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UNIT 1 INTRODUCTION

★ STRUCTURE ★

INTRODUCTION

Ever since the globalization started, the role and responsibilities of the finance manager have undergone a marked transformation. The finance manager has now become an integral part of the business enterprise and is involved in all the activities that take place in the enterprise. Today, his responsibility is not limited to procurement of funds but extends beyond it to ensure its optimal utilization. He plays pivotal role in planning quantum and pattern of fund requirements procuring the desired amount of funds, allocating funds so pooled among profitable outlets and controlling the uses of funds. Since all the business activities like marketing, purchase and production involve cash planning and utilization or generation of funds, the finance manager must take cognizance of his involvement in all the activities of the firm. He must also have clear conception of the over all objectives of his firm as he has to act in conformity with the objectives. Furthermore, he has to evaluate the effectiveness of financial decisions in the light of some standard. Objective of the firm provides such standard.

FINANCIAL OBJECTIVES OF THE FIRM

Objectives are long-term purpose and mission which state the reason for existence of the firm and declare what it wants to achieve in the long run. They represent desired results the firm wishes to attain by its existence and operations. They indicate specific share of aims, activities and accomplishments.

Being profit seeking organisation, the management is supposed to set profit maximization as the financial objective of the firm.

(*a*) Profit maximization objective
(*b*) Wealth maximization objective.

NOTES

PROFIT MAXIMIZATION OBJECTIVE

Profitability objective may be stated in terms of profits, return on investment, or profit to sales ratio. According to this objective, all such actions as increase income and cut down costs should be undertaken and those that are likely to have adverse impact on profitability of the enterprise should be avoided.

Advocates of the profit maximization objective are of the view that this objective is simple and has the inbuilt advantage of judging economic performance of the enterprise. Further, it will direct the resources in those channels that promise maximum return. This, in turn, would help in optimal utilization of society's economic resources. Since the finance manager is responsible for the efficient utilization of capital, it is plausible to pursue profitability maximization as the operational standard to test the effectiveness of financial decisions.

Criticism

(*i*) It is vague
(*ii*) Ignores time value factor
(*iii*) Ignores risk factor.

It is Vague

Ambiguity of term profit, as used in the profit maximization objective, is the first weakness. It is not clear in what sense the term profit has been used. It may be total profit before tax or after tax or profitability rate. Rate of profitability may again be in relation to share capital, owner's funds, total capital employed or sales. Which of these variants of profit should the management pursue to maximization so as to attain the profit maximization. Objective remains vague. Further more, the word profit does not speak anything about short-term and long-term profits. Profits in the short run may not be the same as those in long run. A firm can maximize its short term profit by avoiding current expenditure on maintenance of a machine. But owing to this neglect, the machine being put to use may no longer is capable of operating after sometime with the result that the firm will have to arrange huge investment outlay to replace the machine. Thus, profit maximization suffers in the long run for the sake of maximizing short-term profit. Obviously long-term consideration of profit cannot be neglected in favour of short-term profit.

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Ignores Time Value Factor

Profit maximization objective fails to provide any idea regarding timing of expected cash earnings. *E.g.,* if there are two investments project and if one is likely to produce stream of earnings of Rs. 90,000 in 6th year from now and other is likely to produce annual benefits of Rs. 15,000 in each of the six years, both the projects cannot be treated as equally useful ones. Although total benefits of both the projects are identical because of differences in value of benefits received today and those received a year or two years after. Choice of more worthy projects lies in the study of time value of future inflows of cash earnings. The interest of the firm and its owners is affected by the time value factor. The profit maximization objective does not take cognizance of this vital factor and treats all benefits, irrespective of the timing, as equally valuable.

Ignores Risk Factor

Another serious shortcoming of the profit maximization objective is that it overlooks risk factor. Future earnings of different projects are related with risk of varying degrees. Hence, different profits may have different values even though their earning capacity is the same.

NOTE A profit with fluctuation in earnings is considered more riskier than the one with certainty of earnings.

Naturally an invester would provide less value to the farmer than to the latter. Risk element of a project is also dependent on the financing mix of the project. Project largely financed by way of debt is generally more riskier than the one predominantly financed by means of share capital.

From the above it reveals that profit maximization objective is inappropriate and unsuitable as an operational objective of the firm. Suitable and operationally feasible objective of the firm should be precise and clear cut and should give weightage to time value and risk factor.

WEALTH MAXIMIZATION OBJECTIVE

The word wealth refers to worth of the firm. Therefore, wealth maximization is also stated as maximization of net present worth. Net present worth is the difference between gross present worth and amount of capital investment required to achieve the benefits.

Net present worth = (*GPW*) **Gross present worth**
– (*RCI*) **Requirement of capital investment.**

(GPW) represents the present value of expected cash benefits discounted at a rate which reflects their certainty and uncertainty. Thus, wealth maximization

objective as decisional criterion suggests that any financial action which creates wealth or which has a net present value (NPV) above zero is desirable one and should be accepted and others which do not satisfy (NPV) should be rejected.

$$W = \sum_{t=1}^{n} \frac{At}{(1+k)^t} - C.$$

where, W = net present worth.

A = Expected benefits over a period of time.

K = appropriate discount rate to measure risk and timing.

C = initial outlay required to acquire the asset.

t = time period.

The objective of wealth maximization has the advantage of exactness and unambiguity and taken care of time value and risk factor.

The wealth maximization objective, when used as decisional tool serves as a very useful guideline in taking investment decisions because the concept of wealth is very dear. It represents.

Value of the benefit – cost of investment

The concept of cash flow is more precise in cannotation than that of accounting profit. Thus, measuring benefits in terms of cash flows generated avoids ambiguity.

The wealth maximization objective considers time value of money. It recognises that cash benefits emerging from a project in different years are not identical in value. (Annual cash benefits of a project are discounted at a discount rate to calculate total value of these cash benefits). At the same time, it also gives due weightage to risk factor by making necessary adjustments in the discount rate. **Cash benefits of a project with higher risk exposure are discounted at higher discount rate, while lower discount rate is applied to discount expected cash benefits of a less risky projects.** Hence, discount rate is used to determine present value of future streams of cash earnings reflects both the time and risk.

From the facts enumerated above, wealth maximization objective is considered superior to profit maximization objective.

FINANCE FUNCTIONS

There are two views in respect to finance functions.

(*a*) **Traditional view functions**

(*b*) **Modern view functions.**

(*a*) Traditional View Functions

(*i*) Primary responsibility of a finance manager is to raise necessary funds to meet operating requirements of the business.

(*ii*) Take decisions with respect to the choice of optimum sources from which the funds would have to be secured.

(*iii*) Timing of the borrowing or scale of stock and cost and other terms and conditions of acquiring these funds.

(*iv*) Planning quantum and pattern of fund requirements and allocation of funds as among different assets.

(*b*) Modern View Functions

It views finance as an integral part of the overall management rather than as a staff speciality concerned with fund raising operations. According, finance manager has been assigned under responsibilities.

(*i*) Finance manager has to arrange funds and make sure that firm has sufficient funds to carry out its plans along with wide application of funds in the productive process.

(*ii*) To make the rational matching of the benefits of potential uses against the costs of alternative potential sources so as to help the management to accomplish its broad goals.

(*iii*) Concerned with all financial activities of planning, raising, allocating and controlling etc.

(*iv*) To handle such financial problems as are encountered by a firm at the time of incorporation, liquidation, consolidation, reorganisation and the like situations that occurs infrequently.

ROLE OF FINANCE MANAGER (*IN THE CONTEXT OF INDIA*)

Post second world war witnessed finance manager playing instrumental role in the overall functioning of an enterprise. Finance manager continues to occupy crucial position in the management hierarchy of an enterprise. In fact, he is recognised as an integral part of corporate management who is involved in almost all the crucial decision making affairs because every problem and every decision entails financial implications.

The role of finance manager has further become significant and his responsibility more complex during post liberalisation period in India. In view of increased competitiveness in every business sector, entry of foreign investors in the country, availability of various financial instruments and hedging mechanisms and when the focus of the management has tended to be on cost and quality which can help the enterprise to ensure success and maintain competitive edge over the rivals.

Finance manager plays significant role in helping the business entrepreneurs and management in overcoming their business problems and accomplishing their wealth maximization objective. One of the prime problems facing corporate management is in the area of capital investments. How much capital expenditures should the enterprise commit, what volume of funds should be committed and how should funds be allocated as among different investment outlets are the critical issues which have to be handled with utmost care failing which the enterprise may land in grave financial crises. A finance manager with his expertise, knowledge of capital budgeting, simulation and sensitive techniques enables the corporate management in choosing the most viable projects promising maximum results coupled with minimum risks.

The central management also faces formidable problem of allocating funds as among cash receivables and inventories because they have to strike trade off between the two conflicting but equally important goals of the business. Higher the relative share of liquid assets, lesser will be the possibility of cash drawn other things being equal. However profitability in that case will be less. On the contrary, if a smaller share of funds is held in liquid form, risk of insolvancy will be higher and profitability will also be higher. The management is thus in dilemma which a finance manager endeavours to resolve by making use of principles and techniques of finance. A finance manager has to develop a wide and diversified investors base, develop sensitivity to investors needs and maintain strong investors and banking relationship. In order to ensure ready access to cash without affecting the forms profitability. Investors relation communication of the company's strategy on an ongoing basis is important in the future president finance manager is one who continually balances the objective of achieving the best terms with the requirements to maintain wide and friendly franchise of capital providers.

Another problem plaguing the management pertains to designing such pattern of capitalisation as may be helpful in maximizing earnings per share (EPS) and so also the market value of shares. This involves examination in depth of some of the important issues such as from what sources are funds available to what extent are funds from these sources, what is expected cost of future financing, what sources of funds should be tapped and to what extent, What financial instruments should be employed to raise funds and at what time ? Which financial institution should be approached for garnering funds ? A finance manager with his knowledge of finance, capital and money markets, investors psychology etc., offer suitable solutions to these problems.

While designing suitable capital structure of the firm, finance manager's primary concern should be to minimised cost without foregoing flexibility. He should assess full implications of financial risk arising out of greater reliance on debt. Debt to equity ratios are a widely used measure to evaluate prudent capital structure and to determine the choice of debt and equity in financing. A finance manager's need to reject whether this is a correct and useful measure and one that leads to optimal decisions regarding debt and debt to equity. In

addition, to using the book debt to equity ratios. A finance manager should consider other measures such as asset coverage ratio, cash flow coverage for interest debt or equity.

Once the business is set up and earns profit, the corporate management has to decide about allocation of earnings between payments to share holders and retained earnings. Here again, the management is in dilemma a to trade off between growth and dividends the two equally desirable but conflicting goals of the enterprise. A satisfactory compromise between to two has to be struck in such a way that sharesholders wealth in the enterprise is maximized. The central management calls upon the expertise of the finance manager in striking such compromise and helps the management in prudent allocation of income.

Besides handling day to day problems a finance manager also helps the corporate management in dealing with episodic problems including reorganisation, merger, consolidation and liquidation. During the post liberalisation period which has entire merger wave and corporte restructuring on a massive scale, it becomes the most important responsibilty of the finance manager to assess the financial implication of alliances or restructuring. He has to help ultimately maximise the value of the enterprise.

Thus, finance manager plays a very significant role in optimal utilization of financial resources in the firm and thereby ensures its successful survival and growth.

SUMMARY

- The finance manager has now become an integral part of the business enterprise and is involved in all the activities that take place in the enterprise.
- Being profit seeking organisation, the management is supposed to set profit maximization as the financial objective of the firm.
  (*a*) Profit maximization objective
  (*b*) Wealth maximization objective.
- Wealth maximization objective is considered superior to profit maximization objective.

SELF ASSESSMENT QUESTIONS

1. What are two main aspects of the finance functions?
2. Explain wealth maximization and profit maximization objectives of the financial management.
3. Discuss important functions of finance manager.

NOTES

UNIT 2 CAPITALISATION

★ STRUCTURE ★

- Introduction
- Basis of Capitalisation
- Estimating Annual Net Earnings
- Determining the Capitalisation Rate
- Overcapitalisation
- Undercapitalisation
- Summary
- Self Assessment Questions

INTRODUCTION

It is an important constituent of financial plan. In general, capitalisation refers to total amount of capital employed in the business.

Broadly speaking, the expression capitalisation refers to the act of deciding in advance the quantum of fund requirements of a firm and its pattern and administration of capital in the interest of the firm means capitalisation is used as alternative to the word financial plan.

According to experts holding narrow view, the term capitalisation cannotes the process of determining size of funds that a firm would require to run its business. Decisions as to make up of capitalisation according to them, are manifested in term capital structure.

Modern concept of capitalisation is most logical. Capitalisation should comprise all sources of capital which are employed to raise desired amount of capital for a firm. Thus, there are four sources of capitalisation.

(*a*) Share capital

(*b*) Reserves and Surplus

(*c*) Long-term loans

(*d*) Short-term loan and trade credits.

Capitalisation in case of company in promotional stage, whose financing had not been completed, refers to the total amount of shares and debentures which it was permitted to issue under its memorandum of association called authorised capitalisation. The problem of capitalisation is not only faced at the time of incorporation of a corporation but even a going concern is also seized

with the question of determining the capitalisation when need for assessing the real value of the business arises.

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BASIS OF CAPITALISATION

After estimating fund acquirements for the enterprise, a finance manager is saddled with the problem of determining the value at which firm should be capitalised because firm will have to raise funds accordingly. Following two important theories act as guideline in determining the amount of capitalisation.

1. Cost theory of capitalisation
2. Earning theory of capitalisation.

1. Cost Theory of Capitalisation

According to this theory, capitalisation of a firm is determined on the basis of cost of different assets. A firm needs funds to acquire *fixed assets,* to meet *promotional and organisation expenses* and to meet *current assets,* requirements of the enterprise. Sum of the cost requirements of the above assets give the amount of capitalisation.

Cost basis of capitalisation seems to be logical as the funds are needed to acquire various assets but it does not provide sufficient basis for capitalisation of the company with irregular earnings since capitalisation should reflect the real worth of the enterprise. It is interesting that capitalisation determined on cost basis will represent the true value of the enterprise momentarily as the original cost or book value is highly stable in character and fails to reflect changes. Further more, the capital equipments or assets may have inflated values or become obsolete, it will not be reflected in the capitalisation arrived at on the basis of cost. If some of fixed assets lie idle, become obsolete or are poorly employed, earnings will be low and the company will not be able to pay a favourable return on capital investment resulting over capitalisation.

2. Earning Theory of Capitalisation

According to this theory, a firm should be capitalised on the basis of *expected earnings* of the firm. A firm is a profit seeking entity and hence, its real value should be determined according to what it earns. It should, however, not mean that if a firm's annual earnings is about (suppose) Rs. 50,000/- it is worth that amount for the firm will continue to earn for a number of years. Since company is a going concern it is customary to assume that the stream of net earnings will continue for an indefinite period. According, value obtained by multiplying annual net income of a firm by appropriate multiplier would be the real value of the firm. The multiplier would mean capitalisation rate. Capitalisation of a company as per this theory can thus be determined with the help of following:

Capitalisation = Annual net earnings × capitalisation rate

NOTES

Thus, for the purpose of determining amount of capitalisation in an enterprise the finance manager has to first estimate the stream of annual net income of the enterprise where after he will have to determine capitalisation rate.

ESTIMATING ANNUAL NET EARNINGS

In capitalising income only future annual net income is used. The task of estimating future can be based on the past income since, past earnings give a partial evidence of what future earnings will be. Thus, first step in the process would be to select a period of time that will represent a normal picture of both the good and bad year in the company's recent history.

NOTES

1. While computing, non-recurring gains such as gain realised on the sale of building etc., must not be considered.
2. Usually only earnings attributable to operations of enterprise are included.
3. Income tax is deducted from the earning figures.
4. Net income figure is further adjusted for any other factor that would make the adjusted amount more representative of the expected future earnings.
5. Long run prospects of the company should also be taken into consideration.
6. If the firm's profits have recorded upward tendency recent year figures are given more weight and historical period need not be used.
7. Usually an average of the recent five year figures is taken as a typical of what the future will be.
8. Appropriate adjustments should also be made for any unusual items of income or expenses.
9. Losses resulting from flood or any other disaster should ordinarily not be deducted from income.
10. In case of a new concern an estimate of cost and earnings of the proposed venture has got to be made.
11. Cost will be determined on the basis of the manager's knowledge of material cost, labour cost and other operating expenses.
12. Earnings of the company should be estimated on the basis of the volume of sales.
13. The sales estimate is arrived at on the basis of forecasts of the business conditions in the country as a whole, in industries that will buy from the firm and in the field which the company is entering.
14. These estimates are then compared with the actual figures of the firms engaged in the same business.
15. Allowance, of course, must be made for differences in size, age, location, managerial experience, rate of growth and similar other factors in such comparison.

DETERMINING THE CAPITALISATION RATE

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It refers to the rate of return that is required to attract capital for the enterprise. More specifically, capitalisation rate to tantamount to cost of capital. The rate of capitalisation can best be determined by studying the rate of earnings of the similarly situated companies in the same industry and the rate at which market is capitalising the earnings. Such a study involves an analysis of the return on stock on bonds, and business enterprises.

Thus, capitalisation rate must reflect return on the invested capital that would adequately compensated the investor for the use of his funds and the risk he undertakes. In actual practice, average price-earnings ratio of companies engaged in a particular industrial activity is taken as capitalisation rate of the corporation.

e.g., of market value of shares of a company is Rs. 10,00,000 and the company's annual earnings is Rs. 80,000 its capitalisation rate would be 12.5.

$$\text{Earnings} - \text{Price ratio} = \frac{10,00,000}{80,000} = \frac{100}{8} = 12.5$$

NOTES

1. Determination of capitalisation rate with the help of price earnings ratio would be most appropriate where company's entire financial requirements are met through share capital.
2. Generally, companies rely for their capital needs on different sources of financing. Share capital supplies only a part of total funds.
3. Under such a situation capitalisation rate arrived at on the basis of price earnings ratio would not be representative one.

Earning principle of capitalisation is logical because amount of capitalisation is determined in the light of earning capacity of the corporation. However, it is helpful only when company's expected income and capitalisation rate can precisely be estimated. In real life these two variables are most different to ascertain. In first instance, the amount of future earnings is hand to forecast since it depends on myriads of factors important among them being public demand, competition, managerial efficiency and general price level. Similarly, calculation of capitalisation rate is none-too-easy a job since it is primarily related to the degree of risk inherent in the business and to the amount of managerial skill needed to cope with that risk. Also, it is affected by degree of variability of income. Even intangible factors such as prestige or stigma associated with the line of business affected the capitalisation rate. Alongside this, there is an element of uncertainty in capitalisation rate as it fluctuates with stages in business cycle.

In view of the foregoing limitations of the earning theory of capitalisation newly established concerns prefer cost theory as the basis for determining their capitalisation.

NOTE For existing ventures, however, earning theory might be relatively more helpful.

NOTES

OVERCAPITALISATION

Overcapitalisation is a relative term used to denote that the firm in question is not earning reasonable income on its funds.

When a business is unable to earn a fair rate of return on its outstanding securities it is overcapitalisation.

Thus, overcapitalisation refers tax that state of affairs where earnings of the corporation do not justify the amount of capital invested in the business.

NOTES
1. Company is said to be overcapitalised only when it has not been able to earn fair income over a large period of time. If earning position of a company is adversely affected temporarily, owing to occurrance of abnormal events *e.g.*, strikes, lockouts and fire accident, it would be misnomer to consider such company in the plight of overcapitalisation. Overcapitalisation is the consequence of prolonged irregularities.
2. A company having earned relatively law rate of return on its capital incessantly for a long span of time, real value of its assets would always be less than their book value.

EXAMPLE 1. Ram and Co. has earned net profit of Rs. 12 lakhs in the financial year 2004–05. The total amount of equity share capital of the company is Rs. 1.08 crores and the total assets of Rs. 180 lakhs. Investors expect 12% of return on their investment in shares. Determine if the company is overcapitalised.

SOLUTION. The fair rate of return = 12%

Rate of return earned on equity share capital by this firm

$$= \frac{12,00,000}{1,08,00,000} \times 100 = \frac{1200}{108} = 11.11\%$$

$$\text{Rate of return on total assets} = \frac{12,00,000}{1,80,00,000} \times 100 = \frac{1200}{180} = 6.67\%$$

Since the company's earning rate is less than the fair rate of return, hence, it is overcapitalised.

Causes of Overcapitalisation

1. Promotion of a company with inflated assets.
2. Company promoted with high promotion expenses.
3. Cover estimating earning at the time of promotion.
4. Applying high capitalisation rate to capitals earnings.
5. Company formed or expanded during inflationary period.
6. Shortage of capital.

7. Defective depreciation policy.
8. Liberal dividend policy.
9. Fiscal policy.

NOTES

Impact of Overcapitalisation

Overcapitalisation is a state that affects not only the company and its owners but also the society as a whole.

On Company

1. Company's financial stability to jeopardised.
2. It losses investor's confidence owing to irregularity in dividend declaration caused by reduced earning capacity.
3. Problem in raising capital from capital market for the development and expansion *i.e.,* long term capital requirements.
4. Problem in raising short term capital from commercial banks hence shortage of working capital.
5. Owing to irregular payment of interests and capital, creditors seek liquidation or reorganisation of company.
6. Overcapitalised concerns gradually loose market to their competitions because firstly, production cost goes up due to non-replacement of worn out assets and old technology. Secondly, these companies are also not capable of providing as much facilities to their customers.

On Shareholders

1. Their dividend income falls, and it is uncertain.
2. Capital invested also depreciate due to fall in market value of the shares.

On Society

1. Overcapitalised concerns in their endeavour to maintain their credit take every possible steps to prevent declining tendency of income. They try to increase the prices and deteriorate the quality of product. It is quite difficult under the perfect competition and result is liquidation of concern. Industrial unit closes thereby many men loses their jobs. Wages rate also tends to decline.
2. Owing to fall in purchasing power of the labour class their demand tends to decline. This tendency may gradually permeate over the whole society and recession may follow.
3. Process of capital formation is hampered and development activities slacked and economy is thrown out of gear.

NOTES

Remedies

1. Reduction in Bonded debt.
2. Reduction in fixed changes on debt.
3. Redemption of High dividend preferred stock.
4. Reducing par values of shares.
5. Reducing number of shares.

UNDERCAPITALISATION

The situation of undercapitalisation indicates the excess of real worth of the assets over the aggregate of shares and debentures outstanding. Thus, if a company succeeds in earning abnormally high income continuously for a very long period of time, it indicates symptoms of undercapitalisation.

Undercapitalisation is an indication of effective and proper utilization of funds employed in the business. It also indicates sound financial position and good management of the company. Hence, it is said that "undercapitalisation is not an economic problem but a problem in adjusting capital structure".

