because of fixed costs (Figure 9.8). In the short run, a firm knows it must pay these fixed costs regardless of whether or not it produces. The firm only considers the costs it can save by stopping production and those costs are its variable costs. As long as a firm is covering its variable costs, it pays to keep on producing. It makes a smaller loss by producing. If it stopped producing, its loss would be the entire fixed costs.

Figure 9.8



However, once the price falls below AVC it will pay to shut down (point A). In that case the firm's loss from producing temporarily and save the variable cost. Thus, the point at which MC = AVC is the shut-down point (that point at which the firm will gain more by temporarily shutting down than it will by staying in business. When price falls below the shut-down point, the average variable costs the firm can save by shutting down exceed the price it would get for selling the good. When price is above AVC, in the short run, a firm should keep on producing even though it is making a loss. As long as a firm's total revenue is covering its total variable cost, temporarily producing at a loss is the firm's best strategy because it is making less of a loss than it would make if it were to shut down.

Case Study

Economic Analysis of Agriculture

Irony is the nature of the economics of agriculture; even as many in America still struggle with hunger, the government has been offering subsidies to the American farmer to artificially raise the price of produce, in some cases since 1933.

History of Subsidies

Because a typical farmer is so small compared to the entire market for the good he or she offers, they cannot affect the price of the good, or try to affect the price of good too efficaciously. Instead, they are referred to as 'price takers', who are forced to accept the market price. However, subsidies alter this economic situation to occasionally illogical results. At the end of World War I, farmers were rewarded by high prices as the government

Contd...

Notes

spent millions to rebuilt war-torn Europe. In fact, a small farmer who might have been almost forced to sell the farm before the war was in fact currently quite successful. However, in 1921, the nation fought through a recession as the farm goods they fervently produced outpaced demand, probably due to Europe's quick agricultural recovery. American farmers now suffered, and continued to do so into 1922, where virtually every industry had recovered except for agriculture. Large lands that had been opened up to feed Europe's millions pumped out more and more crops, but prices went lower and lower, and a surplus quickly accumulated that prevented prosperity.

Rising Anger of Farmers

Farmers could no longer meet the cost of production, and many were forced to leave their farms. Under neo-classical theory, this could be considered a frictional unemployment situation; as each farm increases production until it doesn't take as many to cover the market, some of them should switch to other tasks. This 'message of the market' was a message of sadness for many farmers. During the Great Depression, farmers were especially hurt. For example, low dairy prices due to increased production meant that Midwestern dairy farmers were earning less than ever. Milk, as a highly spoilable good, is a good example of 'perfect competition,' when farmers can only earn the price the market tells them. Even dairy farm strikes were ineffective, like those as a part of the Farmer's Holiday Association Strike of 1932 in Wisconsin and Iowa (some of these became violent as milk haulers and milkmen scuffed on the picket lines).

Since the 1930s

FDR worked to create a national program to guarantee income to farmers by enacting a significant number of measures to raise prices, beginning with the creation of the Agricultural Adjustment Administration in May 1933, which began the subsidy system that continues to this day, even though the AAA was declared unconstitutional in 1936. The AAA measures paid landowners to leave part of their land fallow. This did raise farmers' incomes, but consumers were forced to endure high food prices during the worse years of the Depression. Subsidies to farmers have been a part of the American agricultural system ever since. Bill Clinton attempted to reduce payments and increase diversity of crops with the Freedom to Farm Act in 1994. In 2000, however, the Farm Security and Rural Investment Act restored the farming subsidies. While it is true that some farmers struggle, the government spent $30 billion dollars in subsidies yearly, even though it is estimated that it would only cost $10 billion dollars in crop insurances and other measures to bring the poorest farmers in America up to middle class. On May 14, 2002, President Bush signed a farm subsidy estimated to cost $190 billion dollars over ten years, rekindling a national debate about subsidies. Today, large commercial farms dominate the agricultural market; 8% dominate 72% of sales.

Farm policies are sometimes more the product of politics than economics. While security of the food supply and preservation of small family-owned farms are good goals, well-intentioned programs might be hugely inefficient. There are cost-effective ways of helping small farmers, including crop insurance, but today some of these measures are still not used.

Questions

1. Compare the earlier global agricultural scenario with the recent scenario. (as depicted in the case)
2. Do you agree that agriculture is a perfectly competitive industry?

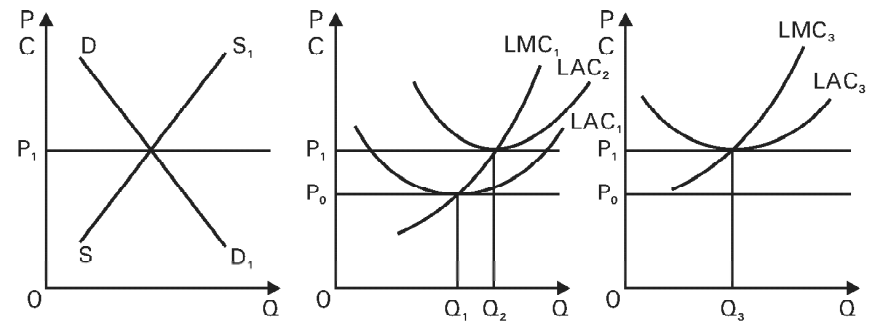
Source: www.ehow.com

Notes

9.2.4 Efficiency of a Firm

Since the price in the market is unique, this implies that all firms in the industry have the same minimum long run average cost. This, however, does not mean that all firms are of the same size or have the same efficiency, despite the fact that their LAC is the same in equilibrium. The more efficient firms employ more productive factors of production and/or able managers. These more efficient factors must be remunerated of their higher productivity, otherwise they will be bid off by the raw entrants in the industry. Or, as the price rises in the market the more efficient firms earn a rent which they must pay to their superior resources. Thus rents of more efficient factors become costs for the individual firm, and hence the LAC of the more efficient firm shifts upwards as the market price rises, even if the factor prices for the industry as a whole remain constant as the industry expands. In this situation, the LAC of the old, more efficient firms must be redrawn so as to be tangent at the higher market price. The LMC of the old firms is not affected by the rents occurring to its more productive factors. It will be shifted only if the prices of factors for the industry in general increase. Thus, the more efficient firms will be in equilibrium, producing that output at which the redrawn LAC is at its minimum (at which point the LAC is cut by the initial LMC given that factor prices remain constant). Under these conditions, with the superior, more productive resources properly costed at their opportunity cost, all firms have the same unit cost in their long run equilibrium. In Figure 9.9, at the initial price P_o the second firm was not in the industry as it could not cover its costs at that price. At the new price P_1, firm B enters the industry, making just normal profits. The established firm A earns rents which are imputed costs, so that its LAC shifts upward and it reaches a new long run equilibrium producing a higher level of output (Q_2).

Figure 9.9



9.3 Supply and Demand Together

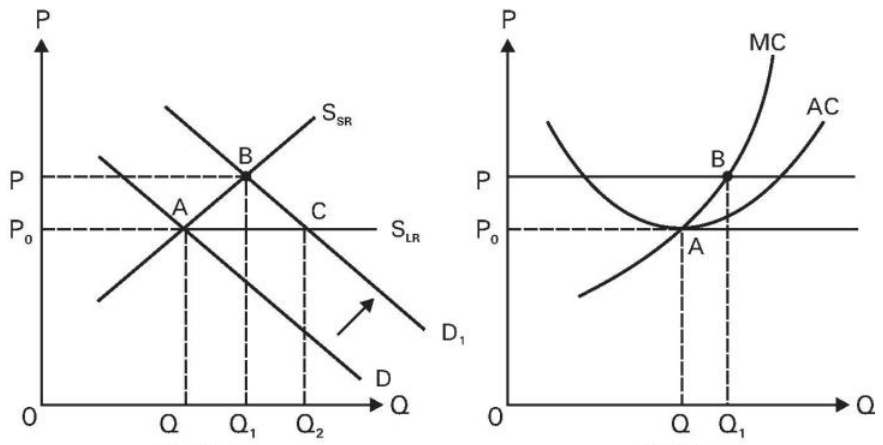
The following three conditions exhibit how adjustment is likely to take place in the firm and in the market under different situations.

Market Response to an Increase in Demand

Faced with an increase in demand which it sees as an increase in price and hence profits, a competitive firm will respond by increasing output (from A to B) in order to maximise profit (Figure 9.10). As all firms increase output and as new firms enter, price will fall until all profit is competed away. Thus the long run supply curve will be perfectly elastic as is S_{LR} in (a). The final equilibrium will be at the original price but a higher output. The original firms return to their original output (A) but since there are more firms in the market the market output increases to (C).

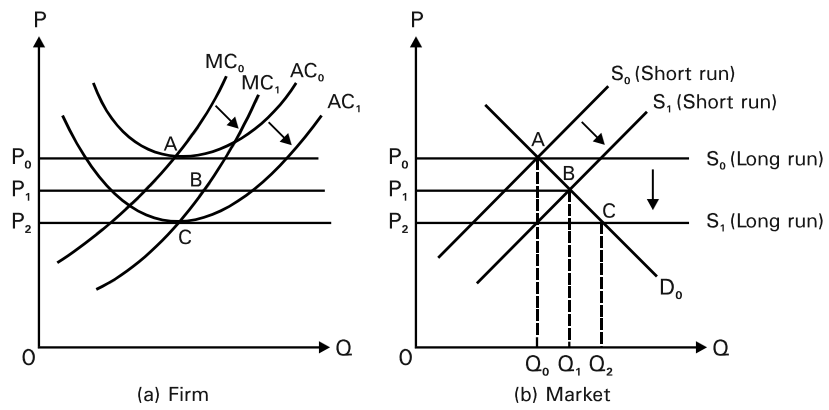
Notes

Figure 9.10



Market Response to a Technological Improvement

Figure 9.11



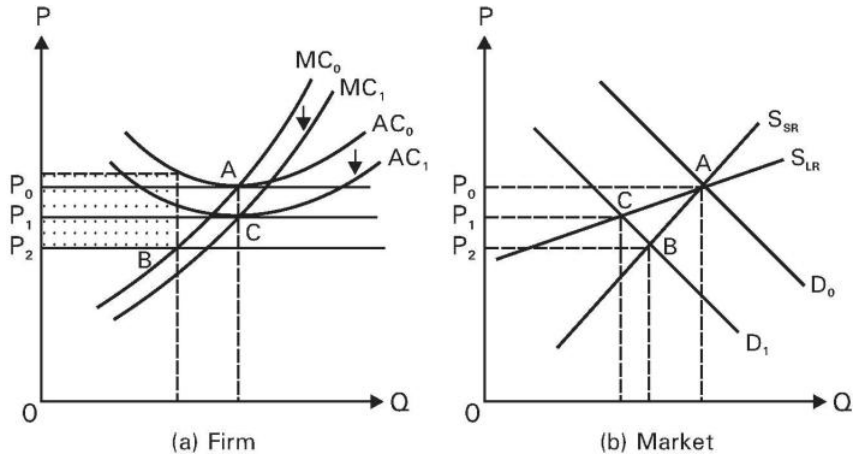
A technological improvement will shift AC and MC curves down, creating short run profits. As existing firms expand output and as new firms enter, these profits will be competed away until the price has once again fallen to equal average total costs (initially point B in the short run) and ultimately point C in the long run (Figure 9.11).

Market with Specialised Inputs Response to a Decrease in Demand

Faced with a decrease in demand which it sees as fall in price and hence profit, a competitive firm will respond by decreasing output in order to minimise losses. Firm output and market output will fall. Figure 9.12 is the market response: as all firms decrease output, the demand for specialised inputs will fall, causing the firm's cost in (a) to fall from AC_0 to AC_1. The long run equilibrium price will be lower than the original price, and the long run supply curve S_{LR} will be upward sloping, rather than perfectly elastic.

Notes

Figure 9.12



Caselet

The Stock Market

The stock market is very close to a perfect competitive market. The price of a stock usually is determined by the market forces of demand and supply of the stock and individual buyers and sellers of the stock have little effect on price (they are price-takers). Resources are mobile as stock is bought and sold frequently. Information about prices and quantities is readily available. Funds flow into stocks and resources flow into uses in which the rate of return. Thus stock prices provide the signal for efficient allocation of investment in the economy. However, imperfections occur here also though the stock market is very close to a perfect competition, for example, sale of huge amount of stocks by a large corporation will certainly affect (depress) the price of its stocks.

Case Study

Perfect Competition: The U.S. Bicycle Industry

(In words of J Townley)

I had an epiphany, as in a sudden insight into reality, in May at a meeting where a long time friend in the industry offered the opinion that the U.S. bicycle industry is in a classic state of perfect competition. My immediate response was "...that sounds like a good thing!" My friend, who went back to graduate school after working in a bike shop, for a major component manufacturer and prominent bicycle brand quickly responded with "...no, you don't understand." He went on to explain that when he studied economics in graduate school he became aware of perfect competition which is a term of art in economics for the most competitive market imaginable - one where the companies and businesses realize the bare minimum profit necessary to keep them in business.

At the time we were in a meeting together with six other people from the bicycle industry - and the room went silent for a time. As the group started to discuss the notion

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Notes

of perfect competition it became apparent that no one strongly disagreed, and in fact there seemed to be more agreement than not that our industry was indeed in perfect competition.

We ended our meeting, and went our separate ways, but the concept of perfect competition stayed with me, kind of like the dull pain of a toothache. When I got back to my office I did a search on the web and found quite a lot about this subject. Here is a summary of what I learned.

Perfect competition according to economists, is the most competitive market imaginable. In the real world, it is rare, and there are even some economists that feel it may not even exist in its purest (I take this as worst) form. The example of a market in perfect competition that is referenced by those economists that believe it does exist - is agriculture.

Competition is ... competition, so what makes perfect competition different from all other forms or kinds of competition? According to economists - because it is so competitive that any individual buyer or seller has a negligible impact on the market price. Products are homogeneous, or composed of parts that are all of the same kind. Product and pricing information is also perfect in that everyone, including the ultimate purchaser knows everything about the products, including the best prices available in the market.

In a market in perfect competition everybody is a price taker, producing and selling essentially identical products and each seller has little or no effect on market price, and is unable to sell any output at a price greater than the market price.

Firms earn only normal profit, or the bare minimum profit necessary to keep them in business.

If firms do earn more than normal profit, which is called excess profit, the absence of barriers to entry mean that other firms will enter the market and drive the price level down until there are only normal profits to be made. Manufacturing output will be maximized and price minimized.

This sounds very familiar to me - and I am sure you can also relate to real world examples of the U.S. bicycle industry as you read through this explanation of perfect competition.

Component manufacturers scramble to get the latest designs and functionality to market in a timely fashion. Bicycle suppliers struggle mightily to craft and specify bicycle products that have more value than the competition and sweat over the timing and dealer programs to introduce them. Bicycle retailers lose sleep over how much to commit for and what to bring to market - and whether to become a concept store or remain independent, and which suppliers to do business with. And with all this activity, no buyer or seller has a negligible impact on the market price, and everybody in the channel of trade is a price taker, earning the bare minimum profit necessary to stay in business.

Last year and this season are good examples. In 2005 we had our best year ever for the sale of high-end road 700c bicycles selling above $1,000. And in 2005 the typical bike shop lost 5 margin points on the sale of new bicycles, continuing an unfortunate trend of losing money on the sale of new bicycles that has plagued our channel of trade for over a decade.

High-profit bike shops, while they performed much better than the typical shop, also came in just below their cost of doing business on the sale of new bicycles in 2005, the first actual loss for high-profit shop on the sale of new bicycles in a decade.

Despite the continuing, and apparently growing losses on the sale of new bicycle, the U.S. bicycle industry posted one of its best years for apparent market consumption in 2005 - second only to the record set in 2000.

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2006 started off well enough, but now as we enter the 3rd quarter of the year, some bicycle brands are reporting overstocks from last season, and retailers are reporting some 2006 models already are out of stock as the brands introduce and start to deliver 2007 models.

History does matter, and in economics, path dependence refers to the way in which apparently insignificant events and choices can have huge consequences for the development of a market or an economy. In the case of the specialty bicycle retail channel of trade, the collective choice not to adopt Uniform Product Codes, or UPC's has come back to blind the industry again, and again over the last twenty five to thirty years.

The seemingly insignificant, competitive based choice of not adopting UPC's has made bar coding technology, and the full power of its inventory and sales tracking efficiency uniformly unavailable across all levels of our channel of trade, making real channel efficiency impossible. Simply stated - brands and manufactures don't know what is selling at retail and retailers have little or no input or influence on what is reordered and manufactured to refill the supply pipeline. As most economists will tell you...where we have been in the past determines where we are now, and where we can go in the future. This, in turn, leads to the importance of information.

Economic and channel efficiency is likely to be greatest when information is comprehensive, accurate, and readily and cheaply available. As evidenced by the specialty bicycle retail channels recurring pattern of having too much or not enough, many of the problems facing economies and markets arise from making decisions without all the information that is needed.

Currently our channel of trade operates on the premise that if a brand or company can acquire or gather more information than its competitors it is a good thing. However, economists will tell you that asymmetric information, when one channel player knows more than the other channel players, can be a serious source of inefficiency and market failure.

Uncertainty can also impose large economic costs. The power of the Internet has greatly increased the availability of certain information. However, even with all its information power, there are specialty bicycle retail channel inefficiencies, like not knowing what is actually selling at retail, that the Internet will not be able to solve. Accordingly, uncertainty - literally not knowing, will remain a huge source of specialty bicycle retail channel inefficiency.

And this inefficiency makes our channels blindness complete. Potentially the most useful information, about what will happen in the future...or the ability to more accurately forecast future demand, replenishment, inventory and sales will simply never be available under our channels current state of perfect competition.

The best example of perfect competition that I have heard recently is in my own backyard...Madison Wisconsin, one of the best specialty bicycle retail markets in the country. As most of the industry knows there are two Trek company stores in Madison, and one of them, located on the East side has been identified as the company's flagship store. Erik's Bike Shop is a successful multi-store retailer headquartered in the Minneapolis-St. Paul Minnesota market. Erik's established a store in Madison several seasons ago, and carries Specialized, as what I understand is its marquee brand.

Several weeks ago, according to the buzz among bicycle dealers, Specialized announced to its dealers in Madison that Erik's will open a second store, reportedly directly across the street from the Trek flagship store on the city's East side. By the way, both the Trek flagship and the new Erik's that will carry Specialized are both in direct competition with an established bicycle dealer that has carried both the Trek and Specialized brands for many years - and is just one-mile away!

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To make this market situation even more "perfect," the Trek flagship and new Erik's store are located almost within sight of a large new Dick's Sporting Goods that opened last year.

This is, I suggest to you, much more than just two brand competitors going head-to-head in one of the best specialty bicycle markets in the country. It is also a clear example of perfect competition at its best, or should I say worst. The most competitive market imaginable...where output will be maximized and price minimized. Consumers, particularly adult enthusiast cyclists have been and will continue to be the clear beneficiaries of this most competitive of markets.

The retailers, including the two backed by deep pocket bicycle brands, will beat on each other and will become more efficient to survive, and as a result prices in the market will be kept surprised. Keep in mind that in a state of perfect competition a firm that earns excess profits will experience other firms entering the market and driving the price level down until there are only normal profits to be made - the bare minimum profit necessary to keep them in business. All of the retailers in this scenario, when it comes to full fruition, including those backed by the big brands, will still only have a negligible impact on the market, including the market pricing.

This all raises the question - at least in my mind, of the big guy that was there first, Trek Bicycle, erecting or creating some type of barrier to entry. I am sure they will think about such a thing - and they may actually try several potential barriers to another new store, which might very well also be a brand "concept," entering their geography, and market space. At the end of the day...there is no real barrier to entry that can be put in place, or actually exists for that matter, because the largest brand seller in our channel of trade still doesn't have enough mass or leverage to dominate through a monopoly, and I am not talking about the board game.

Most markets exhibit some form of imperfect or monopolistic competition. There are fewer firms in this imperfect competition than in a perfectly competitive market and each can to some degree create barriers to entry. Such barriers would allow the existing firms to earn some degree of excess profits without a new entrant being able to compete to bring prices down.

So far, the consolidation in the U.S. specialty bicycle retail channel of trade hasn't reached a point where there are a small enough number of brands and /or manufacturers with enough product differentiation to allow the creating of barriers to market entry. The number of bike shops has kept falling over the last seven years, but here again, no retail organization has grown to the point that it can create barriers to market entry.

And what about the current independent bicycle retailer that has been in the market the longest? He is clearly at a dangerous place, but is the only one of the players who can break away from the state of perfect competition that has a strangle hold on the rest of the industry and the specialty bicycle retail channel of trade. By the way, this retailer was made aware in advance by the brands, first that the Trek flagship store was going in a mile from him, and next that Erik's Bike Shop was going to locate a new store within about the same distance from him. He has reacted by remodeling the interior of his current location. I have not spoken with this particular retailer since the news about the location for the new Erik's store, but I have E-mailed, and when I do talk to him, here is what I am going to suggest.

1. Hyper-differentiate your store. This is a term coined by Mike Basch, former CEO of YaYa! Bike, and it means differentiate your store totally from any other bike shop or bicycle retailer in your market so that you stand out as the brand in your market. It will be important to keep the adult enthusiast cyclists that are now customers - but the key will be crafting and marketing features and benefits to retain them as clients

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for life. The battle between the two big bicycle brands is going to test the "loyalty" of the adult enthusiasts in the market - but their loyalty is a question of personal attachment, relationships and the deal they got most recently, so there is marketing room for the independent to establish client loyalty programs and establish ongoing communications so the relationship is maintained and strengthened. Items 7, 8 and 9 discussed below become very important here.

