

# MMPF-002

## Capital Investment and Financing Decisions

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### PRINT PRODUCTION

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## **COURSE INTRODUCTION**

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Business activities when done on large scale with wide geographical spread is often through formal organisational structure known as company. The distinguishing features of a company are the separation of ownership and management and distinct legal entity. This course aims to introduce how companies operate and manage the financial affairs. Financial affairs include many aspects, which are dealt in this course. This course is divided into five blocks and consists of fifteen units. A brief of each is given below.

### **BLOCK 1 : FINANCIAL DECISIONS :AN OVERVIEW**

All business activities require capital two main avenues for raising of capital are debt and equity instruments. In this block we discuss about nature of long term financial decisions, cost of capital and capital structure.

**Unit 1** deals with Nature of Long term Financing Decisions. In this unit we discuss about Investment Decisions, Financing Decisions & Dividend Policy Decisions and inter relationship among these decisions. While taking investment & financing decisions one crucial factor which has to be taken into consideration is the time value of money. Time value of money concept has application in determining present value & terminal value, implied interest rates and annuities.

**Unit 2** deals with Cost of Capital. Cost of capital links the long term financial decisions with shareholders value. Each of the individual components of capital has different cost associated with it. The companies which are able to keep the cost of capital low gains a competitive advantage and internally also the gain in terms of liquidity, flexibility of capital structure and access to low cost sources of funds.

**Unit 3** deals with Capital Structure. Capital Structure is basically the amount of long term debt and equity in the capital. Inter-relationship among components of the capital structure determines the risk, return and value of the firm.

### **BLOCK 2. INVESTMENT DECISIONS UNDER CERTAINTY**

Investment decisions under certainty refers to the scenario where the cash outflows and inflows over a period of time can be predicted with fair degree of accuracy. These techniques are being widely used in project management. This block deals with Project Management.

**Unit 4** of the block deals with Project Planning in which we discuss about “nature and types of projects, project life cycle and project work planning.

**Unit 5** deals with Capital Budgeting Decisions. In this units we discuss about the various techniques both discounted and non discounted which are used to evaluate and rank the projects.

**Unit 6** deals with Project Monitoring and Control. In this unit we discuss about designing a monitoring control system, project control concept and types, and control processes.

**Unit 7** deals with Social Cost Benefit Analysis. In this unit, we discuss about concept and scope of economic appraisal, social cost-benefit analysis technique, application of social cost-benefit analysis in project management and role of non-financial constraints in project appraisal.

### **BLOCK 3 INVESTMENT DECISIONS UNDER UNCERTAINTY**

This block consist of two **Units**

**Unit 8** Capital Budgeting Decisions and the Capital Asset Pricing Model discusses Capital asset pricing model, which is used to estimate risk adjusted discount rate for making investment decisions. Further in this unit we discuss about how to measure Betas, stability of Betas over time, determinants of Betas and discounted cash flow approach . Project Evaluation Under Risk And Uncertainty deals with risk and uncertainty and the various methods to evaluate and measure project risk.

**Unit 9** Risk Analysis In Investment Decisions deals with some of the advanced techniques used in risk analysis. These techniques are especially useful when the firms have multiple objectives and risk and uncertainty associated with each objective has to be evaluated and incorporated into a single model.

### **BLOCK 4 LONG TERM FINANCING DECISIONS**

Developing countries aiming at higher growth rate require aiming amount of funds for setting up new projects and expansion of existing facilities. Traditionally the companies were mostly dependent on internal accruals and loans from banks and financial institutions for their expansion needs. As the companies grew in size and complexity the requirement of quantum of funds also increased thereby forcing the companies and regulators to innovate and look at new avenues of financing.

**Unit 10** deals with raising of finances through domestic markets. In recent years we have seen many innovations in financial instrument design as well as method of placement of financial instruments.

**Unit 11** deals with raising of finances from global markets. Deregulation of financial markets has thrown up new opportunities. The rate of savings and high cost of intermediation increases the cost of capital, therefore the companies are increasingly looking towards global financial markets, apart from this listing on global financial markets give these companies high visibility in the international arena.

**Unit 12** deals with other modes of financing these modes of financing are leasing and hire purchase, suppliers credit, asset securitization & venture capital. These are some of the innovative techniques which are increasingly used by the companies as these techniques prevent large outflow of funds at a time, better sales realisation, locking of the suppliers, prevention of bad debts etc.

This block basically discusses about various methods, instruments and sources of raising finances.

## **BLOCK 5    STRATEGIC FINANCING DECISIONS**

In today's competitive environment, just having a good product line and high sales is just not enough, in order to translate these advantages into healthy and robust bottomline the companies has to constantly scan the economic environment and respond as per the requirements of the environment.

