UNIT 9 PROFIT AS BUSINESS OBJECTIVE AND PROFIT PLANNING
MODULE - 3
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Structure

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9.0 INTRODUCTION

The conventional theory of a firm assumes profit maximization as the sole objective of business firms. Baumol, a nobel laureate, has, however, argued, “There is no reason to believe that all businessmen pursue the same objective”1. Recent researches on this issue reveal that the objectives that business firms pursue are more than one. Some important objectives, other than profit maximization, are: (a) maximization of sales revenue, (b) maximization of firm’s growth rate, (c) maximization of manager’s utility function,
(d) making satisfactory rate of profit, (e) long-run survival of the firm, and (f) entry-prevention and risk-avoidance.

All business firms have undoubtedly some organisational goals to pursue. What is the most common objective of business firms? There is no definitive answer to this question. Perhaps the best way to find out the common objective of business firms would be to ask the business executives. However, Baumol, a well-known authority on business economics, has remarked that firms and their executives are often not clear about their objectives. “In fact, it is common experience when interviewing executives to find that they will agree to every plausible goal about which they are asked.” However, profit maximization is regarded as the most common and theoretically most plausible objective of business firms. This aspect will be discussed in detail later in the chapter.

We will first discuss profit and profit maximization as the objective of business firms in some details and then describe briefly the alternative objectives of business firms.

9.1 UNIT OBJECTIVES

- To define profit, the main objective of business firms, and to discuss economists’ views on sources of profit
- To discuss the problems in measuring profit
- To discuss profit maximization as the sole objective of business firms
- To describe the alternative objectives of business firms—objectives other than profit maximization
- To discuss profit planning by using break-even analysis

9.2 PROFIT AS BUSINESS OBJECTIVE

9.2.1 Meaning of Profit

Profit means different things to different people. “The word ‘profit’ has different meaning to businessmen, accountants, tax collectors, workers and economists and it is often used in a loose polemical sense that buries its real significance…” In a general sense, ‘profit’ is regarded as income accruing to the equity holders, in the same sense as wages accrue to the labour; rent accrues to the owners of rentable assets; and interest accrues to the money lenders. To a layman, profit means all income that flow to the investors. To an accountant, ‘profit’ means the excess of revenue over all paid-out costs including both manufacturing and overhead expenses. It is more or less the same as ‘net profit’. For all practical purposes, profit or business income means profit in accountancy sense plus non-allowable expenses. Economist’s concept of profit is of ‘Pure Profit’ called ‘economic profit’ or ‘just profit’. Pure profit is a return over and above the opportunity cost, i.e., the income which a businessman might expect from the second best alternative use of his resources. These two concepts of profit are discussed below in detail.

Accounting Profit vs. Economic Profit. The two important concepts of profit that figure in business decisions are ‘economic profit’ and ‘accounting profit’. It will be useful to understand the difference between the two concepts of profit. As already mentioned, in accounting sense, profit is surplus of revenue over and above all paid-out costs, including both manufacturing and overhead expenses. Accounting profit may be calculated as follows.

\[ \text{Accounting profit} = TR - (W + R + I + M) \]

where \( W \) = wages and salaries, \( R \) = rent, \( I \) = interest, and \( M \) = cost of materials.
Obviously, while calculating accounting profit, only explicit or book costs, i.e., the cost recorded in the books of accounts, are considered.

The concept of ‘economic profit’ differs from that of ‘accounting profit’. Economic profit takes into account also the implicit or imputed costs. In the context of profit, *implicit cost is essentially the opportunity cost*. Opportunity cost is defined as the payment that would be ‘necessary to draw forth the factors of production from their most remunerative alternative employment’. Alternatively, opportunity cost is the income foregone which a businessman could expect from the second best alternative use of his resources. For example, if an entrepreneur uses his capital in his own business, he foregoes interest which he might earn by purchasing debentures of other companies or by depositing his money with joint stock companies for a period. Furthermore, if an entrepreneur uses his labour in his own business, he foregoes his income (salary) which he might earn by working as a manager in another firm. Similarly, by using productive assets (land and building) in his own business, he sacrifices his market rent. These foregone incomes—interest, salary and rent—are called *opportunity costs or transfer costs*. Accounting profit does not take into account the opportunity cost.

It should also be noted that the *economic or pure profit* makes provision also for (a) insurable risks, (b) depreciation, and (c) necessary minimum payment to shareholders to prevent them from withdrawing their capital. Pure profit may thus be defined as ‘a residual left after all contractual costs have been met, including the transfer costs of management, insurable risks, depreciation and payments to shareholders sufficient to maintain investment at its current level’. Thus,

\[
\text{Pure profit} = \text{Total revenue} - (\text{explicit costs} + \text{implicit costs})
\]

Pure profit so defined may not be necessarily positive for a single firm in a single year—it may be even negative, since it may not be possible to decide beforehand the best way of using the resources. Besides, in economics, pure profit is considered to be a short-term phenomenon—it does not exist in the long run, especially under perfectly competitive conditions.

### 9.3 THEORIES OF PROFIT: THE ECONOMISTS’ PERCEPTION AND SOURCES OF PROFIT

What are the sources of profit? Economists are not unanimous on this issue. It is in fact this question that has been a source of an unsettled controversy and has led to the emergence of various theories of profit. In this section, we discuss briefly the main theories of profit.

#### 9.3.1 Walker’s Theory of Profit: Profit as Rent of Ability

One of the most widely known theories of profit was propounded by F.A. Walker. According to him, profit is the rent of “exceptional abilities that an entrepreneur may possess” over others. Just as *rent* is the difference between the yields of the least and the most fertile lands, profit is the difference between the earnings of the least and the most efficient entrepreneurs. In formulating his profit theory, Walker assumed a state of perfect competition in which all firms are presumed to possess equal managerial ability. Each firm would receive only the wages of management which, in Walker’s view, forms no part of pure profit. He regarded wages of management as ordinary wages. Thus, under perfectly competitive conditions, there would be no pure profit and all firms would earn only managerial wages, which is popularly known as ‘normal profit’.

**Clark’s Dynamic Theory.** According to J.B. Clark, profits arise in a dynamic economy, not in a static one. A static economy is one in which there is absolute freedom
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of competition; population and capital are stationary; production process remains unchanged over time; goods continue to remain homogeneous; factors enjoy freedom of mobility but do not move because their marginal product in every industry is the same; there is no uncertainty and hence no risk; and if there is any risk, it is insurable. In a static economy therefore all firms make only the ‘normal profit’, i.e., the wages of management.

On the other hand, a dynamic economy is characterized by the following generic changes: (i) increase in population, (ii) increase in capital, (iii) improvement in production technique, (iv) changes in the forms of business organisations, and (v) multiplication of consumer wants. The major functions of entrepreneurs or managers in a dynamic world are to take advantage of the generic changes and promote their business, expand their sales and reduce their costs. The entrepreneurs who take successfully the advantage of changing conditions in a dynamic economy make pure profit.

Pure profits, however, exist only in the short run. In the long run, competition forces other firms to imitate the changes made by the leading firms. This leads to a rise in demand for factors of production and therefore rise in factor prices and rise in cost of production. On the other hand, rise in output causes a decline in product prices, given the demand. The ultimate result is that pure profit disappears. In Clark’s own words, ‘Profit is an elusive sum which entrepreneurs grasp but cannot hold. It slips through their fingers and bestows itself on all members of the society’.

This, however, should not mean that profits arise in a dynamic economy only once and disappear for ever. In fact, in a dynamic economy, generic changes are continuous and managers with foresight continue to take advantage of the change and make profit. Emergence, disappearance and re-emergence of profit is a continuous process.

Hawley’s Risk Theory of Profit. The risk theory of profit was propounded by F.B. Hawley in 1893. Risk in business may arise for such reasons as obsolescence of a product, sudden fall in prices, non-availability of certain crucial materials, introduction of a better substitute by a competitor, and risks due to fire, war, etc. Hawley regarded risk-taking as an inevitable accompaniment of dynamic production and those who take risk have a sound claim to a separate reward, known as “profit”. According to Hawley, profit is simply the price paid by society for assuming business risks. In his opinion, businessmen would not assume risk without expecting adequate compensation in excess of actuarial value, i.e., the premium on calculable risk. They would always look for a return in excess of the wages of management for bearing risk. The reason why Hawley maintained that profit is over and above the actuarial risk is that the assumption of risk is irksome; it give rise to trouble, anxiety and disutilities of various kinds. Therefore, assuming risk gives the entrepreneur a claim to a reward in excess of actuarial value of risk. Profit, according to Hawley, consists of two parts: one part represents compensation for actuarial or average loss incidental to the various classes of risks necessarily assumed by the entrepreneur; and the remaining part represents an inducement to suffer the consequences of being exposed to risk in their entrepreneurial adventures.

Hawley believed that profits arise from factor ownership only so long as ownership involves risk. According to him, an entrepreneur has to assume risk to qualify for profit. If an entrepreneur avoids risk by insuring against it, he would cease to be an entrepreneur and would not receive any profit. In his opinion, it is the uninsured risks out of which profits arise, and until the uncertainty ends with the sale of entrepreneur’s products, the amount of reward cannot be determined. Profit, in his opinion is a residue. Hawley’s theory is thus a residual theory of profit.