2. Market to and really welcome casual cyclists, women, minorities, baby boomers seniors - everyone that is now underserved by all-the-other bike shops and concept stores. This is a key strategy for growth. It involves a product selection that will give all the non-enthusiast adults a truly enjoyable bicycle riding experience while not forgetting about the kids. Proactive market outreach in the form of demographics within zip codes and direct-response is essential, along with a formal referral-marketing program to drive word-of-mouth.

3. Focus totally on the consumer. Our channel of trade is now very product focused, and we think everyone that walks in the door is also product focused. This is a false premise. Shoppers, all shoppers are looking for an enjoyable experience, and that experience includes focusing on their wants and needs, while making them comfortable in the store. Adult enthusiast cyclists want and seek out product orientation, but also appreciate a more enjoyable experience. Casual cyclists and non-cyclists, where the growth potential is, are seeking the shopping experience and want to be comfortable with and develop a relationship with a consultant who's expert advice about bicycle products will best meet their wants and needs.

4. Educate your whole organization to focus totally on shoppers and customers. Because of the current product focus of our channel of trade, we don't educate our employees about the vital importance of focusing totally on the shopper, and not making any snap judgments about who a cyclist or customer is, or isn't. Hiring and educating customer service naturals is way more important than in-depth product knowledge. Educating them to really listen to shoppers and customers wants and needs is vital to building lasting, lifetime relationships.

5. Make it all about them and an extraordinary shopping experience. There is no retail selling today - everything a retailer does, everything retail employees do is marketing. The whole store, and the whole attitude has to make it all about them from the parking lot to the windows to the front door to the greeting - through making the bicycle buying process easy and fun, and the whole visit to the store extraordinary. Making it all about them and providing an extraordinary shopping experience is the path to increased transaction values and increased close rates.

6. Make your store the brand. Work with, stock and sell products that will provide the features and value your customers want and need, and the margins and inventory turns you need to grow your business. Present a uniform brand image in everything you do and that your staff does and says - one outward brand face. And develop and promote formal word-of-mouth customer referral programs to leverage your store brand in the market.

7. Create individual client solutions. You and your staff - your whole store, your brand and the shopping experience you provide are for one purpose. To create individual solutions for your customers wants and needs. In doing so you will create clients for life.

8. Become an efficient database manager. Educate your staff to the importance to your business of utilizing all the features built into to your computerized point of sale system and any other retail shopping systems you incorporate into your retail

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process and shopping experience. The uniform entry of shopper, customer and client information is as important to your business as a uniform and consistent new bicycle assembly process and check list.

9. Become an efficient direct-response marketer. Staying connected to prospects, shoppers, customers and clients utilizing a regular direct-response marketing plan, is essential to growing the number of transactions generated by the business, and it is reliant upon a clean and current database.

10. Follow the Phillips Rule of never ever selling anything in your retail store below your cost of doing business. This will lead to consistently earning excess profits.

All ten of these suggestions together create the foundation for a new level of specialty bicycle retailing that changes the paradigm and has the potential to take the retailers that follow it out from under the state of perfect competition that the rest of the channel of trade is trapped in.

Question

Comment on the suggestions made by the writer.

Source: http://www.jaytownley.com/the-bicycle-industry-competition?page=4

9.4 Summary

- In theory, perfect competition implies no rivalry among firms.
- In a perfectly competitive market structure there is a large number of buyers and sellers of the product and the product is homogeneous.
- There is free mobility of factors of production and the buyers and sellers have perfect knowledge of the market.
- In the short run the best level of output of the firm is the one at which the firm maximises profits or minimises losses. This is possible at P = MR = MC. The point at which the firm covers its variable costs is called "the closing down point".
- In long run the best level of output is one at which price P=LMC. At equilibrium the short run marginal cost is equal to the long run marginal cost and the short run average cost is equal to the long run average cost. Thus, given the above equilibrium condition, we have

$$SMC = LMC = LAC = SAC \; P = MR$$

9.5 Keywords

Equilibrium: Condition when the firm has no tendency either to increase or to contract its output.

Minimum price: Price at which the sellers refuse to supply the goods at all and store it with themselves.

Perfect competition: A market structure characterized by a complete absence of rivalry among the individual firms.

Profit: Difference between total revenue and total cost Market period: A very short period in which the supply is fixed, that is no adjustment can take place in supply conditions.

Notes

9.6 Self Assessment

1. State true or false for the following statements:
   (a) In a perfect market there are large number of sellers.
   (b) In a perfect market there is products differentiation.
   (c) In a perfect market a change in the output of a single firm will affect the market price of the product.
   (d) In perfect market, market agents are not fully aware of market.
   (e) In a perfect market there is perfect mobility of resources.
   (f) Under perfect competition the price curve and the marginal revenue curve are the same.
   (g) Industry has no role in the determination of price under perfect competition.
   (h) When the supply of a commodity decreases and its demand remains constant then it leads to decrease in price.
   (i) For equilibrium MC curve should cut the MR curve from below.
2. Fill in the blanks:
   (a) A perfectly competitive firm faces an ..... elastic demand curve.
   (b) The closing down point is at which the firm covers its ..... cost.
   (c) In the long run all costs are ..... .
   (d) In the long run the best level of output is, where P = ...
   (e) The LMC cuts the LAC at its ..... point.
   (f) The ..... LRS is generally a feature of rapid growth.
   (g) The ..... of an industry might lead to a fall in prices of some of its input.
   (h) The factors of production are ..... to move in perfect competition.

9.7 Review Questions

1. In which condition under perfect competition, would a firm maximize profit in the short run?
2. A firm can sell its product for ₹ 20 each in a perfectly competitive output market. Its total cost of production for the production range of 200 units to 205 units is given below:

200	201	202	203	204	205
₹ 3600	₹ 3615	₹ 3634	₹ 3658	₹ 3688	₹ 3720

   What is the profit maximising level of production?
3. To maximize the profit in the short run, a perfectly competitive firm produces the output for which price is equal to average variable cost- Why/Why not?
4. Why are firms operating under conditions of perfect competition depicted as having a horizontal demand curve?

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5. What will happen to the demand curve of a perfectly competitive firm if:
   (a) new sellers are attracted to the industry by the existence of supernormal profits?
   (b) there is an increase in market demand for the firm's output?
6. Why is it inappropriate to refer to a perfectly competitive firm as 'earning supernormal profit in the long-run'?
7. Under what conditions will a firm operating in a perfectly competitive industry choose to leave the industry?
8. For a perfectly competitive firm, why is it insufficient to say that profit maximisation takes place at the output where marginal cost equals marginal revenue?
9. In the perfect market, if individuals are enjoying consumers' surplus, does it mean that, as a consequence, producers are not receiving producers' surplus?
10. The case of perfect competition is sometimes referred to as a 'benchmark' industrial structure. In this context, what do you think commentators mean by the term 'benchmark'?
11. Taking a real life example, discuss the features of the perfect competition.
12. Why is a firm under perfect competition described as a price-maker? Deduce its equilibrium conditions in the short run.
13. Assume that firms in the short run are earning above normal profits. Explain what will happen to these profits in the long run for a market having perfect competition.
14. How and when will you determine the closing down point in the short run?
15. Explain LMC= LAC= P. Comment.
16. Examine the shut down decision in the long run.

Answers: Self Assessment

1.	(a)	True	(b)	False	(c)	False
	(d)	False	(e)	True	(f)	True
	(g)	False	(h)	False	(i)	True
2.	(a)	Infinitely	(b)	variable	(c)	variable
	(d)	LMC	(e)	minimum	(f)	rising
	(g)	expansion	(h)	free		

9.8 Further Readings

Books

Bibek Debroy, *Managerial Economics,* Global Business Press, Delhi.

Dr. Atmanand, *Managerial Economics,* Excel Books, Delhi.

Shapiro, Bensen, *The Psychology of Pricing,* Harvard Business Review.

Notes

Online links

http://tutor2u.net/economics/content/topics/competition/competition.htm

http://www.amosweb.com/cgi-bin/awb_nav.pl?s=wpd&c=dsp&k=perfect+competition

http://www.buzzle.com/articles/perfect-competition-characteristics.html

http://ayushveda.com/blogs/business/perfect-competition-the-root-of-market-analysis/

Unit 10: Imperfect Competition – Monopoly

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Objectives

After studying this unit, you will be able to:

- State the features of monopoly competition
- Discuss the price and output decisions under monopoly
- Explain the concept of price discrimination

Introduction

Monopoly is exactly opposite to the perfect competition. We can define a Monopolist as a sole supplier to particular market. In fact, after going through this unit you will realise that monopoly is an extreme case and it is rarely found in practice. However, we may also understand the case of monopoly by analysing two different cases - one that is presented in textbooks which says that in a monopoly there is only one firm producing the good. And other, the real world case such as the operating system monopoly, that says that in monopoly there is one firm that provides the overwhelming majority of sales (say, for example Microsoft), and a handful of small companies that have little or no impact on the dominant firm. In this unit, we will stress more on the former case.

10.1 Features of Monopoly

Monopoly is said to exist when one firm is the sole producer or seller of a product which has no close substitutes. According to this definition, there must be a single producer or seller of a product. If there are many producers producing a product, either perfect competition or

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monopolistic competition will prevail depending upon whether the product is homogeneous or differentiated. On the other hand, when there are few producers, oligopoly is said to exist. A second condition which is essential for a firm to be called a monopolist is that no close substitutes for the product of that firm should be available.

From the above discussion it follows that for monopoly to exist, following conditions are essential:

1. One and only one firm produces and sells a particular commodity or a service.
2. There are no rivals or direct competitors of the firm.
3. No other seller can enter the market for whatever reasons — legal, technical or economic.
4. Monopolist is a price maker. He tries to take the best of whatever demand and cost conditions exist without the fear of new firms entering to compete away his profits.

In the case of monopoly one firm constitutes the whole industry. Therefore the entire demand of the consumers for that product faces the monopolist; which slopes downward. Monopolist can lower the price by increasing his level of sales and output and he can raise the price by reducing his level of sales. Demand curve facing the monopolist will be his average revenue curve, which also slopes downward. Since average revenue curve slopes downward, marginal revenue curve will be below it.

Market Conditions

In perfect competition, there is a difference between the market demand curve and the demand curve for the output of an individual firm; when the firm acts as a price taker it views its demand curve as being horizontal with average revenue equal to marginal revenue. However, under monopoly, there is only one firm in the industry and so there is no difference between the demand curve for the industry and the firm. Since a normal demand curve is assumed, it is necessary for the monopolist to reduce price in order to increase the quantity sold. In other words, in order to increase sales the monopolist must reduce the price of all goods sold and therefore marginal revenue will always be less than average revenue under monopoly.

Table 10.1: Market Condition and Monopoly

Output Sales	Price (AR)	Total Revenue	Marginal Revenue
1	20	20	20
2	18	36	16
3	16	48	12
4	14	56	8

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Sources of Monopoly

1. ***Legal Restrictions:*** Some public sector services are statutory monopolies, which means their position is protected by law.

   A monopoly position might also be protected by a patent which prevents other firms from producing an identical good during the life of the patent. However, similar products can often be produced and it is easy to exaggerate the protection afforded by patents.

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2. ***Capital Costs:*** Certain businesses, such as international airlines and chemical companies, have relatively high set-up costs. In such cases the minimum efficient scale of production might be very high indeed and this creates a formidable barrier to entry.

3. ***Natural Factor Endowments:*** Sometimes firms, within a particular country, between them control a major proportion of the world output of a commodity: nitrates from Chile, coffee from Brazil and gold from South Africa are cases in point. A particular country has a monopoly in the supply of a particular commodity due to natural factor endowments and it is impossible to obtain supply of the commodity from any other source.

4. ***Tariffs and Quotas:*** It can happen that a firm has a dominant position in its home country, but faces competition internationally. A tariff raises the price of goods imported into the domestic economy and a quota restricts the volume that can be imported. They, therefore, protect domestic industry from international competition.

10.2 Price and Output Decisions

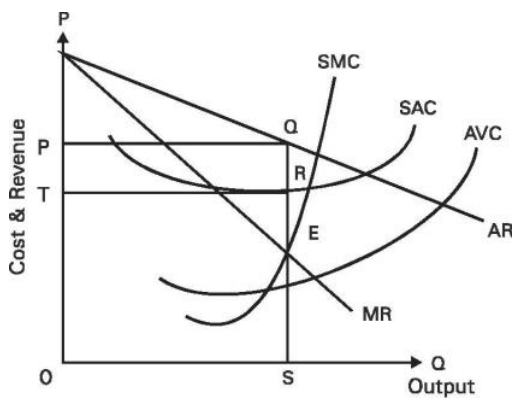
10.2.1 Short Run Equilibrium

In the short run the monopolist maximises his short run profits or minimises his short run losses if the following two conditions are satisfied:

1. MC = MR and

2. The slope of MC is greater than the slope of MR at the point of their intersection (i.e., MC cuts the MR curve from below).

Figure 10.1



In the short run a monopolist has to work with a given existing plant. He can expand or contract output by varying the amount of variable factors but working with a given existing plant. Maximisation of profits in the short run requires the fixation of output at a level at which marginal cost with a given existing plant is equal to marginal revenue. In Figure 10.1, SAC and SMC are short run average and marginal cost curves. Monopolist is in equilibrium at E where marginal revenue is equal to marginal cost. Price set by him is SQ or OP. He is making profits equal to TRQP.

But in the short run he will continue working so long as price is above the average variable cost. If the price falls below average variable cost the monopolist would shut down even in the short

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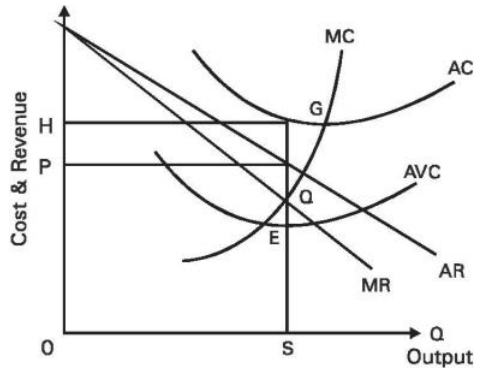
run. In case of losses, monopoly equilibrium is shown in Figure 10.2. The monopolist is in equilibrium at OS level of output with price OP. Since price (or AR) is smaller than average cost, he is making losses which are equal to area of the rectangle PQGH.

Figure 10.2

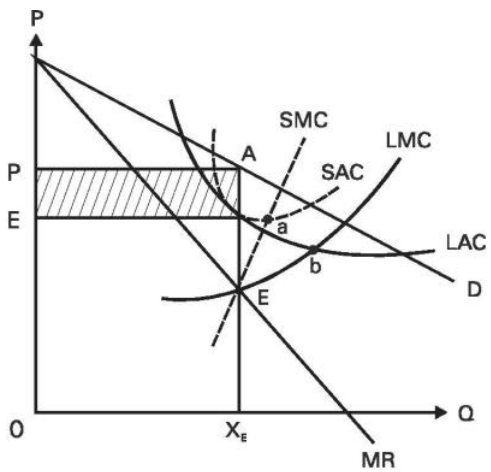


10.2.2 Long Run Equilibrium

In the long run, the monopolist has the time to expand his plant or to intensively use his existing plant which will maximise his profits. Since there will be no new entry, it is not necessary for the monopolist to reach an optimal scale. It means that monopolist will not stay in business if he makes losses in the long run. The size of his plant and the degree of utilisation of any given plant size depend entirely on market demand.

Caution He may reach the minimum point of LAC or remain at falling part of his LAC and expand beyond the minimum LAC depending on the market conditions. In Figure 10.3 we depict the case in which the market size does not permit the monopolist to expand to the minimum point of LAC. This is because to the left of the minimum point of the LAC the SRAC is tangent to the LAC at its falling part and also because the short run MC must be equal to the LRMC. This occurs at E, while the minimum LAC is at b and the optimal use of the existing plant is at a: since it is utilised at the level E, there is excess capacity.

Figure 10.3: Monopolist with Suboptimal Plant and Excess Capacity



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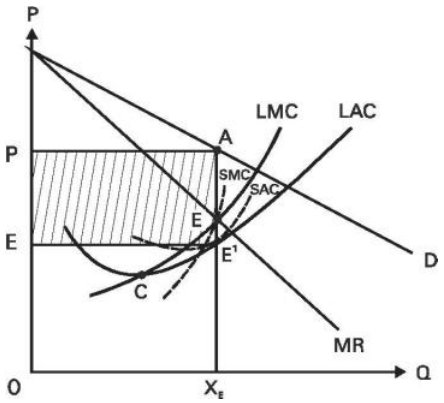
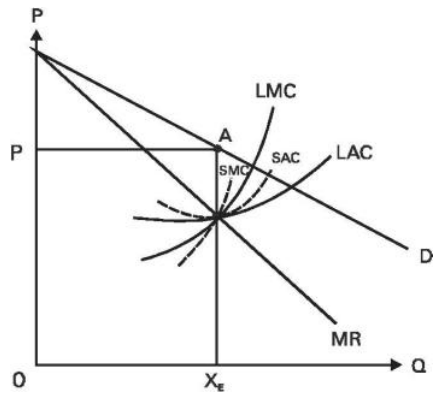
In Figure 10.4, we depict the case where the size of the market is so large that the monopolist, in order to maximise his output, must build a plant larger than the optimal and over utilise it. This is because to the right of the minimum point of the LAC the SRAC and the LAC are tangent at a point of their positive slope and also because the SRMC must be equal to the LAC. Thus, the plant that maximises the monopolist's profits leads to higher costs for two reasons: firstly, because it is larger than the optimal size and secondly because, it is over utilised.

Figure 10.4



Finally, in Figure 10.5 we show the case in which the market size is just large enough to permit the monopolist to build the optimal plant and use it at full capacity.

Figure 10.5



It should be clear as to which of the above situations will emerge in any particular case depends on the size of the market (given the technology of the monopolist).

Task Try to find out the organisations closer to monopoly competition in the real world.

Did u know? **What is Herfindhal Index?**

It is commonly used by government bodies while measuring the degree of competition in a market. It takes into account the size distribution of firms.

Notes

Case Study

Medical Monopoly

Non-physician providers of medical care are in high demand in the United States. But licensure laws and federal regulations limit their scope of practice and restrict access to their services. The result has almost unavoidably been less choice and higher prices for consumers.

Safety and consumer protection issues are often said to be the reasons for restricting non-physician services. But the restrictions appear not to be based on experimental findings. Studies have repeatedly shown that qualified non-physician providers – such as midwives, nurses, and chiropractors – can perform many health and medical services traditionally performed by physicians – with comparable health outcomes, lower costs, and high patient satisfaction.

Licensure laws appear to be designed to limit the supply of health care providers and restrict competition to physicians from non-physician practitioners. The primary result is an increase in physician fees and income that drives up health care costs.

At a time government is trying to cut health spending and improve access to health care, it is important to examine critically the extent to which government policies are responsible for rising health costs and the unavailability of health services. Eliminating the roadblocks to competition among health care providers could improve access to health services, lower health costs, and reduce government spending.

Question

Analyse the possible factors that have lead to this kind of situation.

Source: www.cato.org/pub_display.php?pub_id=1105

10.3 Price Discrimination under Monopoly

A seller indulges in price discrimination when he sells the same product at different prices to different buyers. Price discrimination is 'personal' when different prices are charged from different persons, 'local' when different prices are charged from people living in different localities, and 'according to use' when, for example, higher rates are charged for commercial use of electricity as compared to domestic use.

Price discrimination is possible when the seller is able to distinguish individual units bought by single buyer or to separate buyers into classes where resale among classes is not possible.

Thus, price discrimination is possible in case of personal services of doctors and lawyers. It is also possible when markets are too distant or are separated by tariff barriers. There may be a legal sanction for price discrimination as in the case of electricity charges from domestic and industrial users. It is also possible when some people are prejudiced against a particular market and prefer a posh market or when some people are too lethargic to move away from the nearest shopping centre.

Notes

Case 1: Equilibrium under Price Discrimination

A monopolist firm sells a single product in two different markets either different elasticities of demand. Resale among the customers is not possible. The firm has to decide how much total output should be produced and how it should be distributed between sub-markets and what prices should be charged in the two sub-markets. It is assumed that production takes place at the same point.

Figure 10.6: Equilibrium of Monopolist under Price Discrimination

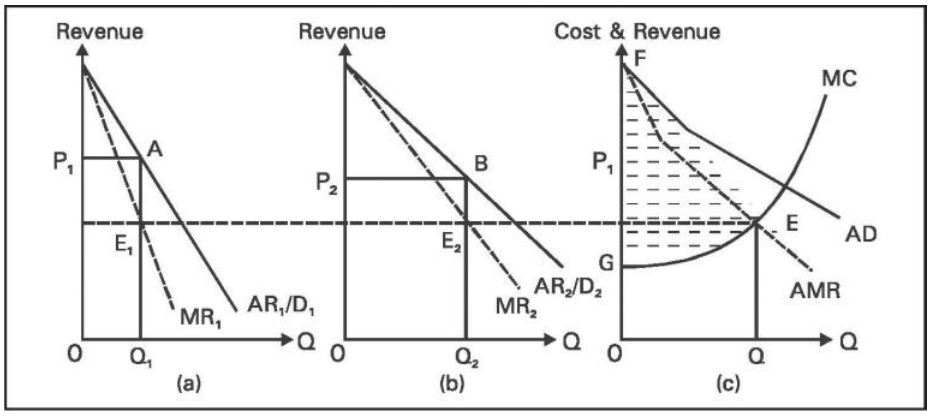


Figure 10.6 shows the equilibrium of a monopolist under the two sub-markets. It may be observed that the monopolist faces a less elastic demand curve in sub-market 1 as compared to 2. The aggregate demand and MR curves are shown in part (c). Profits are maximised where MC curve meets the MR curve from below, i.e., at point E. The total profits are represented by the shaded area EFG lying between the MR and MC curves. The monopolist would produce Q units of output. In order to know the distribution of Q in two sub-markets the equilibrium aggregate MR is equated to MR_1 and MR_2 at points E_1 and E_2 respectively. The monopolist would sell amount Q_1 in sub-market 1 at a price P_1. He would sell amount Q_2 at a price P_2 in sub-market 2. It should be noted that $Q = Q_1+Q_2$.