This block deals with Strategic Financing Decisions which implies that how the financing decisions of companies can impart a competitive edge to the companies over their competitors, i.e. Reliance & Infosys. The former by way of distributing liberal dividends and bonus share has been able to build a very strong investor base for itself. In case of Infosys the transparency in its Operations has attracted a lot of domestic and foreign investors, The net result of this is that both of the companies are able to raise funds from both domestic and foreign sources at quite a low rate as compared to the companies operating in the same industry.

**Unit 13** deals with Capital Restructuring. The rapid change in the economic variables i.e. interest rate, cost of capital, increasing integration of world markets, has put pressure on the companies to change their capital structure. This enables the companies to have a low cost of capital. In order to have a low operating and financial cost the companies have to restructure themselves in terms of capital structure, hiving of non core business and by takeovers and mergers

**Unit 14** deals with Financial Engineering. The first half of the unit deals with the factors that lead to the growth of financial engineering and what is the financial engineering process. The second half of the unit deals with the application of financial engineering to the equity, debt derivative products.

**Unit 15** Investors Relations deals with the Corporate Form of Business Organisation and what are the information demanded by the system from these organizations. In order to make an informed decision the investors, creditors, bankers, government etc. requires information which is not usually disclosed by financial statements therefore the companies are changing the reporting formats and also shifting to universally accepted accounting standards. By providing the full information companies also adhere to code of corporate governance. Apart from information providing quality, services to the investors also form a part of investor's relations.



**BLOCK 1**

**FINANCIAL DECISIONS :AN OVERVIEW**

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## **BLOCK 1 INTRODUCTION**

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All business activities require capital two main avenues for raising of capital are debt and equity instruments. In this block we discuss about nature of long term financial decisions, cost of capital and capital structure.

**Unit 1** deals with Nature of Long term Financing Decisions. In this unit we discuss about Investment Decisions, Financing Decisions & Dividend Policy Decisions and inter relationship among these decisions. While taking investment & financing decisions one crucial factor which has to be taken into consideration is the time value of money. Time value of money concept has application in determining present value & terminal value, implied interest rates and annuities.

**Unit 2** deals with Cost of Capital. Cost of capital links the long term financial decisions with shareholders value. Each of the individual components of capital has different cost associated with it. The companies which are able to keep the cost of capital low gains a competitive advantage and internally also the gain in terms of liquidity, flexibility of capital structure and access to low cost sources of funds.

**Unit 3** deals with Capital Structure. Capital Structure is basically the amount of long term debt and equity in the capital. Inter-relationship among components of the capital structure determines the risk, return and value of the firm.

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# UNIT 1 NATURE OF LONG TERM FINANCIAL DECISIONS

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## Objectives

The objectives of this unit are to:

- explain the basics of financial decisions and spell out the distinguishing features and inter-linkages between financing and investment decisions of the firm.
- describe and illustrate the primary objectives of financial decision making.
- discuss the cardinal principles of financial decisions.
- explain and illustrate the concepts of time value of money.
- explain and illustrate the computation of the implied rate of interest, implied principal amount and annuities in borrowing and lending transactions.
- narrates the basic factors influencing long term financial decisions.

## Structure

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## **1.1 INTRODUCTION**

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Role and responsibilities of a finance manager have undergone a remarkable transformation during the last four decades. Unlike the past, finance manager plays pivotal role in planning the quantum and pattern of fund requirements, procuring the desired amount of funds on reasonable terms, allocating funds so pooled among profitable outlets and controlling the uses of funds. Since all business activities involve planning for and utilization of funds, finance manager must have clear conception of the financial objectives of his firm and cardinal principles of financial decisions. Against this backdrop, we shall discuss the basics of financial decisions; nature of long term financing and investment decisions; NPV Rule; time value of money; determination of implied interest rates, implied principal amount and annuities and basic factors influencing long term financial decisions.

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## **1.2 NATURE OF FINANCIAL DECISIONS**

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Financial decisions refer to decisions concerning financial matters of a business concern. Decisions regarding magnitude of funds to be invested to enable a firm to accomplish its ultimate goal, kind of assets to be acquired, pattern of capitalization, pattern of distribution of firms, income and similar other matters are included in financial decisions. A few specific points in this regard are

- a) Financial decisions are taken by a finance manager alone or in conjunction with his other management colleagues of the enterprise.
- b) A finance manager is responsible to handle all such problems as involve financial matters.
- c) The entire gamut of financial decisions can be classified in three broad categories: Investment Decisions, Financial Decisions and Dividend Policy Decisions.

### 1.2.1 Investment Decisions

Investment decisions, the most important financial decision, is concerned with determining the total amount of assets to be held in the firm, the make-up of these assets and the business risk complexion of the firm as perceived by the investors. The salient features of investment decisions are as follows:

- i) The investment decisions are of two types, viz, long term investment decisions and short term investment decisions.
- ii) Long term investment decision decides about the allocation of capital to investment projects whose benefits accrue for long period. It is concerned with deciding :
  - What capital expenditure should the firm make?
  - What volume of funds should be committed?
  - How should funds be allocated as among different investment opportunities?
- iii) Short terms investment decision decides about allocation of funds as among cash and equivalents, receivables and inventories.
- iv) A firm may have a number of profitable investment proposals. However, owing to paucity of funds, finance manager should be meticulous in choosing the most profitable one.
- v) Thrust of financial decisions is on building suitable asset mix.