Knight’s Theory of Profit. Frank H. Knight treated profit as a residual return to uncertainty bearing, not to risk bearing. Obviously, Knight made a distinction between risk and uncertainty. He divided risk into calculable and non-calculable risks. Calculable
risks are those whose probability of occurrence can be statistically estimated on the basis of available data. For example, risk due to fire, theft, accidents, etc. are calculable and such risks are insurable. There remains, however, an area of risk in which probability of risk occurrences cannot be calculated. For instance, there may be a certain element of cost which may not be accurately calculable and the strategies of the competitors may not be precisely assessable. The risk element of such incalculable events are not insurable. The area of incalculable risk is the area of uncertainty.

It is in the area of uncertainty that decision-making becomes a crucial function of an entrepreneur. If his decisions are proved right by the subsequent events, the entrepreneur makes profit and vice versa. Thus, according to Knight, profit arises from the decisions taken and implemented under the conditions of uncertainty. In his view, the profits may arise as a result of decisions concerning the state of market, e.g., decisions which result in increasing the degree of monopoly, decisions with respect to holding stocks that give rise to windfall gains, and decision taken to introduce new techniques or innovations.

**Schumpeter’s Innovation Theory of Profit.** The innovation theory of profit was developed by Joseph A. Schumpeter. He was of the opinion that factors like emergence of interest and profits, recurrence of trade cycles and such others are only incidental to a distinct process of economic development; and certain principles which could explain the process of economic development would also explain these economic variables. His theory of profit is thus embedded in his theory of economic development.

To explain the phenomenon of economic development (and, thereby, the profit) Schumpeter starts from the state of a stationary equilibrium which is characterised by the equilibrium in all the spheres.

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

1. introduction of a new commodity or a new quality of goods;
2. the introduction of a new method of production;
3. the opening of a new market;
4. finding new sources of raw material; and
5. organizing the industry in an innovative manner with the new techniques.

Over time, however, the supply of factors remaining the same, factor prices tend to increase. As a result, cost of production increases. On the other hand, with other firms adopting innovations, supply of goods and services increases resulting in a fall in their prices. Thus, on the one hand, cost per unit of output goes up and, on the other, revenue per unit decreases. Ultimately, a stage comes when the difference between costs and receipts disappears. Therefore, profits disappear. In the process, however, the economy reaches a higher level of stationary equilibrium.

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

**Monopoly Profit.** Most profit theories have been propounded in the background of perfect competition. But perfect competition, as conceived in the theoretical models, is either non-existent or is a rare phenomenon. An extreme contrast of perfect competition is the existence of monopoly in the market. Monopoly characterises a market situation in which there is a single seller of a commodity without a close substitute.
Monopoly may arise due to such factors as:

(i) economies of scale,
(ii) sole ownership of certain crucial raw materials,
(iii) legal sanction and protection, and
(iv) mergers and takeovers.

A monopolist may earn ‘pure profit’ or what is generally called in this case, ‘monopoly profit’, and maintain it in the long run by using its monopoly powers. Monopoly powers include:

(i) powers to control supply and price;
(ii) powers to prevent the entry of competitors by price cutting; and
(iii) in some cases, monopoly power in certain input markets.

These powers help a monopoly firm to make pure profit (or monopoly profit). In such cases, monopoly is the source of pure profit.

9.4 PROBLEMS IN PROFIT MEASUREMENT

As mentioned above, accounting profit equals revenue minus all explicit costs, and economic profit equals revenue minus explicit and implicit costs. Once profit is defined, it should not be difficult to measure the profit of a firm for a given period. But two questions complicate the task of measuring profit: (i) which of the two concepts of profit be used for measuring profit? and (ii) what costs should be and what should not be included in the implicit and explicit costs?

The answer to the first question is that the use of a profit concept depends on the purpose of measuring profit. Accounting concept of profit is used when the purpose is to produce a profit figure for (i) the shareholders to inform them of progress of the firm, (ii) financiers and creditors who would be interested in the firm’s progress, (iii) the managers to assess their own performance, and (iv) for computation of tax-liability. For measuring accounting profit for these purposes, necessary revenue and cost data are, in general, obtained from the firm’s books of account. It must, however, be noted that accounting profit may present an exaggeration of actual profit (or less) if it is based on arbitrary allocation of revenues and costs to a given accounting period.

On the other hand, if the objective is to measure ‘true profit’, the concept of economic profit should be used. However, ‘true profitability of any investment or business cannot be determined until the ownership of that investment or business has been fully terminated.’ But then life of a corporation is eternal. Therefore, true profit can be measured only in terms of “maximum amount that can be distributed in dividends (theoretically from now to the infinite future) without impairing the companies’ earning power. Hence, the concept aims at preservation of stockholders’ real capital. To estimate income then a forecast of all future changes in demand, changes in production process, cash outlays to operate the business, cash revenues and price changes. [is needed].”

This concept of business income is, however, an ‘unattainable ideal’ and hence is of little practical use. Nevertheless, it serves as a guide to income measurement even from businessmen’s point of view.

If follows from the above discussion that, for all practical purposes, profits have to be measured on the basis of accounting concept. But, measuring even the accounting profit is not an easy task. The main problem is to decide as to what should be and what should not be included in the cost. One might feel that profit and loss accounts and balance sheet of the firms provide all the necessary data to measure accounting profit. There are, however, three specific items of cost and revenue which pose conceptual problems.
These items are: (i) depreciation, (ii) capital gains and losses, and (iii) current vs. historical costs. Measurement problems arise for two reasons: (a) economist’s view on these items differs from that of accountants, and (b) there is more than one accepted method of treating these items. We discuss below the problems related to these items in detail.

9.4.1 Problem in Measuring Depreciation

Economists view depreciation as capital consumption. For them, there are two distinct ways of charging for depreciation: (i) the depreciation of an equipment must equal its opportunity cost, or alternatively, (ii) the replacement cost that will produce comparable earning.

Opportunity cost of an equipment is ‘the most profitable alternative use of it that is foregone by putting it to its present use’. The problem is then of measuring the opportunity cost. One method of estimating opportunity cost, suggested by Joel Dean, is to measure the fall in value during a year. Going by this method, one assumes selling of the equipment as an alternative use. This method, however cannot be applied when a capital equipment has no alternative use, like a hydro-power project. In such cases, replacement cost is the appropriate measure of depreciation.

To accountants, depreciation is an allocation of capital expenditure over time. Such allocation of historical cost of capital over time, i.e., charging depreciation, is made under unrealistic assumptions of (a) stable prices, and (b) a given rate of obsolescence. What is more important in this regard is that the methods of charging depreciation over the lifetime of an equipment are various. The use of different methods of charging depreciation results in different levels of profit reported by the accountants.

For example, suppose a firm purchases a machine for Rs. 10,000 having an estimated life of 10 years. The firm can apply any of the following four methods of charging depreciation:

1. straight method
2. reducing balance method
3. annuity method, and
4. sum-of-the-year’s digit approach.

Under the straight-line method, an amount of Rs.10,000 / 10 = Rs. 1,000 would be charged as depreciation each year.

Under the reducing balance method, depreciation is charged at a constant (per cent) rate of annually written down values of the machine. Assuming a depreciation rate of 20 per cent, Rs. 2000 in the first year, Rs. 1600 in the second year, Rs. 1280 in the third year, and so on, shall be charged as depreciation.

Under annuity method, rate of depreciation is fixed as $d = (C + Cr)/n$, where $n$ is the number of active years of capital, $C$ = total and $r$ is the interest rate.

Finally, under the sum-of-the-year’s digits approach (i.e., a variant of the reducing balance method) the years of equipment’s life are aggregated to give an unvarying denominator. Depreciation is then charged at the rate of the ratio of the last year’s digits to the total of the years. In our example, the aggregated years of capital’s life equals $1 + 2 + 3 + \ldots + 10 = 55$. Depreciation in the 1st year will be $10,000 \times 10/55 = Rs. 1818.18$, in the 2nd year it will be $1,000 \times 9/55 = Rs. 1636.36$ and in 3rd year it will be $10,000 \times 8/55 = Rs. 1454.54$, and so on.

Note that the four methods yield four different measures of depreciation in subsequent years and, hence, the different levels of profit.
9.4.2 Treatment of Capital Gains and Losses

Capital gains and losses are regarded as ‘windfalls’. Fluctuation in the stock market prices is one of the most common sources of ‘windfalls’. In a progressive society, according to Dean, capital losses are, on balance, greater than capital gains. Many of the capital losses are of insurable nature, and when a businessman over-insures, the excess becomes eventually a capital gain.

Profit is also affected by the way capital gains and losses are treated in accounting. As Dean suggests, “A sound accounting policy to follow concerning windfalls is never to record them until they are turned into cash by a purchase or sale of assets, since it is never clear until then exactly how large they are ...” But, in practice, some companies do not record capital gains until it is realized in money terms, but they do write off capital losses from the current profit. If ‘sound accounting policy’ is followed there will be one profit, and if the other method is followed, there will be another figure of profit.

An economist is not concerned with what accounting practice or principle is followed in recording the past events. He is concerned mainly with what happens in future. What an economist would suggest is that the management should be aware of the approximate magnitude of such ‘windfalls’ long before they become precise enough to be acceptable to accountants. This would be helpful in taking the right decision in respect of affected assets.