Case 2: Dumping

This is a special case when the firm is a monopolistic in the domestic market but faces perfect competition in the world market. Figure 10.7 shows the equilibrium of such a firm. AR_H and MR_H are the average and marginal revenue curves respectively which the firm faces in the home market. AR_W or MR_W is horizontal straight line at the level of prices P_w, prevailing in the world market. MC denotes the marginal cost curve. The aggregate MR curve is given by the curve AFEG which is the lateral summation of MR_W and MR_H. The profits are maximised when aggregate MR=MC, i.e., at point E. The firm would sell total output Q. In the home market, the firm would equate MR_H to the equilibrium MC. Thus, the firm would sell Q_H units in the domestic market at a price P_H which is higher than the international price P_W. The remaining amount ($Q-Q_H$) would be sold in the world market at price P_W. The area AFED denotes the total profits of this firm. The producer is said to be 'dumping' in the world market since he is charging less price in the world market than in the home market.

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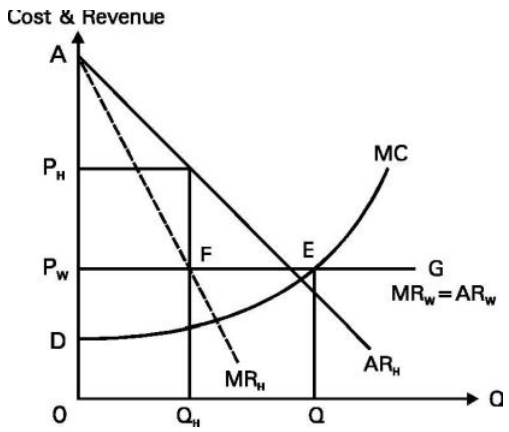
Figure 10.7: Disequilibrium of a Monopolist under Price Discrimination



Caselet

DeBeers : An Unregulated Monopoly

According to the New York Times (1986), the Central Selling Organisation, controlled by DeBeers Consolidated Mines Ltd, is "probably the world's most successful monopoly." De Beers, founded in 1880 by Cecil Rhodes in South Africa, controlled over 99 per cent of world's diamond production until about 1900. At present, the firm mines only about 15 per cent of the world's diamonds, but it still controls the sales of over 80 per cent of the gem quality diamonds through its Central Selling Organisation which markets the output of other major producing countries like Zaire, the Soviet Union, Botswana, Namibia and Australia, as well as its own production. In the first half of 1989, its sales were over $2 billion.

No one doubts that DeBeers controls the price of diamonds. Buyers are offered small boxes of assorted diamonds at a price set by DeBeers on "take it all or leave it" basis. Those that choose not to buy may have to wait some time before getting another opportunity. If the demand for diamond fails, as it did in early 1980s (when inflation slowed and diamonds as an investment lost much of their sparkle), DeBeers stands ready to buy diamonds to support the price. Between 1979 and 1984, its stockpile of diamonds increased from about $360 million to about $2 billion. In the first half of 1992, its earnings fell by about 25 per cent because global recession had reduced the demand for diamonds.

Besides limiting the quantity supplied, DeBeers also works hard and cleverly to push the demand curve for diamonds to the right. An important part of its sales campaign has been to link diamonds and romance (according to its 50-year old slogan, "A Diamond is Forever"), of course, this has also been helpful in keeping diamonds once sold, off the market. A good that is drenched with lasting sentiment is less likely to be sold when times get tough. DeBeers's policies have paid off very substantial profits, but the consumer has paid higher prices than if the diamond market were competitive.

Notes

Case Study

In Curbing Anti-Dumping, Chinese Companies Sued for Monopoly in US.

In a closely watched case that could test the reach of U.S. antitrust law, four Chinese companies face powerful evidence that they colluded to limit production and fix prices of vitamin C in the United States. The evidence is so convincing, in fact, that the defendants have not contested the allegations.

But they still have a potentially solid legal defense: the Chinese Government made them do it. It's a position that has been bolstered by the Chinese government itself, which made an official appearance in the case -- believed to be its first ever in a U.S. court -- to file briefs in support of the defendants. After more than six years of litigation, a Brooklyn federal judge is expected to decide soon whether the case can be decided without a trial.

The legal theory underpinning the defendants' argument is known as the foreign sovereign compulsion doctrine, which protects foreign companies that were compelled by their own government to break U.S. law. As Chinese companies increasingly become the target of antitrust lawsuits in the United States, the doctrine is expected to undergo more legal scrutiny. In addition to the vitamin C case, Chinese companies have raised the sovereign compulsion defense in two other price-fixing cases.

The outcomes of those cases are not expected to have an immediate impact on U.S. trade relations with China, the largest supplier of goods imported into the United States. As China's economic power continues to grow, however, the disputes could be a sign of more trade fights ahead.

Shanker Singham, a partner at Squire, Sanders & Dempsey and the chairman of the International Roundtable on Trade and Competition Policy, said that a ruling for the defendants would undermine global competition. "It would be a declaration of war on the market system where business competition on the merits is the organizing economic principle," Singham said.

Pact Limits Export Volumes

Until recently, Chinese companies have been known for low production costs that have benefited consumers worldwide, and only in the last five years have they been accused of coordinating production in an effort to raise prices. "The appearance of Chinese cartels that are hiding behind the state is a disturbing trend," said John Connor, a professor at Purdue University specializing in antitrust law enforcement.

Among the documents in the vitamin C case is a 2001 written production and price agreement among the four Chinese manufacturers, which together controlled around 60 percent of the world's vitamin C market. The pact explicitly limited each company to a specific volume for export. According to the plaintiffs, after the agreement was made, spot prices for vitamin C shot to as high as $7 per kilogram in December 2002 from $2.50 per kilogram in December 2001.

In an amicus brief filed in support of the defendants, China's Ministry of Commerce argued that the vitamin C manufacturers were compelled by Chinese law to coordinate their production and pricing. It also argued that a ruling against the manufactures would "improperly penalize" them for "the sovereign acts of their government and would adversely affect implementations of China's trade policy."

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The foreign sovereign compulsion defense has rarely been litigated and it has only been successful once, according to antitrust law experts. But the presence of the Chinese government in the vitamin C case could cause Judge Brian Cogan to look for a way to dismiss the case. "You can see why a judge would be reluctant to keep the case when it's about foreign affairs and trade policy," said Spencer Waller, director of the Institute for Consumer Antitrust Studies at Loyola University Chicago School of Law.

No U.S. Action

The Chinese government's participation may explain why neither the U.S. Department of Justice nor the Federal Trade Commission has taken any action against the Chinese companies. According to enforcement guidelines that the government issued in 1995, the DOJ and FTC will not take action against a company if a foreign government makes a sufficiently detailed presentation that a specific law compelled the defendant's actions. William Isaacson, a partner at Boies, Schiller & Flexner and the co-lead counsel for the plaintiffs, said that neither the Chinese government nor the defendants have been able to point to such a law.

Isaacson and his law firm have a unique perspective on the vitamin C market. In the late 1990s, they investigated a vitamin C cartel among European and Japanese companies. Their probe led to U.S. prosecutions that resulted in more than $900 million in corporate fines and several guilty pleas. Isaacson said he is bewildered that the U.S. government has not contacted him for more information about his case against the Chinese companies. "I've never understood why they don't want to find out what's been happening." The Department of Justice's antitrust division and the FTC declined to comment.

The plaintiffs, two U.S. buyers of vitamin C, alleged in one of their briefs that the defendants fixed prices without any help from the government. It was only after the defendants were accused of price fixing that they invoked their government's involvement, according to the plaintiffs.

For their part, the Chinese manufacturers say that China's Ministry of Commerce directed an entity called the Chamber of Commerce of Medicines and Health Products Importers and Exporters to coordinate production. According to the brief submitted by the Ministry of Commerce, the action was taken in order to mitigate the exposure Chinese companies faced in potential antidumping investigations from other countries and to ensure China's orderly transition to a market-driven economy.

But that position could turn out to be problematic for China in a dispute with the United States at the World Trade Organization. In that proceeding, the United States has charged that China has played a role in limiting exports of certain raw materials, in violation of WTO rules. To bolster its case, the United States has pointed to China's admission in the vitamin C case that in fact it is involved in setting production limits.

The case is Animal Science Products and The Ranis Company v. Hebei Welcome Pharmaceutical Co. Ltd. et al, U.S. District Court for the Eastern District of New York, No. 05-00453.

Question

Do you think what China is doing is right?

Source: Reporting by Andrew Longstreth of Reuters Legal; Editing by Amy Singer and Eddie Evans; This article first appeared on Westlaw News & Insight, www.westlawnews.com

Notes

10.4 Summary

- In the case of monopoly one firm constitutes the whole industry.
- There must be a single producer or seller of a product and the product has no close substitute.
- In the short run the monopolist maximises his short run profits or minimises his short run losses if the following two conditions are satisfied: (i) MC = MR and (ii) The slope of MC is greater than the slope of MR at the point of their intersection.
- In the long run, the monopolist has the time to expand his plant or to intensively use his existing plant which will maximise his profits.
- A seller indulges in price discrimination when he sells the same product at different prices to different buyers. A monopolist firm sells a single product in two different markets either different elasticities of demand.

10.5 Keywords

Dumping: When the firm is a monopolistic in the domestic market but faces perfect competition in the world market.

Equilibrium: Condition when the firm has no tendency either to increase or to contract its output.

Imperfect competition: A market structure wherein individual firms exercise control over the price to a smaller or larger degree depending upon the degree of imperfection present in a case.

Market period: A very short period in which the supply is fixed, that is no adjustment can take place in supply conditions.

Monopoly: Existence of a single producer or seller which is producing or selling a product which has no close substitutes.

Perfect competition: A market structure characterized by a complete absence of rivalry among the individual firms.

Profit: Difference between total revenue and total cost.

10.6 Self Assessment

1. State true or false for the following statements:
   (a) In the case of monopoly one firm constitutes the whole industry.
   (b) In case of monopoly, the marginal revenue is less than the price.
   (c) In the short-run, a monopolist cannot be in equilibrium if MC cuts the MR curve from below, even if MC=MR.
   (d) Monopoly represents an efficient use of resources at the macro level.
2. Choose the appropriate answer:
   (a) Given the same cost and revenue schedules, a profit-maximizing monopolist will produce:
      (i) less output than a competitive industry
      (ii) more output than a competitive industry

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(iii) the same amount of output as a competitive industry

(iv) none of above.

(b) The quantity supplied by a profit maximizing monopolist is:

(i) equal to quantity demanded at competitive market price

(ii) insufficient to supply the quantity demanded at monopoly price

(iii) equal to quantity demanded when price equals marginal cost

(iv) insufficient to satisfy the quantity demanded at the competitive market price

(c) Which of the following is not true of a profit maximizing monopoly firm in equilibrium?

(i) total profit is maximum for the firm

(ii) there is less output than under competitive conditions

(iii) average costs are minimum at the equilibrium rate of output

(iv) the price is higher than under competitive conditions.

3. Fill in the blanks:

(a) Under monopoly ..... firm constitutes the whole industry.

(b) In monopoly the demand curve for the firm and industry is..... .

(c) In the short run monopolist will continue working so long as price is above the ..... .

(d) In monopoly seller may indulge in price ..... .

(e) Since there will be no new entry, it is not necessary for the monopolist to reach ..... scale.

(f) If a seller is charging less price in the world market than in the home market, it is called ..... .

(g) In monopoly product has no close ..... .

10.7 Review Questions

1. What perfect competitive market and pure monopoly market have in common?
2. How can a monopoly market be a disadvantage to consumers?
3. In what market did Microsoft have a monopoly in the late 1990s? What technological advances threatened that monopoly?
4. The water company is privately owned and is the only water company in town. It is licensed and franchised by the city for a 10 - year term, just renewed. They advertise on TV, enclose a newsletter with their bills, and donate to local school activities. Why do they do these things?
5. The diagram below represents an industry that was in perfect competition that has become a monopoly. Which area on the graph shows the level of producer surplus that will exist under the monopoly?

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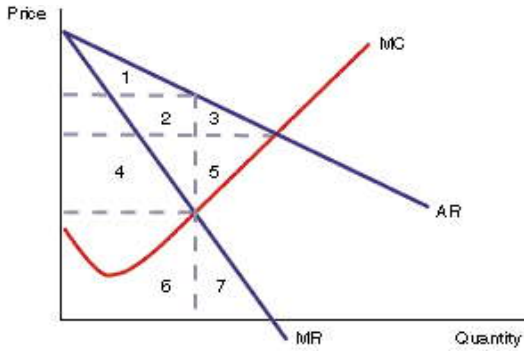

6. Examine the features of monopoly competition through appropriate examples.
7. Show that under monopoly P>MC at equilibrium.
8. Consider the following table and locate the profit maximising level of output; also estimate the "degree of monopoly" corresponding to that level of output.

Output	1	2	3	4	5
Price	5	4	3	2	1
Average costs	3	3	3	3	3

9. Why is the monopolist's MR less than AR?
10. A monopolist is selling fish. But if the fish don't sell, they rot. What will be the likely elasticity at the point on the demand curve at which the monopolist sets the price?
11. Discuss the relation between the average revenue curve and the marginal revenue curve under simple monopoly.
12. How is price determined under a simple monopoly?
13. Will a monopolist continue to produce in the short run even if production means losses? Explain.
14. A TV manufacturer produces X sets a week at a total cost of ₹ $(1/25\ X^2 + 3X + 100)$. He is a monopolist and the demand of his market is $X = 75 - 3P$, when the price is ₹ P per set. Show that the maximum net revenue is obtained when about 30 sets are produced per week. What is the monopolist's price?
15. If you are a monopolist, how will you determine the price discrimination in various markets?

Answers: Self Assessment

1.	(a)	True	(b)	True	(c)	True	(d)	False
2.	(a)	i	(b)	iv	(c)	i		
3.	(a)	one	(b)	same	(c)	average variable cost		
	(d)	discrimination	(e)	an optimal	(f)	Dumping	(g)	substitute

Notes

10.8 Further Readings

Books

Bibek Debroy, *Managerial Economics,* Global Business Press, Delhi.

Dr. Atmanand, *Managerial Economics,* Excel Books, Delhi.

Shapiro, Bensen, *The Psychology of Pricing,* Harvard Business Review.

Online links

http://alpha.fdu.edu/~koppl/note19.htm

http://tutor2u.net/blog/index.php/economics/C180/

http://www.ehow.com/about_6601606_monopoly-economics_.html

Unit 11: Monopolistic Competition

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Objectives

After studying this unit, you will be able to:

- State the features of monopolistic competition
- Discuss the short run and long run equilibrium of a monopolistic firm

Introduction

Monopolistic competition has an element of product differentiation. We can define a monopolistic competitive market as a market in which there are a large number of firms and the products in the market are close but not perfect substitute. The real world is widely populated by monopolistic competition. Perhaps half of the economy's total production comes from monopolistically competitive firms. The best examples of monopolistic competition come can be retail trade, including restaurants, clothing stores, and convenience stores.

11.1 Features of Monopolistic Competition

Monopolistic competition is a form of market structure in which a large number of independent firms are supplying products that are slightly differentiated from the point of view of buyers. Thus, the products of the competing firms are close but not perfect substitutes because buyers do not regard them as identical. This situation arises when the same commodity is being sold under different brand names, each brand being slightly different from the others. For example, Lux, Liril, Rexona, Hamam, etc., are brands of toilet soap, or Colgate, Cibaca, Prudent, Promise, etc., brands of toothpaste.

Each firm is, therefore, the sole producer of a particular brand or "product". It is a monopolist as far as that particular brand is concerned. However, since the various brands are close substitutes, a large number of "monopoly" producers of these brands are involved in keen competition with

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one another. This type of market structure, where there is competition among a large number of "monopolists" is called monopolistic competition.

The differentiation among competing products or brands may be based on real or imaginary differences in quality. Real differences among brands refer to palpable differences in quality such as shape, flavour, colour, packing, after sales service, warranty period, etc. In contrast, imaginary differences mean quality differences which are not really palpable but buyers are made to imagine or are "conditioned" to believe that such differences exist and are important. Advertising often has the effect of making buyers imagine or believe that the advertised brand has different qualities. When there is product differentiation, each firm has some degree of control over price.

As a result, under monopolistic competition, the demand or average revenue curve of an individual firm is a gradually falling curve. It is highly elastic but not perfectly so. Therefore, the marginal revenue curve of the firm is also falling and lies below the average revenue curve at all levels of output. It is in this respect that monopolistic competition differs from perfect competition.

In addition to product differentiation, the other three basic characteristics of monopolistic competition are:

1. There are a large number of independent sellers (and buyers) in the market.
2. The relative (proportionate) market shares of all sellers are insignificant and more or less equal. That is, seller concentration in the market is almost non existent.
3. There are neither any legal nor any economic barriers against the entry of new firms into the market. New firms are free to enter the market and existing firms are free to leave the market.

In other words, product differentiation is the only characteristic that distinguishes monopolistic competition from perfect competition.

Firms selling slightly differentiated products under different brand names compete not only through variations in price but also through variations in product quality (product variation) and changes in advertising or selling costs. Thus, under monopolistic competition, an individual firm has to maximise profits in relation to variations in three policy variables, namely, price, product quality, and selling costs. (In contrast, under perfect competition there is competition only through price variation).

Assumptions in Analysing Firm Behaviour

We analyse the conditions and process of long run equilibrium under monopolistic competition with the assumption that competing firms keep their selling costs and product quality constant and compete only through price variation. We then assume that

1. The demand curve of each individual firm has the same shape (elasticity) and position (distance from the y-axis). That is, we assume the demand curves of all firms to be symmetrical. This assumption implies that market share of every firm is the same and equal to a constant proportion of total market demand. That is, if total market demand is Q and an individual firm's demand is q then q=KQ, where K is a constant fraction for all firms.
2. The cost curves, both average and marginal, are symmetrical for each firm.

These two assumptions are 'heroic' or unrealistic but we need to make them for logical convenience in order to analyse the long run equilibrium of a typical firm under monopolistic competition.

Notes

Caselet

Market Entry and the Vanilla Syndrome

In most categories of consumer products, there is one dominant segment; glucose in biscuits, cola in soft drinks, vanilla in ice creams. These are good categories, but the same thing can be extended to other product categories.

Now the tendency is that when a new player wants to enter an established product category, he automatically looks at the dominant segment first. The MD and CEO, Ashok Jain, Cadbury Schweppes Beverages India Private Limited, calls it a "Vanilla trap". He explains this as follows:

"A trap because you, as the new entrant, can never come close to challenging the dominance of the biggest player in that vanilla segment. So what you get into is a syndrome: "Can I get two-to-three per cent market share in that segment?" The segment spells sheer volume, so this share would be larger than 15 per cent of some other segment in the category.

That's where the trap is. The segment's Goliath is so big, you'll get routed, like it or not.

So what do you do instead? I suggest the "blackcurrant route". A route where you take something else and make yourself dominant there, while getting a foot into the dominant segment as well (you can't afford not to).

And what'll happen? While people will come for your blackcurrant, they will buy your vanilla. Your volumes will still come from your vanilla. But for top-of-mind consumer, the trademark blackcurrant is what will identify you. This is theory. It's happened. I'll give you three examples.

When Cadbury India decided to extend to biscuits, it started off by challenging Parle in glucose, a segment where Parle's strength is unmatched. Cadbury didn't succeed. By the time it launched chocolate biscuits, it was too late.

There was a lesson here, which was extended to ice creams, the next category Cadbury entered. The brand, Dollops, harped on its blackcurrant ice cream, didn't talk vanilla at all, but the volumes came from vanilla anyway.

Then take Britannia. For years, it tried to break Parle's dominance in glucose biscuits, with little success. It then went in for a number of branded products that gave it an aura and gained it respect and attention. Little Hearts was so different, it gave Britannia distinction. And then, the company launched Tiger, a glucose biscuit. Tiger is now a very large brand in the glucose segment.

You've got to have something that's very specially your own. Otherwise, the consumer won't pay you much attention and the trade won't want to stock your products – why should it? The retailer looks Cadbury Schweppes' way because of Crush and Canada Dry. Our largest volumes come from Sport Cola. The brand sells much more than Crush.

Proves my point, doesn't it?

I say again: you can't fight the dominant guy in the dominant segment. Get into his segment's volumes indirectly, instead."