Causes of Undercapitalisation

Following are the causes of undercapitalisation:

1. At times while deciding the amount of shares and debentures to be issued, the future earnings are underestimated resulting under-capitalisation. Similarly, use of low rate of capitalisation for capital the future earning may also result in undercapitalisation.
2. When earnings of the business come as a windfall in the transition period from depression to boom.
3. When company follow too conservative policy for paying the dividends keeping aside more and more profit for making further additions and investments. As a result, the company may find itself to be in too high profit and thus undercapitalisation.
4. The company may be in the position to improve its efficiency through constant modernisation programmes financed out of its own earnings. So such the earnings capacity of the company may increase to such an extent that the real value of the assets is much more than the book value which results into the state of undercapitalisation.

Effects of Undercapitalisation

On Company

1. As earning per share ratio is quite high, it increases the competition unduly by creating a feeling that the line of business is very lucrative.

2. Increasing amounts of profits increases the tax liability of the company.
3. Marketability of the shares of company in share market is restricted due to very high prices.
4. Due to high profitability, the wages demanded by worker go up, reduced working hours, more welfare schemes and more social amenities.
5. High profitability creates feeling that prices changed from customers for the product/service are to high and try to put pressure on company to cut down the prices.
6. Increasing profitability along with unrest among the employees and consumers may create situation where Government intervention or control is unavoidable.

On Shareholders

Shareholders are generally benefited by it because

1. They get a very high return on their capital as dividend.
2. Share prices are high means market value is more than face value hence, can be sold out at any given time resulting capital gain.
3. In times of need these shares can be mortgaged with the banks for the loan due to high credit standing of the company in the market.
4. Due to high prices the market of the share is restricted.

On Society

1. It encourages new entrepreneurs to start new ventures or expansion of existing ones.
2. Increase in production.
3. Reduction in unemployment.
4. Variety of production at a cheaper rate is available to the consumers.
5. If the feeling is developed among the workers and consumers that they are being exploited due to ever increasing profitability may disturb not only the company but the society too.

Remedies

1. Issues of bonus shares.
2. Splitting of shares.

SUMMARY

- Capitalisation refers to total amount of capital employed in the business.

- Two important theories act as guideline in determining the amount of capitalisation.
  1. Cost theory of capitalisation
  2. Earning theory of capitalisation.
- Overcapitalisation is a relative term used to denote that the firm in question is not earning reasonable income on its funds.
- The situation of undercapitalisation indicates the excess of real worth of the assets over the aggregate of shares and debentures outstanding.

SELF ASSESSMENT QUESTIONS

1. What is capitalisation and its bases? Explain them in brief.
2. What do you mean by over and undercapitalisation? Comment on their causes and effects on the different sectors along with the remedies, in brief.

UNIT 3 CAPITAL STRUCTURE

NOTES

★ STRUCTURE ★

INTRODUCTION

It refers to the mix of sources from which the long term funds required by a business are raised.

PRINCIPLES OF CAPITAL STRUCTURE MANAGEMENT

For considering the suitable pattern of capital structure it is necessary to consider certain basic principles which are related to each other. It is necessary to find a golden mean by giving proper weightage to each of them. These principles are :

1. Cost principle
2. Risk principle
3. Control principle
4. Flexibility principle
5. Timing principle.

1. Cost Principle

According to this principle, ideal capital structure should minimize cost of financing and maximizing earning per share. Debt capital is a cheaper form of capital due to two reasons. First, the expectations of returns of debt capital holders are less than those of equity share holders. Secondly, interest is a deductable expenditure for tax purposes where as dividend is an appropriation.

2. Risk Principle

According to this principle, ideal capital structure should not accept unduly high risk. Debt capital is a risky form of capital as it involves contractual obligation as to the payment of interest and repayment of pricipal sum, irrespective of profits or losses of the business. If the organisation issues large

amount of preference shares, out of the earnings of the organisation, less amount will be left out for equity share holders as dividend on preference shares are required to be paid before any dividend is paid to equity share holders. Raising the capital through equity shares involves least risk as there is no obligation as to the payment of dividend.

3. Control Principle

According to this principle, ideal capital structure should keep controlling position of owners intact. As preference share holders and holders of debt capital carry limited or no voting rights, they hardly disturb the controlling position directly as the control of the residual owners is likely to get diluted.

4. Flexibility Principle

According to this principle, ideal capital structure should be able to cater to additional requirements of funds in future if any. *For example,* if a company has already raised too heavy debt capital, by mortgaging all the assets, it will be difficult for it to get further loans inspite of good market conditions for debt capital and it will have to depend on equity shares only for raising further capital. Moreover organisation should avoid capital on such terms and conditions which limit company's ability to procure additional funds. If company accepts debt capital on the conditions that it will not accept further loan capital or dividend on equity shares will not be paid beyond a certain limit, then it looses flexibility.

5. Timing Principle

According to this principle, ideal capital structure should be able to seize market opportunities, should minimize cost of raising funds and obtain substantial savings. Accordingly, during the days of boom and prosperity, company can issue equity shares to get the benefit of investor's desire to invest and take the risk. During the days of depression, debt capital may be used to raise the capital as the investors are afraid to take the risk.

FACTORS AFFECTING CAPITAL STRUCTURE

Before deciding the mix of various long term sources of funds, it is necessary for the company to take into consideration various factors which can be broadly classified as below :

1. Internal factors
2. External factors
3. General factors.

NOTES

1. Internal Factors

Internal factors are further classified as :

(*a*) Cost factor

(*b*) Risk factor

(*c*) Control factor

(*d*) Objects of the capital structure planning.

(*a*) **Cost factor :** It is as the factor affecting the capital structure decisions refers to the cost-associated with the process of raising the various long term sources of funds which is referred to as cost of capital. While deciding the capital structure, it should be ensured that the use of capital is capable of earning enough revenue to justify the cost of capital associated with it. It should be noted that the borrowed capital is a cheaper form of capital for the company and this is due to the following reasons.

(*i*) The expectations of the lenders of borrowed funds are less than the expectations of the investors who invest in the own capital of the company. This is due to the fact that the risk on the part of lenders of borrowed funds is comparatively less than the risk on the part of investors in own funds.

(*ii*) The return which the company pays on borrowed funds, *i.e.*, interest is an income tax deductible expenditure for the company whereas the return paid on own capital *i.e.*, dividend is not an income tax deductible expenditure for a company. As such when the company pay the interest on borrowed capital, its tax liability gets reduced, where as payment of dividend does not affect the tax liability of the company as the same is paid out of profit after taxes.

(*b*) **Risk factor :** In finance, risk and return always go hand in hand, which ever capital is cheaper for the company is risky for the company. Cost associated with the borrowed funds may be less, but the borrowed capital is more risky for the company. It is due to following reasons.

(*i*) Payment of interest at the predetermined rate of interest at the predetermined time intervals irrespective of non-availability of profits is a contractual obligation for the company.

(*ii*) The company is required to repay the principal amount of borrowed capital at the predetermined maturity date.

(*iii*) Borrowed capital is usually secured capital. If the company fails to meet its contractual obligations, the lender of borrowed funds may enforces the sale of assets, offered to them as security.

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Cost associated with the own funds may be more for the company, but risk associated with them is less due to following reasons.

(*i*) As the return paid on own capital *i.e.*, dividend is the appropriation of profits the company is not bound to pay any dividend unless there are profits. There are many companies who have not paid any dividend on equity shares for years together due to non-availability of profits.

(*ii*) The company is not expected to repay the own capital during the life time of the company.

(*iii*) Own capital is an unsecured capital. As such none of the assets of the company are offered as the security to the investors in own funds.

(*c*) **Control factor :** While planning the capital structure and more particularly while raising the additional funds required by the company, the control factor essentially becomes an important factor to be considered, specifically for the closely held private limited companies. Control factor refers to the capacity of the existing owners of the company to retain control over operations of the company. If the company decide to meet the additional requirements of funds by issuing the equity shares or preference shares, the controlling interest of the existing owners is likely to get diluted as the investors in equity shares enjoy the absolute voting right while investors in preference shares enjoy limited voting rights. If the company decides to meet the additional requirement of funds by way of borrowed capital, the controlling interest of the existing owners remain intact as the lenders of borrowed capital do not enjoy and voting rights.

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1. If the existing owners contribute to the rights shares which indicate the additional shares offered to the existing owners in the existing proportion, their controlling interests may not get affected.
2. While raising this additional requirements of funds by way of borrowed capital, the existing owners of the lending bank or financial institutions appoint their representation as Nominee director on the Board of Directors of the borrowed company.

(*d*) **Objects of capital structure planning :** While planning the capital structure, following objects of capital structure planning come into play.

(*i*) To *maximize the profits* available to the owners of the company. This can be achieved by issuing the securities carrying less cost of capital.

(*ii*) To issue *the securities which are easily transferable* and can be ensured by listing the securities on the stock exchange.

(*iii*) To issue *further securities in such* a way that the value of share holding of present owners is not adversely affected.

(*iv*) To issue *the securities which are understandable* by the investors.

(*v*) To issue *the securities which are acceptable* to the lenders or investors.

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2. External Factors

Following are the external factors :

(*a*) General economic conditions (*b*) Behaviour of interest rates

(*c*) Policy of the lending institutions (*d*) Taxation policy

(*e*) Statutory restrictions.

(*a*) **General economic conditions** : While planning the capital structure, the company needs to consider the general conditions existing in the economy. If the economy is in boom and interest rates are likely to decline the company will like to raise equity capital immediately leaving the borrowed capital to the considered in future. It possible to raise more equity capital in boom as the investors may be ready to take risk and to invest.

If economy is in depression, the company will like to go for equity capital as it involves less amount of risk.

NOTE It is not possible to raise the capital by way of equity during the period of depression as the investors may not be willing to take risk. Hence, under such circumstances, the company may be required to go for borrowed capital.

(*b*) **Behaviour of interest rates** : The company may be required to take into consideration the likely behaviour of interest rates in the economy. If the interest rates in the economy are likely to decline depending more upon the long term services carrying fixed rate of return *i.e.*, debentures, preference share etc. will prove to be dangerous for the company. If the interest rates in the economy are likely to increase, the company will get benefit by issuing the long term securities carrying fixed rate of return.

(*c*) **Policy of the lending institutions** : If the policy of lending banks or financial institutions is too harsh or rigid, it will be advisable not to go for borrowed funds. Instead, the company will like to go for more convenient sources like leasing or hire, purchase, though these are more costly propositions.

(*d*) **Taxation policy** : It has to be viewed from both the angles *i.e.*, company as well as investors from company's point of view, return paid on borrowed capital *i.e.*, interest is an income tax deductible expenditure where as return paid on own capital *i.e.*, dividend is considered as the appropriation of post tax profit hence, is not an income tax deductible expenditure.

From investor's point of view, both the interest as well as dividend received by them is considered to be taxable income for income tax purposes. Section 80L of the Income Tax Act 1961 which provides for some deductions from income on investment received by investors applies only to dividend not on interest. Interest received by the investors is fully taxable in their hands.

NOTE If the amount of dividend exceeds Rs. 1000 and if the amount of interest exceeds Rs. 2,500 the paying company is required to deduct the income tax at source at pay the same to the Central Government. As such, income received by the investors in their hands gets reduced to the extent of tax deducted at source.

(*e*) **Statutory restrictions** : The statutory restrictions prescribed by the Government and various other statutes are required to be taken into consideration before the capital structure is planned by the company. The Company has to decide the capital structure within the overall framework prescribed by Government or various other statutes.

3. General Factors

Following points, are covered in general factors :

(*a*) Constitution of the company

(*b*) Characteristics of the company

(*c*) Stability of earnings

(*d*) Attitude of the management.

(*a*) **Constitution of the company** : It also play an important role. If the company is a private limited company or a closely held company, controlled factor may play a dominant role. If the company is public limited company or a way a widely held company, cost factor may play a dominant role.

(*b*) **Characteristics of the company** : It plays a very important role in the capital structure decisions. Very small companies and the companies in their early stages of life have to depend more upon the equity capital, as these have limited bargaining capacity and do not enjoy the confidence of the investors. It is better for these companies to go for equity capital in the early years of life. Increase the capital base, increase the bargaining capacity and then go for borrowed capital in the later years of their life. Similarly, the companies have got credit standing in the market may be in the position to top the sources of their own choice, whereas the choice may not be applicate to the companies having poor credit standing in the market.

(*c*) **Stability of earnings** : If sales and earnings of the company are stable and predictable in future, the company does not mind taking the risk

and it can borrow the funds, as cost factor and control factor will play more important role. However, if the sales and earnings are not likely to be stable and predictable over a period of time and are likely to be subject to wide flotations, the risk factor plays an important role and the company will not like to have more borrowed capital in its capital structure.

(*d*) **Attitude of the management :** If the management attitude is conservative, the control factor and risk factor may play an important role in the capital structure decisions. If the management attitude is aggressive cost factor may play an important role.

SUMMARY

- Capital structure refers to the mix of sources from which the long term funds required by a business are raised.
- For considering the suitable pattern of capital structure it is necessary to consider certain basic principles which are related to each other. These principles are :
  1. Cost principle
  2. Risk principle
  3. Control principle
  4. Flexibility principle
  5. Timing principle.
- In finance, risk and return always go hand in hand, which ever capital is cheaper for the company is risky for the company.
- Control factor refers to the capacity of the existing owners of the company to retain control over operations of the company.

SELF ASSESSMENT QUESTIONS

1. What are the different principles of capital structure management ? Explain them.
2. Write short note on factors effecting capital structure.
3. Enumerate the objects of capital structure planning.

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UNIT 4 CAPITAL STRUCTURE AND COST OF CAPITAL

★ STRUCTURE ★

INTRODUCTION

Cost of capital can be defined as "The rate of which an organisation must pay to the suppliers of capital for the use of their funds."

In economic terms, the cost of capital is viewed from following two different angles.

1. The cost of raising funds to finance a project. This cost may be in the form of the interest which the company may be required to pay to the suppliers of funds. This may be the explicit cost attached with the various sources of capital.
2. The cost of capital may be in the form of opportunity cost of the funds of company *i.e.*, rate of return which the company would have earned if the funds are not invested *e.g.*, suppose that a company has an amount of Rs. 10,00,000 which may either be utilised for purchasing a machine or other assets or may be invested with the bank as fixed deposit carrying the interest 8% p.a. If the company decides to use the interest for purchasing the machine or other assets, obviously it will have to forgo the interest which it would have earned by investing the same in fixed deposit with the bank. Thus, the cost of capital of this capital of Rs. 10,00,000 is 8% p.a.

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CONCEPTS OF COST OF CAPITAL

Besides the general concept of cost of capital, the following concepts are also used very frequently.

(*a*) Component cost and composite cost

(*b*) Average cost and marginal cost

(*c*) Explicit cost and implicit cost.

(*a*) **Component cost and composite cost** : Component cost refers to the cost of individual components of capital *i.e.*, equity shares, preference shares, debentures etc. Composite cost of capital refers to the combined or weighted average cost of capital of the individual components. For capital budgeting decisions, it is the composite cost of capital which is considered.

(*b*) **Average cost and marginal cost** : Average cost refers to the weighted average cost of capital. Marginal cost refers to the incremental cost attached with new funds raised by the company.

(*c*) **Explicit cost and implicit cost** : Explicit cost is the one which is attached with the source of capital emplicity or apparently. Implicit cost is the hidden cost which is not incurred directly *e.g.*, in case of the debt capital the interest which the company is required to pay on the same is explicit cost of capital. However, if the company introduces more and more doses of debt capital in the overall capital structure, it makes the investment in the company a risky preposition. As such, the expectations of the investors in terms of return on their investment may increase and share prices of company may decrease. These increased expectations of the investors or the decreased share prices may be considered to be implicit cost of debt capital.

IMPORTANCE OF COST OF CAPITAL

The term cost of capital is important for a company basically for following reasons :

1. The concept of cost of capital is used as a tool for screening the investment proposals *e.g.*, in case of the Net present value method (NPV), the cost of capital is used as the discounting rate for discounting the future flow of funds. Any project resulting into positive net present value only will be accepted. All other projects will be rejected.

   Similarly, in case of Internal Rate of Return method (IRR), the resultant IRR is compared with cost of capital. It is expected, that if a project

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is accepted, IRR resulting from the same should be more than cost of capital. If project generates IRR which is less than cost of capital project is rejected. Thus,

IRR > Cost of Capital → Project accepted

IRR < Cost of Capital → Project rejected.

2. The cost of capital is used as the capitalisation rate to decide the amount of capitalisation in case of new enterprise.
3. The concept of cost of capital provides useful guidelines for determining the optimal capital structures.

NOTE Optimal capital structure is the one where overall cost of capital is minimum and overall valuations of firm is maximum.

CALCULATION OF COST OF CAPITAL

(*a*) **Cost of debt :** The debts may be either short term or long term. The cost of capital in the form of debt is the interest which company has to pay. But this is not the real cost attached with debt capital. Real cost is less than the rate of interest which the company has to pay because interest on debt is tax deductible expenditure.

NOTE As amount of interest is a part of expenses, the tax liability of company reduces proportionately, it means while computing the cost of debt, adjustments are required to be made for its tax impact.

e.g., a company issues the debentures of face value Rs. 200, bearing rate of interest of 10% p.a. If the corporate tax is 50% company issues 1000 such debentures. Expenses in connection with the issue of debentures is Rs. 10,000 (*i.e.*, discount allowed, underwriting commission advertisements etc.)

The company has to pay an interest on these debentures

$$\frac{200\times1000\times10}{100} = 200 \times 100 = \text{Rs. } 20{,}000$$

$$\text{Capital received} = 2{,}00{,}000 - 10{,}000 = 1{,}90{,}000$$

$$\text{hence, interest rate} = 1{,}90{,}000\times\frac{x}{100} = 20{,}000$$

or $$1{,}90{,}000\ x = 20{,}00{,}000$$

or $$x = \frac{20{,}00{,}000}{1{,}90{,}000}$$

$$x = \frac{200}{19} = 10.5\%$$

As tax rate (corporate) = 50%

The effective cost of debenture capital = 5.25%.

NOTE The debt capital has a hidden cost also if the debt content in the capital structure of a company exceeds the optimum level, the investors start considering company as too risky and their expectations from equity shares increases.

Rs. 10,000 paid as expenses in connection with issue.

(*b*) **Cost of preference shares :** The cost of preference share capital is dividend rate payable on there. The cost capital is adjusted for the amount excess or less received on the issue of preference shares.

e.g., a company issues 1000 preference shares of Rs. 100 each at (*a*) a premium of Rs. 50 each, (*b*) a discount of Rs. 5 each. Rate of dividend is 10%. Expenses incurred on issue of shares is Rs. 10,000 then

(*a*) Net amount received = 150 × 1000 = Rs. 1,50,000

$$\text{Interest payable} = 100 \times 1000 \times \frac{10}{100} = \text{Rs. } 10,000$$

$$\text{Cost of capital} = \frac{10,000}{1,40,000} \times 100 = \frac{100}{14} = 7.143\%$$

(*b*) Net amount received = 95 × 1000 = Rs. 95000

$$\text{Interest payable} = \text{Rs. } 10,000$$

$$\text{Cost of capital} = \frac{10,000 \times 100}{85,000} = \frac{1000}{85} = 11.76\%$$

NOTE Dividend payable is not subjected to any deduction from tax liability hence, does not need any adjustment in this regard.

(*c*) **Cost of equity shares :** Computation of cost of equity shares is the most complex procedure. It is due to the fact that unlike preference shares or debenture equity shares do not have either the interest or dividend to be paid at a fixed rate. The cost of equity shares basically depends upon the expectations of the equity shareholders. There are following approaches to compute the cost of equity shares.

(*i*) D/P approach (*ii*) E/P approach

(*iii*) D/P + G approach (*iv*) Realised yield approach.

(*i*) **D/P approach :** According to this approach, before an investor pays certain price for purchasing equity shares of the company, he expects certain return on the investment which is in form of dividend. The expected rate of dividend is the cost equity share. This means, that the investor calculates the market price of the shares by capitalising the present dividend rate which is expected to be same for all times to come at a given level.

e.g., face value of Rs. 10 per share of equity shares its market value is Rs. 15 per share. Company pays dividend at a rate of 20% which is expected to be continue in future also. Cost of equity share will be

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$$\frac{20}{100} \times \frac{10}{15} = 13.3\%$$

NOTE It can be argued that cost of equity share is 20% because company pays 20% dividend.

Criticism :

1. This presupposes that an investor look towards only to receive dividend on equity shares which is always not correct.
2. He may also look forward to capital appreciation in the value of his shares.
3. This approach assumes that the company will not earn on its retained earnings and that the retained earnings will not result in either appreciation of the market price or increase in dividends. This assumption is wrong.

(*ii*) **E/P approach :** According to this approach, the cost of equity shares is based upon the stream of unchanged earnings earned by a company. This approach holds that each investor expects a certain amount of earnings whether distributed by way of dividend or not from the company in whose shares he invests.

Thus, if an investor expects that the company in which he is investing should have at least 20% rate of earning cost of equity shares will be calculated on that basis. If a company is expected to earn 30% he will be prepared to pay Rs. 150 for one share of Rs. 100.

Criticism :

1. It wrongly assumes that the earnings per share will remain constant in future.
2. The market prices of the shares will not remain constant as the shareholders will expect capital gain as a result of reinvestment of retained earnings.
3. All the earnings may not be distributed among the shareholders by way of dividend.

(*iii*) **D/P + G approach :** According to this approach, the investor is prepared to pay the market price of the shares as he expects not only the payment of dividend but also expect a growth in the dividend rate at a uniform rate perpetually.

Thus, the cost of equity shares can be calculated

as $$\frac{D}{P} + G$$

where D = Expected dividend/share

P = Market price/share

G = Growth in expected dividends

e.g., if the dividend per share Rs. 10 per share with the expected growth of 6% per year perpetually, the cost of equity shares, with the assumed market price of the share of Rs. 25 will be

$$\frac{10}{25} + 0.06 = 0.4 + 0.06 = 0.46 = 46\%$$

NOTE This approach involves the difficulty of determining the growth rate.

(*iv*) **Realised yield approach :** According to this approach the cost of equity shares may be decided on the base of yield actually realised over the period of past few years which may be expected to be continued in future also. This approach basically consider D/P + G approach, but instead of considering the future expectations of dividends and growth factor, the actual yield in past are considered.

(*d*) **Cost of retained earnings :** Often it is said that retained earnings do not cost anythings to the company as there is no obligation, either formal or implied, to pay return on retained earnings even though they constitutes one of the major sources of funds for the company.

In case of debt, the company has fixed obligation to pay interest on it. Similar obligation do exist in case of preference shares. In case of equity shares, as such there is no legal obligation but expectations of shareholders provides a starting point for computing the cost of equity shares.

Retained earnings involve cost and this cost is in the form of the opportunity cost in terms of dividend foregone by or with held from the equity shareholders *e.g.,* if profit earned by company is not retained but distributed among the shareholders as dividend. This dividend money is either reinvested in the company in the form of new shares or in other ventures where it earns some profit or dividend.

Now if company does not pay the total profit as dividend and retains a part of it called retained money or capital. The company is required to earn on the retained earnings at least equal to the rate which would have been earned by the shareholders if they were distributed this money. This is called the cost of retained earnings.

COMPOSITE COST OF CAPITAL

It is defined as the weighted average of the cost of each specific type of capital. The reason behind this weighted average is to give consideration to the proportion of various sources of funds in the capital structure of the company.