9.4.3 Current vs. Historical Costs

Accountants prepare income statements typically in terms of historical costs, i.e., in terms of purchase price, rather than in terms of current price. The reasons given for this practice are: (i) historical costs produce more accurate measurement of income, (ii) historical costs are less debatable and more objective than the calculated present replacement value, and (iii) accountants’ job is to record historical costs whether or not they may have relevance for future decision-making. The accountant’s approach ignores certain important changes in earnings and losses of the firms, e.g., (i) the value of assets presented in the books of accounts is understated in times of inflation and overstated at the time of deflation, (ii) depreciation is understated during deflation. Historical cost recording does not reflect such changes in values of assets and profits. This problem assumes a critical importance in case of inventories and stock. The problem is how to evaluate the inventory and the goods in the pipeline.

There are three popular methods of inventory valuation: (i) first-in-first-out (FIFO), (ii) last-in-first-out (LIFO), and (iii) weighted average cost (WAC).

Under FIFO method, material is taken out of stock for further processing in the order in which they are acquired. The stocks, therefore, appear in firm’s balance sheet at their actual cost price. This method is suitable when price has a secular trend. However, this system exaggerates profits at the time of rising prices.

The LIFO method assumes that stocks purchased most recently become the costs of the raw material in the current production. If inventory levels are stable the cost of raw materials used at any point in the calculation of profits is always close to market or replacement value. But, when inventory levels fluctuate, this method loses its advantages.

The WAC method takes the weighted average of the costs of materials purchased at different prices and different point of time to evaluate the inventory.

All these methods have their own weaknesses and do not reflect the ‘true profit’ of business. So the problem of evaluating inventories so as to yield a true profit figure remains there.
As mentioned earlier, profit maximization has been the most important assumption on which economists have built price and production theories. This hypothesis has, however, been strongly questioned and alternative hypothesis suggested. This issue will be discussed in the forthcoming sections. Let us first look into the importance of the profit maximization hypothesis and theoretical conditions of profit maximization.

The conventional economic theory assumes profit maximization as the only objective of business firms. Profit maximization as the objective of business firms has a long history in economic literature. It forms the basis of conventional price theory. Profit maximization is regarded as the most reasonable and analytically the most ‘productive’ business objective. The strength of this assumption lies in the fact that this assumption ‘has never been unambiguously disproved’.

Besides, profit maximization assumption has a greater predictive power. It helps in predicting the behaviour of business firms in the real world and also the behaviour of price and output under different market conditions. No alternative hypothesis explains and predicates the behaviour of firms better than the profit maximization assumption.

**9.5.1 Profit Maximizing Conditions**

Total profit \( P \) is defined as

\[ \Pi = TR - TC \]  

where \( TR = \) total revenue and \( TC = \) total cost.

There are two conditions that must be fulfilled for \( TR - TC \) to be maximum. These conditions are called (i) necessary condition, and (ii) secondary or supplementary condition.

The necessary or the first order condition requires that marginal revenue (MR) must be equal to marginal cost (MC). By definition, marginal revenue is the revenue obtained from the production and sale of one additional unit of output, marginal cost is the cost arising due to the production of one additional unit of output.

The secondary or the second order condition requires that the necessary condition must be satisfied under the condition of decreasing MR and rising MC. The fulfilment of the two conditions makes it the sufficient condition. This condition is illustrated by point \( P_2 \) in Fig. 9.1.

![Marginal Conditions of Profit Maximisation](image-url)
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The profit maximizing conditions can be presented in technical terms as follows:

We know that a profit maximizing firm seeks to maximize

\[ \Pi = TR - TC \]

Let us suppose that the total revenue and total cost functions are, respectively, given as

\[ TR = f(Q) \]

and

\[ TC = f(Q) \]

where \( Q \) = quantity produced and sold.

By substituting total revenue and total cost functions in Eq. (9.1), the profit function may be written as

\[ \Pi = f(Q)_TR - f(Q)_TC \] \hspace{1cm} (9.2)

Equation (9.2) can now be manipulated to illustrate the first and second order conditions of profit maximization as follows.

First-order condition. The first-order condition of maximizing a function is that its first derivative must be equal to zero. Thus, the first-order condition of profit maximization is that the first derivative of the profit function Eq. (9.2) must be equal to zero. Differentiating the total profit function and setting it equal to zero, we get

\[ \frac{\partial \Pi}{\partial Q} = \frac{\partial TR}{\partial Q} - \frac{\partial TC}{\partial Q} = 0 \] \hspace{1cm} (9.3)

This condition holds only when

\[ \frac{\partial TR}{\partial Q} = \frac{\partial TC}{\partial Q} \]

In Eq. (9.3), the term \( \frac{\partial TR}{\partial Q} \) is the slope of the total revenue curve, which is the same as marginal revenue (MR). Similarly, the term \( \frac{\partial TC}{\partial Q} \) is the slope of the total cost curve or what is the same as marginal cost (MC). Thus, the first-order condition for profit maximisation can be stated as

\[ MR = MC \]

The first-order condition is generally known as necessary condition. A condition is said to be necessary if its non-fulfilment results in non-occurrence of an event.

Second-order Condition. As already mentioned, in non-technical terms, the second-order condition of profit maximization requires that the first order condition is satisfied under rising MC and decreasing MR. This condition is illustrated in Fig. 9.1. The MC and MR curves are the usual marginal cost and marginal revenue curves, respectively. MC and MR curves intersect at two points, \( P_1 \) and \( P_2 \). Thus, the first order condition is satisfied at both the points, but the second order condition of profit maximization is satisfied only at point \( P_2 \). Technically, the second order condition, requires that its second derivative of the profit function is negative. When second derivative of profit function is negative, it implies that the total profit curve has turned downward after having reached the peak, i.e., the highest point on profit scale. The second derivative of the total profit function is given as

\[ \frac{\partial^2 \Pi}{\partial Q^2} = \frac{\partial^2 TR}{\partial Q^2} - \frac{\partial^2 TC}{\partial Q^2} \] \hspace{1cm} (9.4)

The second-order condition requires that

\[ \frac{\partial^2 TR}{\partial Q^2} - \frac{\partial^2 TC}{\partial Q^2} < 0 \]
or
\[
\frac{\partial^2 TR}{\partial Q^2} < \frac{\partial^2 TC}{\partial Q^2} \quad \ldots (9.5)
\]

Since \( \partial^2 TR/\partial Q^2 \) is the slope of \( MR \) and \( \partial^2 TC/\partial Q^2 \) is the slope of \( MC \), the second-order condition may also be written as

Slope of \( MR < \) Slope of \( MC \)

It implies that \( MC \) must have a steeper slope than \( MR \) or \( MC \) must intersect the \( MR \) from below.

To conclude, profit is maximized where both the first and second order conditions are satisfied.

**Example**

We may now apply the profit maximization conditions to a hypothetical example and compute profit maximizing output.

We know that \( TR = PQ \).

Suppose price \( (P) \) function is given as

\[
P = 100 - 2Q \quad \ldots (9.6)
\]

Then

\[
TR = (100 - 2Q)Q
\]

or

\[
TR = 100Q - 2Q^2 \quad \ldots (9.7)
\]

Let us also suppose that the total cost function as given as

\[
TC = 10 + 0.5Q^2 \quad \ldots (9.8)
\]

Let us now apply the first order condition of profit maximization and find profit maximizing output. We have noted that profit is maximum where

\[
MR = MC
\]

or

\[
\frac{\partial TR}{\partial Q} = \frac{\partial TC}{\partial Q}
\]

Given the total \( TR \) function in Eq. (9.7) and \( TC \) function in Eq. (9.8),

\[
MR = \frac{\partial TR}{\partial Q} = 100 - 4Q \quad \ldots (9.9)
\]

and

\[
MC = \frac{\partial TC}{\partial Q} = Q \quad \ldots (9.10)
\]

Thus, profit is maximum where

\[
MR = MC
\]

or

\[
100 - 4Q = Q
\]

\[
5Q = 100
\]

\[
Q = 20
\]

The output 20 satisfies the **second order condition** also. The second order condition requires that

\[
\frac{\partial^2 TR}{\partial Q^2} - \frac{\partial^2 TC}{\partial Q^2} < 0
\]

In other words, the second-order condition requires that

\[
\frac{\partial MR}{\partial Q} - \frac{\partial MC}{\partial Q} < 0
\]
\[
\frac{\partial(100 - 4Q)}{\partial Q} - \frac{\partial(4Q)}{\partial Q} < 0 \\
- 4 - 1 < 0
\]
Thus, the second-order condition is also satisfied at output 20.

9.6 CONTROVERSY OVER PROFIT MAXIMIZATION OBJECTIVE

9.6.1 Gap between Theory and Practice

As discussed above, traditional theory assumes profit maximization as the sole objective of a business firm. In practice, however, firms have been found to be pursuing objectives other than profit maximization. It is argued, in the first place, that the reason for the firms, especially the large corporations, pursuing goals other than profit maximization is the dichotomy between the ownership and management. The separation of management from the ownership gives managers an opportunity and also discretion to set goals for the firms they manage other than profit maximization. Large firms pursue such goals as sales maximization, maximization of managerial utility function, maximisation of firm’s growth rate, making a target profit, retaining market share, building up the net worth of the firm, etc.

Secondly, traditional theory assumes full and perfect knowledge about current market conditions and the future developments in the business environment of the firm. The firm is thus supposed to be fully aware of its demand and cost functions in both short and long runs. Briefly speaking, a complete certainty about the market conditions is assumed. On the contrary, it is widely recognized that the firms do not possess the perfect knowledge of their costs, revenue, and their environment. They operate in the world of uncertainty. Most price and output decisions are based on probabilities.