### 1.2.2 Financing Decision

In Financing decision, finance manager has to decide about the optimal financing mix. It is concerned with how to raise money for business to maximize value of the firm. Highlights of financing decisions are as follows:

- i) Question of making financing decision arise as soon as decision regarding investment outlets is made. At times investment decision follows financing decision.
- ii) A finance manager has to decide the appropriate mix of debt and equity in such a way that wealth of the shareholders is maximized.
- iii) A finance manager is supposed to delve into the following issues requiring financing decisions:
  - a) From which sources are funds available?
  - b) To what extent are funds available from these sources?
  - c) What is the cost of funds presently used?

- d) What is the expected cost of future financing?
- e) What instruments should be employed to raise funds and at what time?
- f) Should firm approach financial institutions for securing funds?
- g) What will be the terms and conditions on which the funds will be raised from different sources?
- h) What will be the nature of underwriting arrangements?
- i) What innovations can be made in raising funds from wide variety of sources?
- iv) A finance manager has to be in constant touch with financial markets.
- v) Financing decisions are primarily concerned with capital structure or debt equity compositions.

### **1.2.3 Dividend Policy Decision**

Dividend policy decision decides about allocation of business earnings between payment to shareholders and retained earnings. A part of the profits is distributed amongst shareholders and other part is retained for growth of the company. A few specific points in this regard are as follows:

- i) Closely related to the issue of raising finance is the issue of distribution of profits, which is effectively a source of total fund requirements. This constitutes the area of dividend decisions.
- ii) Although both growth and dividends are desirable, these two goals are conflicting: a higher dividend rate means less retained earnings and consequently, a slower rate of growth in earnings and stock prices.
- iii) For maximizing the shareholder's wealth, the finance manager has to strike a satisfactory compromise between the two.
- iv) Prudent finance manager takes dividend decision in the light of investor's preferences, liquidity position of the firm, and stability of earnings of the firm, need to repay debt, restrictions in debt contracts, access to capital markets etc.
- v) Dividend policy decision is integral part of financing decisions.

### **1.2.4 Inter-relationship Amongst these Decisions**

The interrelationship between three types of financial decisions centers on the following issues:

**a) Which decision comes first investment or financing?**

One often wonders whether the financing decision comes first or the investment decision. The difficulty with such a question is that any answer in favour of the one or the other is bound to be wrong. For example, why would any management want to raise any capital unless it had some kind of project already in mind? Alternatively, how can a management consider undertaking a new project unless it already had some ideas as to how it is going to raise the necessary finances? So how does one decide which comes first? Chicken or the egg? The answer in our context is somewhat simpler than the moot question concerning the egg and its parent. The two decisions are in reality simultaneous. In fact, neither decision by itself makes sense without the other. There would be no financing decisions to make in the absence of investment decisions and vice versa.

**b) Investment Decision Vs Financing Decision- Fundamental Difference**

This, however, is not to imply that the line dividing the two is fuzzy. In fact, conceptually the two kinds of decisions are quite different and it is important to recognize them as such. What is the fundamental difference between the two? Evidently, both, financing as well as investment decisions involve a certain selection of cash flows. Typically, a financing decision involves accepting cash today (inflows) from the capital market and repaying the same together with interest or dividend subsequently over a period of time (outflows). On the other hand, an investment decision involves investing the cash today in the product market (outflow) and receiving a stream of earnings (inflows) subsequently. Now, the cash invested in the product market is, in fact, the cash, which is raised from the capital market.

**c) Relationship through NPV**

If after paying all lenders their interest and shareholders their normally expected dividend, some surplus is left, obviously, it will belong to the shareholders thereby increasing their wealth. Usually, however, it is extremely cumbersome, though not impossible, to match the cash flows arising from the financing decisions and the cash flows accruing from the investment decisions on a period basis on account of the possible mismatch between their timings. It is therefore far simpler to capture the financing cash flows through their cost (of capital and to use this rate for discounting the operating cash flows. Under this framework, obtaining a positive net present value (NPV) implies the same thing as minimizing the cost of capital. The point becomes further clear if we look at the NPV formula i.e.

$NPV=C_0+C_1/(1+r)$  where  $C_0$  and  $C_1$  are cash flows occurring at time 0 and 1

A close look into the formula would readily show that 'r' and NPV are inversely related. A higher 'r' would mean lower NPV and vice versa. The 'r' being the rate of discount, which normally represents cost of capital. It clearly highlights the inter-linkage between the financing and the investment decisions and provides an explicit justification of the NPV rule as the basic rule of financial decision making.