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11.2 Price and Output Decisions

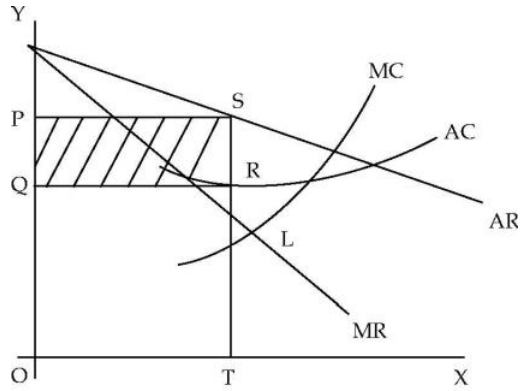
Long Run Equilibrium through New Entry Competition

Under monopolistic competition, the number of independent firms selling differentiated products or brands of a given commodity is large and the relative market share of every firm is insignificant. Therefore, the entry of a new firm into the market will not have any noticeable adverse effect on the sales (or demand) of any of the established firms. Established firms will have no reason to react to new entry by adopting practices to discourage this. Moreover, there are no legal or non-legal (economic) barriers against new entry. Hence, when high profits of the existing firms attract new entry, new firms will in fact enter the market.

Short-Run Equilibrium Under the Monopolistic Competition

Firms under monopolistic competition attain equilibrium when (1) MC = MR and (2) slope of MC > slope of MR. The firm's equilibrium is defined at the point E in the following figure. At this price OP, AR > AC, the firm earns a profits of PQRS. The firm may earn a profit or incurs loss or be at a no loss no profit position depending upon the demand condition and the position of the cost-curves;

Figure 11.1: Firm's Equilibrium under Monopolistic Competition



Long-Run Equilibrium Under the Monopolistic Competition

In the long-run, price cutting, expansion and contraction of output and new entry are possible, i.e., firms may compete with one another through price or non-price competition. The abnormal profit earned in the short-run will attract new entries, therefore the amount sold at any given price will fall resulting in the shift of demand curve until the abnormal profits are wiped out. There is no profit no loss situation since the total cost and the total revenue are equal.

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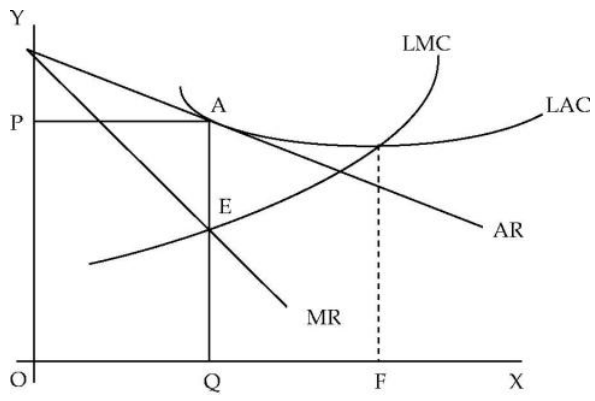
Figure 11.2: Long-run Firm's Equilibrium under Monopolistic Competition



Caution When there is competition only from new entry, the long run equilibrium of the firm under monopolistic competition is reached under the following conditions:

1. Price = AR = LAC = OP_2 (Figure 11.2)
2. MR = LMC = EQ_2 (Figure 11.2)
3. Maximum Profit = Normal Profits

However, because the firm's demand or average revenue curve is falling, the price is higher than marginal revenue. Hence, under monopolistic competition, even though the long run equilibrium price is = LAC, it is greater than LMC. This is because, at equilibrium, MR = LMC but price is greater than MR. (Under perfect competition, price = minimum LAC = LMC).

Moreover, since the firm's demand or average revenue AR_2 is falling on account of product differentiation, it can be a tangent to the U-shaped LAC curve only when LAC is also falling. As shown in Figure 11.2, the long run equilibrium position E will be at a point which is to the left of the minimum LAC. Thus, the long run equilibrium output Q is less than optimum output, Q_m (where LAC is at its minimum). The difference between E and Q = (F – OQ) shows the extent of excess or under utilised capacity. Equilibrium with excess capacity is therefore the necessary consequence of product differentiation and monopolistic competition.

Task Analyse the "market entry and the vanilla syndrome" in the case of health and retirement plans of insurance companies.

11.3 Application of Monopolistic Competition

We find many examples of monopolistic competition in real world. The best examples can be found in retail trade. As we know the main characteristics for this type of market situation is that there are many producers and many customers for the services/products, yet no company has control over the market price, consumers perceive that there are non-price differences among the competitors' products, and there are very few barriers to entry to and exit from the market.

Those markets which have these characteristics, the differentiation of products is often achieved by altering the physical composition of products, or through advertising to claim the superiority of the product. This can easily be seen in markets for toothpastes or soaps etc. Under monopolistic

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market we have many sellers, as under perfect competition). However, they don't sell identical products. Instead, they sell differentiated products-products that differ somewhat, or are perceived to differ, even though they serve a similar purpose. Products can be differentiated. Sometimes, it's simply geographical; you probably buy gasoline at the station closest to your home regardless of the brand. At other times, perceived differences between products are promoted by advertising designed to convince consumers that one product is different from another, and better than it. Regardless of customer loyalty to a product, however, if its price goes too high, the seller will lose business to a competitor. Under monopolistic competition, therefore, companies have only limited control over price.

If we take a closer look we find that in some industries they have it many differentiated brands and create an illusion of competition and providing a barrier to entry. For example so many brands of soaps are there, but the most of these brands are owned by 2 companies, Unilever and Proctor and Gamble. Such type of brand proliferation put barriers for new entry in the market. There is less chance of getting a good market share with so many brands. Therefore, the new firm would have an incentive to keep different brands in order to deter competitors. Another aspect of this is, merging many different brands there may be economies of scale.

Government policies often act as entry barriers in several industries. Besides, the growth of entrepreneurship is also a council element in the Indian context. Until a decade or so ago, even products like soaps and toothpastes were characterised by oligopolies. For some reason, new firms just did not enter into several product lines despite favourable government policy. It is only since the 80s that one finds competition hotting up in the country's markets. Product variations, aggressive promotional campaigns and easy entry of new firms are now commonly encountered in several consumer goods industries.

Case Study

Maruti Facing Tough Competition

The key issue for Maruti today is to sell at least the number of cars it sold last year (1998-99). Insiders in the company admit that it can't. The reason: Hyundai, Daewoo and Telco all plan to hawk 60,000 cars by end of next April. And all of them are targeting the Zen or the Maruti 800, the two monopolists, and not the crowded luxury segment. And with the market expected to stagnate, by simple logic the newcomers will be grabbing a share only from Maruti.

The threat from the new car makers is not an empty one. For instance, Hyundai plans to follow the policy of "enrichment" of the Zen. It intends to price its air conditioned model slightly lower than the Zen VX and top it by pricing the higher end model with power steering and windows just ₹ 10,000-15,000 more than the Zen VX.

Similarly, Daewoo plans to woo buyers of the Maruti 800 air conditioned and the Zen by pricing its car under ₹ 3 lakh. And Telco is all set to take on the 800 by offering a model at a slightly higher price.

The scenario might worsen in 1999-2000 when Maruti would have added to capacity. By next year the three other car rivals will have the capacity to put 3.6 lakh cars a year on the road. Of course, they might not reach full capacity but even at a conservative estimate they would be selling over 1 lakh cars in 1999-2000. Assuming the market grows by 10 per cent, as some optimists predict, there will be more capacity chasing the 40,000 extra car consumers.

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Competition has already begun to put pressure on the company's financials. For example, when Maruti launched the upgraded version of the Zen recently, it decided not to increase the cost of the car even though it had been hit both by the customs and excise duty hikes and the extra cost of the upgradation. That is a sharp reversal of its earlier practice of increasing Maruti 800 prices after it launched an upgrade.

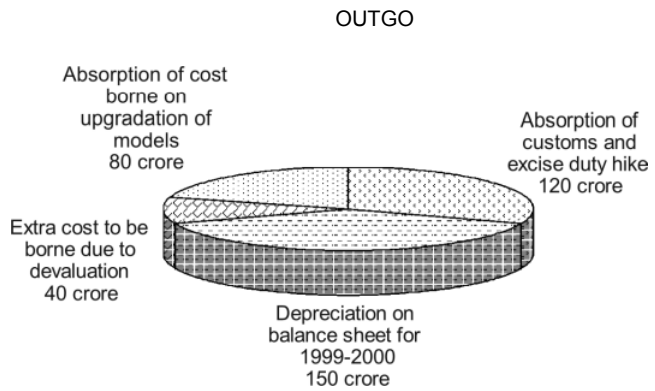
In fact, Maruti is not passing on the customs and excise increases for any model on to its customers. The cost increase on the Zen alone is ₹ 28,000 per car. As a result, Maruti has had to absorb ₹ 120 crore on this account plus ₹ 80 crore for upgradation.

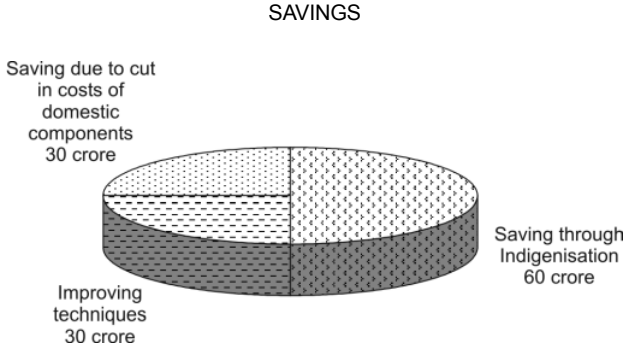
Worse, with the depreciation of the rupee, imported components will cost more leading to an extra outflow of over ₹ 40 crore. So the total extra tab that will immediately affect the bottomline will be ₹ 240 crore.

On the other hand, cost savings for 1998-99 will account for over ₹ 100 crore – which means that more than a fifth of Maruti's net profits last year will be wiped out.

This year Maruti will save around ₹ 30 crore more – from ₹ 50 crore to ₹ 80 crore through improvements in techniques and another ₹ 50-60 crore through further indigenisation. And while negotiations are on with vendors to cut costs, insiders say this would probably be neutralised by Suzuki deciding to hike the price of components it supplies to its joint venture.

Why India's Largest Car Maker will be under threat from this fiscal





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Notes

Provisional Results for 1997-98 in ₹ Crore

	1997-98	1996-97	% Increase
Total income	8,454	7,956	8.3
PBT	976	808	20.8
PAT	651	510	27.6
(Sales in number)			
800cc	89,000	83,000	3.3
Omni	57,000	47,000	21.3
Gypsy	7,700	700	10.0
Esteem/1000cc	18,700	25,000	-25.2
Zen	79,500	42,000	89.3

But whatever the future market, it is clear that Maruti will have a large unutilised capacity. Even assuming that the company can grab as much as 30,000 more cars, its total sales in 1999-2000 will be below 4 lakh cars per year.

But while the company builds up idle capacity with no new models it has to consider the depreciation costs of the new plant. This will dent the bottomline even more. According to Maruti, depreciation cost will go up ₹ 150 crore in 1999-2000.

The options for Maruti are limited: it has to get its new cars on the roads as early as possible. One option that the board will consider is to import completely knocked down (CKD) kits of the new cars which will be available in Japan from October. But the cost of the CKDs will be prohibitive and Maruti will have to subsidise them, which would hit margins and profits. The alternative is for the Maruti board to convince the Japanese parent to subsidise the CKDs for a year before the model is indigenised. Either way, Maruti's future is troubled (Business Standard, August 98).

Question

Discuss Maruti's situation in the light of monopolistic competition.

11.4 Summary

- Monopolistic competition is a form of market structure in which a large number of independent firms are supplying products that are slightly differentiated.
- When firms are competing only through price changes, there are three cases of long run equilibrium of a typical firm under monopolistic competition.
- The long run equilibrium can be seen under three situations: when competition takes place only through the entry of new firms, when competition takes place only through price variations and when competition arises through price variation and new entry.

11.5 Keywords

Actual demand: The actual changes in demand arising from simultaneous reduction in price.

Equilibrium: Condition when the firm has no tendency either to increase or to contract its output.

Product differentiation: Differences among competing products.

Profit: Difference between total revenue and total cost.

Notes

11.6 Self Assessment

1. State true or false for the following statements:
   (a) In a monopolistic market, the demand for the product of one producer depends upon the price and the nature of the products of his rivals.
   (b) A firm in the long-run under monopolistic competition earns high profits like that in perfect competition but only the price is higher and output lower.
   (c) A firm under monopolistic competition does not enjoy monopoly profits in the long run even though it charges monopoly price.
   (d) Selling costs cannot change, and create demand curves.
   (e) Monopolistic competition is identified by a few firms producing a slightly differentiated product.
   (f) Under monopolistic competition the firm has not the ability to collude with respect to price.
   (g) If a large number of firms are competing, the market could be monopolistic competition or monopoly.
   (h) Both monopolistic competition and perfect competition have firms that are price takers.
   (i) Because of the number of firms in monopolistic competition no one firm can dominate the market.
   (j) Identical product is a characteristic of monopolistic competition.
   (k) Product differentiation involves making a product that is completely different from the products of competing firms.
2. Fill in the blanks:
   (a) In monopolistic competition the relative market share of all sellers are .....
   (b) Under monopolistic competition, the demand or AR curve of an individual firm is a gradually ..... curve.
   (c) As the firm's AR curve is falling, the price is ..... than marginal revenue.
   (d) In the long run equilibrium output of the individual firm is ..... than optimum output.
   (e) The assumed demand curve is ..... than the actual demand curve.

11.7 Review Questions

1. Which of the following are examples of product differentiation in monopolistic competition and why?
   (a) New and improved packaging
   (b) Lower price
   (c) Acceptance of more credit cards than the competition
   (d) Location of the retail store
2. What will happen as a result of the increase in the degree of product differentiation among the products sold in a monopolistically competitive industry?

Notes

3. What would happen as a result in a case where a monopolistically competitive seller can convince buyers that his/her product is of better quality and value than products sold by rival firms?

4. What single circumstance in monopolistic competition best explains the nature of the industry's relatively elastic demand curve in the market?

5. Think and answer – does the insurance industry have monopolistic competition – why/ why not?

6. If all firms in a monopolistic competitive industry were to merge would that firm produce as many different brands or just one brand?

7. "In the long run, there is no difference between monopolistic competition and perfect competition." – true, false, or ambiguous. Discuss this statement with respect to the following:

   (a) The price charged to consumers - true

   (b) The average total cost of production - false

   (c) The efficiency of the market outcome - ambiguous

   (d) The typical firm's profit in the long run hide problem- true

8. Do airlines fit into the concept of monopolistic competition? Why or why not?

9. Why or why should not be the monopolistic competition regulated?

10. If the market became competitive, what would happen to output and price?

11. Discuss the main features of monopolistic competition. Complement your answer with real world example.

12. Suppose a monopolistic firm has average revenue functions in three markets as follows:

    $P_1 = 63 - 4Q_1$ where Q_1, Q_2 and Q_3 are quantities sold

    $P_2 = 105 - 5Q_2$ in three markets.

    $P_3 = 75 - 6Q_3$

    The total cost function is $C = 20 + 5\,Q$, where $Q = Q_1 + Q_2 + Q_3$.

    Find out the profit maximising output and price in the three markets. Also estimate demand elasticities.

13. If all the brand names of essential drugs are abandoned, what will be the impact on the society?

14. Discuss whether you find the monopolistic competition in the following industry:

    Hotels and restaurants, Health Spas, Hair dressing.

15. How is equilibrium of a firm under monopolistic competition affected, when firms are competing only through price changes? Discuss with example.

Answers: Self Assessment

1.	(a) True	(b) False	(c) True	(d) False
	(e) False	(f) False	(g) False	(h) True
	(i) True	(j) False	(k) False	

Notes

2. (a) insignificant (b) falling (c) higher
   (d) less (e) More

11.8 Further Readings

Books

Bibek Debroy, *Managerial Economics,* Global Business Press, Delhi.

Dr. Atmanand, *Managerial Economics,* Excel Books, Delhi.

Shapiro, Bensen, *The Psychology of Pricing,* Harvard Business Review.

Online links

http://ingrimayne.com/econ/International/MonoComp.html

http://www.peoi.org/Courses/mic/mic6.html

http://faculty.lebow.drexel.edu/mccainr/top/prin/txt/Imch/MC1.html

http://www.amosweb.com/cgi-bin/awb_nav.pl?s=wpd&c=dsp&k=monopolistic+competition

Notes

Unit 12: Oligopoly

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Objectives

After studying this unit, you will be able to:

- State the characteristics of oligopoly
- Explain the concept cartels & collusion
- Discuss the kinked demand curve concept

Introduction

Oligopoly is a situation in which only a few firms (sellers) are competing in the market for a particular commodity. The distinguishing characteristics of oligopoly are such that neither the theory of monopolistic competition nor the theory of monopoly can explain the behaviour of an oligopolistic firm.

12.1 Characteristics of Oligopoly

The characteristics of oligopoly are briefly explained below:

1. Under oligopoly the number of competing firms being small, each firm controls an important proportion of the total (industry) supply. Consequently, the effect of a change in the price or output of one firm upon the sales of its rival firms is noticeable and not

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insignificant. When any firm takes an action its rivals will in all probability react to it (i.e. retaliate). The behaviour of oligopolistic firms is interdependent and not independent or atomistic as is the case under perfect or monopolistic competition.

2. The demand curve of an individual firm under oligopoly is not known and is indeterminate because it depends upon the reaction of its rivals which is uncertain. Each theory of oligopoly therefore makes a specific assumption about how rivals will (or will not) react to an individual firm's action.

3. In view of the uncertainty about the reaction of rivals and interdependence of behaviour, oligopolistic firms find it advantageous to coordinate their behaviour through explicit agreement (cartel) or implicit, hidden, understanding (collusion). Also because the number of firms is small, it is feasible for oligopolists to establish a cartel or collusive arrangement. However, it is difficult as well as expensive to monitor and enforce an agreement or understanding. Very few cartels last long, particularly when oligopolistic firms significantly differ in their cost conditions.

4. Under oligopoly, new entry is difficult. It is neither free nor barred. Hence the condition of entry becomes an important factor determining the price or output decisions of oligopolistic firms, and preventing or limiting entry an important objective.

5. Given the indeterminacy of the individual firm's demand and, therefore, the marginal revenue curve, oligopolistic firms may not aim at maximization of profits. Modern theories of oligopoly take into account the following alternative objectives of the firm:

   (a) Sales maximization with profit constraint.

   (b) Target or "fair" rate of profit and long-run stability.

   (c) Maximization of the managerial utility function.

   (d) Limiting (preventing) new entry.

   (e) Achieving "satisfactory" profits, sales, etc. That is, the firm is a "satisficer" and not "maximizer".

   (f) Maximization of joint (industry) profits rather than individual (firm) profits.

In view of the fact that the characteristics of oligopoly renders collusion (explicit or implicit cartel) advantageous and feasible, theories of oligopoly are divided into three broad groups, namely, models of non-collusive oligopoly, models of collusive oligopoly, and managerial theories.

The important models of non-collusive oligopoly are: (a) Cournot model, (b) Kinked demand curve models.

The two major theories of collusive oligopoly are: (a) Joint profit maximization, and (b) Price leadership.

Emphasizing the distinguishing characteristics of joint stock enterprises are the three models of managerial theory, namely, (a) Sales maximization with profit constraint, (b) Maximization of managerial utility function, and (c) Firm as a satisficer (behaviourist theory).

12.2 Collusive Oligopoly Models

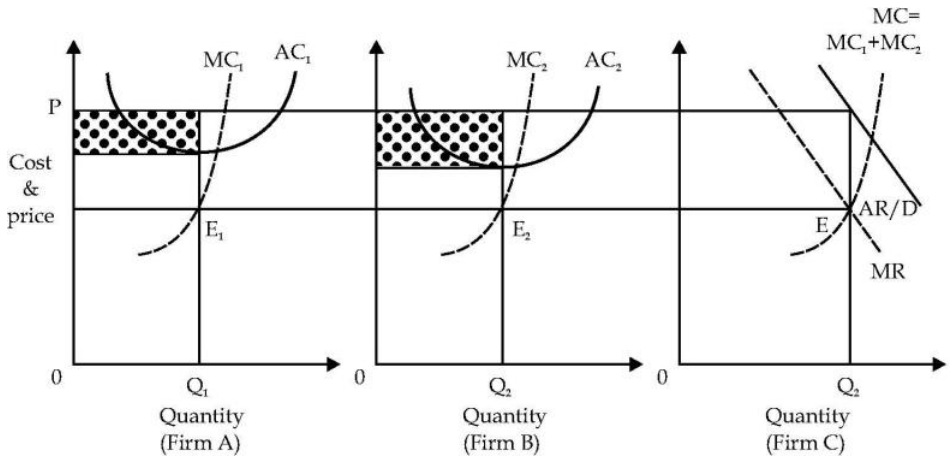
There can be two types of collusion (a) Cartels where firms jointly fix a price and output policy through agreement, and (b) Price Leadership where one firm sets the price and others follow it.

Notes

12.2.1 Cartel

A cartel is a formal collusive organisation of the oligopoly firms in an industry. There may either be an open or secret collusion. A perfect cartel is an extreme form of collusion in which member firms agree to abide by the instructions from a central agency in order to maximise joint profits. The profits are distributed among the member firms in a way jointly decided by the firms in advance and may not be in proportion to its share in total output or the costs it incurs.

Figure 12.1: Equilibrium under Obligopoly: Cartel



If A and B are two firms which join together to form a cartel, the cartel's marginal cost curve can be shown as a lateral summation of MC_1 (marginal cost of firm A) and MC_2 (marginal cost of firm B), as in Figure 12.1. The cartel is in equilibrium at point E when MC=MR. P is the cartel equilibrium price. Each firm will be in equilibrium when it produces output corresponding to the MC of the cartel equilibrium, i.e., at points E_1 and E_2 respectively. Each firm takes price as given i.e., P. The shaded areas represent the shares of profits contributed to the aggregate cartel profit. The division of this profit between the firms depends upon their relative bargaining strengths.