Steps of Computing Composite Cost of Capital

1. Assign weights to various source of funds. It may be stated here that the weights may be in the form of book value of the funds on market value of funds.
2. Multiply the cost of each source of funds by the weights assigned.
3. Calculate the composite cost by dividing total weighted cost by the total weights.

EXAMPLE 1. Calculate the composite cost of capital from following :

	Sources of funds	Book values (Rs.)	Specific Cost p.a.
(*a*)	Debenture	1,50,000	5%
(*b*)	Preference shares	50,000	9%
(*c*)	Equity shares	2,00,000	15%
(*d*)	Retained earnings	1,00,000	8%

SOLUTION. Weighted cost

(*a*) Debenture = Book value × Specific cost
= 1,50,000 × 5%
= Rs. 7,500

(*b*) Preference shares = Book value × Specific cost
= 50,000 × 9%
= Rs. 4,500

(*c*) Equity shares = Book value × Specific cost
= 2,00,000 × 15%
= Rs. 30,000

(*d*) Retained earnings = Book value × Specific cost
= 1,00,000 × 8%
= Rs. 8,000

Total book value on total weights

1,50,000 + 50,000 + 2,00,000 + 1,00,000 = Rs. 5,00,000

Total weighted cost = 7,500 + 4,500 + 30,000 + 8,000
= Rs. 50,000

$$\text{Composite cost of capital} = \frac{\text{Total weighted costs}}{\text{Total weight}} \times 100$$

$$= \frac{50,000}{5,00,000} \times 100 = \frac{50,00,000}{5,00,000} = 10\%$$

EXAMPLE 2. From the following informations given below calculate the weighted cost of capital before tax for ABC Co. Ltd.

Shareholder funds	(Rs.) in lakhs
1. Share capital – equity	700
– preference	200
Retained earnings	200
2. Loan funds	
secured loans	700
unsecured loans	700
	2500

NOTE Unsecured loans includes inter corporate deposit also.

(*a*) Normal held on equity share capital (anticipated) – 15%

(*b*) Dividend rate on preference shares – 10%

(*c*) Tax rate – 50%

(*d*) Interest on secured loans – 15%

(*e*) Interest on unsecured loan – 20%

SOLUTION. Tax adjusted cost

(*a*) Equity shares 15%

(*b*) Preference shares 10%

(*c*) Retained earnings 15%

(*d*) Secured loans – 50% of 15% = 7.5%

(*e*) Unsecured loans – 50% of 20% = 10%

Weighted Costs (Rs. in lakhs)

Equity shares = Book value × Tax adjusted costs
= 700 × 15% = 105

Preference shares = 200 × 10% = 20

Retained earnings = 200 × 15% = 30

Secured loans = 700 × 7.5% = 52.5

Unsecured loans = 700 × 10% = 70

Total weights = 700 + 200 + 200 + 700 + 700
= 2500 lakhs (Rs.)

Total weighted costs = 105 + 20 + 30 + 52.5% + 70
= 277.5 lakhs (Rs.).

Weighted Average Cost

$$\text{(After tax)} = \frac{\text{Total weighted cost}}{\text{Total weights}} \times 100$$

$$= \frac{277.5}{2500} \times 100 = 11.1\%$$

Computation of before tax cost of capital

$$= \frac{\text{After tax cost of capital}}{(100 - \text{tax rate})} \times 100 = \frac{11.1\%}{50\%} \times 100 = 11.1 \times 2 = 22.2\%$$

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LEVERAGE

Leverage analysis is the technique used by business firms to quantify risk-return relationship of different alternative capital structures.

The term leverage in general refers to a relationship between two interrelated variables. In financial analysis it represents the influence of one financial variable over some other related financial variable. These financial variables may be cost, output, sales revenue, earning before tax, earning per share etc.

There are three commonly used measures of leverage in financial analysis. These are :

(*a*) Operating leverage

(*b*) Financial leverage

(*c*) Combined leverage.

Operating Leverage

It is defined as the firm's ability to use fixed operating cost to magnify effects of changes in sales on its earnings before interest and taxes.

Whenever there is increase or decrease in sales level the EBIT also changes. The effect of change in sales on the level of EBIT is measured by operating leverage. The operating leverage is calculated as

$$\text{Operating leverage} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in Sales}}$$

or

$$= \frac{\text{Increase in EBIT / EBIT}}{\text{Increase in sales / sales}}$$

NOTE Operating leverage occurs when a firm has fixed costs which must be met regardless of volume of sales. When a firm has fixed costs, the percentage change in profits due to change in sales level is greater than the percentage change in sales.

EXAMPLE 1. ABC Ltd., sells 200 units @ Rs. 10 per unit. The cost of production is Rs. 6 per unit. The firm has a fixed cost of Rs. 200. Assume that the sale of company ABC Ltd. increases by 40%. The present and expected cost and profits would be as follows.

SOLUTION.

	Present (Rs.)	Expected (Rs.)
Sales = (*a*)	2000.00 (200 × 10)	2800.00 (280 × 10)
(Less) variable cost (*b*)	1200.00 (6 × 200)	1680.00 (6 × 280)
Contribution (*a* – *b*)	2000 – 1200 = 800	2800 – 1680 = 1120
(Less) fixed cost	200	200
EBIT/operating profit	600	920

$$\text{Operating leverage} = \frac{\text{Increase in EBIT/EBIT}}{\text{Increase in sales/sales}}$$

$$= \frac{320/600}{800/2000} = \frac{^{4}\cancel{320} \times \cancel{2000}}{\cancel{800} \times \cancel{600}_{3}} = \frac{4}{3} = 1.33.$$

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1. Operating leverage of 1.33 means that 1% increase in sales would result in 1.33% increase in operating profit.
2. A firm will not have an operating leverage if there are no fixed cost and the total cost is variable in nature. In such cases, the operating profits or EBIT varies in direct proportion to the changes in sales level.

Suppose in the above example firm has no fixed cost then the present and expected costs and revenue will be

	Present (Rs.)	Expected (Rs.)
Sale	2000	2,800
(–) variable cost	1200	1,680
EBIT/Operating profit	800	1,120

$$\text{Operating leverage} = \frac{320/800}{800/2000} = \frac{^{1}\cancel{320} \times \cancel{2000}}{\cancel{800} \times \cancel{800}_{2}} = 1$$

NOTES

1. Operating leverage of 1 means that increase in profit is in direct proportion to the increase in sales.
2. Operating leverage at any level of sales is called its degree. The degree of operating leverage is calculated as ratio of contribution to the EBIT.

$$\text{Degree of operating leverage} = \frac{\text{Contribution}}{\text{EBIT}}$$

In the above example degree of operating leverage

$$= \frac{800}{600} = \frac{8}{6} = \frac{4}{3} = 1.33 \text{ (percent)}$$

$$= \frac{1120}{920} = \frac{112}{92} = \frac{56}{46} = \frac{28}{23} = 1.21.$$

Significance of Operating Leverage

It is very useful to the financial manager. It shows the impact of changes in sales on operating income

- A firm have higher degree of operating leverage can experience a magnified effect on EBIT for even a small change in sales level. Higher degree of operating leverage D.O.L. can dramatically increase the operating profits. But if there is decline in sales level EBIT may be wiped out and loss may be operated.
- If the fixed costs are higher, the higher would be firm's operating leverage and its operating risks.
- If operating average is high, means that the break even point would also be reached at a high level of sales.

- **Operating leverage ↑ → Break even point ↑.**
- **If operating leverage is high, means the margin of safety will be less.**
- **Operating leverage ↑ → Margin of safety ↓.**

Financial Leverage

It is defined as the ability of a firm to use fixed charges to magnify the effects of changes in EBIT/operating profits, on the firm's earning per share.

The financial leverage occurs when a firm's capital structure contains obligation of fixed financial charges *i.e.,* interest of debentures, dividend on preference shares etc., along with owner's equity to enhance earnings of equity shareholders.

The fixed financial charges do not vary with the operating profits/EBIT. These are fixed and are to paid irrespective of level of operating profits or EBIT. The ordinary shareholders of firm are entitled to residual income *i.e.,* Earnings after financial charges (fixed).

Thus, the effect of changes in operating profit/EBIT no the level of EPS (earning per share) is measured by financial leverage. It is calculated as below :

$$\text{Financial leverage} = \frac{\textbf{\% change in EPS}}{\textbf{\% change in EBIT}}$$

or

$$= \frac{\textbf{Increase in EPS / EPS}}{\textbf{Increase in EBIT / EBIT}}.$$

NOTE Financial leverage is favourable when the firm earns more on the investment/ assets financed by the sources having fixed charges. It is obvious that shareholders gain in a situation where the company earns a high rate of return and pays a lower rate of return to the supplier of long term funds/ capital. Financial leverage in such cases is therefore called Trading on equity.

EXAMPLE 2.

	ABC Co. (Rs.)	XYZ Co. (Rs.)
Equity share capital of Rs. 10 each	32,00,000	12,00,000.
12% debentures	2,00,000	22,00,000
Net capital employed	34,00,000	34,00,000
EBIT (Earning before interest and tax)	10,20,000	10,20,000
(–) debenture interest	24,000	2,64,000
Profit before tax (P.B.T.)	9,96,000	7,56,000
(–) Tax. @ 35%	3,48,600	2,64,600
	6,47,400	4,91,400
Earning available for equity share holders	6,47,400	4,91,400
No. of shares	3,20,000	1,20,000
EPS (Earning per share)	2.02	4.09

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From the above example it is clear that the companies had the same return on investment *i.e.*, $\frac{10,20,000}{34,00,000} \times 100 = 30\%$ but the EPS is almost double in the case of XYZ co. as compared to ABC Co.

This is attributed to the fact that the capital structure of the companies are different. Company XYZ relied more on fixed return sources of funds on these funds it is earning 30% but paying only 10%. Thus, the difference between the return and the cost of these funds has enhanced the earnings of the shareholders.

NOTES
1. In case of debt funds the interest cost is also tax deductible.
2. Gain from financial leverage has risen due to :
   (*i*) Excess of return on investment over effective cost of funds. (Cost after considering taxation effect).
   (*ii*) Reduction in number of shares issued due to the use of debt funds.
3. Financial leverage at the levels of EBIT is called degree of financial leverage and it is calculated as ratio of EBIT to profit before tax.

$$\textbf{Degree of financial leverage (DFL)} = \frac{\textbf{EBIT}}{\textbf{Profit before tax}}$$

e.g.,

	(Rs.)
Ordinary shares	5,000
Long term loans etc.	15,000
EBIT	3000
(–) interest @ 10%	1500
EBT	1500

$$\text{Financial leverage} = \frac{3000}{1500} = 2.$$

It means, if the operating profit goes up by 100%, EBIT would go up by 200%. Thus, if EBIT is Rs. 6,000, Rs. 1500 will have to be paid to the supplier of long term funds. This leaves Rs. 4,500 as residual earnings before tax for shareholders. This represents an increase of 200% on the previous figure of Rs. 1500. It is therefore, obvious that share holders gain in a situation where a company has a high rate of return and pays a lower rate of interest to the supplier of long term capitals. The difference obviously accuses to the shareholders. However, where the rate of return on investment falls below the rate of interest, the shareholders suffer, because their earning fall more sharply than the fall in the return on investments.

NOTE The degree of financial leverage (DFL) calculated for different level of EBIT is different.

EXAMPLE 3. A firm has EBIT as Rs. 1,00,000 for 1000 units and Rs. 1,60,000 for 1400 units. The firm pays interest of Rs. 20,000. The firm's profit before tax would be as follows.

NOTES

SOLUTION.

Sales level	1000 units	1400 units
EBIT	1,00,000	1,60,000
(–) interest	20,000	20,000
	80,000	1,40,000

$$\text{DFL (1000 units)} = \frac{\text{EBIT}}{\text{Profit}} = \frac{1,00,000}{80,000} = \frac{10}{8} = 1.25.$$

$$\text{DFL (1400 units)} = \frac{\text{EBIT}}{\text{Profit}} = \frac{1,60,000}{1,40,000} = \frac{16}{14} = \frac{8}{7} = 1.14.$$

The DFL of 1.25 at EBIT of Rs. 1,00,000 means that for 1% increase in EBIT the EPS increase by 1.25. The DFL of 1.14 at EBIT of Rs. 1,60,000 means that for 1% increase in EBIT the EPS increase by 1.14%.

Significance of Financial Leverage

It helps in designing the appropriate capital structure. One of the objective of planning an appropriate capital structure is to maximize the return on equity shareholder's funds or maximize the earning per share.

Financial leverage is double edged sword. On the one hand it increases earning per share on the other hand it increases financial risk. A high financial leverage means high fixed financial costs and high financial risk.

Financial leverage × Financial costs × Financial risk

Thus, finance manager has to bring a balance between risk and return for determining the appropriate amount of debt in the capital structure of a firm.

Combined Leverage

Operating leverage explains the operating risk and financial leverage explains the financial risk of firm. However, a firm has to look into over all risk or total risk of the firm *i.e.*, operating risk as well as financial risk. Hence, if we combine the operating leverage and financial leverage the result is combined leverage. Combined leverage measures the affect of % change in sales on % change in EPS.

$$\text{Combined leverage} = \text{Operating leverage} \times \text{Financial leverage}$$

$$= \frac{\text{\% Change in EBIT}}{\text{\% Change in sales}} \times \frac{\text{\% Change in EPS}}{\text{\% Change in EBIT}}$$

$$= \frac{\text{\% Change in EPS}}{\text{\% Change in Sales}}$$

EXAMPLE 4. ABC Ltd. sells 4000 units @ Rs. 20 per unit. The variable cost of production is Rs. 14 and fixed cost is Rs. 2000. The company raised the required funds by issuing 200, 10% debentures @ Rs. 200 each and 4000 equity shares @ Rs. 20 per share. The sales of ABC Ltd. is expected to increase by 20%. Assume tax rate of company is 50%. Calculate the impact of increase in sales on EPS.

NOTES

	Present (1)	Expected (2)
Sales level (units)	4,000	4,800
Sales (Rs.) (*a*)	80,000	96,000
(–) variable cost (Rs.) (*b*)	56,000	67,200
Contribution (*a* – *b*)	24,000	28,800
(–) fixed cost (Rs.)	2,000	2,000
Operating profit/EBIT	22,000	26,800
(–) Inst. debentures	4,000	4,000
(10% on 40,000) (PBIT Rs.)	18,000	22,800
(–) tax. 50% (Rs.)	9,000	11,400
	9,000	11,400
Profit after tax (R)		
No. of equity shares	4,000	4,000
EPS.	2.5	2.85

Workings : (*a*) Variable cost. 1 = 14 × 4000 = Rs. 56,000

2 = 14 × 4800 = Rs. 67,200

(*b*) Contribution 1 = 80,000 – 56,000 = Rs. 24,000

2 = 96,000 – 67,200 = Rs. 28,800

(*c*) Interest on debenture = 10% on 40,000 = Rs. 4000

(*d*) $$\text{EPS} = \frac{\text{Profit after tax}}{\text{No. of equity shares}}$$

$$1 = \frac{9000}{4000} = 2.5$$

$$2 = \frac{11,400}{4000} = 2.85$$

From the above example it clear that if the sales level increase by 20% the EPS increase by 35%.

Significance of Combined Leverage

The ratio of contribution to EBT is given by combined leverage and indicates the combined effect of financial and operating leverage.

NOTES

1. A high operating leverage and high financial leverage combination is very risky.

   If a company is producing and selling at a high level, it will make extremely high profit for its shareholders. But even a small fall in the level of operation would result in a tremendous fall in earning per share.
2. A company must maintain a proper balance between these two leverage.
3. A high operating leverage and a low financial leverage → management is careful since the higher amount of risk involved in high operating leverage has been sought to be balance by low financial leverage.
4. A low operating leverage and high financial leverage → more preferable situation since low operating leverage means company reaches its break even point at a low level of sales. Hence risk is diminished.

NOTES

5. A highly cautious and conservative manager well keep both its operating and financial leverage a very low levels. But in this situation the company is losing profitable opportunities.

EXAMPLE 5. Following are the figures of two companies. On the basis of these figures calculate the operating leverages, financial leverages and combined leverages of both the companies and also comment on the relative risk position of them.

(Rs. in lakh)

Particulars	A Ltd.	B Ltd.
Sales	250	500
(–) variable cost	100	150
contribution	150	350
(–) fixed costs	75	200
EBIT	75	150
(–) Interest	25	50
PBT	50	100

SOLUTION: 1. **Calculation of leverage**

	A. Ltd.	B. Ltd
Operating Leverage = $\frac{\text{Contribution}}{\text{EBIT}}$	$\frac{150}{75}=2$	$\frac{350}{150}=2.33$
Financial leverage = $\frac{\text{EBIT}}{\text{PBT}}$	$\frac{75}{50}=1.5$	$\frac{150}{100}=1.5$
Combined leverage = $\frac{\text{Contribution}}{\text{PBT}}$	$\frac{150}{50}=3$	$\frac{350}{100}=3.5$

2. **Comments on the relative risk position :**

(*a*) *Operating leverage* : It is higher for B Ltd., then the A Ltd. Hence, B Ltd. has a greater degree of business risk. In other words, the tendency of net income (operating profit or EBIT) to very disproportionate with sales is greater in case of B Ltd. than A Ltd.

(*b*) *Financial leverage* : Both the companies have the same degree of financial risk. It means that the tendency of residual net income (PBT) to vary disproportionately with net income (EBIT) is the same in case of both the companies.

(*c*) *Combined leverage* : A Ltd. has less overall risk as compared to B Ltd.

Study of leverage is essential to define the risk undertaken by the share holders. Earnings available to share holders fluctuate on account of two risks as shown in the above example. The operating risk *i.e.*, variability of EBIT may arise due to variability of sales and variability of expenses. In a given environment operating risk cannot be avoided.

The variability of EPS or return on equity depends on the use of financial leverage. This is termed as financial risk. A firm financed totally by equity finance has no financial risk hence, financial risk can be avoided by eliminating use of borrowed funds.

In case of financial and operating leverage a company has to carefully consider its likely profitability position set before deciding upon the capital mix because capital mix has for coaching implications on the financial position of the company.

NOTES

1. High operating leverage, High financial leverage →.

   A very risky situation as a slight decrease in sales and/contribution may affect the EPS to a very great extent. As far as possible, this situation should be avoided.

2. High operating leverage, Low financial leverage →.

   A slight decrease in sales and/or contribution may affect EBIT to a very great extent due to existence of high fixed cost but this possibility is already taken care of by low proportion of debt capital in the overall capital structure.

3. Low operating leverage, High financial leverage →.

   A decrease in sales/contribution will not affect EBIT to a very great extent as the component of fixed cost is negligible in the overall cost structure. As such the company has accepted the risk of borrowing more debt capital in order to increase EPS to maximum possible extent. It is one among the ideal situation.

4. Low operating leverage, Low financial leverage →.

   A decrease in sales/contribution will not effect EBIT to a very great extent as the component of fixed cost is negligible in the overall cost structure. But, still the company has not accepted the risk of having large component of debt capital in its capital structure.

It may indicate very-very cautious policy followed by the management which need not be necessary, as it will not maximise the share holders wealth. Simultaneously, it also indicates that company is not utilising its borrowing capacity properly and fully.

THEORIES OF CAPITAL STRUCTURE

Introduction of debt capital in the capital structure increases the earning per share (EPS), introduction of debt capital increases the risk (risk of insolvency due to non-availability of cash) and variability of earnings. Available to equity share holders. As such, increasing the debt component beyond a certain limit will not increase the EPS. If debt component crosses a particular limit, the

expectations of the lenders of capital also increase due to the risk factor involved. Similarly, the share holders also will demand a higher rate of return on their investment to compensate for the risk arising out of additional amount of debt capital in the capital structure. As such, introduction of a heavy amount of debt capital in the capital structure will not only reduce the valuation of the firm but will also increase the cost of capital.

It is not an universally accepted principle that the valuation of a firm and its cost of capital may be affected by the change in financing mix. Different views have been given which can be classified in the following four types.

1. Net Income Approach (N-I Approach)
2. Net Operating Income Approach (NOI Approach)
3. Traditional Approach
4. Modigliani-Miller Approach.

For this purpose, following assumptions have been made

(*a*) Firms use only long term debt capital or equity share capital to raise funds.

(*b*) There is no corporate tax.

(*c*) Firms follow policy of paying 100% of its earnings by way of dividend.

(*d*) Operating earnings are not expected to grow.

1. N.I. Approach (*Net Income Approach*)

According to this approach as proposed by *Durand*, there exists a direct relationship between the capital structure and valuation of the firm and cost of capital.

By introduction of additional debt capital in the capital structure, the valuation of the firms can be increased and cost of capital can be reduced and vice versa.

1. **Additional debt capital** ⟨ **Valuation of firm increases** / **Cost of capital reduces**

2. **Reduction in debt capital** ⟨ **Valuation of firm decreases** / **Cost of capital increases**

$$NI = EBIT - I$$

Where

NI = Net-Income

EBIT = Earnings before interest and tax

I = Interest

e.g.,

Particulars	Present Position (Rs.)	50% Increase in Debt Capital (Rs.)	50% Decrease in Debt Capital (Rs.)
8% debentures	6,00,000	9,00,000	3,00,000
NOI *i.e.*, EBIT	1,50,000	1,50,000	1,50,000
(–) I	48,000	72,000	24,000
NI	1,02,000	78,000	1,26,000
Equity capitalisation rate	10%	10%	10%
Market value of shares (S)	10,20,000	7,80,000	12,60,000
Market value of debentures (B)	6,00,000	9,00,000	3,00,000
Total value of the firm V = S + B	16,20,000	16,80,000	15,60,000
Overall cost of capital (EBIT/V)	9.26%	8.95%	9.62%

From the above, it is clear, that by increase in debentures, the total value of the firm increases and cost of capital decreases and *vice versa.*

NOTE This will hold good only if the cost of debenture *i.e.,* rate of interest is less than equity capitalisation rate.

2. NOI (*Net Operating Income*) Approach

This approach is also proposed by Durand and according to this approach, the valuation of the firm and its cost of capital is independent to its capital structure.