**Activity 1**

- a) Identify forces than brought about fundamental change in role and responsibilities of a finance manager in India.

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- b) Write down two sets of cash flows; one representing a financing scheme and the other an investment scheme.

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- c) Show the IRR of the Financing Scheme.

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- d) Discount the cash flows of the investment scheme using the above IRR as the discount rate.

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- e) 'NPV formula captures the inter-linkages between investment and financing decision'. Explain, with examples.

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### 1.3 WEALTH MAXIMISATION AND MAXIMISATION OF PROFIT POOL OBJECTIVES

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In a highly competitive environment, financial objective of a firm should be set within the framework of corporate objective of sustainable competitive edge. As such, Wealth maximization objective has come to be widely recognized criterion with which the performance of a business enterprise is evaluated. The word wealth refers to the net present worth of the firm. Net present worth is the difference between gross present worth and the amount of capital investment required to achieve the benefits. Gross present worth represents the present value of expected cash flows discounted at a rate, which reflects their certainty or uncertainty. Thus, wealth maximization objective (WMO) as decisional criterion suggests that any financial action giving positive NPV should be accepted. Algebraically, net present value can be expressed as follows:

$$\frac{NPV}{(W)} = \frac{A_1}{(1+k)} + \frac{A_2}{(1+K)^2} + \frac{A_n}{(1+K)^n} - C$$

where

W = net present worth

A<sub>1</sub>, A<sub>2</sub>...A<sub>n</sub> = the stream of benefits expected to occur over a period of time

K = appropriate discount rate to measure risk

C = initial outlay required to acquire the asset

n = time

The objective of wealth maximization removes the following limitations of profit maximization objective (all such actions increasing income and cutting down costs should be undertaken):

- i) The term profit as used in the profit maximization goal is vague.
- ii) it ignores time value factor.

iii) It ignores risk factor.

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

### **1.3.1 Value Maximisation is Wealth Maximisation**

The owner of the business employs a manager to look after his business interests. In case of a publicly held company, a manager is expected to act in the best interest of the shareholders, who are the owners of the business. Now, what is in the best interest of the shareholders? This depends on what the shareholders want. Assuming the shareholders to be economically rational beings, it appears reasonable to assume that in general they want to get as rich as possible through their stake in the business. In other words, they want to maximize their wealth i.e. market value of shareholding. They are assumed to trade their wealth to obtain their desired consumption patterns. Further, they are assumed to choose the risks associated with the consumption pattern chosen by them (for example, lending your money may give you a consumption pattern, which is less risky, whereas investing; your money in a security or share may give you a consumption pattern with higher risk). In the final analysis, shareholders seek to maximize their return for a given level of risk or minimize their risk for a given level of return.

### **1.3.2 Objective of Maximization of Profit Pool**

In his endeavor to foster overall objective of sustainable competitive edge over the rivals, finance manager has to focus on value maximization-not only maximization of shareholders' value but also stakeholders' value. Additional value accrues only with efforts that maximize profit pool. A profit pool can be defined as the total profits earned in an industry at all points along the industry's value chain. It includes disaggregation of processes, mapping of the value chain beyond the confines of legal entities, adoption of flexible organizational structures and creation of net-worked organisations. Main highlights of this objective are:

- i) Profit pool concept is based on the concept of looking beyond the core business.
- ii) Shape of a profit pool reflects the competitive dynamics of a business.
- iii) Profit concentrations emanate from actions and interactions of companies and customers.
- iv) A profit pool is not stagnant.
- v) A profit pool map answers the most pertinent question where and how is money being made.
- vi) Profit pool may prompts the management to examine how same profit sources exert influence over others and shape competition.

### 1.3.4 Other Objectives and Value Maximisation Objective

There are many other objectives, which are assumed to compete with Value Maximisation Objective (VMO). In fact there are a whole lot of researchers who interview practicing managers and 'show' that the managers often have a whole lot of other 'legitimate' objectives other than the VMO. These are often enumerated as maximizing return on investment, maximizing profit after taxes, maximizing sales, maximizing the market share of their products and so on. It is often held that very few managers in fact agree to pursue value maximisation of their firms as an explicit objective.

A little reflection reveals the intrinsic weakness of such studies. For example, one researcher asked a manager who held maximization of market share as the corporate objective, as to whether he would like his company to capture 100% market share by pricing below costs. Clearly if market share maximization is the prime objective, he should have no objection to such a proposition. Yet it would be a poor manager indeed who goes for such an opinion. Clearly, his desire to maximize market share even at cost of profits in the short terms, must have been triggered off by the possibility of attaining a monopolistic position so that profits in the long term can be maximized. Similarly, a manager who maximizes sales may be operating under the assumption, that such a course of action would eventually lead to enhanced profits in the long run, if not immediately. Other objectives such as maximization of return on investment or profit before taxes etc. are at any rate linked to the wealth maximization criteria directly or indirectly. We can see that what are constructed as objective as other than VMO are in fact merely short term operational strategies for maximizing wealth of the shareholders in the long run.