Caselet

Cartel on the Wings

While the Competition Commission of India is yet to progress on one alleged case of airline cartelisation - code sharing deal - by Kingfisher and Jet Airlines, our national carrier, Air India, barely escaped being prosecuted by the Korean Fair Trade Commission in a recent case of cartelisation in cargo freight. In May, 2010 the KFTC levied a record fine of more than $98 million on 19 airlines in the biggest cartel case that it has handled.

Fuel Surcharge Rates

It was found that the airlines had conspired to raise fuel surcharge rates for air cargo to-and-from Korea between 1999 and 2007 in a concerted manner. The case included summoning 54 airline executives from all over the world for investigation and conducting a joint investigation with foreign competition authorities for the first time. The regulator found that the conspiracies took place on outbound shipments from Korea and inbound shipments to Korea from Hong Kong, Europe and Japan.

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The case showed that the airlines overcharged by $5.71 billion in the local market by imposing or increasing fuel surcharges during the eight-year period.

The uncovering of airline cartels on fuel surcharge actually began in 2006, when European and US authorities investigated few airlines including British Airways. The investigation came at a time when the airlines were facing high fuel costs and competition from low-cost carriers.

The situation deteriorated further in 2007, as more airlines were inspected and charged for various anti-competitive practices. European Commission charged several airlines for fixing freight service prices. British Airways had to pay billions of dollars in fines as the UK and the US competition authorities denounced it for price fixing during the period 2006-07.

Difficult to Detect

Cartelisation is very difficult to detect and investigate for its inherently secretive nature. The task is more difficult in aviation industry because it operates across borders. As a consequence of liberalisation, many large airlines such as British Airways and Lufthansa are now privately owned. These are being increasingly scrutinised as they engage themselves in collusive agreements.

In all the reported cartel cases, there was always one partner who spilled the beans with the hope of getting away with lesser penalty or what is called as leniency. In the case of British Airways, which was prosecuted in 2007, it was Virgin Airlines which cooperated with the authorities.

Even in the Korean case, it was the Korean Airlines which applied for leniency by becoming the prosecuting agency's 'friend'. Such a provision for leniency now exists in all competition laws, including the one in India. In fact, leniency can be sought by more than one perpetrator as the enquiry moves on thus buttressing the prosecution's case.

The Australian Competition & Consumer Commission has to date named 15 airlines in its investigation and has already collected $38 million as fines while some of the cases are yet to be decided.

The damage that airline cargo cartels cause by raising the surcharge rates is huge as evident from the figures published by competition agencies. Consequently, the prices of goods transported also get overburdened from artificial hikes thus affecting consumer welfare adversely.

Source: www.thehindubusinessline.com

12.2.2 Price Leadership

This is an example of imperfect collusion among duopoly firms. It may result through tacit or formal agreement as one firm sets the price and others follow it. Price leadership has two forms.

Price Leadership by a Low Cost Firm

Say, two firms A and B face identical demand curves (i.e., AR) and MR. If firm A has lower MC and AC curves then $MC_1 < MC_2$ and $AC_1 < AC_2$, as shown in Figure 12.2, firm A will maximise its profit by equating MR to MC_1 at point E_1 and selling Q_1 units at price P_1. Firm B will maximise its profits by equating MR to MC_2 at point E_2 and selling Q_2 units at price P_2. But firm B will not be able to charge P_2 price as firm A is charging P_1 which is lower than P_2. The high cost firm will then accept the leadership of the low cost firm and sell Q_2 units at price P_1. The high cost firm shall earn less profit than low cost firm.

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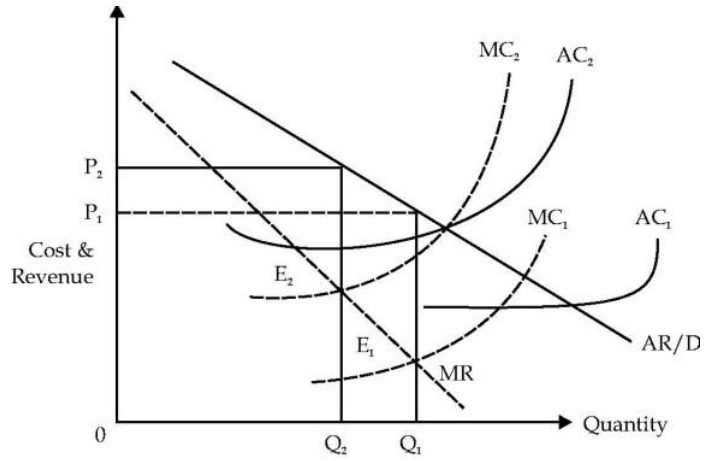
Figure 12.2: Price Leadership by a Low Cost Firm under Oligopoly



Example: Assume that the market demand is

$$P = 105–2.5X = 105–2.5(X_1+X_2)$$

The cost functions of the two firms are

$$C_1 = 5X_1$$

$$C_2 = 15X_2$$

The leader will be the low cost firm A: he will set a price which will maximise his own profit on the assumption that the rival firm will adopt the same price and will produce an equal amount of output. Thus the demand function relevant to the leader's decision is

$$\pi_1 = 105–2.5(2X_1) = 105–5X_1$$

and his profit function is

$$\pi_1 = R_1–C_1 = PX_1 = (105–5X_1)X_1–5X_1$$

or

$$\pi_1 = 100X_1–5X^1{}_2$$

from the first order condition we have

$$\frac{\partial \Pi_1}{\partial X_1} = 100 - 10\,X_1 = 0$$

which yields

$$X_1 = 10$$

Substituting in the price equation, we find

$$P = 105–5X_1 = 55$$

The follower will adopt the same price (55) and will produce an equal level of output ($X_2 = 10$). Note that the profit maximising output of firm B would be $X^*_2 = 9$ units, and he would sell it at $P^* = 60$. This solution is found by maximising from B's profit function

$$\Pi_2 = R_2–C_2 = (105–5X_2)X_2–15X_2$$

Notes

Task Two duopolist manufacture identical radio sets. The total cost of an output x sets per month in ₹ $\left[\frac{1}{25}x^2 + 3x + 100\right]$ for each duopolist. When the price is ₹ p per set, the market demand is x = 75 – 3p per month. What is the total equilibrium output per month.

Notes

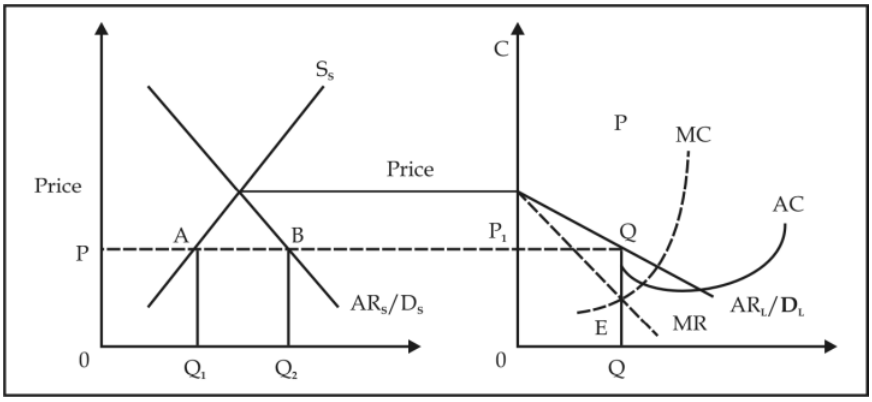
Price Leadership by Dominant Firm

This is more common and happens when a dominant firm shares a larger part of the market along with few small firms. It may become monopolist but compromises with the small rival firms which in turn accept the dominant firm as the price setter and behave as if they are firms under perfect competition i.e., price takers.

It is assumed that the dominant firm knows the aggregate market demand. It finds its own demand curve by setting a price and deducts from the market demand the quantity supplied jointly by the small firms. It also knows the supply curve of the small firms through a knowledge of their individual MC curves. The part of the market demand not supplied by the small firms will be its own share. Given a price, the market share of the dominant firm equals the market demand less the share of small firms. Figure below shows the aggregate market demand curve (AR) and the supply curve of the *small firm* (a) and *dominant firm* (b).

The gap between D and S_S of small firm determines the AR curve (D_L) of the dominant firm. The dominant firm maximises its profit when MR=MC at point E. It sells Q units at price P. The demand curve for small firm becomes the horizontal line PB which is AR as well as MR curve for them. S_S is their MC or supply curve. They supply Q_1 units at price P.

Price Leadership by a Dominant Firm under Oligopoly



12.3 Kinked Demand Curve Model of Oligopoly

There are two versions of the kinked demand curve model. One is called the Sweezy version and the other is called the Hall and Hitch version. Both models were conceived independently in 1939. The essential difference between these two versions is that Sweezy's model is based on the marginalist approach, with the hypothesis that even an oligopolistic firm aims at profit maximisation. In contrast, the Hall and Hitch version rejects the marginalist approach of profit maximisation. It argues that, under oligopoly, firms aim at 'fair' profit and follow the full cost principle in determining the price.

Notes

Sweezy's Model of Kinked Demand Curve

According to Sweezy, the most distinguishing feature of oligopoly is that an individual firm does not know (and cannot determine) the exact nature (functional form) of its actual demand curve because of the uncertainty and indeterminacy of rivals' reactions to its own actions. An oligopolistic firm is therefore guided in its decisions by the 'imagined' demand curve which is based on what it expects to be the most likely (probable) reaction of its rivals.

Under oligopoly, a firm expects that when it raises its price, it is most likely that rival firms will not follow suit by raising their prices. Instead, the rivals will keep their prices constant in order to increase their sales at the expense of the firm that raises the price. Hence, when a firm increases its price, its demand is expected to fall much more than it would if its rivals were not to keep their prices constant. That is, for upward changes in price, a firm's demand is expected to be highly elastic.

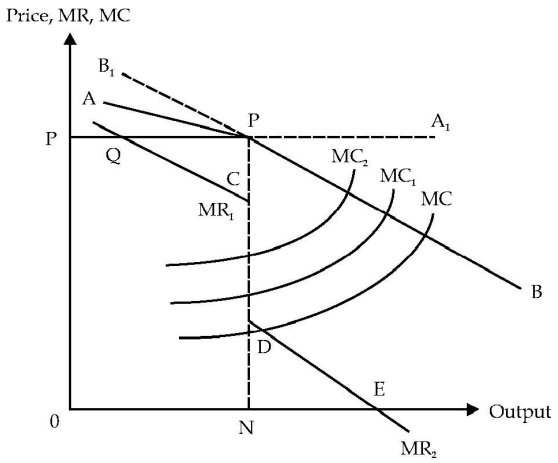
In contrast, when the firm lowers its product price, it is most likely that its rivals will follow suit because if they did not do so they would lose sales to the firm that lowered the price. Hence, when a firm reduces its price, its demand is expected to increase much less than would otherwise have been the case (because its rivals will also reduce their prices). That is, for downward changes in the price, a firm's demand curve is expected to be less elastic than it would have been had the firm's rivals not followed suit by reducing their prices.

Consequently, for an oligopolistic firm, the demand curve is highly elastic and gradually falling for prices above the current or existing price, and for prices below the current price the demand curve is less elastic and steeply falling.

Caution Because of the differences in elasticity (and slope) at prices above and below the current price, the demand curve of the firm has a corner or a kink at the current or existing price.

In Figure 12.3 the firm's demand curve is APB, which has a kink or corner at current price P and output ON. The upward segment AP is relatively more elastic than the downward segment PB. That is, if e_1 shows the elasticity of AP and e_2 shows the elasticity of PB_1 then e_1 is > e_2. The 3 dotted line PB_1 shows the decrease in the firm's demand that would have occurred if the rivals were not expected to keep their prices constant when the firm raised price above P. Dotted line PA_1 shows the rise in demand if rivals were expected not to follow any fall in price below P.

Figure 12.3



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Since the elasticity for a change in price above P is more than, and different from, elasticity for a change in price below P, there are two values of marginal revenue for current price, P. Thus the marginal revenue curve has a discontinuity or gap at price P. For the upper AP portion of the demand curve the marginal revenue (MR_1) curve is QC and for the lower portion PB, the marginal revenue (MR_2) curve is DE.

The marginal revenue curve corresponding to APB is shown by QCDE with discontinuity or gap CD. Note that both e_1 and e_2 have to be greater than 0 for MR_1 and MR_2 to be positive at P.

The magnitude (or length) of this gap is given by $P(1/e_2 - 1/e_1)$. This follows from the fact that $MR = P(1–1/e)$. We find the $MR_1 = P(e_1–_1)/e_2$ and $MR_2 = P(e_2–1)/e_2$.

Hence, $MR_1–MR_2 = P(e_1e_2–e_2–e_1e_2+e_1)/e_1e_2 = P(e_1–e_2)/e_1e_2 = P(1/ e_2–1/e_1)$. Since e_1 is > e_2, the gap $MR_1–MR_2$ is positive.

The marginal cost curve, MC, of the firm passes through the discontinuous gap CD in the marginal revenue curve QCDE. Though the current existing price, P, is not precisely equal to the profit maximising equilibrium price (as there is no unique MR at price P), this price P is consistent with profit maximising, marginalist equilibrium. For output less than ON we find MC is below marginal revenue and for output more than ON we find MC is above marginal revenue. That is, MC cuts the discontinuous MR curve from below.

Since, under oligopoly, demand curve is kinked at the existing price (P) and marginal revenue curve has discontinuity CD at the existing price, any upward or downward shift in the MC curve will not bring about any change in the current or existing price so long as the new MC curve passes through the gap (CD) in the marginal revenue curve (QCDE).

In Figure 12.3 the new higher marginal cost curves MC_1 and MC_2 are passing through the gap CD with the result that the current price P continues to be consistent with profit maximisation even while remaining constant at the existing level.

Thus the most important conclusion of Sweezy's kinked demand curve model of oligopoly is that price remains unchanged and rigid or 'sticky' at the existing level P when, in the short run, the marginal cost increases due to a rise in raw material prices or hike in wages through trade union pressure.

Thus Sweezy's Kinked demand curve model explains the rigidity or stickness of oligopolistic prices in the face of short-term increases or decreases in variable input costs. When costs of raw materials or labour rise, profits will get squeezed and when these costs fall, the benefit of lower input costs will not be passed on to the consumers.

Thus the Sweezy model of Kinked demand curve under oligopoly explains why prices of oligopolistic firms are inflexible and fail to reflect short run changes in variable costs of raw materials and wages.

The principal shortcoming of the Sweezy model is that it does not explain how the existing or current price is determined, and this is a criticism that Sweezy accepts.

Task Analyse Coke-Pepsi non-price competition and its effect on their market.

12.4 Market Structure and Barriers to Entry

Many factors can contribute to the existence of a particular market structure. However, in the long run, conditions of entry may be the most important determinant. Difficulties encountered

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in entering an industry are often referred to as barriers to entry. It has been defined in two alternate way.

1. JS Bain (1956) argues that entry barriers should be defined in terms of any advantage that existing firms hold over potential competitors.
2. GJ Stigler (1968) contends that for any given rate of output, only those costs that must be borne by new entrants but that are not borne by firms already in the industry should be considered in assessing entry barriers.

If a firm has control over all iron ore deposits in a country, new entrants in the steel industry could get ore only by transporting it from another foreign supplier. This will increase cost of producing steel as compared to those of the existing firm and prevent the new firm from successful entry. Both Bain and Stigler criteria for a barrier to entry are satisfied in this example. But if iron ore deposits are equally available to the established firm and new entrants and the existing firm is large enough to take advantage of highly efficient production technologies, then the new entrants require to build large plants which are able to take advantage of economies of scale. Small plants of new entrants will increase costs such that they cannot sell steel at a price competitive with the established firm. Bain would consider this as a barrier to entry because of difficulty in coordinating and raising capital for large scale entry. However, Stigler's definition would not recognise scale economies as an entry barrier because the old and new firms both face same cost conditions. That is, for any given rate of output produced, the cost per unit would be same for the new and existing firm. Stigler's position has appeal but Bain's definition is more useful as it includes all factors that impede entry and provides a better framework for understanding the determination of market structure.

Four important sources of barriers to entry are:

1. ***Product differentiation:*** A firm may have convinced consumers that its product is significantly better than the product of new entrants. The new firm may be forced to sell at lower price and reduce profit though the existing product may not essentially be superior. (e.g., Bayer's Aspirin despite presence of chemically identical brands).
2. ***Control of inputs by existing suppliers:*** Examples are scarcity of natural resources, locational advantages and managerial talent.
3. ***Legal restrictions:*** Examples are patents, licenses, exclusive franchises granted by government.
4. ***Scale economies:*** A new firm entering the industry on a small scale will have higher average cost of production. On the other hand, large scale entry may require gouge, capital organisation, etc. Thus the ability of existing firms to expand gradually as compared to the need for new entrants to start out with considerable production capacity can be a substantial advantage for existing firms (automobile industry).

12.5 Strategic Behaviour

The above discussion gives a passive view of barriers to entry. Business is run by managers and they will react aggressively if they believe that entry could significantly affect profitability of their firms. Some of their strategic behaviour are given below:

1. ***Limit Pricing:*** JS Bain pointed out that when an existing firm — be it a monopolist or oligopolist — is making positive economic profit, it may decide to set the price below the profit maximising level in order to reduce the possibility of entry of new firms into the market.

   The low price level over a long period of time will deter entry of new firms producing at an output rate higher than that of existing firms and thus cannot earn a normal profit. The size requirement makes entry more difficult and thus less likely.

Notes

2. ***Price Retaliation:*** Firms may retaliate by reducing prices when entry actually occurs or if it appears imminent. When the danger has diminished, prices can be increased to appropriate level. If a firm establishes a consistent pattern of reacting to entry by drastically reducing prices, then potential rivals may become convinced that they will face the same response and decide not to compete. Thus, by firmly establishing a reputation for dealing harshly with all new entrants, the firm may create an effective barrier to entry.

3. ***Capacity Expansion:*** The threat of price retaliation may not be credible if existing firms are unable to produce enough output to meet extra demand resulting from lower prices. In a rapidly growing market, a new entrant may be able to survive by serving new customers that the existing firms cannot supply with their present production capacity. A strategic response by established firms to prevent this from occurring would be to invest in additional capacity. Once this investment has been made, it becomes a sunk cost and places existing firms in a position to expand their production at a relatively low cost. The existence of excess capacity provides a strong signal that the established firms can reduce prices as a strategic response to entry in their market.

   Investment in excess capacity reduces the profits earned by an existing firm. Hence, this investment will be undertaken only if management believes that the certain and immediate loss of profit from making the investment is less than the expected future profit/loss resulting from entry.

4. ***Market Saturation:*** The geographic location of the productive capacity can also cause barriers to entry. When costs of transporting a good are high relative to its value, consumers who are not close to a production facility may be required to pay substantially higher prices to have the good delivered to their location. Thus, firms that locate closer to those consumers will have a cost advantage and should be able to attract those customers.

12.6 Application of Oligopoly

An oligopoly market structure is characterized by a small number of large firms that dominate the market, selling either identical or differentiated products, with significant barriers to entry into the industry. This is one of four basic market structures. Oligopoly finds a major share in the modern economic scene. Oligopolistic industries are quite diverse and widespread, covers almost all production areas.

Oligopoly is a market structure characterized by a small number of relatively large firms that dominate an industry. The market can be dominated by as few as two firms or as many as twenty, and still be considered oligopoly. With fewer than two firms, the industry is monopoly. As the number of firms increase (but with no exact number) oligopoly becomes monopolistic competition.

Under oligopoly, firm is relatively large compared to the overall market, it has a substantial degree of market control. It does not have the total control over the supply side as it happens in the case of monopoly. There is an interdependence among firms in an industry, which is a key feature of oligopoly. The actions of one firm depend on and influence the actions of another. The interdependence of firms creates a number of economic issues. One is the tendency for competing oligopolistic firms to turn into cooperating oligopolistic firms.

The cigarette industry was an example of this practice. Over time R.J. Reynolds emerged as the price leader, and the other two major firms never changed prices until Reynolds did. There is not as much evidence of such leadership today, but there was little price competition among cigarette producers until 1993, when strong price competition from discount brands led to a period of price cutting.

Oligopoly structure has both good and bad effects.

Notes

Monopoly Power

Monopoly is relatively uncommon. While there are lots of situations where a few firms are the principal suppliers of a particular good or service, cases where only a single supplier exists are the exception far more often than the rule. But even if a firm is not the only supplier of a particular good or service, it may have a certain amount of monopoly power, in the sense that, unlike a perfectly competitive firm, it will find it profitable to raise its price above marginal cost.

To measure the amount of monopoly power possessed by a firm, economists often use the Lerner index, which equals

$$L = \frac{P - MC}{P}$$

Where P is the firm's price and MC is its marginal cost. This index varies between 0 and I. For a perfectly competitive firm, price equals marginal cost, so L=0. Seller's monopoly power = $\frac{0}{P} = 0$. The higher the L is, the higher the degree of monopoly power is.

Another way to calculate L is to obtain the reciprocal of the price elasticity of demand for the firm's product. This is not the same as the reciprocal of the price elasticity of demand for the industry's product. It is the (negatives) reciprocal of the percentage increase in the quantity demanded by the firm's product if it cuts price by 1 per cent.

$$\therefore \qquad MR = AR\left(1 + \frac{1}{e_P}\right) = P\left(1 + \frac{1}{e_P}\right)$$

If the firm maximises profit

$$MR = MC$$

$$\therefore \qquad MC = P \cdot \left(1 + \frac{1}{e_P}\right)$$

This means that,

$$MC/P = \left(1 + \frac{1}{e_P}\right)$$

And $$-\frac{1}{e_P} = 1 - MC/P = \frac{(P - MC)}{P}$$

What factors influence the price elasticity of demand for a firm's product and hence influence this firm's degree of monopoly power, as measured by the Lerner index?