Means, any change in the capital structure will not affect the value of the firm or cost of capital, though the further introduction of debt capital may increase equity capitalisation rate and *vice versa.*

e.g.,

Particulars	Present Position (Rs.)	50% Increase in Debt Capital (Rs.)	50% Decrease in Debt Capital (Rs.)
8% debentures	6,00,000	9,00,000	3,00,000
overall capitalisation rate	10%	10%	10%
EBIT	1,50,000	1,50,000	1,50,000
Total value of firm (V)	15,00,000	15,00,000	1,500,000
Overall cost of Capital	1,50,000	1,50,000	1,50,000
	15,00,000	15,00,000	15,00,000
EBIT/V	10%	10%	10%
Market value of debenture (B)	6,00,000	9,00,000	3,00,000
Market value of equity share (S) S–B	9,00,000	6,00,000	12,00,000
Interest	48,000	72,000	24,000

Equity Capitalisation Rate = $\frac{EBIT - I}{V - B}$			
	10,2,000	78,000	1,26,000
	9,00,000	6,00,000	12,00,000
	11.3%	13%	10.5%

3. Traditional Approach

It is a mean between two extreme approaches *i.e.,* NI and NOI and believes the existence of optimal capital structure. Upto a certain point, additional introduction of debt capital, inspite of increase in cost of debt capital and equity capitalisation rate individually the overall cost of capital will reduce and total value of the firm increase. Beyond this point, the overall cost of capital will tend to rise and total value of the firm will tend to reduce. Thus, the judicious mix of debt and equity capital, it is possible for a firm to minimize overall cost of capital and maximize total value of the firm. Such a capital structure where overall cost of capital is minimum and total value of the firms is maximum is called optimal capital structure.

e.g.,

Particulars	No Debt	5% Debentures Rs. 6,00,000	8% Debentures Rs. 12,00,000
EBIT	1;50,000	1,50,000	1,50,000
(–) Interest on debt	–	30,000	96,000
NI.	1,50,000	1,20,000	54,000
Cost of equity capital	10%	11%	13.5%
Market value of equity shares (S)	15,00,000	10,20,910	4,00,000
Market values of debenture (B)	0	6,00,000	12,00,000
Total value of firm V = S + B	15,00,000	16,20,910	16,00,000
Overall cost of capital = $\frac{EBIT}{V}$	10%	9.25%	9.3%

e.g.,

Particulars	No Debt Capital	5% Debentures Rs. 3,00,000	8% Debentures Rs. 6,00,000
EBIT	1,50,000	1,50,000	1,50,000
(–) Interest on debt	–	15,000	48,000
NI	1,50,000	1,35,000	1,02,000
Cost of equity capital	10%	11%	12%
Market value of equity shares (s)	15,00,000	12,27,273	8,50,000
Market value of debentures (B)	0	3,00,000	6,00,000
Total value of firm V = S + B	15,00,000	15,27,273	14,50,000
Overall capital cost = $\frac{EBIT}{V}$	10%	9.82%	10.34%

From the above example it reveals :

1. Neither the no-debentures position nor the position where debentures are issued to the extent of Rs. 6,00,000 minimize the overall cost of capital or maximize the total value of the firm.
2. When debenture are issued to the extent of Rs. 3,00,000 the overall cost of capital is minimum and the total value of the firm is maximum. Hence, this capital structure is called optimal capital structure.

4. Modigliani-Miller Approach

Commonly known as M and M approach. It closely resembles with NOI approach. According to this approach, the value of the firm and its cost of capital are independent of its capital structure. It emphasis, that overall cost of capital is the weighted average of cost of debt capital and cost of equity capital. Cost of equity capital depends upon shareholders expectations.

NOTES

1. If shareholders expect 10% from a certain company, they already take into consideration debt capital in the capital structure.
2. For every increase in debt capital the expectations of shareholders also increase because risk of the company also increases.
3. Each change in the mix of debt and equity capital is automatically offset by change in the expectations of share holders which in turn is attributed to change in risk element.
4. As mix of debt and equity capital has nothing to do with overall cost of capital, and over all cost of capital is equal to the capitalisation rate of pure equity stream of a risk class means leverage has no impact on share market prices or cost of capital.

Assumptions

1. Capital market is perfect means investors are free to buy and sell securities. They are well aware of risk return on all type of securities.
2. There is no transaction costs.
3. Investors behave rationally.
4. They can barrow without restrictions on the same terms as the firms do.
5. Firms are into homogeneous risk class.
6. All investors have the same expectations from a firm's Net operating income (EBIT) which is necessary to evaluate the value of a firm.
7. The dividend payment ratio is 100% means no retained earnings.
8. No corporate taxes.

Criticism

1. Perfect market conditions does not prevail in practice.

NOTES

2. Individual arbitrager through the use of personal leverage can alter corporate leverage. Not valid in practical world.
3. Availability of free and upto date information is not valid.

EXAMPLE 6.

	ABC Co.	XYZ Co.
No. of ordinary shares	90,000	1,50,000
Market price/share	Rs. 1.20	Rs. 1.00
6% debentures	60,000	–
PBI (Rs.)	18,000	18,000

All profit after debentures interest are distributed as dividends.

Explain how under M and M approach, an investor holding 10% of shares in company ABC will be better off in switching his holding to XYZ Co.

SOLUTION. Investor will dispose of 10% shares of ABC Co. in market and will receive

$$\frac{90,000\times10}{100}\times1.20 = 9000 \times 1.2 = \text{Rs. } 10,800$$

he will borrow a sum of Rs. 6,000 (10% of debentures) at 6% interest hence, total amount becomes Rs. 16,800.

(10,800 + 6000) Now Present income from ABC Co.

$$\text{PBIT} - \text{Interest} = \frac{9,000}{90,000}\times(18,000-3600)$$

$$= \frac{1}{10}\times14,400 = \text{Rs. } 1440$$

Total amount with the investor = 16,800. Share value of XYZ Co. is Rs. 1:00. No of shares can be purchased = 16800 then.

Proposed income from XYZ Co.

$$\frac{16,800}{1,50,000}\times18,000 = \text{Rs. } 2,016$$

$$(-)\ \text{interest}\left(6,000\times\frac{6}{100}\right) = \underline{\text{Rs. } 360}$$

$$\underline{\text{Rs. } 1,656}$$

From the above calculations. The net income from ABC Co. is 1440 and from XYZ Co. is Rs. 1650. The income from XYZ Co. is Rs. 216 more than income from ABC Co. hence investor will be better off.

ILLUSTRATIVE PROBLEMS

1. A company needs Rs. 12 lakhs for the installation of a new factory which would yield an annual EBIT of Rs. 2,00,000. The company has

the objective of maximizing the EPS. It is considered the possibility of issuing equity shares plus a debt of Rs. 2,00,000, Rs. 6,00,000 or Rs. 10,00,000. The current market price per share is Rs. 40. Which is expected to drop to Rs. 25. if the market borrowings were to exceed Rs. 7,50,000. Cost of borrowings are indicated as below.

upto Rs. 2,50,000 – 10% p.a.

Rs. 2,50,000 to 6,25,000 – 14% p.a.

6,25,001 to 10,00,000 – 16% p.a.

Assuming a tax rate of 50% workout the EPS and the scheme which would meet the objective of the management.

SOLUTION. On the basis of information available following are the alternative capital structure.

	Plan I	Plan II	Plan III
Equity	2,00,000	6,00,000	10,00,000
Debt	10,00,000	6,00,000	2,00,000
Total	12,00,000	12,00,000	12,00,000

Calculation of EPS under each plan.

	Plan I	Plan II	Plan III
EBIT	2,00,000	2,00,000	2,00,000
(–) Interest	20,000	84,000	1,60,000
EBT	1,80,000	1,16,000	40,000
(–) Tax @ 50%	90,000	58,000	20,000
EAT	90,000	58,000	20,000
No of equity shares	25,000	15,000	8,000
E.P.S.	3.60	3.95	2.50

From the calculated EPS it is clear that the EPS is maximum in the case of plan II. Hence, company must go for the plan II so that EPS wealth maximization can be achieved.

NOTE In this question it is assumed that company issue the equity shares at the prevailing market price. Though it is not fair because usually the prices are kept lower than market price. However, if the assumption continues the no. of equity shares in each plan will be as follows:

$$\text{Plan I} \Rightarrow \text{Rs. } \frac{10,00,000}{40} = 25,000 \text{ shares}$$

$$\text{Plan II} \Rightarrow \text{Rs. } \frac{6,00,000}{40} = 15,000 \text{ shares}$$

$$\text{Plan III} \Rightarrow \text{Rs. } \frac{2,00,000}{25^*} = 8,000 \text{ shares.}$$

*Rs. 25 is taken as market price per share because market borrowing are exceeding 7,50,000. Now market borrowings are 10,00,000. (condition given).

2. The operating and combined leverage of a company is 2 and 3 respectively at the present level of sales of 10,000 units. The selling price per unit is Rs. 12 while its variable cost is Rs. 6. The company has no preference share capital. Applicable corporate income tax rate can be assumed to be 50%. The rate of interest on company's debt is 16% p.a. What is the amount of debt in the capital structure of the company?

Solution. Sales = 10,000 × 12 = Rs. 1,20,000

Variable cost = 10,000 × 6 = Rs. 60,000

Contribution = Rs. 60,000

Operating leverage = 2

(Operating leverage = contribution/PBIT)

$$\text{PBIT} = \frac{\text{Contribution}}{\text{Operating leverage}}$$

$$= \frac{60{,}000}{2} = \text{Rs. } 30{,}000$$

Combined leverage = 3

(Combined leverage = Contribution/PBT)

$$\text{PBT} = \frac{\text{Contribution}}{\text{Combined leverage}}$$

$$= \frac{60{,}000}{3} = \text{Rs. } 20{,}000$$

Interest = PBIT – PBT

= 30,000 – 20,000 = Rs. 10,000

Given interest rate is 16% then amount of debt capital

$$= \frac{10{,}000}{16} \times 100 = \textbf{Rs. 62,500} \quad \textbf{Ans.}$$

3. The capital structure of XYZ Co. is as below.

Equity share capital	
(Each share is of Rs. 20)	Rs. 1,20,000
10% debenture	Rs 80,000
Retained earnings	Rs. 40,000

Sales of the company are Rs. 12,00,000. Its variable operating cost is 50% of sales and fixed operating cost is Rs. 1,50,000. Corporate tax rate is 50%.

(*a*) Calculate different leverages.

(*b*) Determine the level of EBIT. If EPS is

(*i*) Rs. 2, (*ii*) Rs. 6, (*iii*) NIL.

SOLUTION.

	(in Rs.)
Sales	1200,000
(–) Variable cost	6,00,000
Contribution	6,00,000
(–) Fixed cost -	1,50,000
EBIT -	4,50,000
(–) Interest	8,000
EBT	4,42,000
(–) Tax. @ 50%	2,21,000
PBT	2,21,000

(*a*) **Calculation of leverages :**

(*i*) $\text{Operating leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{6,00,000}{4,50,000} = 1.33$

$\text{Financial leverage} = \frac{\text{EBIT}}{\text{EBT}} = \frac{4,50,000}{4,32,000} = 1.04$

$\text{Combined leverage} = \frac{\text{Contribution}}{\text{EBT}} = \frac{6,00,000}{4,32,000} = 1.39$

(*b*) **Calculation of EBIT**

$$\text{EPS} = \frac{50\% \text{ of [EBIT} - \text{interest]}}{\text{No of equity shares}}$$

Given interest = 8,000

No. of equity shares = 6,000

Now EBIT when EPS = 2

(*i*) $\frac{50\% \text{ [EBIT} - 8000]}{6000} = 2$

$50\% \text{ (EBIT} - 8000) = 12,000$

$\frac{1}{2}\text{EBIT} - 4000 = 12,000$

$\frac{1}{2}\text{EBIT} = 12,000 + 4,000$

$\frac{1}{2}\text{EBIT} = 16,000$

$\text{EBIT} = 32,000$

(*ii*) When EPS = 6. $\frac{50\% \text{ of [EBIT} - 8000]}{6000} = 6$

$\frac{50\% \text{ [EBIT} - 8000]}{6000} = 6$

$50\% \text{ (EBIT} - 8000) = 36,000$

NOTES

$$\frac{1}{2}\text{EBIT} = 36{,}000 + 4000$$

$$\frac{1}{2}\text{EBIT} = 40{,}000$$

$$\text{EBIT} = 80{,}000$$

(iii) When EPS = 0

$$\frac{50\%\ [\text{EBIT} - 8000]}{6000} = 0$$

$$\frac{1}{2}\text{EBIT} - 4000 = 0$$

$$\frac{1}{2}\text{EBIT} = +4000$$

$$\text{EBIT} = 8000$$

4. Followings are the figures of M/s Rama and Co. Ltd.

	EBIT		23,00,000
(–)	Debentures interest @10%	1,00,000	
	Long term loan interest @ 11%	2,20,000	3,20,000
	EBT		19,80,000
(–)	Income tax		9,90,000
	EAT		9,90,000
	No of equity shares of Rs. 10 each		4,95,000
	EPS		Rs. 2.00
	Market price of shares		Rs. 20.00
	P/E Ratio		10

Company has reserves and surplus of Rs. 20 lakhs. It is in need of Rs. 30 lakhs to pay the debentures and modernise its existing plant. Advice on the following alternative models of raising finance.

(*a*) Raising entire amount as term loan from banks @ 12%

(*b*) Raising part of the funds by issue of 1,00,000 shares of Rs. 10 each at par and rest by term loan @ 12%.

The company expects to improve its rate of return on capital employed by 2% as a result of modernisation. But P/E ratio is likely to go down to 8 if the entire amount is raised as term loan.

(*a*) Advice the company on the financial plan to be selected.

(*b*) It is assumed that there will be no change in P/E Ratio, if either of two alternatives are adopted, would you advice still hold good?

SOLUTION.

	(Rs.)
Equity share capital	49,50,000
Reserve and surplus	20,00,000
10% debentures	10,00,000
11% long term loan	20,00,000
Capital employed	99,50,000
EBIT	23,00,000
Rate of EBIT on Capital employed	23.1%

Alternative A. Term capital only

New Capital employed = 49,50,000 + 20,00,000 + 20,00,000 + 30,00,000

= Rs. 1,19,50,000

New Rate of EBIT on Capital employed = 25.1%

(because there is an increase of 2% from previous)

	EBIT =		29,99,450
(–)	interest		
	11% term loan	2,20,000	
	12% term loan	3,60,000	5,80,000
	EBT		24,19,450
	tax @ 50%		12,09,725
	EAT		12,09,725
	EPS		2.44
	PE Ratio		8
	Market price of the share		19.52

Alternative B. Term loan + equity shares

	EBIT		29,99,450
(–)	interest –		
	11% term loan	2,20,000	
	12% term loan	1,20,000	3,40,000
	EBT		26,59,450
	Tax @ 50%		13,29,725
	EAT		13,29,725
	No. of shares –	4,95,000 + 1,00,000 = 5,95,000	
	EPS =	2.23	
	P/E Ratio–	10	
	Market price of the shares	Rs. 22.34	

Conclusion :

(*a*) As the market price of the share in the B alternative is going to be more, the company will select that financial plan.

(*b*) If it is assumed that there will be no change in P/E ratio in either of these alternatives the A alternative will be preferred as the market price of the share is going to be Rs. 24.40 in that situation.

5. Philips Co. is contemplating to set up a project with a cost of Rs. 10 crore. The proposed financing pattern alternative are as below.

	A	B	C
Equity (equity share @ 200/– each)	10,00,00,000	8,00,00,000	4,00,00,000
Debt 20%	–	2,00,00,000	6,00,00,000
Total	10,00,00,000	10,00,00,000	10,00,00,000

The expected earning from the project are 4 crores. Corporate tax rate is 50% among A, B, and C which alternative will be more suitable and why?

Solution. EPS in all three alternatives :

		A	B	C
	EBIT	4,00,00,000	4,00,00,000	4,00,00,000
(–)	interest @ 20%	–	80,00,000	1,20,00,000
	EBT	4,00,00,000	3,20,00,000	2,80,00,000
(–)	Tax @ 50%	2,00,00,000	1,60,00,000	1,40,00,000
	EAT	2,00,00,000	1,60,00,000	1,40,00,000
	No. of shares	5;00,000	4,00,000	2,00,000
	EPS	40	40	70

From the above EPS of all three alternative it is clear that EPS in the case of A and B alternative is same where as EPS in 'C' alternative is quite high.

As the objective of the management is wealth maximization hence, 'C' alternative is most suitable.

6. Nobel Manufacturing Co. is capitalised with Rs. 2,00,000 divided in 2000 equity shares of Rs. 100 each. Management wishes to raise another Rs. 2,00,000 to finance a major programme of expansion through one of four possible financing plans. The management may finance the company with

   (*a*) all equity shares

   (*b*) Rs. 1,00,000 through equity and Rs. 1,00,000 in debt at 5% interest

   (*c*) all debt at 6% interest

   (*d*) Rs. 10,000 equity capital and Rs. 1,00,000 preference share with 5% dividend.

   The EBIT of the company at present is Rs. 24,000. Corporate tax rate is 50%. Advice which financing plan will be most suitable?

   Solution. Calculation of EPS in each plan :

	Plan *a* (Rs.)	Plan *b* (Rs.)	Plan *c* (Rs.)	Plan *d* (Rs.)
EBIT–	24,000	24,000	24,000	24,000
(–) Interest	–	5,000	12,000	–
EBT	24,000	19,000	12,000	24,000
(–) Tax @ 50%	12,000	9,500	6,000	12,000
EAT	12,000	9,500	6,000	12,000
(–) Dividend on pref. share	–	–	–	5000
Earning available to equity	12,000	9,500	6,000	7,000
No. of equity shares	4,000	3,000	2,000	3,000
EPS.	3.00	3.67	3.00	2.33

NOTES

From the above EPS. *i.e.*, Rs. 3 in plan *a*, Rs. 3.67 in plan *b*, Rs. 3 in plan *c* and Rs. 2.33 in plan *d*. It is clear the EPS is maximum in the case of plan *'b'* hence, plan *b* may be accepted.

7. Excellent Manufacturing Co. expects to earn net operating income of Rs. 3,00,000 annually. The company has Rs. 12,00,000, 8% debentures. The cost of equity capital of the company is 10%. What would be the value of company? Also calculate overall cost of capital.

   (*a*) If management raises the amount of debt to Rs. 18,00,000 and uses the proceeds to repurchase stock. Presuming the cost of debt remain constant, find the value of the Co.

   (*b*) If debt decreases from 12,00,000 to 6,00,000 and Co. issues new shares worth Rs. 75,000 to return the debentures. Calculate impact of change in financial leverage or cost of capital and value of the firm.

SOLUTION.

	(Rs.)
Net operating income –	3,00,000
(–) Interest on 8% debenture –	96,000
Net income	2,04,000
Equity capitalisation rate (ke) =	0.10
Market value of equity (s) = NI/Ke	20,40,000
Market value of debt (B)	12,00,000
Total value of the firm (S + B) = V	32,40,000

$$\text{Overall cost of capital} = K_0 = \frac{EBIT}{V} \text{ or } \frac{NOI}{V}$$

$$= \frac{3,00,000}{32,40,000} = 0.925$$

$$= 0.93 \text{ appro or } 93\% \text{ approx.}$$

(*a*)			
	NOI	–	3,00,000
	(–) Interest	–	1,44,000
	NI	–	1,56,000
	Ke	–	0.10
	S	=	1,56,00,00
	B	=	18,00,000
	V	=	33,60,000
	Total value of the firm V = S + B =		33,60,000

$$\text{Overall cost of capital } K_0 = \frac{NOI}{V} = \frac{1,50,000}{33,60,000}$$

$$= 0.0446$$

$$= 0.045$$

$$= 4.5\%$$

NOTES

From the above it is clear when amount of debt increase from 12,00,000 to 18,000 the value of company rises from Rs. 32,40,000 to 33,60,000 and overall cost of capital declines from 93% to 4.5%.

(*b*) **Calculation of value of company**

		(Rs.)
	EBIT or NOI	3,00,000
(–)	interest on 8% debenture	48,000
	EBT in NI	2,52,000
	Equity Capitalisation rate (Ke)	0.10
	Market value of equity (s) = $\frac{NI}{Ke}$	2,5,20,000
	Market value of debt. (B)	6,00,000
	Total value of the firm V = (S + B) =	31,20,000

$$\text{Cost of overall capital} = K_0 = \frac{EBIT}{V} = \frac{3,00,000}{31,20,000} = 0.96 = 96\%$$

In this case when debt capital is decreased from 12,00,000 to 6,00,000 the value of company decrease from 32,40,000 to 31,20,000 and overall cost of capital increases from 93% to 96%.

8. Murphy Manufacturing Company has annual net operating income of 3,00,000. The company has Rs. 12,00,000, 8% debentures. The overall cost of capital of the company is 10%. What would be the value of the company?

Solution. Value of Murphy Co. has to be computed as below.

	(Rs.)
NOI	3,00,000
Overall capitalisation rate (Ko)	0.10
Total market value of company (V)	30,00,000
Total value of debt (B)	12,00,000
Total market value of equity (S)	18,00,000

$$\text{Equity capitalisation rate } K_e = \frac{EBIT - I}{V - B}$$

$$= \frac{\text{Earnings available to equity holders}}{\text{Total market value of equity shares}}$$

$$= \frac{3,00,000 - 96,000}{9,00,000}$$

$$= \text{Rs.}\frac{2,04,000}{9,00,000} = \frac{204}{900} = 0.2266$$

$$\text{in percentage} = 0.2266$$

Now, if the company increases the amount of debt from 12,00,000 to 18,00,000. The value of the firm and cost of equity capital will be as above.

Calculation of value –

NOI –	3,00,000
Ko –	0.10
Total market value of Co. (V)	30,00,000
Total value of debt (B)	18,00,000
Total market value of equity (S)	12,00,000

$$\text{Equity capitalisation rate } (K_e) = \frac{3,00,000-96,000}{12,00,000} = \frac{2,04,000}{12,00,000}$$

$$= \frac{204}{1,200} = 0.17 \times 100 = 17\%$$

Now, if the amount of debt declines from Rs. 12,00,000 to Rs. 6,00,000. What will be value of company and equity capitalisation rate (K_e)

NOI –	3,00,000
Over all capitalisation rate (Ke)	0.10
Total value of company (V)	30,00,000
Total value of debt. (B)	6,00,000
Total value of equity (S)	24,00,000

$$\text{Equity capitalisation rate} - (K_e) = \frac{3,00,000-48,000}{24,00,000}$$

$$= \frac{2,52,000}{24,00,000} = \frac{252}{2400} = 0.105 \text{ or } 10.5\%$$

9. M/s. Sheetal Ltd. is expecting a net operating income of Rs. 6,00,000 on the total investment of Rs. 40,00,000. The equity capitalisation rate is 10%, if the firm has no debt, but it would increase to 11% when the firm substitutes equity capital by issuing debentures of Rs. 12,00,000 and to 12.5% when debentures of Rs. 20,00,000 are issued to substitute equity capital. The management expect that it will have to pay interest @ 5% to raise an additional debt of Rs. 12,00,000 and @ 7% to raise an additional debt of Rs. 20,00,000. What would be the overall cost of capital and market value of the firm under traditional approach.

Solution. Calculation of value of firm and overall cost of capital as per traditional approach.

	No. debt.	5% Rs. 12,00,000 debt.	7% Rs. 20,00,000 debt.
NOI	6,00,000	6,00,000	6,00,000
(–) interest	–	(–) 60,000	(–) 1,40,000
NI	6,00,000	5,40,000	4,60,000
Cost of equity (*i.e.*,)	0.10	0.11	0.125
Market value of equity (S)	60,00,000	49,09,090	36,80,000
Market value of debt (B)	NIL	12,00,000	20,00,000
Total value of firm (V)	60,00,000	61,09,090	56,80,000
Overall cost of Capital (Ko)	0.10	0.098	0.106

10. Two firms (α) Alpha and (β) Beta falling in risk class have not operating income of Rs. 6,00,000 each. Firm Alpha is an unleavered concern having all equity by firm Beta is levered concern as it has Rs. 20,00,000 of 10% bonds outstanding. The equity capitalisation rate of α and β is 12.5% and 16% respectively.