Finally, the marginality principle of equalizing \( MC \) and \( MR \) has been found to be absent in the decision-making process of the firms. Empirical studies of the pricing behaviour of the firms have shown that the marginal rule of pricing does not stand the test of empirical verification. Hall and Hitch\(^\text{11}\) have found, in their study of pricing practices of UK 38 firms, that the firms do not pursue the objective of profit maximization and that they do not use the marginal principle of equalizing \( MR \) and \( MC \) in their price and output decisions. Most firms aim at long-run profit maximization. In the short-run, they set the price of their product on the basis of average cost principle, so as to cover \( AC = AVC + AFC \) and a normal margin of profit (usually 10 per cent). In a similar study, Gordon\(^\text{12}\) has found that there is marked deviation in the real business conditions from the assumptions of the traditional theory and that pricing practices were notably different from the marginal theory of pricing. He has concluded that the real business world is much more complex than the one postulated by the theorists. Because of the extreme complexity of the real business world and ever-changing conditions, the past experience of the business firms is of little use in forecasting demand, price and costs. The firms are not aware of their \( MR \) and \( MC \). The average-cost-principle of pricing is widely used by the firms. Findings of many other studies of the pricing practices lend support to the view that there is little link between pricing theory and pricing practices.

9.6.2 The Defence of Profit Maximization

The arguments against the profit-maximization assumption, however, should not mean that pricing theory has no relevance to the actual pricing policy of the business firms. A section of economists has strongly defended the profit maximization objective and ‘marginal principle’ of pricing and output decisions. The empirical and theoretical
support put forward by them in defence of the marginal rule of pricing may be summed as follows.

In two empirical studies of 110 ‘excellently managed companies’, J.S. Earley has concluded that the firms do apply the marginal rules in their pricing and output decisions. Fritz Maclup has argued in abstract theoretical terms that empirical studies by Hall and Hitch, and Lester do not provide conclusive evidence against the marginal rule and these studies have their own weaknesses. He further argues that there has been a misunderstanding regarding the purpose of traditional theory of value. The traditional theory seeks to explain market mechanism, resource allocation through price mechanism and has a predictive value, rather than deal with specific pricing practices of certain firms. The relevance of marginal rules in actual pricing system of firms could not be established because of lack of communication between the businessmen and the researchers as they use different terminology like \( MR \), \( MC \) and elasticities. Besides, businessmen even if they do understand economic concepts, would not admit that they are making abnormal profits on the basis of marginal rules of pricing. They would instead talk of a ‘fair profit’. Also, Maclup is of the opinion that the practices of setting price equal to average variable cost plus a profit margin is not incompatible with the marginal rule of pricing and that the assumptions of traditional theory are plausible.

While the controversy on profit maximization objective remains unresolved, the conventional theorists, the marginalists, continue to defined the profit maximization objective and its marginal rules.

**Arguments in Defence of Profit Maximization Hypothesis.** The conventional economic theorists defend the profit maximization hypothesis also on the following grounds.

1. **Profit is indispensable for firm’s survival.** The survival of all the profit-oriented firms in the long run depends on their ability to make a reasonable profit depending on the business conditions and the level of competition. Nevertheless, what is a reasonable profit? May be a matter of opinion. But, making a profit is a necessary condition for the survival of the firm. Once the firms are able to make profit, they try to make it as large as possible, i.e., they tend to maximize it.

2. **Achieving other objectives depends on firm’s ability to make profit.** Many other objectives of business firms have been cited in economic literature, e.g., maximization of managerial utility function, maximization of long-run growth, maximization of sales revenue, satisfying all the concerned parties, increasing and retaining market share, etc. The achievement of such alternative objectives depends wholly or partly on the primary objective of making profit.

3. **Evidence against profit maximization objective not conclusive.** Profit maximization is a time-honoured objective of business firms. Although this objective has been questioned by many researchers, the evidence against it is not conclusive or unambiguous.

4. **Profit maximization objective has a greater predicting power.** Compared to other business objectives, profit maximization assumption has been found to be a much more powerful premise in predicting certain aspects of firms’ behaviour. As Friedman has argued, the validity of the profit-maximization objective cannot be judged by a priori logic or by asking business executives, as some economists have done. The ultimate test of its validity is its ability to predict the business behaviour and the business trends.

5. **Profit is a more reliable measure of firm’s efficiency.** Thought not perfect, profit is the most efficient and reliable measure of the efficiency of a firm. It is also the source of internal finance. Profit as a source of internal finance assumes a greater significance when financial market is highly volatile. The recent trend shows a
growing dependence on the internal finance in the industrially advanced countries, In fact, in developed countries, internal sources of finance contribute more than three-fourths of total finance.

Finally, whatever one may say about firms’ motivations, if one judges their motivations by their acts, profit maximization appears to be a more valid business objective.

### 9.7 ALTERNATIVE OBJECTIVES OF BUSINESS FIRMS

While postulating the objectives of business firms, the conventional theory of firm does not distinguish between owners’ and managers’ interests. The recent theories of firm called ‘managerial’ and ‘behavioural’ theories of firm, however, assume owners and managers to be separate entities in large corporations with different goals and motivation. Berle and Means were the first to point out the dichotomy between the ownership and the management and its role in managerial behaviour and in setting the goal(s) for the firm that they manage. Later on Galbraith wrote extensively on this issue which is known as Berle-Means-Galbraith (B-M-G) hypothesis. The B-M-G hypothesis states (i) that owner controlled firms have higher profit rates than manager controlled firms; and (ii) that managers have no incentive for profit maximization. The managers of large corporations, instead of maximizing profits, set goals for themselves that can keep the owners quiet so that managers can take care of their own interest in the corporation. In this section, we will discuss very briefly some important alternative objectives of business firms, especially of large business corporations.

#### 9.7.1 Baumol’s Hypothesis of Sales Revenue Maximization

Baumol has postulated maximization of sales revenue as an alternative to profit-maximization objective. The reason behind this objective is the dichotomy between ownership and management in large business corporations. This dichotomy gives managers an opportunity to set their goals other than profit maximization goal which most owner-businessmen pursue. Given the opportunity, managers choose to maximize their own utility function. According to Baumol, the most plausible factor in managers’ utility functions is maximization of the sales revenue.

The factors which explain the pursuance of this goal by the managers are following.

First, salary and other earnings of managers are more closely related to sales revenue than to profits.

Second, banks and financial corporations look at sales revenue while financing the corporation.

Third, trend in sale revenue is a readily available indicator of the performance of the firm. It helps also in handling the personnel problem.

Fourth, increasing sales revenue enhances the prestige of managers while profits go to the owners.

Fifth, managers find profit maximization a difficult objective to fulfill consistently over time and at the same level. Profits may fluctuate with changing conditions.

Finally, growing sales strengthen competitive spirit of the firm in the market and vice versa.

So far as empirical validity of sales revenue maximization objective is concerned, factual evidences are inconclusive. Most empirical works are, in fact, based on inadequate data simply because requisite data is mostly not available. Even theoretically, if total cost
function intersects the total revenue function (TR) function before it reaches its climax, Baumol’s theory collapses.

Besides, it is also argued that, in the long run, sales maximization and profit maximization objective converge into one. For, in the long run, sales maximization tends to yield only normal levels of profit which turns out to be the maximum under competitive conditions. Thus, profit maximization is not incompatible with sales maximization.

9.7.2 Marris’s Hypothesis of Maximization of Firm’s Growth Rate

According to Robin Marris,\(^{20}\) managers maximize firm’s balanced growth rate subject to managerial and financial constraints. He defines firm’s balanced growth rate (G) as

\[ G = G_D = G_C \]

where \( G_D \) = growth rate of demand for firm’s product and \( G_C \) = growth rate of capital supply to the firm.

In simple words, a firm’s growth rate is balanced when demand for its product and supply of capital to the firm increase at the same rate. The two growth rates are according to Marris, translated into two utility functions: (i) manager’s utility function, and (ii) owner’s utility function.

The manager’s utility function (\( U_m \)) and owner’s utility function (\( U_o \)) may be specified as follows.

\[ U_m = f(\text{salary, power, job security, prestige, status}), \]

and

\[ U_o = f(\text{output, capital, market-share, profit, public esteem}). \]

Owners’ utility function (\( U_o \)) implies growth of demand for firm’s product and supply of capital. Therefore, maximization of \( U_o \) means maximization of ‘demand for firm’s product’ or growth of capital supply’. According to Marris, by maximizing these variables, managers maximise both their own utility function and that of the owners. The managers can do so because most of the variables (e.g., salaries, status, job security, power, etc.) appearing in their own utility function and those appearing in the utility function of the owners (e.g., profit, capital market, share, etc.) are positively and strongly correlated with a single variables, i.e., size of the firm. Maximization of these variables depends on the maximization of the growth rate of the firms. The managers, therefore, seek to maximize a steady growth rate.

Marris’s theory, though more rigorous and sophisticated than Baumol’s sales revenue maximization, has its own weaknesses. It fails to deal satisfactorily with oligopolistic interdependence. Another serious shortcoming of his model is that it ignores price determination which is the main concern of profit maximization hypothesis. In the opinion of many economists, Marris’s model too, does not seriously challenge the profit maximization hypothesis.