1. The higher the price elasticity of demand for any individual firm's product, lower is the degree of monopoly power.
2. The larger the number of firms in the industry and the more strongly they compete, the higher the price elasticity of demand is likely to be for any individual firm's product (and the lower the degree of monopoly power).

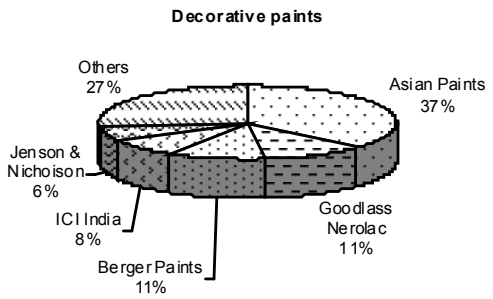
Notes

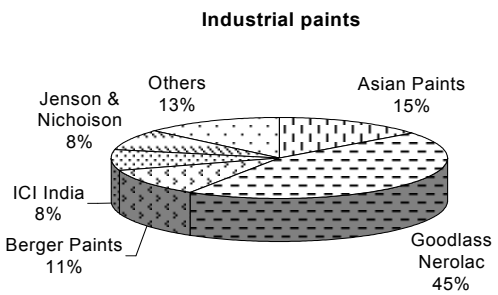
Case Study

Paint Industry — From Pure Competition to Oligopoly

Even as the paints industry is poised for further large-scale consolidation, the last three years have already resulted in some reshuffling of companies. In the struggle for the survival of the fittest, while some of the weaklings have faded away, the stronger ones have gained more strength. The curious result — which, incidentally, is taking place in other industries too — is that from the days when the industry operated under pure competition, competition is slowly turning mesoeconomic (oligopolistic). In other words, it is just a handful of companies which literally control the entire paints industry now.

As these companies extend their mesoeconomic power, they may impose unequal conditions of competition in the market. In contrast with the traditional view of a firm, big companies would be multiproduct, multisectoral, multiregional and multinational. What implications can this change in the market structure have on the functioning of companies? What will be the impact on profitability?





The emerging mesoeconomic industry structures, apart from indicating the relatively small number of players, may cover even the differentiated product manufacturers such as the paints. The existence of mesoeconomic structures could be seen from the concentration ratios (market shares) of the dominant companies.

The top five companies — Asian Paints, Goodlass Nerolac, Berger Paints, ICI India and Jenson and Nicholson — together control around 73 per cent of the total market for decoratives.

The industry is even more concentrated in industrial paints, where the same top five companies control around 87 per cent of the total market. These five would form the mesoeconomic barrier which would be tough even for any new strong entrant to penetrate.

Contd...

Notes

But how did the paints industry acquire such a mesoeconomic structure? The existence of economies of scale usually leads to its establishment. Where economies of scale exist, profitable expansion to larger plant sizes will necessarily come at the expense of rival companies. Realisation of economies of scale by some companies means the number of rival firms are simultaneously reduced through failure or merger. However, no such economies of scale exist in the paints industry. Paint manufacture essentially being a batch process, economies of scale do not automatically flow from larger plant sizes. On the other hand, there are other factors which contributed to the emergence of the industry structure. The basic infrastructure in terms of distribution network, the consumer hold through strong brand awareness, power of innovation and the introduction of a large variety of products are some of the aspects responsible for the creation of strong entry barriers and, consequently, dominant firms.

Regardless of how such structures have started emerging, one important phenomenon which may develop in the future is the mutual interdependence of companies. What it means in reality is that no company in the mesoeconomic industry may dare to alter its price policies without attempting to calculate the most likely reaction of its rivals. It is like playing a chess or a poker game. There is no way to know beforehand the best way to play your cards in a poker or a chess game because it depends on the way the other players play theirs. Players should pattern their actions according to the expected reactions of their rivals.

What emerges out of the difficulty in assessing rival reaction is the rigidity in prices. Prices are expected to change less frequently in mesoeconomic structures than under pure or monopolistic competition. On the other extreme, a price change by one producer may spark off a price war as other producers come out with more drastic price changes. As an intermediate position, producers may collide with each other to bring about organised price changes. However, non-collusive mesoeconomies may seek to lead a quiet life and may adopt a live-and-let live policy.

At the same time, collusive behaviour, though difficult, cannot be ruled out. To reduce the uncertainties of price wars, producers may collide with each other and charge the maximum profit making price. For society, it would be more like a monopolist kind of market under the garb of competition. Yet another way to deal with uncertainties with respect to rival reactions would be collusion. Adopting a "follow the leader" policy may result in tacit collusion. This has often been witnessed in the paints industry — when one company comes out with a price change, it is followed by the other players. What all this indicates is that mesoeconomic companies shun price competition.

But often such collusive behaviour is accompanied by non-price competition. This phenomenon has also been witnessed in the paints industry. The emphasis on non-price competition has its roots in two facts. One, price cuts can be quickly and easily met by a firm's rivals who may promptly react to cancel out any potential gains in sales through matching price cuts. There is also the risk of price war. On the other hand, non-price competition is harmless and can be safely carried out without any side effects through product innovation, improvement in productive techniques and advertising gimmicks which may be difficult to replicate.

This is exactly what the paints industry has been following for the last three years with the introduction of consumer-interactive marketing methods for advertising paints – 'Insta Colour' by Jenson & Nicholson, "Colour Solutions" by ICI India, "Colour Bank' by Berger Paints and "Colour World' by Asian Paints. ICI India's generous offer to paint the Ananthpur Sahib could also be fitted into the category of non-price competition. And, second, mesoeconomic firms generally have the financial strength to support such advertising.

Contd...

Notes

But are such mesoeconomic structures economically efficient? Traditional view holds that being characterised by barriers to entry, mesoeconomic entitles can be expected to result in a restriction of output short of the point of lowest unit costs and a corresponding market price which yields substantial, if not maximum, economic profits. But Kenneth Galbraith, in his book American *Capitalism*, challenged this view by arguing that mesoeconomic firms, because of their inherent strengths, are necessary to ensure rapid technological growth. They have the necessary financial muscle to undertake innovations and research.

Empirical research on this aspect has been ambiguous. Though consensus opinion has it that big mesoeconomic industries are not big contributors to technological progress, there are quite a few exceptions. The paints industry has been one.

The industry, recognising the need to differentiate itself from others, has been frequently introducing technologically innovative products. The introduction of interactive paints solutions, anti-bacterial exterior paints and washable plastic emulsion paints are just some of the innovations. It is of interest that some leading researchers in this field have tentatively concluded that technological progress in an industry may be determined more by the industry's scientific character and "technological opportunities" rather than by its market structures.

Question

Identifying the factors contributing to the paint industry for becoming oligopoly.

12.7 Summary

- Oligopoly is a situation in which only a few firms (sellers) are competing in the market for a particular commodity.
- Under oligopoly, each firm controls an important proportion of the total supply. The demand curve of an individual firm under oligopoly is not known and is indeterminate.
- Oligopolistic firm may form cartel or enter into collusion. There may be barrier to new entrants.
- Theories of oligopoly are divided into three broad groups, namely, models of non-collusive oligopoly, models of collusive oligopoly, and managerial theories.
- The collusive oligopoly models have cartel, and price leadership.
- There are four important sources of barriers to entry, such as product differentiation, control of inputs by existing suppliers, legal restrictions and scale economies.

12.8 Keywords

Cartel: A formal collusive organisation of the oligopoly firms in an industry.

Monopoly: A market situation with a single supplier of a particular good or service.

Oligopoly: A situation in which few firms are competing in the market for a particular commodity.

12.9 Self Assessment

1. Fill in the blanks:
   (a) Sweezy's model is based on the ..... list approach.
   (b) An oligopolistic firm is guided in its decisions by the ..... demand curve.

Notes

(c) Under oligopoly, a firm expects that when it raises its price, it is most likely that rival firms will also ..... the price.

(d) For an oligopolistic firm, the demand curve is highly ..... and gradually falling for prices above the current or existing price.

(e) Sweezy's kinked demand curve model explains the rigidity or stickiness in oligopolistic prices in the face of short-term increases or decreases in ..... input costs.

(f) The Hall and Hitch model of the Kinked demand curve is based on an empirical survey of a sample of 38 well managed firms in ..... .

2. State true or false for the following statements:

(a) Locational advantages and managerial talents have nothing to do with entry barriers.

(b) Price leadership can be seen as collusive oligopoly.

(c) Under oligopoly, new entry is easy.

(d) The demand curve of an oligopolist is indeterminate.

(e) Under Hall and Hitch version the demand curve has a kink at the price which is above full cost price.

(f) Oligopoly firm may form cartel.

(g) Price leadership is, where firms jointly fix a price and output through agreement.

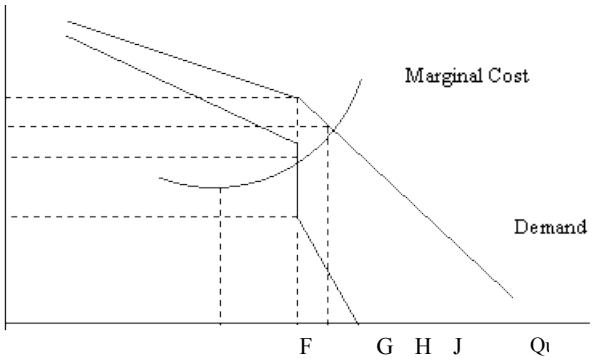
12.10 Review Questions

1. In what form does rivalry occur in an oligopoly? Why does competition among rivals occur most often in oliogopolies?

2. Why is there so much advertising in oligopoly? How does such advertising help consumers and promote efficiency? Why might it be expensive at times?

3. 'Oligopoly is the most prevalent form of market structure in the manufacturing sector'. Describe this statement with the help of an example.

4. Go through the figure below and answer the questions that follow:



(a) Which point determines the equilibrium output in the figure above?

(b) Which point determines the equilibrium price in the figure above?

Notes

5. There is an oligopoly consisting of 4 firms. Assume that the marginal cost of production is Rs10 per unit of the good. Demand at price X is given as:

P	Q
60	0
50	100
40	200
30	300
20	400
10	500
0	600

What are the price and output levels in an oligopoly Nash Equilibrium?

6. Assume that firms in the short-run are earning above normal profits. Explain what will happen to these profits in the long-run for the following markets:

   (a) Pure Monopoly

   (b) Oligopoly

   (c) Monopolistic Competition

   (d) Perfect Competition

7. The following list is a number of well-known companies and their products. Which of the four types of markets (perfect competition, monopoly, monopolistic competition and oligopoly) best characterize the markets in which they compete? Explain why.

   (a) Mcdonald's-hamburgers.

   (b) exxon-gasoline.

   (c) IBB-personal computers

   (d) Heinz

8. Comment on the following statements with logical reasoning and appropriate diagrams.

   (a) In oligopoly, there is no one single determinate solution, but a number of determinate solutions depending upon different assumptions.

   (b) The success of price leadership of a firm depends upon the correctness of his estimates about the reactions of his followers.

   (c) The kinked demand curve theory explains why a price once determined would remain sticky but does not determine that price level.

9. Why might oligopolists be more likely to match a price cut than a price increase by a competitor?

10. What is price leadership? Explain price leadership with the help of real world examples.

11. As a manager, what might be the different types of barriers to entry an oligopoly? How will you react and what will be your different ways of strategic behaviour for entry?

12. 'Globalisation and high level of competition have resulted in oligopolies emerging in many market sectors'. Discuss with examples.

Notes

Answers: Self Assessment

1.	(a)	Marginal	(b)	Imagined	(c)	raise	(d)	elastic
	(e)	Variable	(f)	England				
2.	(a)	False	(b)	True	(c)	False	(d)	True
	(e)	False	(f)	True	(g)	False		

12.11 Further Readings

Books

Bibek Debroy, *Managerial Economics,* Global Business Press, Delhi.

Dr. Atmanand, *Managerial Economics,* Excel Books, New Delhi.

R.S. Bhardwaj, *Mathematics for Economics and Business,* Excel Books, New Delhi.

Shapiro, Bensen, *The Psychology of Pricing,* Harvard Business Review.

Online links

http://tutor2u.net/economics/content/topics/monopoly/oligopoly_notes.htm

http://www.referenceforbusiness.com/encyclopedia/Oli-Per/Oligopoly.html

http://www.amosweb.com/cgi-bin/awb_nav.pl?s=wpd&c=dsp&k=oligopoly

Unit 13: Basic National Income Concepts

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Objectives

After studying this unit, you will be able to:

- Explain the concept of national income
- Discuss important identities related to national income

Introduction

Macroeconomics is concerned with the determination of the economy's total output, the price level, the level of employment, interest rates and other variables. A necessary step in understanding how these variables are determined is "national income accounting". The national income accounts give us regular estimates of GNP — the basic measure of the economy's performance in producing goods and services. National income is the most comprehensive measure of the level of the aggregate economic activity in an economy. It is the total income of a nation as against the income of an individual but the term national income is not as simple and self-explanatory as the concept of individual income maybe.

Notes

13.1 Concept of National Income

We may define national income as the aggregate of money value of the annual flow of final goods and services in the national economy during a given period.

The well-known writer, Paul Studenski, writes: "National income is both a flow of goods and services and a flow of money incomes. It is therefore called national product as often as national income". The flow of national income begins when production units combine capital and labour and turn out goods and services. We call this Gross National Product (GNP), it is the value of all final goods and services produced by domestically owned factors of production within a given period. It includes the value of goods produced such as houses and food grains and the value of services such as broker's services and economist's lectures. The output of each of these is valued at its market price and the values are added together to give GNP. At the same time, the production units which produce goods and services distribute money incomes to all who help in production in the form of wages, rent, interest and profit — we call this as Gross National Income.

GNI is the sum of the money incomes derived from activities involving current production in an economy in a given time period.

It may be noted from above that

1. ***National income is an aggregative value concept:*** It makes use of the value determined by the money as the common denominator.
2. ***National income is a flow concept:*** It represents a given amount of aggregate production per unit of time, conventionally represented by one year and relates to a particular year.
3. National income represents the aggregate value of final products rather than the total value of all kinds of products produced in the economy.

   We would not want to include the full price of an automobile producer to put on the car. The components of the car that are sold to the manufacturers are "intermediate goods" and their value is not included in GNP.

In practice, double counting is avoided by working with the "value-added".

Caution At each stage of manufacture of goods only the "value added" to the good at that stage of manufacture is counted as part of GNP.

It should be noted that the sum of the value added at each stage of processing will be equal to the final value of the bread sold. The flour that is directly purchased by households for baking in the home is counted as the contribution towards GNP since it represents a final sale. It indicates that national income is an unduplicated total that does not involve any double counting. Obviously there are three different stages or phases in the flow of output and income in the national economy.

1. There is production of goods and services by all production units by the use of labour, capital and enterprise,
2. There is distribution of incomes to all the factors who are suppliers of labour, capital, etc. this distribution takes the form of wages, interest, rent and profit,
3. There is spending of incomes on the goods and services produced by the economy; this expenditure is classified into consumption goods (c) and expenditure on investment goods (I).

Notes

So, we have three kinds of national income estimates:

1. National income as net aggregate output
2. National income as sum of distributive shares
3. National income as aggregate value of final products

13.1.1 Gross and Net Concept

Gross emphasises that no allowance for capital consumption has been made or that depreciation has yet to be deducted.

Net indicates that provision for capital consumption has already been made or that depreciation has already been deducted.

Thus the difference between the gross aggregate and the net aggregate is depreciation.

i.e.,

GNP at market price/factor cost = NNP at market price/factor + Depreciation cost.

13.1.2 National and Domestic Concepts

The term national denotes that the aggregate under consideration represents the total income which accrues to the normal residents of a country due to their participation in world production during the current year. Thus, the term 'national' is used to emphasise that the aggregate under consideration covers all types of factor incomes accruing to normal residents of a country irrespective of whether the factors of production supplied by them are located at home or abroad.

As against this, it is also possible to measure the value of the total output or income originating within the specified geographical boundary of a country known as "domestic territory". The resulting measure is called "domestic product".

In other words, the distinction between "national" and "domestic" aggregates lies in the frame of reference — the former takes the normal residents of a country, the latter takes a given "geographical area". Here, national produce differs from domestic product by the amount of net factor income from abroad.

GNP at market price/factor cost = GDP at market price/factor cost + Net factor income from abroad

NNP at market price/factor cost = NDP at market price/factor cost + Net factor income from abroad

Net factor income from abroad = Factor income received from abroad — Factor income paid abroad.

13.1.3 Market Prices and Factor Costs

The valuation of the national product at market prices indicates the total amount actually paid by the final buyers while the valuation of national product at factor cost is a measure of the total amount earned by the factors of production for their contribution to the final output.

GNP at market price = GNP at factor cost + Indirect taxes – Subsidies.

NNP at market price = NNP at factor cost + Indirect taxes – Subsidies.

Notes

And vice versa.

	Category A	Category B
Type 1	GNP at market price NNP at market price	GOP at market price NDP at market price
Type 2	GNP at factor cost NNP at factor cost	GDP at factor cost HDP at factor cost

1. Difference between the aggregates in category A and aggregates in category B is net factor income from abroad.
2. Difference between the aggregates of type 1 and aggregates of type 2 is indirect taxes less subsidies.
3. The difference between the two aggregates of each type in each category is depreciation.

13.1.4 Gross National Product and Gross Domestic Product

For some purposes we need to find the total income generated from production within the territorial boundaries of an economy, irrespective of whether it belongs to the inhabitants of that nation or not. Such an income is known as Gross Domestic Product (GDP) and found as:

GDP = GNP – Net factor income from abroad

Net factor income from abroad = Factor income received from abroad – Factor income paid abroad.

Example: If in 1986 the GNP is ₹ 8,00,000 million, the income (including tax on such incomes) received and paid ₹ 60,000 million, and ₹ 70,000 million respectively, then, the GDP in 1986 would be:

(₹ 8,00,000 – 70,000 + 60,000) million = ₹ 7,90,000 million

GNP as a Sum of Expenditures on Final Products

Expenditure on final products in an economy can be classified into the following categories:

1. ***Personal consumption expenditure (c):*** The sum of expenditure on both the durable and non-durable goods as well as services for consumption purposes,
2. ***Gross Private Investment (I_g)*** is the total expenditure incurred for the replacement of capital goods and for additional investment,
3. ***Government expenditure (G)*** is the sum of expenditure on consumption and capital goods by the government, and
4. ***Net Exports (Exports - Imports) (X - M)*** constitute the difference between the expenditure or rest of the world on output of the national economy and the expenditure of the national economy on output of the rest of the world.

GNP is the aggregate of the above mentioned four categories of consumption expenditure. That is,

$$GNP = C + I_g + G + (X - M)$$

Notes

GNP as the Total of Factor Incomes

As mentioned above, national product gives a measure of a nation's productive activity, irrespective of the fact whether this activity takes place at home or abroad. When national income is calculated after excluding indirect taxes like excise duty, sales tax, etc. and including subsidies we get GNP at factor cost as this is the amount received by all the factors of production (indirect taxes being the amount claimed by the government and subsidies becoming a part of factor income).

GNP at factor cost = GNP at market prices – Indirect taxes + Subsidies

13.1.5 Net National Product

The NNP is an alternative and closely related measure of the national income. It differs from GNP in only one respect. GNP is the sum of final products. It includes consumption goods plus gross investment plus government expenditures on goods and services plus net exports. Here gross investment (GI) is the increase in investment plus fixed assets like buildings and equipment and thus exceeds net investment (NI) by depreciation.

GNP = NNP + Depreciation

NNP includes net private investment while GNP includes gross private domestic investment.

We know that during the process of production, assets get consumed or depreciated. So, during a year the net contribution to output is the production of goods and services minus the depreciation during the year. This is known as NNP at market prices because it is the net money value of final goods and services produced at current prices during the year after depreciation.

Gross National Product	585.00
Less:	
Capital consumption allowances	51.6
Equals:	
Net National Product	533.4
Less:	
Indirect business taxes	56.6
Other adjustments	-1.6
Equals:	
National Income	478.4

Equation

NNP = GNP – Depreciation

$= C + I_g + G + (X - M)$ – Depreciation

$= C + G + (X - M) + (I_g$ – Depreciation), where I_g = Government investment

$= C + G + (X - M) + I_n$, where I_n = Net investment, C = Consumption expenditure, G = Government Expenditure, X = Export, M = Import

$= C + G + I_n + (X - M)$

Where I_n represents net investment which equals gross investment minus depreciation (I_g - Depreciation).

Notes

NNP at Factor Cost (or National Income)

Goods and services are produced with the help of factors of production. National income or NNP at factor cost is the sum of all the income payments received by these factors of production.

NI = GNP – Depreciation – Indirect taxes + Subsidies

Since factors receive subsidies, they are added while indirect taxes are subtracted as these do not form part of the factor income.

NNP at factor cost = NNP at market prices – Indirect taxes + Subsidies

Did u know? **What does Genuine Progress Indicator — GPI Mean?**

A metric used to measure the economic growth of a country. It is often considered as a replacement to the more well known gross domestic product (GDP) economic indicator. The GPI indicator takes everything the GDP uses into account, but also adds other figures that represent the cost of the negative effects related to economic activity (such as the cost of crime, cost of ozone depletion and cost of resource depletion, among others). The GPI nets the positive and negative results of economic growth to examine whether or not it has benefited people overall.