SOLUTION.

	α	β
NOI	6,00,000	6,00,000
(–) interest (I)	–	2,00,000
NI	6,00,000	4,00,000
Equity capitalisation rate (*Ke*)	0.125	0.16
Total market value of equity (S)	48,00,000	25,00,000
Total value of the debt (B)	–	20,00,000
Total value (V)	48,00,000	5,00,000
Overall cost of capital (Ko) =	0.125%	1.2%

It may be noted from the above that the total value of firm Beta which is levered is higher than the unleverid firm Alpha. However, this state of affairs cannot exist for a long time as the rational investors.

PROBLEMS

1. Rama and Co. Ltd. is considering expanding assets by Rs. 15 lakhs and has decided that it can finance the expansion either through a bond issue carrying a 10% interest rate or through a new issue of common stock which can be sold to net the company Rs. 30 per share. The company currently has 8,00,000 shares of stock outstanding and Rs. 15 lakhs of bonds with an 8% coupon rate. Tax rate is 50%, calculate EPS for each alternative at EBIT levels of Rs. 3 lakhs, Rs. 6 lakhs and Rs. 9 lakhs.
2. Sahara Trading Company has EBIT of Rs. 3,20,000. The company's capital structure consists of following securities.
   (*a*) 10% bonds Rs. 10,00,000.
   (*b*) 15% preference shares of Rs. 2,00,000
   (*c*) Equity shares of Rs. 50 each Rs. 8,00,000.

   The tax rate is 50%. Determine the EPS of the company. What would be the change in EPS if EBIT of the company increases by 25% and decreases by 20%?
3. An analytical statement of AB company is shown below. It is based on an output (sales) level of 80,000 units.

	(Rs.)
Sales	9,60,000
Variable cost	5,60,000
Revenue before fixed cost	4,00,000

Fixed cost	2,40,000
EBIT	1,60,000
Interest	60,000
EBT	1,00,000
Tax	50,000
Net income	50,000

Calculate (*i*) operating leverage (*ii*) financial leverage (*iii*) combined leverage.

4. Calculate operating leverage and financial leverage under situation A, B, and C and financial plans I, II, and III respectively from the following informations relating to the operation and capital structure of XYZ Co. Also find out the combinations of operating and financial leverages which give the higher value and the least value. How are these calculations useful to financial manager in a company?

Installed capacity	1200 units
Actual production and sales	800 units
selling per unit	Rs. 15
variable cost per unit	Rs. 10
fixed cost – 'A' situation –	Rs. 1,000
'B' situation –	Rs. 2,000
'C' situation –	Rs. 3,000

Capital structure	**Financial plan**		
	I	II	III
Equity	Rs. 5,000	Rs. 7,500	Rs. 2,500
Debt. 12%	Rs. 5,000	Rs. 2,500	Rs. 7,500

5. The selected financial data for A, B and C for the year ended 31 Dec. 2004 are as below.

	A	B	C
Variable Expenses as % of sales	66 2/3	75	50
Interest Expenses	Rs. 200	Rs. 300	Rs. 1000
Degree of operating leverage	5.1	6.1	2.1
Degree of financial leverage	3.1	4.1	2.1
Income to a rate	50%	50%	50%

Prepare income statement of A, B and C companies.

6. Calculate the cost of various form of capital of A Ltd. from the following information.

(*a*) 15% Debentures redeemable after 10 years face value of Rs. 100, net amount realised is Rs. 95 per debenture. Tax rate is 50%.

(*b*) 10% preference shares face value of Rs. 100, net amount realised Rs. 105.

NOTES

(c) Market price of equity share Rs. 150, dividend expected Rs. 12 per share. The dividend per share is expected to grow at 5% per year.

7. A Ltd. has the following capital structure.

12% Debt	Rs. 30 lakhs
Equity capital (Rs. 100 shares)	Rs. 20 lakhs
Retained earnings	Rs. 40 lakhs
Market value of equity	Rs. 50 lakhs

Earning per share and dividend per share have grown steadily at the rate of 5% per year. Future dividend per share expected is Rs. 15. Market price per share is Rs. 250. Tax rate for the company is 60%.

Calculate the average cost of capital for the company.

8. Shyam Ltd. has the following capital structure.

Equity Capital	Rs.
(1 lakh shares of Rs. 10)	10 lakhs
10% preference capital	
(1000 shares of Rs. 100)	1 lakh
13% debentures	
(5000 debentures of Rs. 100)	5 lakhs
14% term loans	8 lakhs
Retained earnings	12 lakhs
	36 lakhs

Expected dividend per share is Rs. 1.50 with the expected growth rate of 7%. Market price per share is Rs. 20. Preference shares and debentures are selling at Rs. 75 and 80 respectively. Tax rate of the company is 50%.

Calculate the average cost of Capital using

(*a*) Book value weights

(*b*) Market value weights.

9. Calculate the degree of operating leverage, degree of financial leverage and the degree of combined leverage for the following firms and interpret the results.

	X	Y	Z
Output (units)	3,00,000	75,000	5,00,000
Fixed costs (Rs.)	3,50,000	7,00,000	75,000
Unit variable cost (Rs.)	1.00	7.5	0.10
Interest expenses (Rs.)	25,000	40,000	NIL
Unit selling price (Rs.)	3.00	25.00	0.50

10. A company is considering raising of funds at about Rs. 100 lakhs by one of the two alternative methods. viz. 14% institutianale term loan and 13% non-convertible debentures. The term loan option would attract no incidental cost. The debentures would have to be issued at

a discount of 2.5% and would involve issue cost of Rs. 1 lakh. Advice the company as to the better option based on the effective cost of capital in each case. Assume a tax rate of 50%.

11. The following figures relate to two companies.

		(Rs. in lakhs)
	α Ltd.	**β Ltd.**
Sales	500	1000
Variable cost	200	300
Contribution	300	700
Fixed cost	150	400
PBIT	150	300
Interest	50	100
PBT	100	200

You are required to calculate

(*a*) Operating, financial and combined leverage of both companies.

(*b*) Comment on relative risk position for them.

12. Following is an extract from the financial statement of Swamy and Co. Ltd.

	(Rs. in lakh)
Operating profit	105
(–) Interest on debenture	33
PBT	72
(–) Income Tax	36
PAT	36
Equity share capital (share of Rs. 10 each)	200
Reserve and Surplus	100
15% non-convertible Debenture of Rs. 100 each	220
	520

The market price per equity share is Rs. 12 and per debenture is Rs. 93.75 find,

(*a*) Earning per share.

(*b*) What is the percentage cost of capital to the company for the debenture funds and the equity?

13. Sheetal and Co. Ltd. is considering three different plans to finance its total project cost of Rs. 100 lakhs.

These are,

(Rs. in lakhs)

	Plan A	**Plan B**	**Plan C**
	Rs.	**Rs.**	**Rs.**
Equity (Rs. 100 per share)	50	34	25
8% debenture	50	66	75
	100	100	100

Sales for the 1st three years of operations are estimated at Rs. 100 lakhs, Rs. 125 lakhs and Rs. 150 lakhs and a 10% profit before interest and taxes is forecasted to be achieved. Corporate taxation to be taken at 50%. Compute Earning per share in each of the alternative plans of financing for the three years.

14. Everready Co. has to decide between debt fund and equity for its expansion programme. Its current position is as follows :

	Rs.
Debt 5%	40,000
Equity capital (Rs. 10 per share)	1,00,000
Surplus	60,000
Total capitalisation	2,00,000
Sales	6,00,000
(–) Total cost	5,38,000
PBIT	62,000
(–) interest	2,000
(–) Income tax @ 57.25%	60,000
PAT	34,350
	25,650

The expansion programme is estimated to cost Rs. 1,00,000. If this is financed through debt, the rate of new debt will be 7% and the price earning ratio will be 6 times, if the expansion programme is financed through equity shares, the new shares can be sold @ Rs. 25 per share and price earning ratio will be 7 times. The expansion will generate addition sales of Rs. 3,00,000 with a return of 10% on sales before interest and taxes.

If company is to follow a policy of maximizing the market value of its shares, which form of financing should it choose?

15. AC Engineering Ltd. provides you with the following figures.

	Rs.
PBIT or EBIT	3,00,000
(–) interest on debt @ 12%	60,000
PBT or EBT	2,40,000
(–) Income tax @ 50%	1,20,000
EAT	1,20,000
No of equity share (Rs. 10 each)	40,000
EPS	3
Ruling price in market	30
P/E ratio	10

The company has undistributed reserve of Rs. 6,00,000. The company needs Rs. 2,00,000 for expansion. This amount will earn at the same rate as funds already employed. You are informed that a debt equity ratio higher than 35% will push the P/E ratio down to 8 and raise the

interest rate on additional amount borrowed to 14%. You are required to ascertain the probable price of the share.

(*a*) If the additional funds are raised as debt.

(*b*) If the amount is raised by issuing equity shares.

[**Hint** : debt – equity ratio = debt/debt + equity]

SUMMARY

- Cost of capital can be defined as "The rate of which an organisation must pay to the suppliers of capital for the use of their funds."
- The cost of capital is used as the capitalisation rate to decide the amount of capitalisation in case of new enterprise.
- Composite cost of capital is defined as the weighted average of the cost of each specific type of capital.
- Leverage analysis is the technique used by business firms to quantify risk-return relationship of different alternative capital structures.

SELF ASSESSMENT QUESTIONS

1. Define the term capital structure. Explain the factors which influence the capital structure of a company.
2. What do you mean by cost of capital? How the cost of capital is calculated for.
   (*a*) Equity shares (*b*) Preference shares
   (*c*) Debentures (*d*) Retained earnings.
3. What is the meaning of leverage? What are the different types of leverages which can be calculated? Explain the indication of each type of leverage. Discuss the combined effect of the operating leverage and financial leverage.
4. Define optimal capital structure. What is its link with cost of capital?
5. Write short notes on :
   (*a*) Cost of capital
   (*b*) Operating and financial leverage
   (*c*) Optimal capital structure.

UNIT 5 TIME VALUE OF MONEY

NOTES

★ STRUCTURE ★

- Introduction
- Compounding Technique
- Discounting Technique
- Present Value of Series of Cash Flows
- Techniques for Evaluation of Capital Expenditure Proposals
- Illustrated Problems
- Problems
- Summary
- Self Assessrnent Questions

INTRODUCTION

The evaluation of capital expenditure proposals involves the comparison between cash outflow and cash inflow. The peculiarity of evaluation of capital expenditure proposals is that it involves the decisions to be taken today where as the flow of funds, either outflow or inflow may be spread over a number of years. It goes without saying that for a meaningful comparison between cash outflow and inflow, both the variables should be on comparable basis. The question arises that "Is the value of flows arising in future the same in terms of today"? The ideal reply to this is 'no'. The reasons for this are as below :

(*a*) There is always an element of uncertainty attached with the future cash flows.

(*b*) The purchasing power of cash inflows received after the year may be less than that of equivalent sum if received today.

(*c*) There may be investment opportunities available if the amount is received today which cannot be exploited if the equivalent sum is received after one year.

This concept is called time value of money. In the capital budgeting decisions. If there has to be a meaningful comparison between the cash outflows and cash inflows which may arise in future at different points of time whereas the evaluation is required to be done as on today, both the future cash outflows and cash inflows are required to be expressed in terms of today.

There are mainly two techniques available for this : (*a*) Compounding, (*b*) Discounting.

NOTES

COMPOUNDING TECHNIQUE

In this technique, the interest is compounded and becomes a part of initial principal at the end of compounding period.

The compounding of interest can be calculated with the help of following equation :

$$A = P(1 + i)^n$$

where A = Amount at the end of the period

P = Amount of principal at the beginning of the period

i = Rate of interest

n = Number of years.

EXAMPLE 1. If Mr. Gopal invests Rs. 10,000 in fixed deposit carrying interest @ 10% p.a. compounded annually, at the end of Ist year, Rs. 10,000 will be worth of Rs. 11,000, if Rs. 11,000 reinvested in the same fixed deposit, at the end of 2nd year it will amount to Rs. 12,100.

Now by applying equation

$$A = P\ (1 + i)^n$$

$A = 7i = 10\%$ p.a.

$P = 10{,}000,\ n = 2$ years.

$$A = 10{,}000\left(1 + \frac{10}{100}\right)^2$$

$$= 10{,}000\left(\frac{100 + 10}{100}\right)^2 = 10{,}000\left(\frac{110}{100}\right)^2$$

$$= 10{,}0\cancel{0}\cancel{0} \times \frac{11}{1\cancel{0}} \times \frac{11}{1\cancel{0}} = 100 \times 11 \times 11 = 100 \times 121$$

= **Rs. 12,100 Ans.**

DISCOUNTING TECHNIQUE

This technique involves the process which is exactly opposite to that involved in the technique of compounding. This technique tries to find out the present value of Rs. 1 if received or spent after 'n' years provided that the interest rate of 'i' can be earned on investment. The present value is calculated with the help of following equation

$$P = \frac{A}{(1+i)^n}$$

P = Present value of sum received or spent

NOTES

A = Sum received or spent in future

i = Rate of interest

n = Number of years

EXAMPLE 2. If Mr. Gopal is given the opportunity to receive Rs. 10,000 after 2 years. When he can earn interest of 10% p.a. on his investment. What should be the amount which he should invest today so that he may be able to receive Rs. 10,000 after 2 years.

By applying formula,

$$P = \frac{A}{(1+i)^n}$$

A = Rs. 10,000

i = 10%, n = 2 years

$$= \frac{10,000}{(1+0.10)^2} = \frac{10,000}{(1.10)^2} = \frac{10,000}{1.10 \times 1.10}$$

= Rs. 8,264.46

In other words, if Mr. Gopal invests Rs. 8,264.46 today in the investment carrying interest rate of 10% p.a. he may be able to receive Rs. 10,000 after 2 years or the present value or Rs. 10,000 if received after 2 years is only Rs. 8,264.46 as on today if investment opportunities are available to earn the interest of 10% p.a.

To simplify the computation of present value, use can be made of "table A" given in the appendix which gives the present value of Rs. 1 for the various interest rates (i) and year (n) for computing the present value of a future amount. The said amount can be multiplied by choosing the interest factor/ discounting factor/present value factor for the relevant combination of 'i' and 'n'.

EXAMPLE 3. To find out the present value of Rs. 4000 received after 7 years assuming interest rate to be 15%.

the present value factor = 0.513

then present value = 4000 × 0.513

= Rs. 2.052.

PRESENT VALUE OF SERIES OF CASH FLOWS

In capital budgeting decisions, the cash flows, either cash outflow or cash inflow, may occur at various point of time. For finding out the present value of this series of cash flows, it is necessary to find out the present value of each future cash flow and then aggregate them.

Example 4. A project involves cash inflows as below

Year	Cash Inflow (Rs.)
1	10,000
2	12,000
3	15,000
4	20,000

Assuming interest rate to be 15%, find out the present value of cash inflows.

Solution. Calculation of present value of cash inflows :

Year	Cash Inflows (Rs.)	Present Value @ 15%	Total Present Value
1	10,000	0.870	8,700
2	12,000	0.756	9,072
3	15,000	0.656	9,840
4	20,000	0.572	11,440
	Total 57,000		Total 39,052

Example 5. A machine costing Rs. 1,00,000 is to be purchased as below– Rs. 20,000–down payment out of own contribution–Rs. 80,000, borrowing by way of term loan. To be paid in 04 equal annual instalment along with the interest @ 15% p.a. The interest being computed on opening outstanding balance. Calculate present value of cash outflow.

Solution. Calculation of present value of cash outflows :

Year	Principal Sum (Rs.)	Interest @ 15% pa (Rs.)	Total Outflow (Rs.)	PV Factor 15%	Total PV (Rs.)
0	20,000	–	20,000	1.000	20,000
1	20,000	12,000	32,000	0.870	27,840
2	20,000	9,000	29,000	0.756	21,924
3	20,000	6,000	26,000	0.658	17,108
4	20,000	3,000	23,000	0.572	13,156
	Total 1,00,000	Total 30,000	Total 1,30,000		Total Rs. 1,00,028

NOTE If a project involves uniform cash flows, the present value of the cash flows can be calculated by a short cut method. Instead of calculating present value for each cash flow and then summing up the present values, the discounting factors themselves can be summed upto find out Accumulated Discounting factor for the various interest rates (i) and years (n) and the multiplication of Accumulated discounting factor and cash flow will give present value of cash flow. Table B gives the Accumulated Discounting factors for the various interest rates (i) and years (n).

NOTES

EXAMPLE 6. A project involves the cash inflow of Rs. 20,000 per year for 4 years. Assuming interest rate of 15% find out the present value of cash inflows.

SOLUTION. Accumulated discounting factor at 15% for 4 years

$$= 1.000 + 0.870 + 0.756 + 0.658 + 0.572$$

$$= 3.856$$

Present value of cash inflow = 20,000 × 3.856 = 77.120

Importance of Discounting System (Technique) in Capital Budgeting Decisions

To make the value of cash outflows and cash inflows comparable, it is necessary to reduce future cash outflows or cash inflows to their present value by discounting them by proper discounting factor or present value factor.

NOTE Usually, weighted average cost of capital is considered as the discounting factor in capital budgeting decision.

TECHNIQUES FOR EVALUATION OF CAPITAL EXPENDITURE PROPOSALS

There are various techniques available for evaluation of capital expenditure proposals. These techniques can be broadly categorised into the following two on the basis of time value of money.

1. **Techniques not considering time value of money.**
2. **Techniques considering time value of money.**

1. Techniques Not Considering Time Value of Money

There are two techniques which do not consider time value of money.

(*a*) Pay back period

(*b*) Accounting rate of return.

(a) Pay Back Period

It indicates the period with in which the cost of the project will be completely recovered. In other words, it indicates the period with in which the total cash inflows equal to the total cash outflows.

Thus, $$\textbf{Pay back period} = \frac{\textbf{Cash outlay}}{\textbf{Annual cash inflow}}$$

NOTE Pay back period method can be used as an accept or reject criteria or as a method of ranking the project. If the pay back period computed for a project is more than maximum pay back period estimated by the management it would be rejected or vice versa.

Pay back period (*Computed*) > **Maximum pay back period** (*estimated*) = **Rejected**

Pay back period (*Computed*) < **Maximum pay back period** (*estimated*) = **Accepted**

NOTES

In the case of ranking method the projects having shortest pay back period will be ranked highest.

e.g., A project requires an outlay of Rs. 5,00,000 and earns an annual cash inflow of Rs. 1,00,000 for 8 years. Calculate pay back period.

$$\text{Pay back period} = \frac{\text{Cash outlay}}{\text{Annual cash inflow}}$$

$$= \frac{5,00,000}{1,00,000} = 5 \text{ years.}$$

NOTE If the project involves unequal cash inflows, the pay back period can be computed by adding upto the cash inflow till the total is equal to cash outlay.

e.g., A project requires an outlay of Rs. 1,00,000 and earns the annual cash inflow of Rs. 25,000, 30,000, 20,000 and Rs. 50,000. Calculate pay back period.

25,000 + 30,000 + 20,000 = 75,000 Rs. paid in 3 years.

Balance is 1,00,000 – 75,000 = 25,000 Rs.

$$\text{Pay back period (for Rs. 25,000)} = \frac{25,000}{50,000} \times 12 = \frac{1}{2} \times 12 = 6 \text{ months}$$

Hence, pay back period = 3 years 6 months

Working : On adding cash inflows in first 3 yrs an amount of Rs. 75,000 of the cash outlay is recovered. 4th year generates the cash inflow of Rs. 50,000. Whereas the amount of Rs. 25,000 only remains to be recovered. Assuming that the cash inflows occur evenly during the year, the time which will be required to recover Rs. 25,000 is 6 months.

Advantages of Pay Back Period

1. It is quite simple to calculate and easy to understand. It makes it clear that there are no profits on the project unless pay back period is over.
2. It costs less.
3. It may be a suitable technique where risk of absolescence is high. In such cases, projects with shorter pay back period may be preferred as the changes in technology may make other projects obselete before their costs are recovered.

Disadvantages

1. It does not consider the return from a project after its pay back period is over. Suppose there are two projects A and B. Pay back period of

A is 5 years and B's it is 3 years. Then project B is considered. Pay back period technique is never interested beyond the pay back period. If project A gives better yield after pay back period then it is failed to consider this point.

2. It may not be a suitable method to evaluate the projects if they involve uneven cash inflow.
3. It ignores time value of money.
4. To decide the acceptable pay back period is a difficult task. There is no rational basis for deciding the maximum pay back period, it is a subjective decision.

(b) Accounting Rate of Return

According to accounting rate of return (ARR) it computes the average annual yield on the net investment in the project. ARR is computed by dividing the average profits after depreciation and taxes by net investments in the projects. ARR can be computed as :

$$\text{ARR} = \frac{\text{Total profits}}{\text{Net investment in project} \times \text{No. of years of profit}} \times 100$$

NOTE ARR can also be used for accepting or rejecting projects/plans or as a method for ranking the projects

ARR > minimum rate prescribed by management - Accepted

ARR < minimum rate prescribed by management - Rejected

EXAMPLE 7. A project involves the investment of Rs. 5,00,000 which yields profit after depreciation and tax as stated below :

Years	Profit after depreciation and tax (Rs.)
1	25,000
2	37,500
3	62,000
4	65,500
5	40,000
Total	2,30,000

At the end of 5 years, the machineries in the project can be sold for Rs. 40,000 find ARR.

SOLUTION. Total profit after depreciation and tax = Rs. 2,30,000

The net investment in the project will be original cost (–) salvage

Value = 5,00,000 – 40,000 = 4,60,000.

$$\text{ARR} = \frac{2,30,000}{4,60,000 \times 5} \times 100 = \frac{1}{2 \times 5} \times 100 = 10\%$$

Advantages

1. It is simple to calculate and easy to understand.
2. It considers the profit from the project throughout its life.
3. It can be calculated from accounting data.

Disadvantages

1. It uses profits after depreciation and taxes, not the cash inflows for evaluating the projects.
2. Ignores time value of money.

2. Techniques Considering Time Value of Money

Following are the main techniques which do consider the time value of money.

(*a*) Discounted pay back period

(*b*) Net present value

(*c*) Internal rate of return

(*d*) Profitability index/Benefit cost ratio.

(a) Discounted Pay Back Period

It is an improved verson of pay back period method. It considers time value of money. Thus discounted pay back period indicates that period with in which the discounted cash inflows equal to the discounted cash outflows involved in a project.

EXAMPLE 8. A project requires an outlay of Rs. 1,00,000 and earns the annual cash inflows of Rs. 35,000, 40,000, 30,000 and 50,000. Calculate discounted pay back assuming the discounting rate of 15%.

SOLUTION.

Years	Cash Inflows (Rs.)	Discounted Factor @ 15%	Discounted Cash Inflow (Rs.)	Cumulative Discounted Cash Inflow (Rs.)
1	35,000	0.870	30,450	30,450
2	40,000	0.756	30,240	60,690
3	30,000	0.658	19,740	80,430
4	50,000	0.572	28,600	1,09,030

Thus the pay back period will be after 3 years but before 4 years.