### 1.3.5 Net Present Value Rule

Wealth maximization objective gives Net Present Value (NPV) rule as the most basic rule of financial decision making. To make as investment decision, you compare the returns on the investment with what the financial markets are offering. The NPV rule really provides you with a simple way of making that comparison. By computing the present value of an investment, you are finding out what the investment is worth today. On comparing the present value of an investment with its initial outlay, you arrive at the net present value, which may be positive or negative. The concept of NPV, in the form of a simple algebraic formula, may be stated as follows:

$$NPV = C_1 / (1+r) + \dots + C_n / (1+r)^n - C_0$$

Where  $C_0$  stands for initial cash outlay,  $C_1$  for the cash that will be received from the investment in one year's time and  $C_n$  for the cash that will be received from the investment at end of  $n$  year's time,  $r$  for is the discount

rate. The discount rate  $r$  should include an appropriate premium for risk. The riskier investment would have higher ' $r$ '

As a rule, an investment is worth making if it has a positive NPV. If an investment's NPV is negative, it should be rejected.

Example:

X invests Rs.70, 000 in a piece of land. There are three possible probabilities before him for its sale after a period of one year:

A Rs.75, 000

B Rs.77, 000

C Rs.80, 000

His expectation of income is 10%. When he should sell his piece of land? By applying NPV Rule, the results will be as follows:

$$NPV = C_1 / (1+r) - c_0$$

$$NPV_A = \frac{75,000}{(1+0.1)} - 70,000 = -1817.50$$

$$NPV_B = \frac{77,000}{(1+0.1)} - 70,000 = 0$$

$$NPV_C = \frac{80,000}{(1+0.1)} - 70,000 = 2727.27$$

Applying the NPV rule, X will invest in land only where the land will sell for Rs.80, 000 next year and not when the land will sell for either Rs.75, 000 or Rs.77, 000. positive NPV is the logic.

One might ask here: Is this NPV rule valid for firms also? The answer is 'yes', as long as the objective of the firm is value maximization.

### **1.3.5 VMO and NPV Rule**

It clearly emerges from the foregoing discussion that a manager can help the shareholders by making all business decisions in such a manner that the shareholders' stake in the business is maximized. This would essentially mean that the managers would invest in all such investment opportunities where the present value of the expected future cash inflows exceeds the current level of investment, so that this excess of the present value of inflows over the initial investment enhances the total market value of the shares belonging to the shareholders.

It should be clear that if the New Present Value (NPV) of an investment were to be negative, the investors would be better off by investing their funds elsewhere. Thus, the manager must invest the shareholders' funds only in ventures, which yield positive NPV such that the value of their shares is maximized. Let us suppose that the market value of a firm's share is Rs.100. Let us further assume that the shareholders of the firms expect to earn a return of 20% per annum from their investment in the firm. If the management of the firm fails to earn Rs.20 per share, the market mechanism would ensure that the price of the firm's share drops. How much will the drop be? It depends on the level of the firm's earnings. If the earnings level falls to say Rs.15 per share over a period of time, the price of the share would drop to Rs.75. why? This is because, given the earnings per share of Rs.15 of the firm, the shareholders can continue to earn their expected level of 20% return only if the price of the share fell to Rs.75. this drop in the price of the share would however lower the wealth of the shareholders. Hence, the manager must ensure that the funds are invested in ventures, which would be able to generate enough surpluses to meet the expectations of the shareholders. thus, the principal objective in business becomes the maximization of the shareholders wealth.

### Activity 2

a) Map out profit pool for a transport industry.

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b) The market price of a company's share falls. What could be the possible reasons?

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c) Investors in a capital market revise their expectation of return from a particular company from 20% to 24% on account of that company having undertaken some risky ventures recently. Would the market price of that company's share go up or go down? why?

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- .....
- .....
- d) On account of certain government concessions to a particular company, its financial performance is expected to improve in the future. Would the market price of the company's share go up or go down? Why?

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- e) A firm has decided to set up a steel plant. What sources of funds would you suggest to the firm for funding the plant?

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### **1.4 CARDINAL PRINCIPLES OF FINANCIAL DECISIONS:**

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A finance manager in his attempt to maximize corporate value of the firm must keep in view the following basic considerations while making financial decisions:

**i) Strategic Principle**

According to this principle, financial decisions of a firm should be tethered to the overall corporate objectives and strategies.

**ii) Optimization Principle**

Thrust of financial decisions should be on intensive use of available funds and for that purpose, proper balance between fixed and working capital should be sought.

**iii) Risk – Return Principle**

Maintaining suitable balance between risk and return is the crux of financial decision making. Given the product-market strategy, return and risk are the function of decision relating to size of the firm, kinds of assets to be acquired, types of funds to be employed, extent of funds to be kept in liquid form, etc.