13.1.6 Personal Income

National income is the total income accruing to the factors of production for their contribution to current production. It does not represent the total income that individuals actually receive.

Two types of factors account for the difference between national income and personal income. On the one hand a part of the total income which accrues to the factors of production is not actually paid out to the individuals who own the factors of production. The obvious instances are corporate taxes and undistributed or retained profits. On the other hand, the total income that individuals actually receive generally includes some part that comes to be regarded as payment for the factor services rendered in the current year, for example, gifts, pensions, relief payments and other welfare payments. Such payments are known as "transfer payments" because they do not represent the payments made for any direct contribution to current production.

Thus, personal income is calculated by subtracting from national income those types of incomes which are earned but not received and adding those types which are received but not currently earned. So

Personal Income = NNP at factor cost – Undistributed profits – Corporate taxes + Transfer payments

13.1.7 Disposable Income

Disposable income is the total income that actually remains with individuals to dispose off as they wish. It differs from personal income by the amount of direct taxes paid by individuals.

Disposable Income = Personal Income – Personal taxes

$$DI = PI - T$$

So, $$PI = DI + T$$

Usually, people divide their disposable income between consumption spending and personal saving.

Notes

We, therefore, have the following identities

$$PI = DI + T$$

$$DI = C + S$$

It follows

$$PI = C + S + T$$

Notes The concept of value added is a useful device to find out the exact amount that is added at each stage of production to the value of the final product. Value added can be defined as the difference between the value of output produced by that firm and the total expenditure incurred by it on the materials and intermediate products purchased from other business firms. Thus, value added is obtained by deducting the value of material inputs or intermediate products from the corresponding value of output.

Value added = Total sales + Closing stock of finished and semi-finished goods – Total expenditure on raw materials and intermediate products – Opening stock of finished and semi-finished goods

Caselet

Smoking Costs over 6.5% of National Income to Nations

Love for nicotine is weighing heavily on developing nations with top ten smoker countries losing more than $30 billion annually which is more than 6.5 per cent of their gross national income (GNI).

The top ten smokers countries, identified by Forbes magazine include Kenya, Turkey, Namibia, Yemen, Guinea, Bosnia and Herzegovina, Serbia and Montenegro, Mongolia, Nauru and Sao Tome and Principe.

Thanks to celebrity activism and widespread media attention, the magazine notes, HIV, malaria and starvation are well-known diseases of the third world. But there's another resource-draining plague afflicting these countries - smoking.

While the smoking population is half what it was a generation ago in the US and other industrialised nations, with only one in five using tobacco, it's different in Africa and East Asia, where time stands still when it comes to cigarettes, it says.

Smoking rates of 40 per cent or more of the population are common in these regions and medical services are limited.

In Turkey, for example, 44 per cent of its 71.5 million population smokes, draining USD 22.4 billion annually which accounts for 5.8 per cent of its GNI of 384.3 billion dollars.

Around 45 per cent of Yemen's population smokes costing $1 billion to its economy annually and accounts for 6.2 per cent of GNI.

Societal costs in those countries, Forbes says, can't be calculated the same way they would be in the US, where most studies measure how much smokers burden taxpayers with extra medicare and medicaid payments.

For poor countries, there is no medicare-like programme to fund. Nor is there enough data about the economic impact of other diseases to make real comparisons.

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Notes

Tom Glynn, Director of International Care Control for the American Cancer Society has been quoted as saying. "In Africa, these health care systems don't exist, at least not in the form we're used to," Only Kenya, he says of Africa's low income nations, has a medical care system that reasonably resembles that of the western world.

Most studies conclude a cigarette costs 10 minutes of life, so a pack-a-day smoker (20 cigarettes a day) loses 13.9 per cent of a year to the habit over the long haul, the magazine notes.

Source: www.articles.economictimes.indiatimes.com

13.2 Some Important Identities

We denote the value of output by 'Y' under the assumption that the simple economy does not consist of either a government or foreign trade. Consumption is denoted by 'C' and investment spending by 'I'. The key identity is between output produced and output sold.

Output sold can be written in terms of consumption and investment spending, so identity of output produced and output sold is

$$Y \equiv C + I \tag{1}$$

Output produced is identically equal to output sold.

Now, a part of the whole, Y, will be spent on consumption and a part will be saved. So

$$Y \equiv S + C \tag{2}$$

This tells us that the whole of income is allocated either to consumption or to saving.

Identity (1) and (2) can be combined to read

$$C + I \equiv Y \equiv C + S \tag{3}$$

The left hand side of identity (3) shows the components of demand and the right hand side shows the allocation of income. The identity emphasises that output produced is equal to output sold. The value of output produced is equal to income received and income received, in turn, is spent on goods or saved.

Identity (3) can be rewritten as the relation between saving (S) and investment (I). Subtracting consumption (C) from each part of identity (3), we have

$$I \equiv Y - C \equiv S \tag{4}$$

Identity (4) is very important. It shows us that in this simple economy, saving is identically equal to income less consumption and investment is identically equal to saving.

The identity is really only a reflection of our definitions - output less consumption is investment, output is income and income less consumption is saving.

Reintroducing the Government and Foreign Trade

We now reintroduce government sector and the external sector, G. All taxes denote the purchase of goods and services by government by I. Transfer to the private sector (including interest) are denoted by TR. Net exports (X - M) are denoted by X.

We return to the easier identity between output produced and sold, taking into account additional components of demand G and X. So

$$Y \equiv C + I + G + X \tag{5}$$

Notes

Now we have to recognise that part of income is spent on taxes and that the private sector receives net transfers (TR) in addition to national income.

Disposable income (YD) is thus equal to income plus transfers less taxes

$$YD \equiv Y + TR - T \quad (6)$$

Disposable income is allocated to consumption and saving

$$YD \equiv C + S \quad (7)$$

Combining identity (6) and (7) allows us to write consumption as the difference between income plus transfers minus taxes and saving.

$$C + S\ YD \equiv Y + TR - T \quad (8)$$

Or $$C \equiv YD - S \equiv Y + TR - T - S \quad (8a)$$

Identity (8) states that consumption is disposable income less saving or that consumption is equal to income plus transfers less taxes and saving. Now we use the right hand side equation (8a) to substitute for C in identity (5).

$$Y \equiv Y + TR - T - S + I + G + X$$

Or $$Y - Y + S - I \equiv (G + TR - T) + X$$

Or $$S - I \equiv (G + TR - T) + X \quad (9)$$

The term (G + TR - T) in equation (9) is the government budget deficit. (G + TR) equals government purchases of goods and services (G) and government transfer payments (TR) which is total government spending. T is the amount of taxes received by the government, the difference (G + TR – T) is the excess of government. Spending over its receipts or its budget deficit. The second term on the right hand side is the excess of exports over imports or the net export of goods and services.

Thus, identity (9) states that the excess of saving over investment (S – I) of the business sector is equal to the government budget deficit plus the trade surplus.

Task From the following data, find (a) National Income, (b) NNP, (c) GNP, (d) personal disposable income, (e) personal income, (f) personal saving.

	Rupees (crores)
Capital consumption allowance	356.4
Wages and compensation of employees	1866.3
Interest paid by business	264.9
Indirect business of persons	34.1
Corporate profits	164.8
Income of self employed	120.3
Corporate dividends	66.4
P.F. contributions	253.0
Personal taxes	402.1
Interest paid by consumers	64.4
Interest paid by government	105.1
Government and business transfer	374.5
Personal consumption expenditure	1991.9

Notes

Case Study

Marking a Significant Shift

On May 31, 2010, when the government announced GDP numbers for 2009-10, for the first time, factories contributed more to the national income than the country's farmers, marking a significant shift in the structure of the India economy.

That does not, however, diminish the importance of the farm, fisheries and the forest sector because of the disproportionately high percentage of people still engaged in these activities. Neither does it take away the fact that the share of manufacturing is still below desired levels.

As per the advance estimates of GDP growth in 2009-10 released by the Central Statistical Organisation in February, the manufacturing sector was expected to contribute Rs 7,07,512 crore to the economy, overtaking the ₹ 6,49,370 crore from agriculture, forestry, and fishing.

That would make manufacturing the second biggest contributor to the GDP among the major sub-sector, but its relative share is well below that of many of India's peers. For instance, in China, value add by industry has a near 48% share in the national income.

However, a recent CII-BCG report says that India, the 13th largest manufacturing economy in the world, could emerge as the fourth largest manufacturer if the sector grows by 11% in the next 15 years. "The share of manufacturing in the GDP has stuck at about 18%. It should grow up to 30% in the next five to 10 years. Only then can the economy sustain a growth of 9% to 10%," says Saumitra Chaudhuri, member, Planning Commission.

Experts are, however, unanimous in that the industrial sector needs to generate lot more employment. "Its (manufacturing) share in GDP is going to be higher by about 15% to that of agriculture, but dependency is too low compared to agriculture," says P K Joshi, Director, National Academy of Agricultural Research Management, arguing for a greater employment generation in manufacturing.

The real structural change in the Indian economy would occur only when lesser people are employed in agriculture, says Suresh Tendulkar, former chairman of the Prime Minister's Economic Advisory Council. In fact, India's structural transition has been different from many other economies, with intermediate manufacturing stage not growing as desired.

"The Indian economy has jumped from an agrarian to a service centric economy. The services sector has been unable to absorb the vast unskilled population," says Sunil Sinha, senior economist and head of research at rating agency Crisil.

Question

Is it a real shift in the structure of the Indian economy or is it a temporary event? Give your views.

Source: www.articles.economictimes.indiatimes.com

13.3 Summary

- National income is the aggregate of money value of the annual flow of final goods and services in the national economy during a given period.
- GNP is the value of all final goods and services produced by domestically owned factors of production within a given period. The production units, which produce goods and

services, distribute money incomes to all who help in production in the form of wages, rent, interest and profit, is known as Gross National Income.

- National produce differs from domestic product by the amount of net factor income from abroad.
- The valuation of the national product at market prices indicates the total amount actually paid by the final buyers while the valuation of national product at factor cost is a measure of the total amount earned by the factors of production.
- Personal income is calculated by subtracting from national income those types of incomes which are earned but not received and adding those types which are received but not currently earned.

13.4 Keywords

Disposable income: The amount of income left to an individual after taxes have been paid, available for spending and saving.

Gross domestic product: The money value of all final goods and a service produced by normal residents as well as non-residents in the domestic territory of a country but does not include net factor income earned from abroad.

Gross national product: Total market value of all finished goods & services produced in a year by a country's residents

National income: National income is a measure of the total value of the goods and services (output) produced by an economy over a period of time (normally a year).

Nominal GDP: It is calculated by using the current prices to place value on the economy's production of goods and services.

Personal income: Income received by persons from all sources. It includes income received from participation in production as well as from government and business transfer payments

Real GDP: It is calculated by evaluating current production using prices that are fixed at past levels, it shows the economy's overall production which changes over time.

13.5 Self Assessment

1. Choose the appropriate answer:
   (a) The growth of an economy is indicated by an:
      (i) Increase in general prices
      (ii) Increase in national income
      (iii) Increase in savings
      (iv) Increase in investment
   (b) The difference between NNP and NDP is:
      (i) Depreciation
      (ii) Current transfers from rest of the world
      (iii) Indirect tax
      (iv) Net factor income from abroad

Notes

(c) National income as commonly understood by every one refers to:

(i) GNP

(ii) NNP

(iii) GDP

(iv) NDP

2. State true or false for the following statements:

(a) NNP = C+G+X+M.

(b) Disposable income includes personal taxes.

(c) Value added = Total sales + total expenditure on raw materials and intermediate products - closing stock of finished and semi-finished gods.

(d) GDP = GNP+ Net factor income from abroad.

(e) NNPMP = NNPFC+ Indirect taxes- Subsidies.

3. Fill in the blanks:

(a) The NNP is an ..... measure of the national income.

(b) Government expenditure is the sum of expenditure on consumption and .....by the government.

(c) NNP at factor cost is the sum of all the income payments received by ..... .

(d) Gross concept does not include..... .

(e) ..... is the total income that actually remains with individuals to dispose off as they wish.

(f) Disposable income is allocated to ..... and ..... .

(g) Disposable income equals to income plus transfers less ..... .

13.6 Review Questions

1. Suppose that in the country of Nemania, the real gross national product in 1987 was £1483 billion (1972 equals 100). In 1988, real gross national product is £1510 billion (1972 equals 100). By how much the real gross national product would have grown in Nemania?

2. Why is there so much attention given to the national income figures of a country? Newspapers report the figures, government officials talk about GDP growth, and even secondary school textbooks mention them.

3. China has overtaken the UK to be the world's fourth largest economy. What this means is that the GDP of China is larger than UK. But do the Chinese people have a higher standard of living than the British or the French? Why/ why not?

4. Refer to the data (in billion dollars) below and answer the questions that follow:

Consumption of Fixed capital	25.00
Government purchases	315.00
U.S. imports	260.00
Personal payments	45.00
Transfer payments	247.00

Notes

U.S. exports	249.00
Personal consumption expenditures	475.00
Net foreign factor income earned	5.00
Gross private domestic investment	300.00
Indirect business taxes	245.00
Undistributed corporate profits	60.00
Social security contributions	240.00
Corporate income taxes	65.00

(a) What is the Personal income?

(b) What are the gross and net domestic products?

(c) Calculate the disposable income.

5. In the national income and product accounts (NIPAs), growth in real imports of services has been slowing since 2000, and 2003 showed no growth. Yet, we know that outsourcing has been growing dramatically. Does this imply that the NIPAs are failing to capture the effects of outsourcing?

6. Given the following data about the economy:

	₹
Consumption	7000
Investment	5000
Proprietor's income	2500
Corporate income taxes	2150
Govt expenditure	3000
Profits	2500
Wages	7000
Net exports	2750
Rents	250
Depreciation	250
Indirect business taxes	1000
Undistributed corporate profits	600
Net foreign factor income	30
Interest	1500
Social security contribution	0
Transfer payments	0
Personal taxes	1650

(a) Calculate GDP and GNP.

(b) Calculate NDP, NNP, NI and domestic income.

7. Suppose capital stock of an economy is worth ₹ 200 million and it depreciates at the rate of 10 per cent per annum. Indirect taxes amount to ₹ 30 million, subsidies amount to ₹ 15 million. Its GNP at market prices is ₹ 1200 million. Calculate the national income. (NNP at factor cost is termed national income).

Notes

8. What is the impact (if any) on the national income of India in each of the following cases?
   (a) Shyam receives ₹ 5000 as a gift from his father who is also a resident of India.
   (b) Aggregate inventories in Indian companies go down by ₹ 20,000.
   (c) A receives 100 dollars as dividend from a company based in the USA.
   (d) A sells shares and reaps capital gains worth ₹ 1,000.

   Give reasons for your answers.
9. Calculate national income from the following figures (in ₹ crores):

Consumption	200
Depreciation	20
Retained earning	12
Gross investment	30
Import	40
Provident fund contributions	25
Exports	50
Indirect business taxes	15
Government purchases	60
Personal income taxes	40

   (a) If there were 10 crores people in this country.
   (b) If all prices were to double overnight, what would happen to the value of real and nominal GDP per capita?
10. Discuss the National Income identities with reference to India.

Answers: Self Assessment

1. (a) ii (b) iv (c) iii
2. (a) True (b) False (c) False (d) False
   (e) True
3. (a) alternative (b) capital goods (c) Factors of production
   (d) depreciation (e) disposable income
   (f) consumption, savings (g) taxes.

13.7 Further Readings

Books

Bibek Debroy, *Managerial Economics,* Global Business Press, Delhi.
Dr. Atmanand, *Managerial Economics,* Excel Books, Delhi.
H.L. Ahuja, *Macroeconomics Theory and Policy,* S. Chand Publication.
Shapiro, Bensen, *The Psychology of Pricing,* Harvard Business Review.

Notes

Online links

http://www.tradechakra.com/indian-economy/national-income.html

http://www.economywatch.com/world-country/national-income.html

http://www.wisegeek.com/what-is-a-circular-flow-of-income.htm

http://tutor2u.net/economics/content/topics/macroeconomy/circular_flow.htm

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Unit 14: Calculation of National Income

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Objectives

After studying this unit, you will be able to:

- Discuss the methods of measuring national income
- Identify problems in measuring national income
- Describe the circular flow of income in 2 sector and 4 sector model

Introduction

We can measure national income either at the production stage by measuring the value of output or at the income accrual stage by measuring the amount of factor income earned or at the expenditure stage by measuring the size of total expenditure incurred in the economy. The Following are the three different methods of measuring national income.

1. Product Approach
2. Income Approach
3. Expenditure Approach

Notes

14.1 Product Approach

According to this method, the sum of net value of goods and services produced at market prices is found. Three steps are involved in calculation of national income through this method:

1. ***Gross product*** is calculated by sensing up the money value of output in the different sectors of the economy.
2. ***Money value*** of raw material and services used and the amount of depreciation of physical assets involved in the production process are summed up.
3. The ***net output or value added*** is found by subtracting the aggregate of the cost of raw material, services and depreciation from the gross product found in first step.

Let us denote the amounts of each of the three different types of final outputs in a given year as Q_1, Q_2, Q_3…… Q_n and their respective market prices as P_1, P_2, P_3…… P_n where n stands for the total number of final goods and service produced in the economy. Then according to the product approach, the size of the national income (NI) will be equal to the sum of the annual flow of final goods and services valued at their respective market prices

$$\text{i.e., } NI = P_1Q_1 + P_2Q_2 + P_3Q_3 + \ldots\ldots\ldots\ldots + P_nQ_n$$

Production approach involves estimation of gross value of products, by-products and ancillary activities of a production unit and deducting from it the value of inputs of raw materials and other intermediates including services to obtain gross value added.

Broadly speaking the steps involved are:

1. Obtain estimates of quantities of all outputs and all inputs.
2. Obtain estimates of average price for each output and input from market sources.
3. Compute gross value of outputs and inputs using price-quantity data and subtract the latter from the former to get gross value added.
4. Obtain estimates of value of stocks of fixed assets and apply predetermined depreciation rates to get capital consumption.

This approach is used to estimate gross and net value added in the following sectors of the Indian economy:

1. Agriculture and allied activities (e.g., animal husbandry)
2. Forestry and Logging
3. Fishing
4. Mining and Quarrying
5. Registered Manufacturing

For the first three of these sectors, obtaining reliable data on quantities and average prices is a difficult task particularly for minor products and by-products as also for unorganised part of fishing activity. CSO uses estimates obtained from a variety of sources such as union ministry of agriculture, state statistical bureaus, directorate of market intelligence, etc. For registered manufacturing the Annual Survey of Industries (ASI) gives data on inputs and outputs on a census basis for larger units and sample basis for smaller units. However, ASI data are often out of date and several adjustments are required. Corrections for non-response to ASI questionnaires also have to be incorporated. For mining and quarrying the Indian Bureau of Mines supplies quantity and value data for inputs and outputs which are supplemented by data from state governments.

Notes

For constant price estimation, the same procedure can be used with prices of the base year being employed for valuation of quantities.

14.2 Income Approach

This approach is also known as the income-distributed method. According to this method, the incomes received by all the basic factors of production used in the production process are summed up. The basic factors for the purposes of national income are categorised as labour and capital. We have three incomes.

1. ***Labour income*** which includes wages, salaries, bonus, social security and welfare contributions.
2. ***Capital income*** which includes dividends, pre-tax retained earnings, interest on saving and bonus, rent, royalties and profits of government enterprises.
3. ***Mixed income,*** i.e., earnings from professions, farming enterprises, etc.

These three components of income are added together to get national income.

Following the income approach, national income can be measured by aggregating the annual flows of factor earnings generated by the production of the final output. Thus the value of output, say good I (P_i Q_i) is also reflected in the sum of the corresponding factor incomes generated, i.e., $P_iQ_i = R_i + W_i + I_i + P_i$.

Where R_i, W_i, I_i, P_i denote flow of rent, wages, interest, and profits generated by the production of good i. It follows, therefore, that national income can be measured as the sum of annual flow of different types of factor incomes in the economy.

In this approach, payments for factor, viz. wages, salaries, rents, interest and profits are directly aggregated together to obtain estimates of value added. Output or input valuation is not necessary. This approach is particularly suitable for those activities whose output are difficult to value.

The prime example is services. However, reliable data on factor incomes are available only for those units which keep proper annual accounts. For others, some indirect method has to be followed. One such method involves estimation of number of workers employed and of value added per worker. The product of the two gives an estimate of total value added in the relevant activity. Number of workers is estimated by extrapolation-interpolation of decennial case figures; per worker value added is taken from surveys conducted at various times with appropriate adjustments to bring up the estimates to date.

The approach is used for following activities:

1. Railways
2. Electricity, gas and water supply
3. Transport, storage and communication
4. Banking, finance and insurance
5. Real estate
6. Public administration and defence

For the first three groups almost complete data are available from annual accounts. Such data are also available for parts of latter three - the part that is in the organised sector. For the rest the indirect approach has to be employed.

Notes

Database is the weakest for unorganised sectors of the economy such as unregistered manufacturing, trade, hotels and restaurants and a variety of personal services. For these sectors rough and ready estimates based sometimes on production approach, sometimes on income approach are used. Most often estimates are obtained for a benchmark year during which a major survey had been conducted and then these benchmark estimates are brought up to date using a variety of indicators.

Constant price estimates using the income approach are obtained by updating the base year estimates using some physical indices such as amount of electricity sold, tonne-kilometres of freight transport, etc.