If the cash inflows accurs evenly during the 4th year then –

Pay back period will be 3 years 8 months. (approx)

(b) Net Present Value

It is a method of calculating present value of cash inflows and cash outflows in an investment projects by using cost of capital as the discounting rate and

NOTES

finding out net present value by subtracting present value of cash outflows from present value of cash inflows. Thus

NPV = Σ discounted cash inflows – Σ discounted cash outflows

NOTE This method is also used for the acceptance or rejection as well as ranking method.

As accept or rejection criteria – all the projects which involve positive NVA *i.e.,* more than 'zero' will be accepted otherwise rejected.

NPV > 0 → Accepted

NPV < 0 → Rejected

As a ranking method – the projects having maximum (+) NPV will be ranked highest. More is the (+) NPV higher is the rank.

EXAMPLE 9. Calculate NPV of a project involving initial cash outflow Rs. 1,00,000 and generating annual cash inflows of Rs. 35,000, 40,000, 30,000 and 50,000 discounted rate is 15%.

SOLUTION.

Years	Cash Inflows (Rs.)	Discounted Factor @ 15%	Present Value of Cash Inflows (Rs.)
1	35,000	0.870	30,450
2	40,000	0.756	30,240
3	30,000	0.658	19,740
4	50,000	0.572	28,600
	Total 1,55,000		1,09,030
		(–) investment outlay	1,00,000
		NPV	9,030

Advantages

1. It considers time value of money.
2. It considers cash inflows from the project throughout its life.

Disadvantages

1. It is difficult to use, calculate and understand.
2. It preassumes that the discounting rate, *i.e.,* cost of capital is known. But cost of capital is known. But cost of capital is difficult to measure in practice.
3. It may give dissatisfactory results if the alternative projects involve varying investment outlay. A project involving (+) NPV may not be desirable if it involves huge investments.
4. It also preassumes that the cash inflow can be reinvested immediately to yield the return equivalent to the discounting rate, which may not be possible always.

NOTES

(c) Internal Rate of Return

It is that rate at which the discounted cash inflows match with discounted cash outflows. The indication given by IRR is that this is the maximum rate at which the company will be able to pay towards the interest on amounts borrowed for investing in the projects, without loosing anything. Thus IRR may be called as the "break even rate" of borrowing for the company.

In other words, IRR indicates that discounting rate at which NPV is zero. If by applying 10% as the discounting rate the resultant NPV is positive, while by applying 12% discounting rate, the resultant NPV is negative it means that IRR *i.e.*, the discounting rate at which NPV is zero, falls between 10% and 12%. Thus, by applying the trial and error method, one can find out the discounting rate at which NPV is zero.

The process to compute IRR will be to select any discounting rate should be tried and the process should be repeated till the NPV becomes zero.

NOTE The computed IRR will be compared with the cost of capital. If the IRR is more than or at least equal to the cost of capital the project is accepted and vice versa.

IRR > Cost of Capital — Accepted

IRR < Cost of Capital — Rejected

EXAMPLE 10. A project cost Rs. 1,00,000 and generates annual cash flow of Rs. 35,000, 40,000, 30,000 and Rs. 50,000 over its life of 4 years. Calculate the IRR, discounting rate, and present value of cash inflows.

SOLUTION. Using 15% discounting rate :

Year	Cash Inflows (Rs.)	PV Factor (15%)	Total PV (Rs.)
1	35,000	0.870	30,450
2	40,000	0.756	30,240
3	30,000	0.656	19,740
4	50,000	0.572	28,600
		Total	1,09,030

Using 18% discounting rate :

Year	Cash Inflows (Rs.)	PV Factor (18%)	Total PV (Rs.)
1	35,000	0.847	29,645
2	40,000	0.718	28,720
3	30,000	0.609	18,270
4	50,000	0.516	25,800
		Total	1,02,435

Using 20% discounting rate :

Year	Cash Inflows (Rs.)	PV Factor (20%)	Total PV (Rs.)
1	35,000	0.833	29,155
2	40,000	0.694	27,760
3	30,000	0.579	17,370
4	50,000	0.482	24,100
		Total	98,385

NOTES

Thus, at 18% discounting rate NPV is Rs. 2435 and at 20% discounting rate NPV is (–) negative Rs. 1615 hence, IRR is between 18% and 20% *i.e.,* more than 18% and less than 20%. Difference between PV at 18% and 20% is Rs. 4050.

$$(102435 - 98385 = 4050)$$

$$\text{IRR} = 20\% - \frac{1615 \times 2}{4050}$$

$$= 19.2\% \text{ (approx)}$$

Advantages

1. It considers time value of money.
2. It considers cash inflows from the project throughout its life.
3. It can be computed even in the absence of the knowledge about the firms' cost of capital. But in order to draw the final conclusion, the comparison with the cost of capital is a must.

Disadvantages

1. *It is difficult to use, calculate and understand.*
2. It pre-supposes that the cash inflows can be reinvested immediately to yield the return equivalent to the IRR. NPV method on the other hand, pre-supposes that the cash inflows can be reinvested to yield the return equivalent to the cost of capital, which is more realistic.

(d) Profitability Index (PI)/Benefit Cost Ratio (B/C ratio)

It is the ratio between total discounted cost inflows and total discounted cash outflows. Thus the profitability index can be computed as :

$$\textbf{PI} = \frac{\Sigma \textbf{ Discounted cash inflows}}{\Sigma \textbf{ Discounted cash outflows}}$$

NOTES

1. The PI as computed is gross in nature. To find out net PI following formula is used.

   Net PI = Gross PI – 1

2. Proposals or projects or plan have profitability under more than one are accepted and vice versa.

   Profitability index is more than one–accepted.

   Profitability index is less than one–rejected.

3. In the case of ranking of plan/projects etc., those which have highest profitability index will be ranked highest.

EXAMPLE. A project requires an outlay of Rs. 1,00,000 and earn the annual cash inflows of Rs. 35,000, 40,000, 30,000 and 50,000. Calculate PI. Assuming discounting rate of 15%.

NOTES

Year	Cash Inflows (Rs.)	Discounting Factor (15%)	Discounting Cash Inflow (Rs.)
1	35,000	0.870	30,450
2	40,000	0.756	30,240
3	30,000	0.658	19,740
4	50,000	0.572	28,600
		Total	1,09,030

$$PI\ (g) = \frac{1,09,030}{1,00,000} = 1.09$$

$$PI\ (n) = 1.09 - 1 = \mathbf{0.09}\quad \textbf{Ans.}$$

ILLUSTRATED PROBLEMS

1. One of two machines A and B is to be purchased. From the following information find out which of the two will be more profitable? The average rate of tax is 50%.

	A (Rs.)	B (Rs.)
Cost of machine	50,000	80,000
Working life	4 yrs.	6 yrs.
Earning before tax.		
Year		
1	10,000	8,000
2	15,000	14,000
3	20,000	25,000
4	15,000	30,000
5	–	18,000
6	–	13,000

Solution. In the question as discounting rate is not given hence only pay back period, accounting rate of return method can be used.

Pay back period

	A (Rs.)		B (Rs.)	
Cash outflow	50,000		80,000	
Cash inflow				
		Cumulation		
1	10,000	10,000	8,000	8,000
2	13,750	23,750	13,667	21,667
3	16,250	40,000	19,167	40,834
4	13,750	53,750	21,667	62,501
5	–	–	15,667	78,168
6	–	–	13,000	91,168

$$\text{Pay back period (A)} = \frac{50,000}{10,000 \text{ balance}} - 40,000 \text{ (in 3 years)}$$

It is assumed that cash inflow remain same throughout the year then –

$$\frac{\text{Balance of cash layout}}{\text{Cash inflow}} \times 12 = \frac{10,000}{13,750} \times 12$$

= 8.72 month = 9 month (Approx.)

Total pay back period (A) = 3 yrs 9 months

Pay back period (B) = 80,000 – 78,168 (in 5 years)

= Rs. 1,832 (balance)

It is assumed that the cash inflow remains same throughout the year then.

$$12 \times \frac{\text{Balance of cash layout}}{\text{Cash inflow}}$$

$$12 \times \frac{1,832}{91,168} = 0.24 \text{ months} = 0.3 \text{ months} = 10 \text{ days.}$$

Total pay back period (B) = 5 yrs 10 days.

Accounting Rate of Return

Machine A. Depreciation = $\frac{\text{Cost of machine in Rs.}}{\text{Working life of machine in years}}$

Year	Earnings (Rs.)	Depreciation (Rs.)	PBT (Rs.)	Tax 50%	PAT (Rs.)
1	10,000	12,500	(–) 2,500	–	(–) 2,500
2	15,000	12,500	2,500	1,250	1,250
3	20,000	12,500	7,500	3,750	3,750
4	15,000	12,500	2,500	1,250	1,250
				Total	3,750

$$\text{ARR} = \frac{\text{Total profit}}{\text{Net investment} \times \text{No. of years of profit}} \times 100$$

$$= \frac{3,750}{50,000 \times 4} \times 100 = 1.875\%$$

Machine B. Depreciation = $\frac{\text{Cost of machine in Rs.}}{\text{Working life of machine in years}}$

Year	Earning	Depreciation	PBT	Tax	PAT
1	8,000	13,333	(–) 5,333	–	(–) 5,333
2	14,000	13,333	667	333	334
3	25,000	13,333	11,666	5,833	5,833
4	30,000	13,333	16,667	8,333	8,334
5	18,000	13,333	4,667	2,333	2,334
6	13,000	13,333	(–) 334	–	(–) 334
				Total	Rs. 11,168

$$\text{ARR} = \frac{11,168 \times 100}{80,000 \times 6} = 2.33\%$$

According to Pay back method, Machine A is profitable but according to ARR method Machine B is profitable.

2. A company is considering an investment proposal to install new milling controls. The project will cost Rs. 50,000. The facility has a life expectancy of 5 years and no salvage value. The company's tax rate is 55%. The firm uses straight line depreciation which is allowed for income tax purposes. The estimated cash inflow before tax from the proposed investment proposal are as follows :

Compute (*i*) Pay back period, (*ii*) Average rate of return.

SOLUTION. Cash inflows

Year	CFBT	Depreciation	Taxable Income (*x*–3)	Taxes	PAT (4–5)	Cash Inflows (6+3)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	10,000	10,000	0	0	0	10,000
2	11,000	10,000	1,000	550	450	10,450
3	14,000	10,000	4,000	2,200	1,800	11,850
4	15,000	10,000	5,000	2,750	2,250	12,250
5	25,000	10,000	15,000	8,250	6,750	16,750
					11,250	61,300

$$\text{Cash flows} = \text{CFBT} - \text{depreciation} - \text{taxes} + \text{depreciation}$$

$$\text{Depreciation} = \frac{\text{Cost of machine} - \text{Salvage value}}{\text{Life of machine in yrs.}}$$

$$= \frac{50,000}{5} = 10,000 \text{ Rs.}$$

(*i*) **Pay back period**

Year	Cash Inflows	Cumulative Cash Inflow
1	10,000	10,000
2	10,450	20,450
3	11,800	32,250
4	12,250	44,500
5	16,750	61,250

Cost of machine (project) = 50,000

Cash inflow upto 4 years = 44,500

balance after 4 years = 5,500

If cash inflow remain same throughout the year then

$$\frac{5,500 \times 12}{16,750} = 3.90 = 4 \text{ months (approx.)}$$

Total pay back period = 4 years 4 months (approx.)

(*ii*) $$ARR = \frac{\text{Total profit (after depreciation and taxes)}}{\text{Net investment in machine} \times \text{No. of years in profit}} \times 100$$

$$= \frac{11,250 \times 100}{50,000 \times 5} = \frac{11,25,000}{50,000 \times 5} = 4.5\%$$

3. A company, whose cost of Capital is 12% is considering two projects A and B. The following data are available :

	Project A	Project B
Investment	1,40,000	1,40,000
Cash inflows		
1	20,000	1,00,000
2	40,000	80,000
3	60,000	40,000
4	1,00,000	20,000
5	1,10,000	20,000
	3,30,000	2,60,000

Select the most suitable project by using following methods (*i*) Pay back period, (*ii*) Net present value method, (*iii*) Profitability index.

If present value of Rs. 1 at 12% are

1 yr. – 0.900, 2 yrs. – 0.800, 3 yrs. – 0.700, 4 yrs. – 0.600, 5 yrs. – 0.550

Solution.

Year	Discounting Factor 12%	Project A Cash Inflow	Project A Discounted Cash Inflow	Project B Cash Inflow	Project B Discounted Cash Inflow
1	0.900	20,000	18,000	1,00,000	90,000
2	0.800	40,000	32,000	80,000	64,000
3	0.700	60,000	42,000	40,000	28,000
4	0.600	1,00,000	60,000	20,000	12,000
5	0.550	1,10,000	60,500	20,000	11,000
Total			2,12,500		2,05,000
(–) cash inflow			1,40,000		1,40,000
			72,500		65,000

(*i*) **Pay back period**

$Project_{(A)}$ ⇒ Cash outflow – Cash inflow in (3 years)

1,40,000 – 1,20,000 = 20,000 (balance)

If cash inflow remain same throughout year then,

$$\frac{20,000 \times 12}{1,00,000} = \frac{24}{10} = 2.4 \text{ months}$$

$PBP_{(A)}$ = 3 yrs. 2.4 months

$Project_{(B)}$ ⇒ Cash outflow – Cash inflow in 1st year

1,40,000 – 1,00,000 = 40,000 (balance)

If cash inflow remain same throughout year then,

$$\frac{40,000 \times 12}{80,000} = 6 \text{ months}$$

$$PBP_{(B)} = 1 \text{ year } 6 \text{ months}$$

Pay back period method reveals that the pay back period of project B is less *i.e.*, 1½ yrs. hence acceptable.

(*ii*) **Net present value**

NPV of project A = Rs. 72,500

NPV of project B = Rs. 65,000

According to NPV method. The NPV of project A higher than the NPV of project B hence project A is acceptable.

(*iii*) **PI method**

$$PI_{(g)} = \frac{\Sigma \text{ Discounted cash inflows}}{\Sigma \text{ Discounted cash outflow}}$$

$$PI_{(A)(g)} = \frac{2,12,500}{1,40,000} = 1.52$$

$$PI_{A(n)} = 1.52 - 1 = 0.52$$

$$PI_{B(g)} = \frac{2,05,000}{1,40,000} = 1.46$$

$$PI_{B}(n) = 1.46 - 1 = 0.46$$

PI method reveals that the $PI_{(n)}$ is more than $PI_{(B)}$ hence Project A is acceptable.

PROBLEMS

1. A project of Rs. 20,00,000 yielded annually a profit of Rs. 3,00,000 after depreciation @12.5% and is subjected to income tax @ 50%. Calculate pay back period.
2. No project is acceptable unless the yield is 10% cash inflows of a certain project along with cash outflow are given below :

Year	Outflows (Rs.)	Inflows (Rs.)
0	1,50,000	–
1	30,000	20,000
2	–	30,000
3	–	60,000
4	–	80,000
5	–	30,000
6	–	40,000
		outlays value at the end of 5 yrs.

Calculate NPV.

NOTES

3. Following details are available for the independent projects :

Project	Initial Outlay	Annual Cash Inflows	Life in yrs.
A.	5,00,000	1,20,000	8
B.	1,25,000	12,000	15
C.	95,000	16,000	18
D.	6,600	2,000	5
E.	45,000	7,000	10

If cost of capital is 12% and corporate tax rate is 50% rank the projects as the following methods.

(*a*) Pay back period

(*b*) Accounting rate of return

(*c*) NPV

(*d*) Profitability index

(*e*) Internal rate of return

4. The project cash flows from two mutually exclusive projects A and B are as under

Period	Project A	Project B
O (outflow)	Rs. 22,000	Rs. 27,000
1 to 7 (inflow)	Rs. 6000 each year	Rs. 7000 each year
Project life	07 yrs.	07 yrs.

(*a*) Advice on the project selection with reference to IRR.

(*b*) Will it make any differences in selection if the cash flow from project B is 8 yrs instead of 7 yrs, @ Rs. 7,000 per year? Given

PV factor	7 yrs	8 yrs
15%	4.16	4.49
16%	4.04	4.34
17%	3.92	4.21
18%	3.81	4.08
19%	3.71	3.95
20%	3.60	3.85

5. Bharat Metals Ltd. is considering two different investment proposals. The details are as under :

	Proposal A (Rs.)	Proposal B (Rs.)
Investment cost	9,500	20,000
Estimated income at the end of		
1st year	4,000	8000
2nd year	4,000	8000
3rd year	4,000	12,000

(*a*) Suggest the most attractive proposal on the basis of NPV method considering that future incomes are discounted at 12%.

(*b*) Also find out the IRR of two proposals.

NOTES

6. A company has to select one of two alternative projects, the particulars in respect of which are given below.

	Project A (Rs.)	Project B (Rs.)
Initial outlay	1,20,000	1,10,000
Net cash flow		
end of 1st year	70,000	20,000
end of 2nd year	50,000	40,000
end of 3rd year	30,000	50,000
end of 4th year	20,000	40,000
end of 5th year	10,000	20,000
end of 6th year	NIL	10,000

The company can arrange funds at 15%. Compute the NPV and IRR of each project and comment on the result.

7. A company has the choice to select any one of the projects X and Y which involves outflows of Rs. 40,000 and Rs. 30,000 respectively. The flows before depreciation and tax are as below :

Year	Project X (Rs.)	Project Y (Rs.)
1	8,000	8,000
2	10,000	9,000
3	15,000	10,000
4	15,000	10,000
5	4,000	2,000

Assume that depreciation is changed on straight line basis, cost of capital is 12% and corporate tax is 50%.

Which project should be selected if the following criteria are used?

(*a*) Pay back period (*b*) IRR

(*c*) NPV (*d*) Profitability index.

8. A Ltd. is considering to purchase a machine costing Rs. 8,00,000 having an estimated life of 10 yrs. It will increase the sales by Rs. 4,00,000 per year and operating costs by Rs. 2,00,000 per year. The machine will be subjected to straight line depreciation and will have a salvage value or Rs. 40,000 at the end of its life. If the cost of capital is 10% and corporate tax rate is 50%. Compute :

(*a*) Annual cash inflows (*b*) Pay back period

(*c*) IRR (*d*) NPV

9. Ram & Co Ltd. is considering two machines one of which may be purchased. Following information is available.

	Machine A	Machine B
Cost	Rs. 40,000	Rs. 50,000
Annual saving in cost	Rs. 20,000	Rs. 15,000
Life	05 yrs.	06 yrs.

NOTES

Assume :

(*i*) Neither of the machine is having salvage value.

(*ii*) Cost of capital is 10%.

(*iii*) Corporate tax rate is 50%.

(*iv*) Depreciation is charged on straight line basis.

10. Shyam and Co. is considering the purchase of a machine. The machines X and Y costing Rs. 50,000. Earning after tax are expected to be as below :

Year	Machine X	Machine Y	Discount Factor 10%
1	15,000	5,000	0.9091
2	20,000	15,000	0.8264
3	25,000	20,000	0.7513
4	15,000	30,000	0.6830
5	10,000	20,000	0.6209

Evaluate the two alternatives according to

(*a*) Pay back period (*b*) ARR method

NPV @ 10% discount rate.

11. Following are the details of three projects A, B and C.

	Project A	Project B	Project C
Cost Rs.	50,000	70,000	70,000
Life	10 yrs.	12 yrs.	14 yrs.
Estimated scrape (Rs.)	5,000	10,000	7000
Annual profit less Tax	5,000	6,000	5,500

Select the best one using :

(*i*) Pay back period

(*ii*) Surplus life over pay back period

(*iii*) Surplus cash flow as decision criterion.

SUMMARY

- In compounding technique, the interest is compounded and becomes a part of initial principal at the end of compounding period.
- Discounting technique involves the process which is exactly opposite to that involved in the technique of compounding.
- Pay back period indicates the period within which the cost of the project will be completely recovered.
- Net present value is a method of calculating present value of cash inflows and cash outflows in an investment projects by using cost of

capital as the discounting rate and finding out net present value by subtracting present value of cash outflows from present value of cash inflows.

- Internal rate of return is that rate at which the discounted cash inflows match with discounted cash outflows.

NOTES

SELF ASSESSMENT QUESTIONS

1. Pay back period, as a method of evaluating investment proposal, suffers from a number of servas limitations. Discuss.
2. Write short notes on
   (*a*) Net present value method
   (*b*) Internal rate of return method.

UNIT 6 SOURCES OF WORKING CAPITAL

★ STRUCTURE ★

INTRODUCTION

After determining the level of working capital, here comes the question of financing. It the present day context the sources of finance for working capital may be categorised as (*i*) Trade credit (*ii*) Bank credit (*iii*) Current provision of Non-bank short term borrowings and (*iv*) Long term sources comprising equity capital and long term borrowings. However, in India the primary sources of financing the working capital are trade credit and short term bank credit, stated to have finance more than 75% requirement of working of Indian Industry.

Two other sources of working capital finance are : (*i*) Factoring of receivables and (*ii*) Commercial papers.

1. **Trade discount :** Trade credit refers to the credit that a consumer gets from suppliers of goods in normal course of business. Normally, the buying firms do not have to pay cash immediately for purchases made by them. The time gap between the receipt of goods and services and payments thereof provide a firm with a source of finance *i.e.,* trade credit. Trade credit can be in the form of an open account or bills payable.
2. **Short term bank credit for working capital :** The bank credit is the primary Institutional source of financing working capital. The amount approved by bank for company working is called credit limit. Credit limit thus denotes the maximum limit of finances which the firm can raise in the form of loan from the bank. Sometimes the bank may approve separate limits for peak seasons and non-peak seasons. Usually the bank credit is available in the following forms :
   (*i*) *Cash credit :* This type of credit is provided mainly to individuals or enterprises engaged in manufacturing and Trading activities to enable them to carry on their activities. The amount of cash credit facility to be sanctioned to a unit is need based and is worked out as per well defined parameters in each Bank. The guidelines of RBI may also affect the quantum of facility in some cases. This facility is generally granted against the security of stocks of goods bills/book debts presenting genuine sales.
   (*ii*) *Letter of credit :* A letter of credit is the guarantee provided by a buyer banker to the seller that is the case of default or failure of the buyer, the bank shall make the payment to the seller.
   (*iii*) *Bills finance :* The banks extend assistance to the borrower against the bills. The finance against bills is ment to finance, the actual sale transaction. The finance against bills can take 3 forms
      — Purchase of bill by bank if these are payable on demand.
      — Discounting of bills by bank if these are time bills.
      — Advance against bills under collection from the drawers, whether sent for realisation through bank or sent directly by the drawer to the drowee D.
   (*iv*) *Working capital demand loan (WCDL) :* In complacence of RBI directions, banks presently grant only small part of the fund based working capital facilities to a borrower by way of running cash credit account; a major portion is in the form of working capital demand loan. This arrangement is presently applicable to borrowers having working capital facilities of Rs. 10 crores or above. The minimum period of WCDL which is basically non-operable account

keep on changing. The WCDL is granted for a fixed term on the carrying of which has to be timely renewed of rolled over.