9.7.3 Williamson’s Hypothesis of Maximization of Managerial Utility Function

Like Baumol and Marris, Williamson\(^{21}\) argues that managers have discretion to pursue objectives other than profit maximization. The managers seek to maximize their own utility function subject to a minimum level of profit. Managers’ utility function(\( U \)) is expressed as

\[ U = f(S, M, I_D) \]

where

- \( S \) = additional expenditure on staff
- \( M \) = managerial emoluments,
- \( I_D \) = discretionary investments
According to Williamson’s hypothesis, managers maximize their utility function subject to a satisfactory profit. A minimum profit is necessary to satisfy the shareholders or else manager’s job security is endangered.

The utility functions which managers seek to maximize include both quantifiable variables like salary and slack earnings, and non-quantitative variable such as prestige power, status, job security, professional excellence, etc. The non-quantifiable variables are expressed, in order to make them operational, in terms of expense preference defined as ‘satisfaction derived out of certain types of expenditures’ (such as slack payments), and ready availability of funds for discretionary investment.

Like other alternative hypotheses, Williamson’s theory too suffers from certain weaknesses. His model fails to deal with the problem of oligopolistic interdependence. Williamson’s theory is said to hold only where rivalry between firms is not strong. In case of strong rivalry, profit maximization is claimed to be a more appropriate hypothesis. Thus, Williamson’s managerial utility function too does not offer a more satisfactory hypothesis than profit maximization.

### 9.7.4 Cyert-March Hypothesis of Satisficing Behaviour

Cyert-March hypothesis is an extension of Simon’s hypothesis of firms’ ‘satisficing behaviour’ or satisfying behaviour. Simon had argued that the real business world is full of uncertainty; accurate and adequate data are not readily available; where data are available managers have little time and ability to process them; and managers work under a number of constraints. Under such conditions it is not possible for the firms to act in terms of rationality postulated under profit maximization hypothesis. Nor do the firms seek to maximize sales, growth or anything else. Instead they seek to achieve a ‘satisfactory profit’ a ‘satisfactory growth’, and so on. This behaviour of firms is termed as ‘Satisfaction Behaviour’.

Cyert and March added that, apart from dealing with an uncertain business world, managers have to satisfy a variety of groups of people—managerial staff, labour, shareholders, customers, financiers, input suppliers, accountants, lawyers, authorities, etc. All these groups have their interest in the firms—often conflicting. The manager’s responsibility is to ‘satisfy’ them all. Thus, according to the Cyert-March, firm’s behaviour is ‘satisficing behaviour’. The ‘satisficing behaviour’ implies satisfying various interest groups by sacrificing firm’s interest or objective. The underlying assumption of ‘Satisficing Behaviour’ is that a firm is a coalition of different groups connected with various activities of the firms, e.g., shareholders, managers, workers, input supplier, customers, bankers, tax authorities, and so on. All these groups have some kind of expectations—high and low—from the firm, and the firm seeks to satisfy all of them in one way or another by sacrificing some of its interest.

In order to reconcile between the conflicting interests and goals, managers form an aspiration level of the firm combining the following goals: (a) Production goal, (b) Sales and market share goals, (c) Inventory goal, and (d) Profit goal.

These goals and ‘aspiration level’ are set on the basis of the managers’ past experience and their assessment of the future market conditions. The ‘aspiration levels’ are modified and revised on the basis of achievements and changing business environment.

The behavioural theory has, however, been criticised on the following grounds. First, though the behavioural theory deals realistically with the firm’s activity, it does not explain the firm’s behaviour under dynamic conditions in the long run. Secondly, it cannot be used to predict exactly the future course of firm’s activities, Thirdly, this theory does not deal with the equilibrium of the industry. Fourthly, like other alternative hypotheses, this theory too fails to deal with interdependence of the firms and its impact on firms behaviour.
9.7.5 Rothschild’s Hypothesis of Long-run Survival and Market Share Goals

Another alternative objective of a firm—as an alternative to profit maximization—was suggested by Rothschild. According to him, the primary goal of the firm is long-run survival. Some other economists have suggested that attainment and retention of a constant market share is an additional objective of the firms. The managers, therefore, seek to secure their market share and long-run survival. The firms may seek to maximise their profit in the long-run though it is not certain.

9.7.6 Entry-prevention and Risk-avoidance

Yet another alternative objective of the firms suggested by some economists is to prevent entry of new firms into the industry. The motive behind entry-prevention may be (a) profit maximization in the long run, (b) securing a constant market share, and (c) avoidance of risk caused by the unpredictable behaviour of new firms. The evidence of whether firms maximize profits in the long-run is not conclusive. Some economists argue, however, that where management is divorced from the ownership, the possibility of profit maximization is reduced.

The advocates of profit maximization, argue however, that only profit-maximizing firms can survive in the long-run. They can achieve all other subsidiary goals easily if they can maximize their profits.

It is further argued that, no doubt, prevention of entry may be the major objective in the pricing policy of the firm, particularly in case of limit pricing. But then, the motive behind entry-prevention is to secure a constant share in the market. Securing constant market share is compatible with profit maximization.

9.8 A REASONABLE PROFIT TARGET

As noted above, objectives of business firms can be various. There is no unanimity among the economists and researchers on the objective of business firms. One thing is, however, certain that the survival of a firm depends on the profit it can make. So whatever the goal of the firm—sales revenue maximization, maximization of firm’s growth, maximization of managers’ utility function, long-run survival, market share, or entry-prevention—it has to be a profitable organisation. Maximization of profit in technical sense of the term may not be practicable, but profit has to be there in the objective function of the firms. The firms may differ on ‘how much profit’ but they set a profit target for themselves. Some firms set their objective of a ‘standard profit’, some of a ‘target profit’ and some of a ‘reasonable profit’. A ‘reasonable profit’ is the most common objective.

Let us now look into the policy question related to setting standard or criteria for reasonable profits. The important policy questions are:

(i) Why do modern corporations aim at a “reasonable profit” rather than attempting to maximise profit?

(ii) What are the criteria for a reasonable profit?

(iii) How should “reasonable profits” be determined?

Let us now briefly examine the policy implications of these questions.

9.8.1 Reasons for Aiming at “Reasonable Profits”

For a variety of reasons, modern large corporations aim at making a reasonable profit rather than maximizing the profit. Joel Dean has listed the following reasons.
1. **Preventing entry of competitors.** Profit maximization under imperfect market conditions generally leads to a high ‘pure profit’ which is bound to attract competitors, particularly in case of a weak monopoly. The firms, therefore, adopt a pricing and a profit policy that assure them a reasonable profit and, at the same time, keeps potential competitors away.

2. **Projecting a favourable public image.** It becomes often necessary for large corporations to project and maintain a good public image, for if public opinion turns against it and government officials start raising their eyebrows on profit figures, corporations may find it difficult to sail smoothly. So most firms set prices lower than that conforming to the maximum profit but high enough to ensure a “reasonable profit”.

3. **Restraining trade union demands.** High profits make trade unions feel that they have a share in the high profit and therefore they raise demands for wage-hike. Wage-hike may lead to wage-price spiral and frustrate the firm’s objective of maximizing profit. Therefore, profit restrain is sometimes used as a weapon against trade union activities.

4. **Maintaining customer goodwill.** Customer’s goodwill plays a significant role in maintaining and promoting demand for the product of a firm. Customer’s goodwill depends largely on the quality of the product and its ‘fair price’. What consumers view as fair price may not be commensurate with profit maximisation. Firms aiming at better profit prospects in the long run, sacrifice their short-run profit maximization objective in favour of a “reasonable profit”.

5. **Other factors.** Some other factors that put restraint on profit maximisation include (a) managerial utility function being preferable to profits maximization for executives, (b) congenial relation between executive levels within the firm, (c) maintaining internal control over management by restricting firm’s size and profit, and forestalling the anti-trust suits.

**Standards of Reasonable Profits**

When firms voluntarily exercise restraint on profit maximization and choose to make only a ‘reasonable profit’, the questions that arise are: (i) what form of profit standards should be used, and (ii) how should reasonable profits be determined?

(i) **Forms of Profit Standards.** Profit standards may be determined in terms of (a) aggregate money terms, (b) percentage of sales, or (c) percentage return on investment. These standards may be determined with respect to the whole product line or for each product separately. Of all the forms of profit standards, the total net profit of the enterprise is more common than other standards. But when purpose is to discourage the potential competitors, then a target rate of return on investment is the appropriate profit standard, provided competitors’ cost curves are similar. The profit standard in terms of ‘ratio to sales is an eccentric standard’ because this ratio varies widely from firm to firm, even if they all have the ‘same return on capital invested’. This is particularly so when there are differences in (a) vertical integration of production process, (b) intensity of mechanization, (c) capital structure, and (d) turnover.

(ii) **Setting the Profit Standard.** The following are the important criteria that are taken into account while setting the standards for a “reasonable profit”.

(a) **Capital-attracting standard.** An important criterion of profit standard is that it must be high enough to attract external (debt and equity) capital. For example, if the firm’s stocks are being sold in the market at 5 times their current earnings, it is necessary that the firm earns a profit of 20 per cent of the book investment.
There are however certain problems associated with this criterion: (i) capital structure of the firms (i.e., the proportions of bonds, equity and preference shares) affects the cost of capital and thereby the rate of profit, and (ii) whether profit standard has to be based on current or long-run average cost of capital as it varies widely from company to company and may at times prove treacherous.