**iv) Marginal Principle**

According to this principle, a firm should continue to operate upto the point where its marginal revenue is just equal to its marginal cost.

**v) Suitability Principle**

Focus of this principle is on creating an asset by a financial instrument of the same approximate maturity.

**vi) Flexibility Principle**

According to this principle, financial plan of a firm should be capable to being changed in sync with changing environment.

**vii) Timing Principle**

Timing should be crucial consideration in financial decisions. Investment and financing decisions should be taken at a time that enables the organisation to seize market opportunities and minimize cost of raising funds.

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## 1.5 TIME VALUE OF MONEY

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Suppose you are given an option to receive Rs.100 today or Rs.100 a year from today, which option would you choose? Of course, Rs.100 today. Why? Could it be that Rs.100 today represents greater certainty than Rs.100 a year from now? Possibly. However, this element or risk associated with Rs.100 a year from now could be eliminated or largely reduced through suitable promises, insurance against default and so on, so that you may disregard the possibility of such default. So you are required to make your choice once again. Would you still choose to receive Rs.100 today rather than a year from now? Why?

Maybe you are afraid that Rs.100 a year from now might be worth much less than Rs.100 today on account of inflation. Let us suppose, for the sake of argument that you are living in an economy, which is free from inflation. You may be promised Rs.100 worth of goods today, instead of cash and the same amount of goods a year from now, so that you are effectively protected against inflation. What would your choice be? Still Rs.100 today why? A good reason can be that you could collect your Rs.100 today, put it in the fixed deposit in the bank for a year, and collect Rs.110 a year from now, assuming that the bank gives you 10% interest on your deposit. Thus, you would be better off by Rs.10 than you would have been if you had received Rs.100 a year later.

The next question could be why should the bank give you 10% interest on your deposit? The obvious reason is that cash is a scarce resource and the bank is, therefore, prepared to give you a rental (Rs.10) in return for your

allowing them the use of your capital (Rs.100) for a year. Needless to say, the bank would not have agreed to give you Rs.10 for using your capital for a year, if it did not expect to earn more than Rs.10 by investing Rs.100 elsewhere during the year. Thus, in this case, Rs.10 represents the time value of Rs.100 for a period of one year, i.e. 10% per annum. Of course, the real time value of money would depend on the total amount of money available in the economy and the investment opportunities available in the economy and so on.

Time value of money or time preference for money is one of the central ideas in finance. Money has a time value because of the following reasons:

- i) Individuals generally prefer current consumption.
- ii) An investor can profitably employ a rupee received today to give him a higher value to be received tomorrow.
- iii) Future is uncertain.
- iv) Inflationary pressures make the money received in future of lesser purchasing power.

Thus, there is preference of having money at present than at a future point of time. This automatically means:

- i) That a person will have to pay in future more for a rupee received today.
- ii) A person may prefer to accept less today for a rupee to be received in future.

They are called as compounded value and discounted value.

### **1.5.1 Compounded Value**

The process of finding the future value of a payment or receipt or series of payments or receipts when applying the concept of compound interest is known as compounding. It is also called terminal value.

#### **Present Cash to Future Cash**

Let us now understand the concept of terminal value. Given that the time value of money (say interest rate) is 10% per annum, what will be the value of Rs.100 one year from today? Obviously Rs.110. Thus the terminal (or compounded) value of Rs.100 at the rate of 10% a year from now is equal to Rs.110.

How did you arrive at the terminal value of Rs.110? whether you were aware of it or not, you multiplied Rs.100 by 0.10 (being 10%) and added the result to Rs.100, to obtain Rs.110.

**In mathematical terms:**

Terminal value of Rs.100 @ 10% at the end of one year is equal to  $100 + 0.10 \times 100 = 100 \times 1.1 = \text{Rs.}110$ .

Similarly, can you now find out the terminal value of Rs.100 at the rate of 10% two years from today?

(Hint: First find out the terminal value of Rs.100 one year from now, which will be Rs.110. now find out the terminal value of Rs.110 a further one year hence.)

In mathematical terms, this would be equal to  $100 \times 1.1 \times 1.1 = 100 \times 1.1^2 = \text{Rs.}121$

In general then, the terminal value of an amount ‘p’, at a rate of ‘r’ per period, and for ‘n’ periods from today will be

$$p (1+r) (1+r) (1+r) \dots n \text{ times} = p (1+r)^n$$

Note:  $(1+r)^n$  is known as the Terminal Value factor n periods hence, at the compound rate of r per period.

In case of multiple period compounding

$$A = P \left( 1 + \frac{r}{m} \right)^{m \times n}$$

Where

- A = Amount after n period
- m = number of times per year compounding is made
- P = Amount in the beginning of period
- r = Interest rate
- n = Number of years for which compounding is to be done

**1.5.2 Discounted Value**

“Deposit Rs.100 and take back Rs.110 after one year” stated in a numerical way means that Rs.100 is the present value of Rs.110 to be received a year hence. In case of discounted value, we estimate the present worth of a future payment/installment or series of payments adjusted for the time value of money.