(*v*) *Overdraft facility* : Under this arrangement the borrower is allowed to withdraw upto a certain limit for his current account over and above his actual credit balance. Within the stipulated limits any number of withdrawals are permitted by bank.

WORKING CAPITAL MANAGEMENT

One of the most important area in the day to day management of the firm is the management of working capital which is the functional area of finance that covers all the current accounts of the firm. It is concerned with management of the level of individual current assets as well as the management of total working capital.

MEANING AND CONCEPT OF WORKING CAPITAL

Working Capital refers to the funds invested in current assets *i.e.,* investment in stocks, Sundry debtors, cash and other current assets. Current assets are essentials to use fixed assets profitably *e.g.,* a machine cannot be used without raw material. The investment on the purchase of raw material is identified as working capital. It is obvious that a certain amount of funds is always tied up in raw material inventories, work in progress, finished goods, consumable stores, sundry debtors and day to day cash requirements. However, the business man also enjoys credit facilities from his suppliers who may supply, raw material on credit. Similarly, a business man may not pay immediately for various expenses for instance, the labourers are paid only periodically.

Therefore, a certain amount of funds is automatically available to finance the current assets requirements. However, the requirements for current assets are usually greater than the amount of funds payable through current liabilities. In other words, the current assets are to be kept at a higher level than the current liabilities.

From the point of view of concept the term working capital can be used in two different ways as follows :

(*a*) Gross Working Capital

(*b*) Net Working Capital

Gross Working Capital

It refers to investment in all the current assets taken together. The total of investments in all current assets is known as gross working capital.

Net Working Capital

It refers to excess of total current assets over total current liabilities. It may be noted that current liabilities refers to these liabilities which are payable with in a period of one year.

From the point of view of time the term working capital can be divided into following two categories.

(*a*) Permanent working capital

(*b*) Temporary working capital.

Permanent Working Capital

It refers to Hard Core working capital. It is that minimum level of investment in the current assets that is carried by the business at all times to carry out minimum level of activities.

Temporary Working Capital

It refers to that part of total working capital which is required by a business over and above. Temporary working capital also known as variable working capital. Since the volume of temporary working capital keeps on fluctuating from time to time according to business activities it may be financed from short term sources.

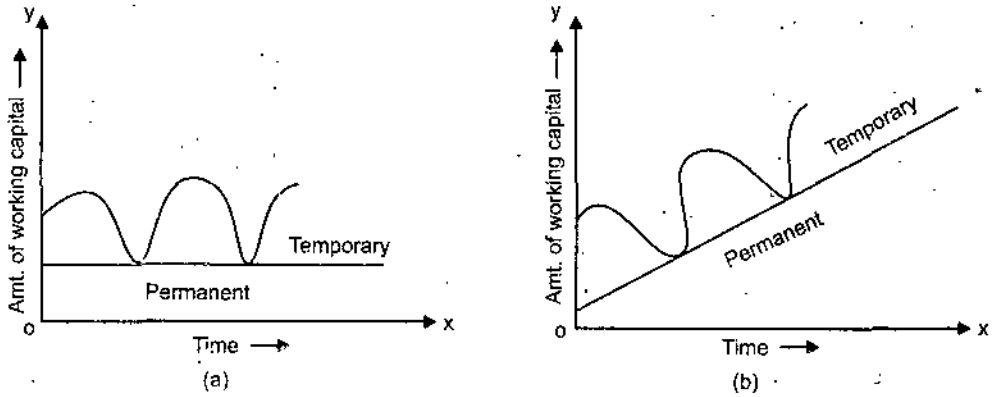


Figure 6.1

The above two (*a*) and (*b*) diagrams show permanent and temporary are fluctuating or variable working capital.

IMPORTANCE OF ADEQUATE WORKING CAPITAL

The importance of adequate working capital in commercial undertaking can never be over emphasised. A concern needs funds for its day to day running. Adequacy or inadequacy of these funds would determine the efficiency with which the daily business may be carried on. Management of working capital

is an essential task of finance manager. He has to ensure that the amount of working capital available with his concern is neither too large nor too small for its requirements. A large amount of working capital would mean that the company has idle funds. Since funds have a cost, the company has to pay huge amount as interest on such funds. This results in over capitalisation *i.e.*, company has too large funds for its requirements, resulting in a low rate of return a situation which implies a less than optimal use of resources.

A firm has inadequate, working capital, it is said to be under-capitalised. Such a firm runs the risk of insolvency. This is because, paucity of working capital may lead to a situation where the firm may not be able to meet its liabilities. It is interesting to note that many firms which are otherwise prosperous (having good demand for their products and enjoying profitable marketing conditions) may fail because of lack of liquid resources.

OPTIMUM WORKING CAPITAL

Current ratio has traditionally been considered the best indicator of the working capital situation. It has been stated by many accountants that a current ratio of two of a manufacturing firm implies that the firm has an optimum amount of working capital. Thus, if the current assets are twice the amount of current liabilities a manufacturing concern is supposed to be having an adequate amount of working capital.

- Current ratio $= \frac{\text{Current assets}}{\text{Current liabilities}} = 2$ then adequate working capital.

  This is supplemented by acid test ratio which should be at least 1.

- Acid test ratio $= \frac{\text{Quick assets}}{\text{Current liabilities}} = 1.$

  Then, it is considered that there is a comfortable liquidity position if liquid amount assets are equal to current liabilities. Bankers, financial institutions, financial analysts, investors and other people interested in financial statements have for years considered the current ratio at 2 and the acid test ratio at 1 as indications of a good working capital.

NOTE An optimum working capital ratio is dependent upon the business situation as such and the nature and composition of various current assets.

WORKING CAPITAL CYCLE

It refers to the length of time between the firms paying cash for materials etc., entering into the production process/stock and the inflow of cash from debtors (sales).

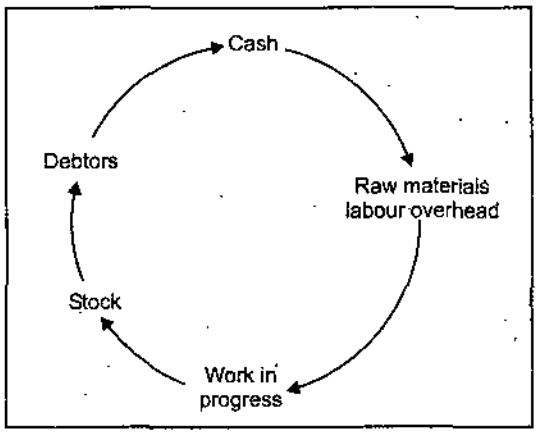


Figure 6.2. *Working capital cycle.*

Suppose a company has a certain amount of cash it will need raw materials. Some raw materials will be available on credit but, cash will be paid out for the other part immediately. Then, it has to pay labour costs and incurs factory overheads. These three combined together will constitute work-in-progress. After the production cycle is complete, work in progress will get converted into finished products. Finished products when sold on credit get converted into sundry debtors will be realised in cash after the expiry of credit period. This cash can again be used for financing of raw materials, work in progress etc. Thus, there is a complete cycle from cash to cash wherein cash gets converted into raw materials, work in progress, finished goods, debtors and finally in cash again. Short term funds are required to meet the requirements of funds during this time period. This time period is dependent upon the length of time with in which the original cash get, converted into cash again.

The cycle is also known as operating cycle or cash cycle.

Working Capital cycle indicates the length of time between a company's paying for materials, entering into stock and receiving the cash from sales of finished goods. It can be determined by adding the number of days required for each stage in the cycle.

e.g., A company holds raw materials on an average for 60 days, it gets credit from the supplier for 15 days, production process needs 15 days, finished goods are held for 30 days and 30 days credit is extended to debtors.

The total of all these = 60 – 15 + 15 + 30 + 30 = 120 days.

Hence, working capital cycle is of 120 days.

The determination of working cycle helps in the forecast, control and management of working capital. It indicates the total time lag and the relative significance of its constituents parts. The duration of working capital cycle may vary depending on the nature of the business.

The operating cycle (working capital cycle) consists of the following events which continues throughout the life of business.

NOTES

(*a*) Conversion of cash into raw materials.

(*b*) Conversion of raw materials into work in progress.

(*c*) Conversion of work in progress into finished work.

(*d*) Conversion of finished stock into accounts receivable though sales.

(*e*) Conversion of accounts receivable into cash.

NOTE The duration of the operating cycle for the purpose of estimating working capital is equal to the sum of the durations of each of the above said events, less the credit period allowed by the suppliers.

Operating cycle or working capital cycle = *WCC*

$$WCC = R + W + F + D - C$$

where

R = Raw material storage period

W = Work in progress holding period

F = Finished goods storage period

D = Debtors collection period

C = Credit period available

$$R = \frac{\text{Average stock of raw material}}{\text{Average cost of raw material consumption per day}}$$

$$W = \frac{\text{Average work in progress inventory}}{\text{Average cost of production per day}}$$

$$F = \frac{\text{Average stock of finished goods}}{\text{Average cost of goods sold per day}}$$

$$D = \frac{\text{Average book debts}}{\text{Average credit sales per day}}$$

$$C = \frac{\text{Average trade creditors}}{\text{Average credit purchases per day}}$$

WORKING CAPITAL FORECASTS

An adequate amount of working capital is essential for the smooth running of a business enterprise. The finance manager must forecast working capital requirements carefully to determine an optimum level of investment in working capital.

NOTE Working capital requirements are determined on the basis of average not at any specific point of time.

Factors to be considered which determining the requirement of working capital. Following are the main factors which are to considered while determining the requirement of working capital :

(*a*) Production policies (*b*) Nature of the business

(c) Credit policy
(d) Inventory policy
(e) Abnormal factors
(f) Market conditions
(g) Conditions of supply
(h) Business cycle
(i) Growth and expansion
(j) Level of taxes
(k) Dividend policy
(l) Price level changes
(m) Operating efficiency.

WORKING CAPITAL MANAGEMENT

It is usually concerned with the administration of all the current assets and current liabilities and concerned with

(i) Determining the need for working capital.

(ii) Determining the optimal levels of investment in various current assets.

(iii) Examining the salient points regarding each element of working capital.

It is obvious that given a constant level of production, higher the amount of working capital, the lower will be the return on investment since capital turn over ratio will be less.

On the other hand lower the amount of working capital, the higher would be the amount of the risk since the company would not have adequate liquidity to meet its short term obligations.

In working capital management, a balance between risk and profitability have to be maintained means have to find out level of investment in working capital which gives reasonable amount of liquidity subject to a good working capital turnover ratio. In fact working capital management policies have a great influence on a firm's profitability, liquidity and structural health.

WORKING CAPITAL MANAGEMENT POLICIES

Working Capital management policies have a great effect on the firm's profitability, liquidity and it's structural health. Gross working capital consists of cash, receivables and inventory.

If a firm has relatively high investment in these assets in comparison to a firm which is transacting the same volume of sales, it will have lower profitability in comparison to the later. Therefore, a firm which has high working capital turn over will have higher profitability.

Working capital turn over ∝ profitability.

A firm may require the reduction of investment in working capital but, if it is reduced disproportionately, it will affect the liquidity position of the firm.

NOTES

Generally, the current ratio and the quick ratio indicate liquidity aspect of a firm. If current assets are reduced beyond limit the current and quick ratios will be adversely affected leading the firm to poor liquidity.

Therefore, it is essential that finance manager, lays down such working capital management policies that a proper balance is struck between profitability and liquidity.

$$\text{Profitability } \frac{1}{\propto} \text{ liquidity}$$

means, when profitability increases the liquidity decreases and vice versa.

Working capital management policies also have a great impact on the structural health of the organisation. If different components of working capital are not properly balanced, then in spite of the fact that current ratio and quick ratio may indicate satisfactory. Financial position in respect of the liquidity of the firm, it may not in fact be a liquid as indicated by the current and quick ratio.

e.g., If the proportion of inventory is very high in the total current assets or greater proportion is appropriated by slow moving or absolute inventory then this cannot provide the cushion of liquidity. Similarly, high investment in debtors and failure of the firms to collect them in time will also adversely affect the real liquidity of the firms, thereby adversely affecting the structural health of the organisation. If a firm carries higher cash and bank balances, it would mean that the firm is not making profitable use of its resources. Idle cash does not give any return to the firm but it has carrying costs.

It is therefore, important that the finance manager should chalk out such working capital management policies in respect of different components of working capital, *i.e.,* cash receivables and investing so as to ensure higher profitability, proper liquidity and structural health of the organisation. The proper and efficient management of working capital can ensure all this.

VARIOUS ELEMENTS OF WORKING CAPITAL

Proper working capital management policies are required for the various constituents of working capital *i.e.,* cash, inventories, debtors and stock etc., in order to see that the amount invested in working capital is not excessive.

MANAGEMENT OF CASH

It is an important function of the finance manager. The modern day business comprises of numerous units spread over vast geographical areas. It is the duty of the finance manager to provide adequate cash to each of the units for

the survival of the business, it is absolutely essential that there should be adequate cash. It is the duty of finance manager to have liquidity at all parts of the organisation while managing cash. On the other hand, he has also to ensure that there are no funds blocked in idle cash. Idle cash resource entail a great deal of cast in terms of interest changes and in terms of opportunities costs. Hence, the question of costs of idle cash must also be kept in mind by the finance manager. A cash management scheme therefore, is a delicate balance between the time objectives of liquidity and costs.

Need for Cash

Following are three basic considerations in determining the amount of cash or liquidity

(*a*) Transaction need

(*b*) Speculative needs

(*c*) Precautionary needs.

(*a*) **Transaction need :** Cash facilities, the meeting of the day-to day expenses and other payments on the debts. Normally, inflows of cash from operations should be sufficient for this purpose. But sometimes this inflows may be temporary blocked. In such cases, it is only the reserve cash balance that can enable the firm to make its payment in time.

(*b*) **Speculative needs :** Cash may be held in order to take advantage of profitable opportunities that may present themselves and which may be lost for want of ready cash settlement.

(*c*) **Precautionary needs :** Cash may be held to act as for providing safety against unexpected events. Safety as its typified by the saying that a man has only three friends an old wife, an old dog and money in bank.

NATURE OF CASH MANAGEMENT

The exact nature of a cash management system would depend upon the organisational structure of an enterprise. In a highly centralised organisation the system would be such that the central or head office controls, the inflows and outflows of cash on a routine and daily basis. In a decentralised form of organisation where the divisions have complete responsibility of conducting their affairs, it may not be possible and advisable for the central office to exercise a detailed control cash inflows and outflows.

NOTES

CASH MANAGEMENT PLANNING ASPECT

The first step on cash management is to estimate the requirements of cash. For this cash flow statement and cash budgets are required to be prepared.

CASH BUDGETS

It represents each requirements of business during the budget period. It is the plan of receipts and payments of cash during the budget period. Cash budget can be prepared for short period or for long period.

Cash Budget for Short Period

Preparation of cash budget month by month would involve making the following estimates.

(A) As regards receipts :

(*i*) Receipts from debtors

(*ii*) Cash sales etc.

(*iii*) Any other sources of receipts of cash *i.e.,* dividend etc.

(B) As regards payments :

(*i*) Payments to be made for purchases

(*ii*) Payments to be made for expenses and salaries

(*iii*) Payments that are made periodically but not every month

(*a*) Debenture interest

(*b*) Income tax paid in advance

(*c*) Sales tax. etc.

(*iv*) Special payments to be made in a particular month *e.g.,* dividend to shareholders, redemption of debentures, repayment of loan, payment for assets acquired etc.

CASH MANAGEMENT CONTROL PROCESS

Control and levels of cash balance at various points in the organisation assumes special importance on account of the fact that there is generally a tendency amongst divisional managers to keep cash balance in excess of their needs. Hence, the financial manager must devise a system where by cash division of an organisation retains enough cash to meet its day-to-day requirements with having surplus balances on hand.

Following methods have to be employed

(*a*) Speed up the mailing time of payments from customers.

(*b*) Reduce the time during which payments received by the firm remain uncontrolled and speed up the movement funds to disbursement banks.

Two very important methods to speed up collection process are :

(*i*) Concentration banking

(*ii*) Lock-box system.

NOTES

PLAYING THE FLOAT

Beside accelerating collections, an effective control over payments can also cause faster turnover of cash. This is possible only by maturing payments on the due date, making excessive use of draft (bill of exchange) instead of cheques. Availability of cash can be maximized by playing the float.

In this, a firm estimates accurately the time when the cheques issued will be presented for encashment and thus, utilises the float period to its advantage by issuing more cheques but having in the bank account only so much cash balance as will be sufficient to honour those cheques which are actually expected to be presented on a particular date.

KINDS OF FLOATS

The term float is used to refer to the periods that affect cash as it moves through the different stages of the collection process. There are following four types of floats :

1. Billing float
2. Mail float
3. Cheque processing float
4. Banking processing float.

1. **Billing float :** An invoice to the formal document that a seller prepares and sends to the purchaser as the payment request for goods sold or service provided. The time between the sales and the mailing of the invoice is the billing float.
2. **Mail float :** This is a time when a cheque is being processed by post office/courier/ messenger service etc.
3. **Cheque processing float :** This is time required for the seller to sort, record and deposit the cheque after it has been received by the company.
4. **Banking processing float :** This is the time from the deposit of the cheque to the crediting of funds in the sellers' account.

NOTES

CASH MANAGEMENT MODELS

In the recent year several types of mathematical models have been developed which helps to determine the optimum cash balance to be carried by an business organisation.

The objective of all these models is to ensure that cash does not remain idle unnecessarily and at the same time the firm is not confronted with a situation of cash shortage. All these models can be put into two categories.

(*a*) Inventory type models

(*b*) Stochastic type models.

Inventory Type Model—Economic Order Quantity Model (E.O.Q. model)

Given by William J. Baumal according to this model, optimum cash level is the level of cash where the carrying cost and transactions costs are the minimum. The carrying cost includes cost of holding cash, namely, the interest foregone on marketable securities. The transaction costs refers to the cost involved in getting the marketable securities converted into cash. This happens when the firms falls short of cash and has to sell the securities resulting in clerical, brokerage, registration and other costs.

The optimum cash balance according to this model will be that point where these two costs are equal.

$$C = \sqrt{\frac{2U \times P}{S}}$$

where C = Optimum cash balance

U = Annual or monthly cash disbursement

P = fixed cost per transaction

S = Opportunity cost of one rupee p.a. or p.m.

Stochastic Type Model—Cash Management Model

Given by Miller-Orr according to this model the net cash flow is completely stochastic. When changes in cash balance occur randomly the application of control theory serves a useful purpose.

This model is designed to determine the time and size of transfers between an investment account and cash account. In this model control limits are set for cash balances. These limits may consist of '*n*' as upper limit, 'z' as the return point and zero as the lower limit. When the cash balance reaches the upper limit, the transfer of cash will equal to $h - z$ and invested in marketable securities *a/c*.

When it touches the lower limit, a transfer from marketable securities *a/c* to cash *a/c* is done.

During the period when cash balance stays between (*h*, z) and (z, *o*) *i.e.*, high and low limits no transactions between cash and marketable securities *a/c* is made.

The high and low limits of a cash balance are set up on the basis of fixed cost associated with the securities transaction. These limits satisfy the demands for cash at the lowest possible total costs.

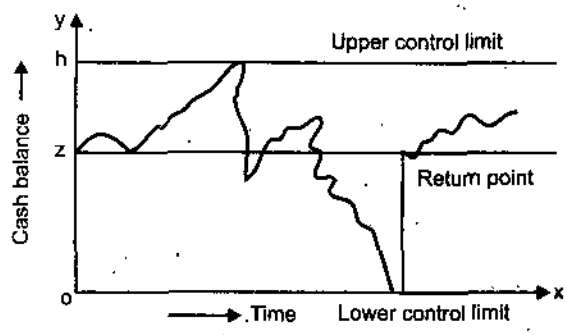


Figure. 6.3

CONTROL OF RECEIVABLES

An aspect of management of debtors is the control of receivables. Merely setting of standards and framing a credit policy is not sufficient. It is equally important to control receivables.

Collection Policy

Efficient and timely collections of debtors ensures that the bad debt losses are reduced to the minimum and the average collection period is shorter. If a firm spends more resources on collection of debts, it is likely to have smaller bad debts. Thus, a firm must work out the optimum amount that it should spend on collection of debtors. This involves a trade off between the level of expenditure on the one hand and decrease in bad blast losses and investment in debtors on the other.

The collection cell of a firm has to work in a manner that it does not create two much resentment among the customers. On the other hand, it has to keep the amount of the outstanding in check. Hence, it has to work in a very smoother manner and diplomatically.

NOTE Clear cut procedures regarding credit collection are set up and such procedure must answer the following :

(*a*) How long should a debtor balance be allowed to exist before collection process is started?

(*b*) What should be the procedure of follow up with defaulting customers? How reminders are to be sent and how should each successive reminder be drafted?

(*c*) Should thereby a collection machinery where by personal calls by company's representatives are made?

(*d*) What should be the procedure for dealing with doubtful accounts? Is legal action to be instituted? How should account be handled?

Monitoring of Receivable

(*i*) Computation of average age of receivables

(*ii*) Ageing schedule

(*iii*) Collection programme.

(*i*) **Computation of average age of receivables :** It involves computation of average collection period.

(*ii*) **Ageing schedule :** An important means to get an insight into the collection pattern of debtors is the preparation of their 'Ageing Schedule'.

In this receivables are classified according to their age. This classification helps the firm in its collection efforts and enables the management to have a close control over the quality of individual accounts. The ageing schedule provides an effective method of comparing the liquidity of receivable with the liquidity of receivables in the past and also comparing current liquidity of receivables of one firm with that of other firms. This comparison can be made periodically.

The preparation of ageing schedule requires going back to receivable ledger where the dates of each customer's purchases and payments are available. The ageing schedule by indicating a tendency for old accounts to accumulate provides a useful supplement to average collection period of receivables/sales analysis. The analysis of receivable in terms of associated dates of sales enables the firm to recognise the recent increases and slumps in sales. To ascertain the condition of receivables for control purposes, it may be considered desirable to compare the current ageing schedule with an earlier schedule in the same firm and also to compare this information with the experience of other firms.

(*iii*) **Collection programme :**

(*a*) Monitoring the state of receivables.

(*b*) Intimation to customers when due date approaches.

(*c*) Telegraphic and telephonic advice to customers on the due date.

(*d*) Threat of legal action on over due accounts.

(*e*) Legal action on over due a/cs.

The relationship between collection expenses and bad debt losses has to be established as initial increase in collection expenses may have only a small impact on the bad debt losses.