(b) ‘Plough-back’ standard. In case a company intends to rely on its own sources for financing its growth, then the most relevant standard is the aggregate profit that provides for an adequate “plough-back” for financing a desired growth of the company without resorting to the capital market. This standard of profit is used when maintaining liquidity and avoiding debt are main considerations in profit policy.

Plough-back standard is, however, socially less acceptable than capital-attracting standard. From society’s point of view, it is more desirable that all earnings are distributed to stockholders and they should decide the further investment pattern. This is based on a belief that market forces allocate funds more efficiently and an individual is the best judge of his resource use. On the other hand, retained earnings which are under the exclusive control of the management are likely to be wasted on low-earning projects within the company. But one cannot be sure as to which of the two allocating agencies—market or management—is generally superior. It depends on “the relative abilities of management and outside investors to estimate earnings prospects.”

(c) Normal earnings standard. Another important criterion for setting standard of reasonable profit is the ‘normal’ earnings of firms of an industry over a normal period. Company’s own normal earnings over a period of time often serve as a valid criterion of reasonable profit, provided it succeeds in (i) attracting external capital, (ii) discouraging growth of competition, and (iii) keeping stockholders satisfied. When average of ‘normal’ earnings of a group of firms is used, then only comparable firms and normal periods are chosen.

However, none of these standards of profits is perfect. A standard is, therefore, chosen after giving due consideration to the prevailing market conditions and public attitudes. In fact, different standards are used for different purposes because no single criterion satisfies all conditions and all the people concerned.

9.9 PROFIT AS CONTROL MEASURE

An important managerial aspect of profit is its use in measuring and controlling performance of the executives of the large business undertakings. Researches have revealed that business executives of middle and high ranks often deviate from profit objective and try to maximize their own utility functions. They think in terms of job security, personal ambitions for promotion, larger perks, etc., which often conflict with firms’ profit-making objective. Keith Powlson has pointed out three common deviationist tendencies:

(i) more energy is spent in expanding sales volume and product lines than in raising profitability;

(ii) subordinates spend too much time and money doing jobs to perfection regardless of its cost and usefulness; and

(iii) executives cater more to the needs of job security in the absence of any reward for imaginative ventures.

In order to control these deviationist tendencies and orienting managerial functions towards the profit objective, the top management uses "managerial decentralisation and
control-by-profit techniques’. These techniques have distinct advantage for a big business corporation. Managerial decentralisation is achieved by changing over from functional division of business activities (e.g., production branch, sales division, purchase department, etc.) to a system of commodity wise division. Managerial responsibilities are then fixed in terms of profit. Managers enjoy autonomy in their operations under the general policy framework. They are allotted a certain amount to spend and a profit target to be achieved by the particular division. Profit is then the measure of executive performance, not the sales or quality. This kind of reorganisation of management helps in assessing profit-performance of various product lines in a multi-product organisation. It serves as a useful guide in reorganisation of the product lines.

The use of this technique, however, raises many interesting technical issues that complicate the application of this technique. These issues centre around the method of measuring divisional profits and profit standards to be set. The two important problems that arise are: (i) should profit goals be set in terms of total net profit for the divisions or should they be confined to their share in the total net profit? and (ii) how should divisional profits be determined when there is a long ladder of vertical integration?

In respect of question (i) the most appropriate profit standard of divisional performance is revenue minus current expenses. In respect of allocating different costs, however, some arbitrariness is bound to be there. However, where a long vertical integration is involved, relative profitability of a division can be fixed in terms of a lower “transfer price” compared to the market price. But, control measures are not all that simple to apply. It is difficult to set a general formula. That has to be settled differently under varying conditions.

9.10 PROFIT PLANNING: BREAK-EVEN ANALYSIS

In traditional theory of firm, the basic objective of the firm is to maximize profit. Maximum profit does not necessarily coincide with the minimum cost, as far as the traditional theory of firm is concerned. Besides, profit is maximum at a specific level of output which is difficult to know before hand. Even if it is known, it cannot be achieved at the outset of production. In real life, firms begin their activity even at a loss, in anticipation of profit in the future. However, the firms can plan their production better if they know the level of production where cost and revenue break even, i.e., the profitable and non-profitable range of production. Break-even analysis or what is also known as profit contribution analysis is an important analytical technique used to study the relationship between the total costs, total revenue and total profits and losses over the whole range of stipulated output. Break-even analysis is the calculation of the sales volume that is required to cover costs; the level of sales revenue below which production is unprofitable and above which production is profitable. The break-even analysis is a technique of having a preview of profit prospects and a tool of profit planning. It integrates the cost and revenue estimates to ascertain the profits and losses associated with different levels of output.

The relationship between cost and output and between price and output may be linear or non-linear in nature. We shall discuss the break-even analysis under both linear and non-linear revenue conditions.

9.10.1 Break-Even Analysis: Linear Cost and Revenue Function

To illustrate the break-even analysis under linear cost and revenue conditions, let us assume a linear cost function and a linear revenue function are given as follows.

Cost function: \( TC = 100 + 10Q \) \( \ldots(9.11) \)

Revenue function: \( TR = 15Q \) \( \ldots(9.12) \)

The cost function given Eq. (9.11) implies that the firm’s total fixed cost is given at Rs. 100 and its variable cost varies at a constant rate of Rs. 10 per unit in response to
increase in output. The revenue function given in Eq. (9.12) implies that the price for the firm’s product is given in the market at Rs. 15 per unit of sale.

What firm needs to carry out break-even analysis of its business operations is to make a chart of its total fixed cost \( (TFC) \), total variable \( (TVC) \), total cost \( (TC) \) and the total revenue \( (TR) \), and graph them to find the break-even point. The process of break-even analysis is illustrated graphically in Fig. 9.8. The line \( TFC \) shows the total fixed cost at Rs. 100 for a certain level of output, and the line \( TVC \) shows the variable cost rising with a slope \( \left( \frac{\Delta Q}{\Delta TVC} \right) = \frac{1}{10} \). The line \( TC \) has been obtained by plotting the \( TC \) function. It can be obtained also by a vertical summation of \( TFC \) and \( TVC \) at various levels of output. The line \( TR \) shows the total revenue \( (TR) \) obtained as \( Q \times P \). The line \( TR \) intersects the line \( TC \) at point \( B \), where output is equal to 20 units. The point \( B \) shows that at \( Q = 20 \), firm’s total cost equals its total revenue. That is, at \( Q = 20 \), \( TC \) breaks even with \( TR \). Point \( B \) is, therefore, the break-even point and \( Q = 20 \) is the break-even level of output. Below this level of output, \( TC \) exceeds \( TR \). The vertical difference between \( TC \) and \( TR \), \( (i.e., TC–TR) \) is known as operating loss. Beyond \( Q = 20 \), \( TR > TC \), and \( TR–TC \) is known as operating profit. It may thus be inferred that a firm producing a commodity under cost and revenue conditions mentioned above must produce at least 20 units to make its total cost and total revenue break-even.

\[
\begin{align*}
TR &= TC \\
15Q &= 100 + 10Q \\
5Q &= 100 \\
Q &= 20
\end{align*}
\]

Thus, 20 is the break-even output. Given the \( TR \) and \( TC \) functions, production beyond 20 units will yield increasing profits, at least in the short-run.

**Algebra of Break-Even Analysis.** The break-even analysis can also be presented algebraically. As mentioned above, at break-even volume of sales,

\[
TR = TC
\]

where \( TR = (P \times Q) \) and \( TC = TFC + TVC \).

In break-even analysis, \( TVC \) is defined as \( TVC = AVC \times Q \). Thus,

\[
TC = TFC + AVC \times Q
\]
Now, break-even quantity \((Q_B)\) can be obtained as follows:

\[
TR = TC \\
Q_B \cdot P = TFC + AVC \cdot Q_B
\]

where \(Q_B\) = break-even volume.

Rearranging Eq. (9.13), we get

\[
Q_B \cdot P - AVC \cdot Q_B = TFC
\]

\[
Q_B = \frac{TFC}{P - AVC}
\]  \(\ldots (9.14)\)

If \(TFC, AVC\) and \(P\) are known, \(Q_B\) can be obtained straightaway from Eq. (9.14).

**Limitations.** The break-even analysis, as presented above, is based on the assumption that cost and revenue functions are linear. Under the condition of linear cost and revenue functions, \(TC\) and \(TR\) are straight lines and intersect each other at only one point (as shown in Fig. 9.8.) dividing the whole range of output into two parts—profitable and non-profitable. It may give the impression that the whole output beyond the break-even level is profitable. In real life, however, it may not be true due to changing price and cost conditions. In reality, the cost and revenue functions may be non-linear. Non-linearity arises because \(AVC\) and price vary with variation in the output. As a result, the total cost \((TC)\) may increase at increasing rates while the total revenue \((TR)\) increases at decreasing rates. Therefore, at some stage of output, \(TC\) may exceed \(TR\). Thus, there might be two break-even points (as shown in Fig. 9.3) instead of one. This limits the profitable range of output and determines the lower and upper limits of profitable output. The analyst should, therefore, pre-test and verify the validity of cost and revenue functions rather than assuming straightaway the linearity conditions.