Did u know? **What is transaction in the parallel economy?**

The unaccounted flows of money give rise to black money which takes the form of push money, hush money, hiss money, speed money and so on. Such money either circulates very fast or gets converted into black property or assets like farm houses, gold ornaments and benami share certificates. These are the forms in which black money is held, if not circulated by way of black income to finance black expenditure.

14.3 Expenditure Approach

This method is known as the final product method. According to this method, the total national expenditure is the sum of the expenditure incurred by the society in a particular year. The expenditures are classified as personal consumption expenditure, net domestic investment, government expenditure on goods and services and net foreign investment (imports-exports).

The flow of total expenditure can be measured by aggregating the flows of expenditure on final goods and services incurred by the three main sectors involved, *viz.,* the household sector, the business sector, the government sector. Thus from the viewpoint of the expenditure approach, national income can be measured by

$$NI = E_h + E_b + E_g$$

Where E_h, E_b, E_g denote the annual flow of expenditure on final goods and services incurred by the household sector, the business sector, and the government sector.

These three approaches to the measurement of national income yield identical results. They provide three alternative methods of measuring essentially the same magnitude. If we follow the product approach or the expenditure approach, we are in effect trying to measure national income by the size of the income flow in the upper half of the circle. As against this if we follow income approach, we are actually trying to measure the flow in the lower half of the circle.

Notes Estimates of national product can also be obtained by adding together expenditure flows, viz., C, I, G, E and subtracting M. To obtain these, CSO uses the commodity flow approach. For instance, in case of private consumption expenditures, over 160 goods and services are identified and quantities of these entering private consumption are estimated by deducting from quantities produced, quantities used up in intermediate uses, purchased by government, etc. Market prices are then applied to the quantities to get expenditures. For organised construction, value of output is estimated by estimating the quantities of major construction materials, cement, steel, bricks, etc., used up in construction. Similarly, several items of machinery and equipment are identified and market value of their outputs are added together to estimate capital formation in the form of machinery and equipment.

Notes

Task Given the following data about the economy, calculate national income, personal income and disposable personal income with both the expenditure and income approach.

	(₹ crores)
Wages and salaries	7,500
Interest received	450
Rent	900
Dividends	2,100
Undistributed Profits	400
Social security contribution of business sector	600
Mixed incomes	800
Corporate profit taxes	600
Pensions paid by the government	200
Net interest paid by government	300
Personal income tax	1,500

Case Study

Rich Getting Richer

Year 2009 may have been a cruel year for much of the country with slow growth and double-digit food inflation, but India's High Net Worth Individuals (HNWIs) prospered — just over 120,000 in number, or 0.01% of the population, their combined worth is close to one-third of India's Gross National Income (GNI).

HNWIs, in this context, are defined as those having investable assets of $1 million or more, excluding primary residence, collectibles, consumables, and consumer durables. According to the 2009 Asia-Pacific Wealth Report, brought out by financial services firms Capgemini and Merrill Lynch Wealth Management, at the peak of the recession in 2008, India had 84,000 HNWIs with a combined net worth of $310 billion. To put that figure in perspective, it was just under a third of India's market capitalization, that is, the total value of all companies listed on the Bombay Stock Exchange — as of end-March 2008. The average worth of each HNWI was ₹ 16.6 crore.

To get a fix on just how rarefied a level it puts them in, we did some simple calculations that threw up stunning numbers. It would take an average urban Indian, 2,238 years, based on the monthly per capita expenditure estimates in the 2007-08 National Sample Survey, to achieve a net worth equal to that of the average HNWI. And that's assuming that this average urban Indian just accumulates all his income without consuming anything. A similar calculation shows that an average rural Indian would have to wait a fair bit longer — 3,814 years!

According to the firms' 2010 World Wealth Report, India now has 126,700 HNWIs, an increase of more than 50% over the 2008 number. While the figure for combined net worth is not available, it seems safe to assume that as a class not only have India's super-rich recouped their 2008 losses, they have even made gains over their pre-crisis (2007) positions. In 2007, 123,000 HNWIs were worth a combined $437 million. Meanwhile, in 2009 alone, an estimated 13.6 million more people in India became poor or remained in poverty than would have been the case had the 2008 growth rates continued, according to the United

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Notes

million more people in India became poor or remained in poverty over 2008 and 2009 than would have been poor had the pre-crisis (2004-07) growth rates been maintained over these two years.

The 2009 Asia-Pacific Wealth Report notes that the HNWI population in India is also expected to be more than three times its 2008 size by the year 2018, with emergent wealth playing a key role. Like China, relatively few among the current HNWI population (13%, compared to 22% in Japan) have inherited their wealth and even fewer (9%) are over the age of 66.

Question

What does the case say about distribution of income in India?

Source: timesofindia.indiatimes.com

14.4 Problems in Measuring National Income

The major problems that hinder the calculation of national income using a particular method have already been discussed before along with the methods. Now let's discuss the problems that occur, in general.

The difficulties in measurement of national income are:

1. National income measures domestic economic performance and not social welfare. For real economic growth, there should be strong positive correlation between the two.
2. National Income understates social welfare-non-market transactions like home-makers service and do-it-yourself projects are not counted.
3. National Income does not measure an increase in leisure or work satisfaction or changes in product quality.
4. National Income does not accurately reflect changes in environment like oil spills cleanup is measured as positive output but increased in pollution is not measured as negative.
5. Per capital income is a more meaningful measure of living standards than total national income.
6. There is a problem of double counting. However, problem of double counting could be avoided by utilizing the value added approach. For example, the wheat that is used to make bread is an "intermediate good". The value of the bread only is counted as part of GNP and we do not count the value of wheat sold to the miller and the value of flour sold to the baker.
7. Problems of depreciation estimation as there are different methods of calculating or estimating depreciation.
8. Inclusion or exclusion of certain items in national income accounting can cause confusion.
   (a) Imputed rent of owner occupied houses is also included in calculation of national income.
   (b) Imputed value of goods and services produced for self consumption are included.
   (c) Sale and purchase of second hand goods are excluded.
   (d) Imputed rent of owner occupied houses and production for self-consumption are included.
   (e) Incomes from illegal activities are not included.
   (f) Direct taxes such as Income tax are paid by employees from their salaries are included.

Notes

(g) Expenditure on purchase of old share is excluded.

(h) Government expenditure on all transfer payment is excluded.

9. Challenges like difficulties in getting information especially those related to underground economy (illegal activities).

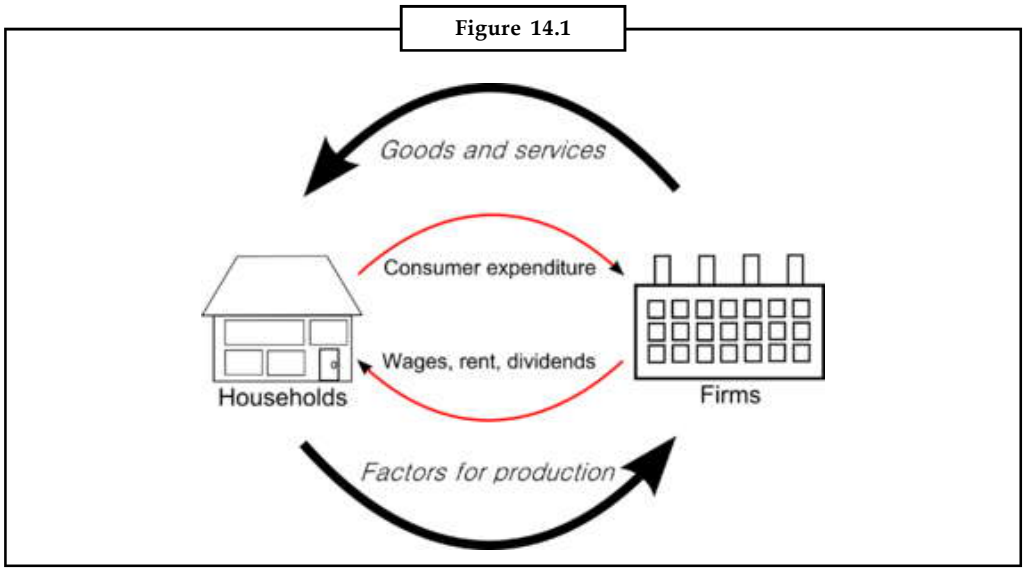
14.5 Circular Flow of Income

Circular flow of income model shows the flow of income between the producers and the households who buy their goods or services. Income moves from households to producers as the households purchase goods or services and income moves from producers to households in the form of wages or profits. Let's discuss the circular flow of income in a simple 2 sector model and in a 4 sector model.

14.5.1 Circular Flow of Income in a 2 Sector Model

One of the most important insights about the aggregate economy is that it is a circular flow in which output and input are interrelated (Figure 11.1). Household's expenditures (consumption and saving) and firm's expenditures (wages, rents, etc.) are household's income.

Figure 14.1



Source: www.medlibrary.org/medwiki/Circular_flow

The circular flow of income model is a model used to show the flow of income through an economy. Through showing the leakages in the economy and the injections, the different factors affecting the economic activities are apparent. Just like a leakage in a bucket leads to decrease in the level of water, a leakage in the economy leads to a decrease in economic activity. And just like an injection into the bucket where the water level rises, an injection in an economy leads to an increase in economic activity.

Basic Assumptions of a Simple Circular Flow of Income Model

1. The economy consists of two sectors: households and firms.
2. Households spend all of their income (Y) on goods and services or consumption (C). There is no saving (S).

Notes

3. All output (O) produced by firms is purchased by households through their expenditure (E).
4. There is no financial sector.
5. There is no government sector.
6. There is no overseas sector.

In the simple two sector circular flow of income model the state of equilibrium is defined as a situation in which there is no tendency for the levels of income (Y), expenditure (E) and output (O) to change, that is: Y = E = O.

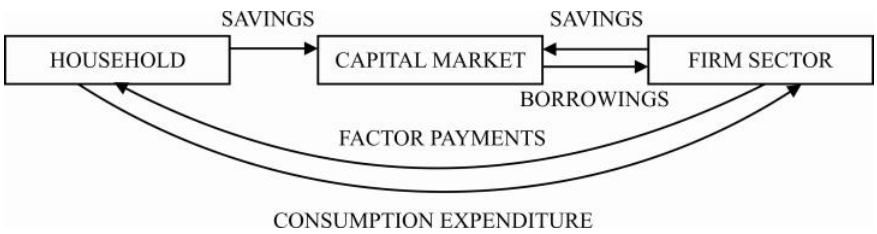
This means that all household income (Y) is spent (E) on the output (O) of firms, which is equal in value to the payments for productive resources purchased by firms from households.

Example: This can be shown in an example where John earns `100.00, he doesn't save it and spends it all on the goods and services (O) provided by the firms.

2 Sector Model with Financial Market

Financial institutions act as intermediaries between savers and investors. All the lending and borrowings are carried on in the financial or capital market. All that is earned by the households is not spent on consumption; a part of it is saved. This saving is deposited in the financial market leading to a money flow from the household to the financial market. On the other hand, the firm saves to meet its depreciation expenses and expansion. The savings of the firm going into the financial market and borrowings made by the firm from the financial market also create money flows.

Figure 14.2: Circular Flow of Income in 2 Sector Model with Financial System



Therefore, we can say that the savings by households and firms are leakages and borrowings by the firms act as injections into the circular flow of income.

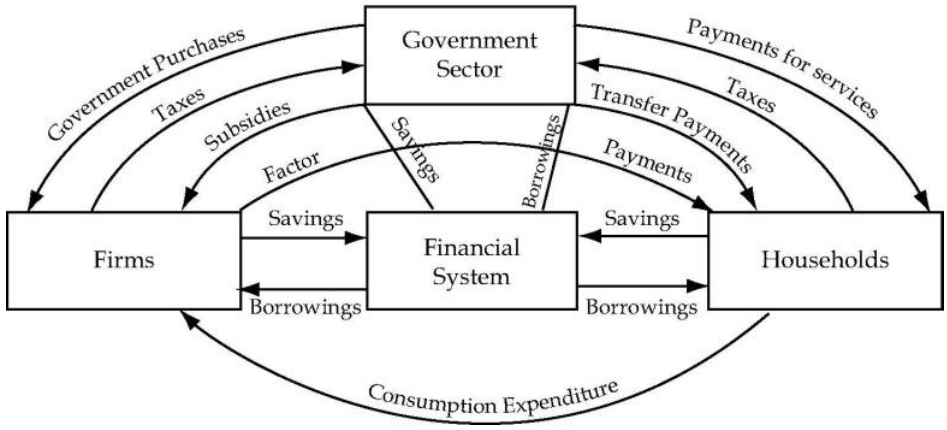
14.5.2 Circular Flow of Income in a 3 Sector Model

In this model, we introduce the government sector as well that purchases goods from firms and factors services from households. Between households and the government money flows from government to the household when the government makes transfer payments. Like old age pension, scholarship and factors payments o the households. Money flows back to the government when it collects direct taxes from the households.

Similarly, there are flows of money between the government sector and firm sector. Money flows from firms to government when the government realises corporate taxes from the firms. Money flows from the government to the firms in form of subsidies and payment made for the goods purchased.

Notes

Figure 14.3: The Circular Flow of Income in a Three-sector Economy



14.5.3 Circular Flow of Income in a 4 Sector Model

In a 4 sector model, an economy moves from being a closed economy to an open economy. In an open economy imports and exports are made. You must understand that one country's exports are other country's imports. In case of a country imports, money flows to the rest of the world and in case of exports, money flows in from the rest of the world. An economy experiences a trade surplus if its exports exceed its imports. On the other hand, there is a trade deficit if imports exceed exports. Imports act as leakages and exports as injection into the circular flow of income in an economy.

In a 4 sector model, we have,

$$Y = C + I + G + (X\text{-}M)$$

Where,

Y = Income or Output

C = Household consumption expenditure

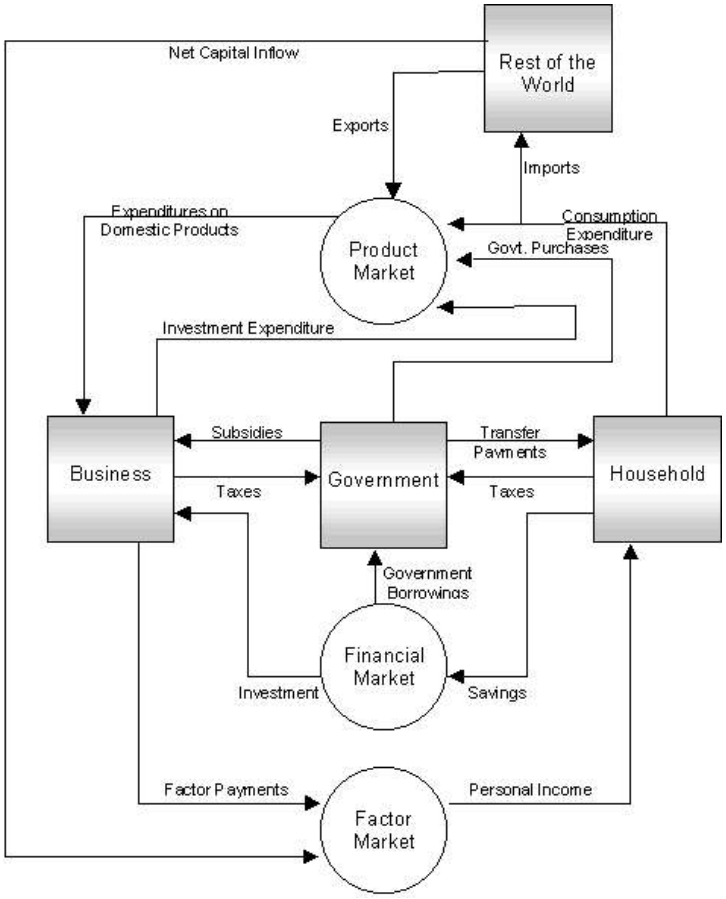
I = Investment expenditure

G = Government expenditure

X – M = Exports minus Imports

Notes

Figure 14.4: Circular Flow of Income in a Four Sector Model



Source: www.maeconomics.web.com

Caselet

India — Seeking a Second Generation of Reform

Ten years ago the Indian government embarked upon reform, liberalizing the economy to open it to global markets. Today, this liberalization effort is showing mixed results.

Despite strong GDP growth (averaging 5 to 6 percent annually), a reasonably low current account deficit (less than 2 percent of GDP), and ample foreign reserves (over $30 billion), an analysis of India's economy shows indications of distortions in three areas: the real economy, the financial sector, and macroeconomic policy. India is considering a "second generation" of reforms to further liberalize the economy and correct these market distortions, but if distortions remain unchecked, a financial crisis could emerge.

In the real economy, steady value destruction has been evident over the past eight years. This value destruction has been sustained since 80 percent of available capital is directed at non profitable sectors, a trend that is unlikely to change in the near future due to

Contd...

Notes

government-directed lending regulations, high transaction costs, and depressed market conditions. The financial sector also appears weak - as of 1998, 46 percent of financial institutions had returns on assets (ROA) of less than 1 percent, and the banking average ROA was 0.55 percent in 2001.

Both the real and the financial sectors are impeded by poor macroeconomic policies. The Indian government exercises significant ownership and control over the economy, directly owning 60 percent of assets in the real sector and 75 percent of assets in the financial sector. In addition to a strong presence in the economy, the Indian government has been intervening in the economy through fiscal policy and monetary measures to maintain liquidity and the exchange rate, and to support weak institutions.

Despite weakness in these three areas, the outlook for India is not all gloom. The economy has low foreign debt exposure and has been able to avoid a credit boom in the real sector. But government and macroeconomic reforms are needed - more privatization and liberalization in the real sector, a reduced presence of the government in the real and financial sectors, fewer requirements on government-directed lending, and a greater reliance on market decisions to allocate savings. Whether these reforms will occur in time to prevent a crisis remains to be seen.

14.6 Summary

- There are three different methods of measuring national income. These are product approach, income approach and expenditure approach.
- Under product approach, the sum of net value of goods and services produced at market prices is found.
- Income approach is also known as the income-distributed method. According to this method, the incomes received by all the basic factors of production used in the production process are summed up.
- Expenditure method is known as the final product method. Under this method, the total national expenditure is the sum of the expenditure incurred by the society in a particular year.
- In India, the national income estimates are prepared by the Central Statistical Organisation.

14.7 Keywords

Expenditure approach: The total national expenditure is the sum of the expenditure incurred by the society in a particular year.

Government expenditure: The sum of expenditure on consumption and capital goods by the government.

Income approach: The incomes received by all the basic factors of production used in the production process.

Product approach: The sum of net value of goods and services produced at market prices.

Notes

14.8 Self Assessment

1. State true or false for the following statements:
   (a) Under product approach, the factors of production used in the production of a product are added up.
   (b) The three approaches to national income will all lead to different results.
   (c) Under expenditure approach net foreign investment is (exports-imports).
   (d) Expenditure approach is also known as the income-distributed method.
   (e) Product method is known as the final product method.
2. Fill in the blanks:
   (a) In India the national income estimates are prepared by the ..... .
   (b) The three approaches to the measurement of national income yield ..... results.
   (c) According to product method, the sum of net value of goods and services produced at ..... is found.
   (d) Expenditure approach is known as the ..... method.
   (e) Personal income = NNP at factor cost - ..... - corporate taxes + transfer payments.
   (f) According to product approach, the sum of net value of goods and services produced at..... is found.
   (g) The greatest difficulty in counting the national income is of .....
   (h) All inventory changes whether negative or positive are included in the ..... .
   (i) The government account is concerned with the..... of the government sector.
   (j) Database is the weakest for ..... sector of the economy.

14.9 Review Questions

1. Discuss one method of computing national income. Is this measurement precise? Why?
2. Examine all standard method of computing national income and social accounting in India with particular reference to both conceptual statistical difficulties of measurement.
3. Find out what is a national income and product account (NIPA) benchmark or comprehensive revision.
4. Think and enlist the problems that you might face when comparing national income with other countries.
5. The data in the table below represent the selling price of the intermediate good. After converting the tree to paper the paper manufacturer sells the paper to the textbook publisher for $3.

   textbook production:

tree	$01
paper	$03
book	$ 7

Notes

bookstore	$75
sum of factor payments	$86

How much is added to GDP?

6. Suggest how the discrepancy between output can be calculated by the expenditure approach.
7. 'The national income over the past five decades has shown erratic growth'. Discuss the statement.
8. The national income growth rate fluctuates with fluctuations in agriculture. Give your opinion.
9. Discuss the three methods of national income measurement with a hypothetical example.
10. Explain the circular flow of income in two, three and four sector economy.

Answers: Self Assessment

1. (a) True (b) False (c) False (d) False
   (e) False
2. (a) Central Statistical Organisation (b) identical
   (c) market prices (d) final product (e) undistributed profit
   (f) market price (g) double counting (h) GDP
   (i) outflow and inflow (j) unorganized

14.10 Further Readings

Books

Bibek Debroy, *Managerial Economics,* Global Business Press, Delhi.
Dr. Atmanand, *Managerial Economics,* Excel Books, Delhi.
H.L. Ahuja, *Macroeconomics Theory and Policy,* S. Chand Publication.
Shapiro, Bensen, *The Psychology of Pricing,* Harvard Business Review.

Online links

http://www.tradechakra.com/indian-economy/national-income.html
http://www.economywatch.com/world-country/national-income.html
http://www.wisegeek.com/what-is-a-circular-flow-of-income.htm
http://tutor2u.net/economics/content/topics/macroeconomy/circular_flow.htm

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