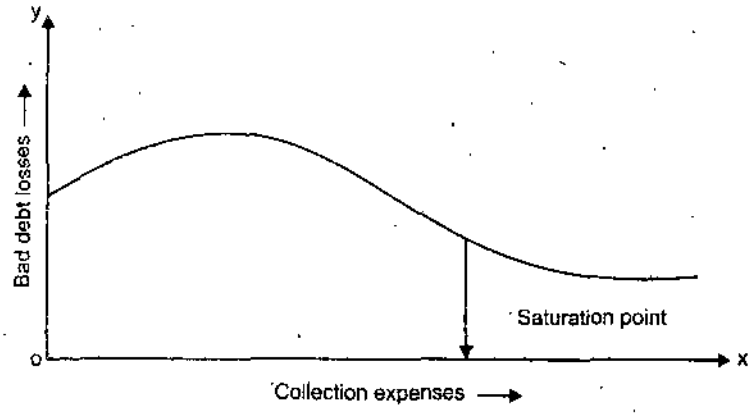


Figure 6.4

SUMMARY

- In India the primary sources of financing the working capital are trade credit and short term bank credit.
- Working Capital refers to the funds invested in current assets *i.e.*, investment in stocks, Sundry debtors, cash and other current assets.
- The total of investments in all current assets is known as gross working capital.
- New working capital refers to excess of total current assets over total current liabilities.
- Working capital cycle refers to the length of time between the firms paying cash for materials etc.
- The term float is used to refer to the periods that affect cash as it moves through the different stages of the collection process.

SELF ASSESSMENT QUESTIONS

1. What is working capital ? In how many ways working capital can be used ?
2. Name various sources of working capital finance.
3. What is acid ratio test ?
4. Define float. Name different types of floats.

NOTES

APPENDIX

- **Table A**
  Compound Value of Re 1
- **Table B**
  Compound Value of an Annuity of Re 1
- **Table C**
  Present Value of Re 1
- **Table D**
  Present Value of an Annuity of Re 1
- **Table E**
  Value of the standard Normal Distribution Function
- **Table F**
  Continuous Compounding of Re 1 e^x and Continuous Discounting of Re 1
- **Table G**
  Cumulative Distribution Function for the Standard Normal Randam Variable

Table A. COMPOUND VALUE OF Re 1

Interest Rate

Period	*1%*	*2%*	*3%*	*4%*	*5%*	*6%*	*7%*	*8%*	*9%*	*10%*	*12%*	*14%*	*16%*
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.120	1.140	1.150
2	1.020	1.040	1.061	1.082	1.102	1.124	1.145	1.166	1.186	1.210	1.254	1.300	1.322
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.405	1.482	1.521
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.574	1.689	1.749
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.762	1.925	2.011
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.974	2.195	2.313
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.211	2.502	2.660
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.476	2.853	3.059
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.773	3.252	3.518
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	3.106	3.707	4.046
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.553	3.479	4.226	4.652
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138	3.896	4.818	5.350
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452	4.363	5.492	6.153
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797	4.887	6.261	7.076
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	5.474	7.138	8.137
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.670	4.595	6.130	8.137	9.358
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054	6.866	9.276	10.761
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560	7.690	10.575	12.375
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116	8.613	12.056	14.232
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.728	9.646	13.743	16.367
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835	17.000	26.462	32.319
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.063	13.268	17.449	26.960	50.950	66.212

(Contd...)

Table A Contd.

	Interest Rate												
Period	*16%*	*18%*	*20%*	*24%*	*28%*	*32%*	*36%*	*40%*	*50%*	*60%*	*70%*	*80%*	*90%*
1	1.160	1.180	1.200	1.240	1.280	1.320	1.360	1.400	1.500	1.600	1.700	1.800	1.900
2	1.346	1.392	1.440	1.538	1.638	1.742	1.850	1.960	2.250	2.560	2.890	3.240	3.640
3	1.561	1.643	1.728	1.907	2.067	2.300	2.515	2.744	3.375	4.096	4.913	5.832	6.859
4	1.811	1.939	2.074	2.364	2.684	3.036	3.421	3.842	5.062	6.544	8.352	10.498	13.032
5	2.100	2.288	2.488	2.932	3.436	4.097	4.653	5.378	7.594	10.486	14.199	18.896	24.761
6	2.436	2.700	2.986	3.635	4.398	5.290	6.328	7.530	11.391	16.777	24.138	34.012	47.046
7	2.826	3.185	3.583	4.508	5.629	6.983	8.605	10.541	17.086	26.844	41.034	61.222	89.387
8	3.278	3.759	4.300	5.590	7.206	9.217	11.703	14.758	25.629	42.950	69.758	110.200	169.836
9	3.803	4.435	5.160	6.931	9.223	12.166	15.917	20.661	38.443	68.720	118.588	198.359	322.688
10	4.411	5.234	6.192	8.594	11.806	16.060	21.647	28.925	57.665	109.951	201.599	347.047	613.107
11	5.117	6.176	7.430	10.657	15.112	21.199	29.439	40.493	86.498	175.922	342.719	642.684	1164.902
12	5.926	7.288	8.916	13.215	19.343	27.983	40.037	56.694	129.746	281.475	582.622	1156.831	2213.314
13	6.886	8.599	10.699	16.386	24.759	36.937	54.451	79.372	194.619	450.360	990.457	2082.295	4205.297
14	7.988	10.147	12.839	20.319	31.961	48.757	74.053	111.120	291.929	720.576	1683.777	3748.131	7990.065
15	9.266	11.974	13.407	25.196	40.565	64.359	100.712	155.568	437.894	1152.921	2862.421	6746.636	15181.122
16	10.748	14.129	18.488	31.243	51.923	84.954	136.97	217.95	656.84	1844.7	4866.1	12144.000	28844.0
17	12.468	16.672	22.186	38.741	66.461	112.14	186.28	304.914	985.26	2951.5	8272.4	21859.0	54804.0
18	14.463	19.673	26.623	48.039	85.071	148.02	253.34	426.879	1477.9	4722.4	14063.0	39346.	104130.0
19	16.777	23.214	31.948	59.568	108.89	195.39	344.54	597.630	2216.8	7555.8	23907.0	70824.	197840.0
20	19.461	27.393	38.338	73.864	139.38	257.92	468.57	836.683	3325.3	12089.0	40642.0	127480.	375900.0
25	40.874	62.669	95.396	216.542	478.90	1033.6	2180.1	4499.880	25251.0	126760.0	577060.0	2408900	9307600.0
30	85.850	143.371	237.376	634.820	1645.5	4142.1	10143.	24201.432	191750.	1329200.	8193500.0	45517000	23047000.0

Table B. COMPOUND VALUE OF AN ANNUITY OF Re 1

Interest Rate

Period	*1%*	*2%*	*3%*	*4%*	*5%*	*6%*	*7%*	*8%*	*9%*	*10%*	*12%*	*14%*
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.120	2.140
3	3.030	3.060	3.091	3.122	3.152	3.184	3.215	3.246	3.278	3.310	3.374	3.440
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.770	4.921
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.353	6.610
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	8.115	8.536
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	10.089	10.730
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436	12.300	13.233
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.776	16.085
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937	17.549	19.337
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	20.655	23.044
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384	24.133	27.271
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	28.029	32.089
14	14.947	15.974	17.086	18.292	19.599	21.051	22.550	24.215	26.019	27.975	32.393	37.581
15	16.097	17.293	18.599	20.024	21.579	22.276	25.129	27.152	29.361	31.772	37.280	43.842
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950	42.753	50.980
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974	40.545	48.884	59.118
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599	55.750	68.394
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159	63.440	78.969
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275	72.052	91.025
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347	133.334	181.871
30	34.785	40.568	47.575	56.805	66.439	79.058	94.461	113.283	136.308	164.494	241.333	356.787

(Contd...)

Table B Contd.

	Interest Rate											
Period	*16%*	*18%*	*20%*	*24%*	*28%*	*32%*	*36%*	*40%*	*50%*	*60%*	*70%*	*80%*
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.160	2.180	2.200	2.240	2.280	2.320	2.360	2.400	2.500	2.600	2.700	2.800
3	3.506	3.572	3.640	3.778	3.918	4.062	4.210	4.360	4.750	5.160	5.590	6.040
4	5.066	5.215	5.368	5.684	6.016	6.362	6.725	7.104	8.125	9.256	10.503	11.872
5	6.877	7.154	7.442	8.048	8.700	9.398	10.146	10.846	13.188	15.810	18.855	22.370
6	6.977	9.442	9.930	10.980	12.136	13.406	14.799	16.324	20.781	26.295	33.054	41.265
7	11.414	12.142	12.916	14.615	16.534	18.696	21.126	23.853	32.172	43.073	57.191	75.278
8	14.240	15.327	16.499	19.123	22.163	25.678	29.732	34.395	49.258	69.916	98.225	136.500
9	17.518	19.086	20.799	24.712	29.369	34.895	41.435	49.153	74.887	112.866	167.983	246.699
10	21.321	23.521	25.959	31.643	38.592	47.062	57.352	69.814	113.330	181.585	286.570	445.058
11	25.733	28.755	32.150	40.238	50.399	63.122	48.998	98.739	170.995	291.536	488.170	802.105
12	30.850	34.931	39.580	50.985	65.510	84.320	108.437	139.235	257.493	467.458	830.388	1444.788
13	36.786	42.219	48.497	64.110	84.853	112.303	148.475	195.929	387.239	748.933	1413.510	2601.619
14	43.672	50.818	59.196	80.496	109.612	149.240	202.926	275.300	581.859	1199.293	2403.968	4683.914
15	51.660	60.965	72.035	100.815	141.303	197.997	276.979	386.420	873.788	1919.869	4087.745	8432.045
16	60.925	72.939	87.442	126.011	181.87	262.36	377.69	541.99	1311.7	3072.8	6950.2	15179.0
17	71.673	87.068	105.931	157.253	233.79	347.31	514.66	759.78	1968.5	4917.5	11816.0	27323.0
18	84.141	103.740	128.117	195.994	300.25	450.45	700.94	1064.7	2953.8	7868.9	20089.0	49182.0
19	98.603	123.414	154.740	244.033	385.32	607.47	954.28	1491.6	4331.7	12591.0	34152.0	88528.0
20	115.380	146.628	186.688	303.601	494.21	802.86	1298.8	2089.2	6648.5	20147.0	58059.0	159350.0
25	249.214	342.603	471.981	898.092	1706.8	3226.8	6053.0	11247.2	50500.0	211270.0	824370.0	3011100.4
30	530.312	790.948	1181.882	2640.916	5873.2	12941.0	28172.0	60501.0	383500.0	2215400.0	11705000.0	56896000.0

Table C. PRESENT VALUE OF Re 1

Interest Rate

Period	*1%*	*2%*	*3%*	*4%*	*5%*	*6%*	*7%*	*8%*	*9%*	*10%*	*12%*	*14%*	*15%*
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909	.893	.877	.870
2	.920	.961	.943	.925	.907	.890	.873	.857	.842	.826	.797	.769	.756
3	.971	.942	.915	.889	.864	.840	.816	.794	.772	.751	.712	.675	.658
4	.961	.924	.889	.855	.823	.792	.763	.735	.708	.683	.636	.592	.572
5	.951	.906	.863	.822	.784	.747	.713	.681	.650	.621	.567	.519	.497
6	.942	.888	.838	.790	.746	.705	.666	.630	.596	.564	.507	.423	.432
7	.933	.871	.813	.760	.711	.665	.623	.583	.547	.513	.452	.400	.376
8	.923	.853	.789	.731	.677	.627	.582	.540	.502	.467	.404	.351	.327
9	.914	.837	.766	.703	.645	.592	.544	.500	.460	.424	.361	.308	.284
10	.905	.820	.744	.676	.614	.558	.508	.463	.422	.386	.322	.270	.247
11	.896	.804	.722	.650	.585	.527	.475	.429	.388	.350	.287	.237	.215
12	.887	.788	.701	.625	.557	.497	.444	.397	.356	.319	.257	.208	.187
13	.879	.773	.681	.601	.530	.469	.415	.368	.326	.290	.229	.182	.163
14	.870	.758	.661	.577	.505	.442	.388	.340	.299	.263	.205	.160	.141
15	.861	.743	.642	.555	.481	.417	.362	.315	.275	.239	.183	.140	.123
16	.853	.728	.623	.534	.458	.394	.339	.292	.252	.218	.163	.123	.107
17	.844	.714	.605	.513	.436	.371	.317	.270	.231	.198	.146	.108	.093
18	.836	.700	.587	.494	.416	.350	.296	.250	.212	.180	.130	.095	.081
19	.828	.686	.570	.475	.396	.331	.276	.232	.194	.164	.116	.083	.070
20	.820	.673	.554	.456	.377	.312	.258	.215	.178	.149	.104	.073	.061
25	.780	.610	.478	.375	.295	.233	.184	.146	.116	.092	.059	.038	.030
30	.742	.552	.412	.308	.231	.174	.131	.099	.075	.057	.033	.020	.015

(Contd...)

Table C Contd.

	Interest Rate												
Period	*16%*	*18%*	*20%*	*24%*	*28%*	*32%*	*36%*	*40%*	*50%*	*60%*	*70%*	*80%*	*90%*
1	.862	.847	.833	.806	.781	.758	.735	.714	.667	.625	.588	.556	.526
2	.743	.718	.694	.650	.610	.574	.541	.510	.444	.391	.346	.309	.277
3	.641	.609	.579	.524	.477	.435	.398	.364	.296	.244	.204	.171	.146
4	.552	.516	.482	.423	.373	.329	.292	.260	.198	.153	.120	.095	.077
5	.476	.437	.402	.341	.291	.250	.215	.186	.132	.095	.070	.053	.040
6	.410	.370	.335	.275	.227	.189	.158	.133	.088	.060	.041	.029	.021
7	.354	.314	.279	.222	.178	.143	.116	.095	.059	.037	.024	.016	.011
8	.305	.266	.233	.179	.139	.108	.085	.068	.039	.023	.014	.009	.006
9	.263	.226	.194	.144	.108	.082	.063	.048	.026	.015	.008	.005	.003
10	.227	.191	.162	.116	.085	.062	.046	.035	.017	.009	.005	.003	.002
11	.195	.162	.135	.094	.066	.047	.034	.025	.012	.006	.003	.002	.001
12	.168	.137	.112	.076	.052	.036	.025	.018	.008	.004	.002	.001	.001
13	.145	.116	.093	.061	.040	.027	.018	.013	.005	.002	.001	.001	.001
14	.125	.099	.078	.049	.032	.021	.014	.009	.003	.001	.001	.000	.000
15	.108	.084	.065	.040	.025	.016	.010	.006	.002	.001	.000	.000	.000
16	.093	.071	.054	.032	.019	.012	.007	.005	.002	.001	.000	.000	.000
17	.080	.060	.045	.026	.015	.009	.005	.003	.001	.000	.000		
18	.069	.051	.038	.021	.012	.007	.004	.002	.000	.000	.000		
19	.060	.043	.031	.017	.009	.005	.003	.002	.000	.000			
20	.051	.037	.026	.014	.007	.004	.002	.001	.000	.000			
25	.024	.016	.010	.005	.002	.001	.000	.000					
30	.012	.007	.004	.002	.001	.000	.000						

Table D. PRESENT VALUE OF AN ANNUITY OF Re 1

Interest Rate

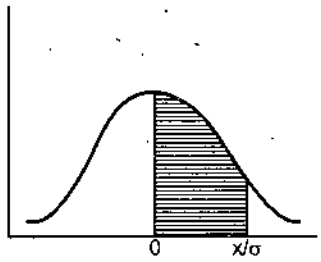
Period	*1%*	*2%*	*3%*	*4%*	*5%*	*6%*	*7%*	*8%*	*9%*	*10%*
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	4.766	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.785	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.060	7.606
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.312	7.824
17	15.562	15.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.128	8.514
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077
30	25.808	22.397	19.600	17.292	15.373	13.765	12.409	11.258	10.274	9.427

(Contd...)

Table D Contd.

	Interest Rate								
Period	*12%*	*14%*	*16%*	*18%*	*20%*	*24%*	*28%*	*32%*	*36%*
1	0.893	0.877	0.862	0.847	0.833	0.806	0.781	0.758	0.735
2	1.690	1.647	1.605	1.566	1.528	1.457	1.392	1.332	1.276
3	2.402	2.322	2.246	2.174	2.106	1.981	1.868	1.766	1.674
4	3.037	2.914	2.798	2.690	2.589	2.404	2.241	2.096	1.966
5	3.605	3.433	3.274	3.127	2.991	2.745	2.532	2.345	2.181
6	4.111	3.889	3.685	3.498	3.326	3.020	2.759	2.534	2.339
7	4.564	4.288	4.039	3.812	3.605	3.242	2.937	2.678	2.455
8	4.968	4.639	4.344	4.078	3.837	3.421	3.076	2.786	2.540
9	5.328	4.946	4.607	4.303	4.031	3.566	3.184	2.868	2.603
10	5.650	5.216	4.833	4.494	4.193	3.682	3.269	2.930	2.650
11	5.938	5.453	5.029	4.656	4.327	3.776	3.335	2.978	2.683
12	6.194	5.660	5.197	4.793	4.439	3.851	3.387	3.013	2.708
13	6.424	6.842	5.342	4.910	4.533	3.912	3.427	3.040	2.727
14	6.628	6.002	5.468	5.008	4.611	3.962	3.459	3.061	2.740
15	6.811	6.142	5.575	5.092	4.675	4.001	3.483	3.076	2.750
16	6.974	6.265	5.669	5.162	4.730	4.033	3.503	3.088	2.758
17	7.120	6.373	5.749	5.222	4.775	4.059	3.518	3.097	2.763
18	7.250	6.467	5.818	5.273	4.812	4.080	3.529	3.104	2.767
19	7.366	6.550	5.877	5.316	4.844	4.097	3.539	3.109	2.770
20	7.469	6.623	5.929	5.353	4.870	4.110	3.546	3.113	2.772
25	7.843	6.873	6.097	5.467	4.948	4.147	3.564	3.122	2.776
30	8.005	7.003	6.177	5.517	4.979	4.160	3.569	3.124	2.778

Table E. VALUE OF THE STANDARD NORMAL DISTRIBUTION FUNCTION



z	*.00*	*.01*	*.02*	*.03*	*.04*	*.05*	*.06*	*.07*	*.08*	*.09*
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

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Table F. CONTINUOUS COMPOUNDING OF Re 1 e^x AND CONTINUOUS DISCOUNTING OF Re 1

$$(e^x): \lim_{m\to\infty}\left(1+\frac{i}{m}\right)^{(nm)} \text{ or } e^{(i)(n)}$$

x	e^x Value	e^{-x} Value	x	e^x Value	e^{-x} Value	x	e^x Value	e^{-x} Value
0.00	1.0000	1.00000	0.45	1.5683	.63763	0.90	2.4596	.40657
0.01	1.0110	0.99005	0.46	1.5841	.63128	0.91	2.4843	.40252
0.02	1.0202	.98020	0.47	1.6000	.62500	0.92	2.5093	.39852
0.03	1.0305	.97045	0.48	1.6161	.61878	0.93	2.5345	.39455
0.04	1.0408	.96079	0.49	1.6323	.61263	0.94	2.5600	.39063
0.05	1.0513	.95123	0.50	1.6487	.60653	0.95	2.5857	.38674
0.06	1.0618	.94176	0.51	1.6653	.60050	0.96	2.6117	.38298
0.07	1.0725	.93239	0.52	1.6820	.59452	0.97	2.6379	.37908
0.08	1.0833	.92312	0.53	1.6989	.58860	0.98	2.6645	.37531
0.09	1.0942	.91393	0.54	1.7160	.58275	0.99	2.6912	.37158
0.10	1.1052	.90484	0.55	1.7333	.57695	1.00	2.7183	.36788
0.11	1.1163	.89583	0.56	1.7507	.57121	1.20	3.3201	.30119
0.12	1.1275	.88692	0.57	1.7683	.56553	1.30	3.6693	.27253
0.13	1.1388	.87809	0.58	1.7860	.55990	1.40	4.0552	.24660
0.14	1.1503	.86936	0.59	1.8040	.55433	1.50	4.4817	.22313
0.15	1.1618	.86071	0.60	1.8221	.54881	1.60	4.9530	.20190
0.16	1.1735	.85214	0.61	1.8404	.54335	1.70	5.4739	.18268
0.17	1.1853	.84366	0.62	1.8589	.53794	1.80	6.0496	.16530
0.18	1.1972	.83527	0.63	1.8776	.53259	1.90	6.6859	.14957
0.19	1.2092	.82696	0.64	1.8965	.52729	2.00	7.3891	.13534
0.20	1.2214	.81873	0.65	1.9155	.52205	3.00	20.086	.04979
0.21	1.2337	.81058	0.66	1.9348	.51885	4.00	54.598	.01832
0.22	1.2461	.80252	0.67	1.9542	.51171	5.00	148.41	.00674
0.23	1.2586	.79453	0.68	1.9739	.50662	6.00	403.43	.00248
0.24	1.2712	.78663	0.69	1.9937	.50158	7.00	1096.6	.00091
0.25	1.2840	.77880	0.70	2.0138	.49659	8.00	2981.0	.00034
0.26	1.2969	.77105	0.71	2.0340	.49164	9.00	8103.1	.00012
0.27	1.3100	.76338	0.72	2.0544	.48675	10.00	22026.5	.00005
0.28	1.3231	.75578	0.73	2.0751	.48191			
0.29	1.3364	.74826	0.74	2.0959	.47711			
0.30	1.3499	.74082	0.75	2.1170	.47237			
0.31	1.3634	.73345	0.76	2.1383	.46767			
0.32	1.3771	.72615	0.77	2.1598	.46301			
0.33	1.3910	.71892	0.78	2.1815	.45841			
0.34	1.4049	.71177	0.79	2.2034	.45384			
0.35	1.4191	.70569	0.80	2.2255	.44933			
0.36	1.4333	.69768	0.81	2.2479	.44486			
0.37	1.4477	.69073	0.82	2.2705	.44043			
0.38	1.4623	.68386	0.83	2.2933	.43605			
0.39	1.4770	.67707	0.84	2.3164	.43171			
0.40	1.4918	.67032	0.85	2.3396	.42741			
0.41	1.5068	.66365	0.86	2.3632	.42316			
0.42	1.5220	.65705	0.87	2.3869	.41895			
0.43	1.5373	.65051	0.88	2.4109	.41478			
0.44	1.5527	.64404	0.89	2.4351	.41066			

Table G. CUMULATIVE DISTRIBUTION FUNCTION FOR THE STANDARD NORMAL RANDOM VARIABLE

D	*.00*	*.01*	*.02*	*.03*	*.04*	*.05*	*.06*	*.07*	*.08*	*.09*
–0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641
–0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
–0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
–0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
–0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
–0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
–0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
–0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
–0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
–0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
–1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
–1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
–1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
–1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
–1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
–1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
–1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
–1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
–1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
–1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
–2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
–2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
–2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
–2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
–2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
–2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
–2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
–2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
–2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
–2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
–3.0	0.0014	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
–3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
–3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
–3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
–3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
–3.5	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
–3.6	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
–3.7	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
–3.8	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
–3.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
–4.0	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

(Contd...)

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Table G Contd.

D	*.00*	*.01*	*.02*	*.03*	*.04*	*.05*	*.06*	*.07*	*.08*	*.09*
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9986	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.7	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.8	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
4.0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

NOTE This table shows value of N(d) for $d \geq 0$. For example. N (–2.15) = 0.9842 and N(1.83) = 0.9664.