### 9.10.2 Break-even Analysis: Non-linear Cost and Revenue Functions

Let us now describe the break-even analysis under non-linear cost and revenue functions. The break-even analysis is presented in Fig. 9.3. As shown in the figure, the \(TFC\) line shows the fixed cost at \(OF\) and the vertical distance between \(TC\) and \(TFC\) measures the total variable cost \((TVC)\). The curve \(TR\) shows the total sale proceeds or the total revenue \((TR)\) at different levels of output and price. The vertical distance between the \(TR\) and \(TC\) measures the profit or loss for various levels of output.

![Fig. 9.3: Break-even Analysis: Non-Linear Functions](image)

As shown in Fig. 9.3, \(TR\) and \(TC\) curves intersect each other at two points, \(B_1\) and \(B_2\), where \(TR = TC\). These are the lower and upper break-even points. For the whole range of output between \(OQ_1\) (corresponding to the break-even point, \(B_1\)) and \(OQ_2\) (corresponding to the break-even point \(B_2\)), \(TR > TC\). It implies that a firm producing
more than $OQ_1$ and less than $OQ_2$ will make profits. In other words, the profitable range of output lies between $OQ_1$ and $OQ_2$ units of output. Producing less or more than these limits will result in losses.

### 9.10.3 Contribution Analysis

Contribution analysis is the analysis of incremental revenue and incremental cost of a business decision or business activity. Break-even charts can also be used for measuring the contribution made by the business activity towards covering the fixed costs. For this purpose, variable costs are plotted below the fixed costs as shown in Fig. 9.4. Fixed costs are a constant addition to the variable costs. In that case, the total cost line will run parallel to the variable cost line.

![Fig. 9.4: Contribution Analysis](image)

The ‘Contribution is the difference between total revenue and variable costs’ arising out of a business decision. At the break-even level of output $OQ$ in Fig. 9.5, contribution equals fixed costs. Below the output $OQ$, the total contribution is less than the fixed cost. This amounts to loss. Beyond output $OQ$, contribution exceeds fixed cost. The difference is a contribution towards profits resulting from a business decision.

![Fig. 9.5: Profit Contribution Analysis](image)

Sometimes, contribution over the time period under review is plotted in order to indicate the commitment that the management has made for fixed expenditure, and to find the level of output of which it will be recovered and profit will begin to emerge. This kind...
of contribution analysis is graphically presented in Fig. 9.5. At output \( OQ \), contribution equals fixed cost. Beyond output \( OQ \), contribution includes net profit.

### 9.10.4 Profit Volume Ratio

The profit volume \((PV)\) ratio is another handy tool used to find the \( BEP \) for sales, specially for the multi-product firms. The formula for \( PV \) ratio is given below.

\[
PV\ Ratio = \frac{S - V}{S} \times 100
\]

where \( S \) = Selling price, and \( V \) = Variable costs (average).

For example, if selling price \((S)\) = Rs. 5 and variable cost \((V)\) = Rs. 4 per unit, then,

\[
PV\ Ratio = \frac{5 - 4}{5} \times 100 = 20\ per\ cent
\]

The break-even point \((BEP)\) in sales value is calculated after dividing the fixed expenses by \( PV \) ratio as follows.

\[
BEP\ (Sale\ value) = \frac{Fixed\ Expenses}{PV\ Ratio}
\]

For example, given the selling price at Rs. 5 per unit, average variable expenses at Rs. 3 per unit and fixed expenses \((F)\) of Rs. 4,000 per month, \( BEP \) (sale value) is calculated as follows.

\[
BEP\ (Sale\ value) = \frac{Fixed\ Expenses}{PV\ Ratio} \quad or \quad \frac{F}{(S-V)/S}
\]

We can calculate break-even sale volume by using the contribution per unit of sale by the following formula.

\[
BEP\ (Sale\ value) = \frac{Fixed\ Expenses}{Contribution\ per\ unit}
\]

\[
BEP = \frac{4000}{(5-3)} = \frac{4000}{2} = 2000\ units
\]

The \( PV \) ratio is not only helpful in finding the break-even point but it can also be used for making a choice of the product.

If there is no time constraint, the choice should always be for a product which assures a higher \( PV \) ratio. Otherwise, \( PV \) ratio per time unit is taken as the basis of choice. For example, suppose two products \( A \) and \( B \) involve the following variable cost and selling price.

<table>
<thead>
<tr>
<th>Products</th>
<th>( A )</th>
<th>( B )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling price unit (Rs.)</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>Variable cost per unit (Rs.)</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Machine hour per unit</td>
<td>2</td>
<td>1.0</td>
</tr>
</tbody>
</table>

\[
PV\ ratio\ for\ A = \frac{Selling\ Price - Variable\ cost}{Selling\ price} \times 100
\]

\[
= \frac{2 - 1}{2} \times 100 = 50\ per\ cent
\]

Therefore, for each machine hour, \( PV\ Ratio = 50/2 = 25\ per\ cent \)
PV ratio for \( B = \frac{2.5 - 1.5}{2.5} \times 100 = 40 \text{ per cent} \)

Therefore, for each machine hour, PV Ratio = 40 per cent.

In this case, product B is preferable to product A.

9.10.5 Margin of Safety

The margin of safety represents the difference between the sales at break-even point and the total actual sales. Three measures of the margin of safety are given below:

(i) Margin of safety = \( \frac{\text{Profit} \times \text{Sales}}{\text{PV Ratio}} \)

(ii) Margin of safety = \( \frac{\text{Profit}}{\text{PV Ratio}} \)

(iii) Margin of safety = \( \frac{S_a - S_b}{S_a} \times 100 \)

where \( S_a = \) actual sales and \( S_b = \) Sales at BEP.

The safety margin can be worked out by using formula (iii) as follows. Suppose \( TR \) and \( TC \) functions are given, respectively, as

\[ TR = 10Q \]
\[ TC = 50 + 5Q \]

and \( S_a = 20 \)

Given the \( TR \) and \( TC \) functions, \( S_b \) can be obtained as shown below. At break-even point, \( TR = TC \).

By substituting \( S_b \) for \( Q \) in \( TR \) and \( TC \) functions, we get

\[ TR = 10S_b \quad \text{and} \quad TC = 50 + 5S_b \]

Thus, at break-even point,

\[ 10S_b = 50 + 5S_b \]
\[ 10S_b - 5S_b = 50 \]
\[ 5S_b = 50 \]
\[ S_b = 10 \]

By substituting \( S_a \) and \( S_b \) in formula (iii), we get

\[ \text{Margin of safety} = \frac{20 - 10}{20} \times 100 = 50 \text{ per cent} \]

Margin of safety can be increased by increasing selling price provided the sales are not seriously affected. This can happen only when demand for the product is inelastic.

It can also be increased by increasing production and sales up to the capacity of the plant, if necessary, even by reducing selling price provided the demand is elastic. The other modes include reduction in fixed expenses, reduction in variable expenses or having a product mix with greater share of the one which assures greater contribution per unit or which has a higher PV ratio.

9.10.6 Profit-Volume Analysis Charts

The general break-even and contribution break-even charts have been discussed above in Figs. 9.3 through 9.5. There can be a number of such charts or graphs showing existing and proposed situations with variation in sales price, fixed and variable cost and, consequently, variable contributions to fixed costs, profits, etc. One of such charts is the cash break-even chart.
A cash break-even chart can be prepared by taking cash inflow from sales and cash outlay on fixed and variable costs. The distribution of the total contribution may also be shown from the angle of incidence as shown in Fig. 9.6.

Another variation of the break-even chart is called profit-volume analysis chart or graph. In this chart, the horizontal axis represents the sales volume and the vertical axis shows profit or loss. The profit line is graphed by computing the profit or loss consisting of the difference between sales revenue and the total cost at each volume. The point where the profit line intersects the horizontal axis is the break-even point. This has been shown in Fig. 9.7.

It may be noticed that break-even charts are good for displaying information. The same information is available from simple calculations.

Use of Break-Even Analysis

(i) Sales volume can be determined to earn a given amount of return on capital.
(ii) Profit can be forecast if estimates of revenue and cost are available.
(iii) Effect of change in the volume of sales, sale price, cost of production, can be appraised.
(iv) Choice of products or processes can be made from the alternatives available. Product-mix can also be determined.
(v) Impact of increase or decrease in fixed and variable costs can be highlighted.
(vi) Effect of high fixed costs and low variable costs to the total cost can be studied.
(vii) Valid interfirm comparisons of profitability can be made.
(viii) Cash break-even chart helps proper planning of cash requirements.
(ix) Break-even analysis emphasizes the importance of capacity utilization for achieving economies.
(x) Further help is provided by margin of safety and angle of incidence.

Limitations  We have discussed above that the break-even analysis based on linear assumptions. The linearity assumption can be removed by pre-testing the cost and revenue functions and by using, if necessary, the non-linearity conditions. Nevertheless, the break-even analysis as such has certain other limitations. First, the break-even analysis can be applied only to a single product system. Under the condition of multiple products and joint operations the break-even analysis can be applied only if product-wise cost can be ascertained which is, of course, extremely difficult. Second, break-even analysis cannot be applied usefully where cost and price data cannot be ascertained beforehand and where historical data are not relevant for estimating future costs and prices. Despite these limitations, the break-even analysis may serve a useful purpose in production planning if relevant data can be easily obtained.

Conclusion

Although profit maximization continues to remain the most popular hypothesis in economic analysis, there is no reason to believe that profit maximization is the only objective that firms pursue. Modern corporations, in fact, pursue multiple objectives. The economists have postulated a number of alternative objectives of business firms. The main factor behind the multiplicity of the objectives, particularly in case of large corporations, is the separation of management from the ownership.