**Future Cash to Present Cash**

At the rate of 10% per annum, what will be the present (or discounted) value of Rs.110 to be received one year from now? Clearly, this will be Rs.100. how was this arrived at?

By dividing Rs.110 by 1.1 (Remember: Rs.110 was the terminal value of Rs.100 one year hence @ 10%).

Similarly, what will be the present value of Rs.100 to be received one year hence, @ 10% per annum? This will be Rs.90909, arrived at by dividing Rs.100 by 1.1.

**In mathematical terms:**

Present value of Rs.100 to be received one year hence, @ 10% per annum =  $100/1.1=90.90909$ .

Similarly, the present value of Rs. 100 to be received two years. Hence, @ 10% per annum =  $(100/1.1)/1.1=100(1.1)^{-2} =82.64463$ .

In general then the present value of an amount 'P' to be received in 'n' periods hence, at the rate or 'r' per period will be  $=P/(1+r)^n$ .

Note:  $1/(1+r)^n$  is shown as the present value factor for an amount received 'n' periods hence, at the discount rate of 'r' per period.

**Activity 3**

a) A sum of Rs.1,000 is placed in the savings account of a bank at 5 percent interest rate. Find the sum at the end of two years.

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b) An investor has an Opportunity of receiving Rs.1,000, Rs.1,500, Rs.800, Rs.1,100 and Rs.400 respectively at the end of one through five year. Find the present value of this stream of uneven cash flows, if the investor's interest rate is 8 percent?

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c) You can get an annual rate of interest of 13 percent on a public deposit with a company. What is the effective rate of interest if the compound is done (a) half yearly (b) quarterly and (c) weekly.

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## 1.6 DETERMINATION OF IMPLIED INTEREST RATES, IMPLIED PRINCIPAL AMOUNT AND ANNUITIES

In this subsection, the process of determination of implied interest rates, implied principal amount and annuities is explained.

### 1.6.1 Determination of Implied Interest Rates

Suppose you borrow Rs.100 for one year and the lender asks you to repay Rs.120 one year later. What is the interest rate implied by your borrowing? Clearly 20%. This is because at the end of one year, you are required to repay the principal of Rs.100 as well as the interest of Rs.20.

However, suppose the lender offers you any one of the seven following repayment schedules for having borrowed Rs.100 now:

Repayment Schedule	1	2	3	4	5	6	7
Repay at the end of 1st year = Rs.	20	20	45	70	95	95	20
Repay at the end of 2nd year = Rs.	20	20	90	60	30	5	20
Repay at the end of 3rd year = Rs.	120	20	-	-	-	5	20
Repay at the end of 4th year = Rs.	-	120	-	-	-	5	20
Repay at the end of 5th year = Rs.	-	-	-	-	-	30	20
Repay at the end of 6th year = Rs.	-	-	-	-	-	-	20
(Repay in perpetuity)							20

What is the interest rate implied in each of the above repayment schedules? Is it 20% for all the schedules? At this stage, you may find it more difficult to provide an answer. It may, however, be relatively simpler to answer the question for schedules 1,2 and 7 intuitively.

In case of schedule 1, Rs.20 is paid towards interest at the end of first year since the loan is fully outstanding. Similarly, Rs.20 is paid again at the end of second and third years, at which time the principal of Rs.100 is also repaid. Similarly, in case of schedule 2, the principal amount is fully repaid only at the end of fourth year, till which time the interest of Rs.20 is being paid at the end of every year. In case of schedule 7, the principal is never repaid and hence the interest of Rs.20 is being paid at the end of every year for ever, thus, in all these cases the implied interest rate remains 20% per annum.

For repayment schedules from 3 through 6, a similar interpretation is possible, through this would be somewhat more difficult. Consider, for example, schedule 4. in this case, at the end of first year half of the principal is repaid. However since the entire principal is outstanding for the whole of first year, the interest accrued is Rs.20. this together with half the principal being repaid at the end of the first year amounts to Rs.70. Thus, only Rs.50 is outstanding

as long for the second year so that the interest accrued on this amount at the rate of 20% in the second year is only Rs.10. The outstanding loan of Rs.50 is fully paid the end of second year so that the total repayment at the end of second year is Rs.60. Thus, the interest rate implied in this case is also 20%.

(Can you provide similar interpretations for schedules 3,5 and 6? You should be able to see that in all these cases the implied interest rate is 20% per annum).

It should be readily apparent that one may arrive at an infinite number of such repayment schedules all of which imply an interest rate of 20% per annum. In the absence of prior information on the interest rate, how can one determine what interest rate is implied in a given loan scheme? One must have a more structured and systematic approach to determine the implied interest rate, given a loan amount and its repayment schedule.