Moreover, profit maximization hypothesis is a time-honoured one. It is more easy to handle. The empirical evidence against this hypothesis is not conclusive and unambiguous. Nor are the alternative hypotheses strong enough to replace the profit maximization hypothesis. More importantly, profit maximization hypothesis has a greater explanatory and predictive power than any of the alternative hypotheses. Therefore, profit maximization hypothesis still forms the basis of firms’ behaviour. In the subsequent chapters, we will use this hypothesis to explain the price and output decisions of the business firms.

9.11 SUMMARY

- Making profit, not necessarily profit maximization, is the most important objective of business firms. While economists use the concept of economic profit, business firms use accounting concept of profit, i.e., Profit = TR – TC.
- Theory of firm or theory of price determination is based on the assumption that firms aim at profit maximization. Theoretically profit is maximized at the level of output where MR = MC with rising MC.
- Economists have pointed out many other alternative objectives of business firms, viz. (i) sales maximization, (ii) maximization of firm’s growth rate, (iii) maximization of managerial utility function, (iv) satisfying all parties related with the firm, (v) entry prevention and risk avoidance, and (vi) making a reasonable profit. However, profit remains the main objective of business firms as it serves also as a control measure of business activities.
- Related to cost analysis is break-even analysis. Break-even analysis requires calculation of sales volume which covers cost. Production and sales below the break-even level causes loss to the firm and production and sales beyond the break-even level yields profit. Graphically, break-even marks a point where TR and TC curves intersect.
CONTRIBUTION ANALYSIS shows the contribution of total sales revenue (TR) over and above the total variable cost (TVC). In fact, contribution is the difference between TR and TVC.

Profit volume ratio is the percentage of per unit contribution to sales. It is worked out as \((S - V)/S\); where \(S = \) sale price and \(V = \) per unit variable cost.

9.12 ANSWERS TO ‘CHECK YOUR PROGRESS’

1. From businessmen’s point of view, the term ‘profit’ is used in accounting sense. Profit is defined as measured as \(TR – TC\).

2. Accounting profit is defined as the surplus of total revenue over all the explicit or paid out cost, \(i.e., \) profit = \(TR – TC\), whereas ‘economic profit’ is defined as the surplus of total revenue over both explicit and implicit costs. Implicit costs include (i) insurable risk, (ii) depreciation, and (iii) necessary minimum payment to shareholders.

3. The innovation theory of profit, suggested by J. A. Schumpeter, states that profit (more than normal profit) is the result of innovation. Innovation may be in the forms of new product, new quality of product, new technique of production, new market, new source of raw materials, and innovative management.

4. Knight’s theory of profit suggests that profit is the result of decisions taken and implemented under the condition of uncertainty-unpredictable risk.

5. Problems in measuring profit arise due to (i) problems in measuring depreciation, (ii) problem in treating capital gains and losses, and (iii) problem in treating current and historical cost.

6. The different methods used in accounting for depreciation are (i) straight line method, (ii) reducing balance method, (iii) annuity method, and (iv) sum of the year digit method.

7. There are two conditions for profit maximization: (i) necessary condition that \(MR = MC\), and (ii) supplementary condition that necessary condition must be satisfied under rising \(MC\).

8. In pricing theory, profit maximization is assumed to be the main objective of business firms. However, many economists suggest that business firms pursue many other objectives other than profit maximization, \(e.g.,\) Sales maximization, firms growth maximization, a target or reasonable profit, etc.

9. Business objectives other than profit maximization are (i) sales revenue maximization, (ii) maximization of firms growth rate, (iii) maximization of managerial utility function, (iv) satisfying all those who are related with firms directly or indirectly, and (v) surviving in the long run and having large market share.

10. The equilibrium price and output under profit maximization and sales maximization are different. Generally, under profit maximization price is higher and output lower than those under sales maximization objective.

11. Managerial utility function includes such (i) increasing managerial perks and reputation, (ii) increasing expenditure on staff, and (iii) having discretion to make investments.

12. According to ‘satisficing behaviour theory’, firms seek to satisfy all those who are directly or indirectly related to the firm by sacrificing a part of their profit. Such parties include shareholders, employees, customers, input suppliers, accountant, financers and authorities.

13. Break-even analysis is an exercise to find out the sales revenue that equals total cost. It help in finding out the minimum sales required by the firm.
14. For answer, see secton 6.6.1, Fig. 6.8.
15. Contribution analysis is carried out to find the difference between the sales revenue and total variable cost.
16. Profit volume ratio is the percentage profit per unit of sales estimated on the basis of variable cost.

**9.13 EXERCISES AND QUESTIONS**

1. Distinguish between the following concepts of profit:
   (a) Accounting profit and economic profit;
   (b) Normal profit and monopoly profit;
   (c) Pure profit and opportunity cost.
2. Explain the following statements:
   (i) Profit is the rent for exceptional ability of an entrepreneur (Walker).
   (ii) Profits arise only in a dynamic world (J.B. Clark).
   (iii) Profit is a reward for risk bearing (F.B. Hawley).
   (iv) Profit is a return to uncertainty bearing (F.H. Knight).
   (v) Profit is reward for innovations (J.A. Schumpeter).
3. What is the controversy on profit maximization hypothesis? How will you react to the controversy?
4. What problems do the depreciation and capital gains cause in measuring profit? What are the methods of resolving the problems?
5. Examine critically profit maximization as the objective of business firms. What are the alternative objectives of business firms?
6. Explain the first and second order conditions of profit maximization.
7. Why do firms in general aim at a reasonable profit rather than pursuing other goals? What are the standards of reasonable profits?
8. State whether the following statements are true or false:
   (a) Pure profit is the return in excess of the opportunity cost.
   (b) Profit maximization is the sole objective of all the firms.
   (c) Profit is maximum when MR – MC is maximum.
   (d) Pure profit is nil when opportunity cost equals actual earning.
   **Ans.** (a) True, (b) False, (c) False, (d) True
9. Profit maximization remains the most important objective of business firms in spite of multiplicity of alternative business objectives. Comment.
10. Profit maximization is theatrically the most sound but practically unattainable objective of business firms. Do your agree with this statement? Give reasons for your answer.
11. Assuming a price function as
    \[ P = 90 - 2Q \]
    and a cost function as
    \[ C = 10 + 0.5Q^2 \]
    find profit maximizing output and price.
12. Suppose cost (C) and revenue (R) functions are given as
    \[ C = 100 + 5Q^2 \]
    \[ R = 150Q - 2.5Q^2 \]
13. Find (a) profit maximizing output, 
    (b) maximum profit, and 
    (c) profitable range of output.

14. State precisely the major propositions of the Williamson’s model of managerial discretion. How are his propositions different from profit maximization assumption?

15. Explain how profit is used as a control measure. What problems are associated with the use of profit figures as a control measure?

16. What are the considerations in aiming at a reasonable profit target? What standards are used in determining a reasonable profit?

17. The profit and loss data of company for a particular year are given as follows:

<table>
<thead>
<tr>
<th>Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Sales</td>
</tr>
<tr>
<td>Cost of goods sold:</td>
</tr>
<tr>
<td>Variable cost</td>
</tr>
<tr>
<td>Fixed cost</td>
</tr>
<tr>
<td>Gross profit</td>
</tr>
<tr>
<td>Selling costs</td>
</tr>
<tr>
<td>Variable cost</td>
</tr>
<tr>
<td>Fixed cost</td>
</tr>
<tr>
<td>Net Profit</td>
</tr>
</tbody>
</table>

   (a) Compute the break-even point.
   (b) Forecast the profit for the sale volume of Rs. 1,60,000 and Rs. 70,000.
   (c) What would be sales volume to earn a net profit of Rs. 55,000?

18. (a) Discuss assumptions and limitations of break-even analysis.
    (b) A firm has purchased a plant to manufacture a new product. Cost data for the plant is given below:

   Estimated annual sales: 24,000 units

   Estimated costs:
   - Material: Rs. 4.00 per unit
   - Direct Labour: Rs. 0.60 per unit
   - Overhead: Rs. 24,000 per year
   - Administrative Expenses: Rs. 28,000 per year
   - Selling cost of sales: Rs. 1,590 per year

   (i) Calculate the selling price if profit per unit is Rs. 1.02, and
   (ii) Find out the break-even point in terms of output.

19. Distinguish between the following:
    (a) Marginal cost and incremental cost;
    (b) Business cost and full cost;
    (c) Actual cost and imputed cost;
    (d) Private cost and social cost of private business.

20. From the following data find out: (i) PV ratio, and (ii) BEP.

   |                |          |
   | Selling price | Rs. 50   |
   | Cost price    | Rs. 40   |
   | Fixed cost    | Rs. 5,000|

[Ans. (i) 20; (ii) 250]
9.14 FURTHER READING

Dean, Joel, Managerial Economics, Asia Publishing House, Bombay 1960, Indian edition, Ch. 1.

References

2. ibid., p. 378.
4. For example, Indian Income Tax Act makes only partial allowance for expenses on ‘entertainment and advertisement’.
17. J.K. Galbraith, American Capitalism; The Concept of Countervailing Power, 1952;
NOTES

25. A weak monopoly is one that has no strong barriers to protect its strategic material markets, patent rights, etc., and where production of a close substitute is technically a near possibility.
26. Managerial utility functions have already been discussed above in the section ‘Alternative Objectives of Business Firms’.