Let us consider schedule 3. The Schedule represents a repayment of Rs.45 at the end of first year and Rs.90 at the end of second year, against a loan of Rs.100 now. The interest rate may be defined as that rate at which the present value of the repaid amounts exactly equal Rs.100 Let this rate be equal to 'r'. Thus, we must have:

$$100 = 45/(1 + r) + 90/(1 + r)^2$$

(Note :  $45/(1 + r)$  represents the present value of Rs.45 to be paid one year later and  $90/(1 + r)^2$  represents the present value of Rs.90 to be paid two years later, at the rate of 'r' per annum).

The value of 'r' can be determined from the above equation using the hit and trial method without much difficulty. In this case, it can be found that when  $r = 0.20$ , the equation is exactly satisfied, so that the interest rate implied in this case is confirmed to be 20%.

You have studied that Internal Rate of Return (IRR) is the rate at which the present value of the inflows exactly equals the initial outflow. In the above example, the initial borrowing (inflow) is 100 and the repayments (outflows) at the end of the first and second years are Rs.45 and Rs.90, respectively. At the rate of 20%, the present value of outflows exactly equals the initial inflow.

Thus, for the set of cash flows represented by Rs. 100, in time zero, -45 at the end of the first year, and -90 at the end of second year respectively (plus sign is for the inflow and minus sign is for the outflow), the implied rate of interest is equal to 20%. In other words, interest rate implied in a typical loan scheme, which involves an initial inflow (borrowing), followed by

subsequent outflows (repayments) is just like the IRR of the cash flows associated with the loan scheme.

## 1.6.2 Determination of the Implied Principal Amount

Let us assume that a prospective borrower approaches you for a loan. He is confident of being able to pay you Rs.193 for four years starting a year from today. Assuming that your desired rate of interest is 20% per annum, how much amount would you be prepared to lend him today?

In the light of our discussion above, it should be clear that the amount you should lend, should exactly equal the present value of the annual stream of Rs.193 for four years discounted at the rate of 20%. Let us assume that the amount you would be prepared to lend is P.

Mathematically, we must have:

$$P = 193/(1.2) + 193/(1.2)^2 + 193/(1.2)^3 + 193/(1.2)^4 = 500$$

Thus, you should be prepared to lend Rs.500 in the above case. The same logic may be employed to determine what is called 'fair price of a share' in the market. Let us suppose you expect a company to pay you dividends worth Rs.20, 30 and 40 at the end of one, two and three years from today, respectively. Further suppose you wish to hold the share for only three years and you expect to be able to sell the share at the end of the third year for Rs.120 how much would you be prepared to pay for the share of such a company today? "Clearly, we must employ the same technique as above and find out the present value of the inflows, namely Rs.20 at the end of first year, Rs.30 at the end of second year and 160 at the end of third year (Rs.40 worth of dividends plus Rs.120 from the sale of the share) at a rate which you expect to earn on your investment". Let us assume that you wish to earn 25% on this investment as you consider the proposition somewhat risky (assuming that higher the risk, higher the return expected). The present value of the above inflows when discounted at 25% yields about Rs.117, which is the amount you should be willing to pay for a single share of the company mentioned above.

## 1.6.3 Determination of Annuities

Let us assume that you borrow Rs.100 at an interest of 20% per annum for a period of two years. However, you wish to repay the loan in two equal annual installments (also known as annuities). What should be this installment?

(If your answer is Rs.50, it is obviously wrong. Guess why?).

Let us assume that each installment amount equals X. We have a cash flow pattern of the kind + 100 in times zero, X at the end of first year and x at the end of second year respectively.

According to the IRR rule, we must have:

$$100 = X/(1.2) + X/(1.2)^2, \text{ or } 100 = 0.833 X + 0.694 X \text{ or } X = 100/1.527 = 65.49.$$

**Activity 4**

- a) In the above example, the repayments commenced one year later. What would you do if annual repayments were to commence as soon as loan was received, i.e. from time zero onwards, instead of from the end of first year onwards?

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- b) In the annuity example given above, can you find out the annuity payments if the repayment period three years or four years or five years were? What will be the annuities, if the payments were to commence immediately?

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- c) Given the cash flows + 500, -100, -200, -300, -400 in period 0,1,2,3 and 4, respectively. Calculate the Implied rate of interest.

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**1.7 BASIC FACTORS INFLUENCING LONG TERM FINANCIAL DECISIONS**

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A finance manager has to exercise great skill and prudence while taking long-term financial decisions since they effect the financial health of the enterprise over a long period of time. It would, therefore, be in fitness of things to take the decisions in the light of external and internal factors as discussed below.

## External factors

External factors refer to environmental factors that bear upon operations of a business enterprise. These factors are beyond the control and influence of management. The following external factors enter into long term financial decision making process:

- i) State of economy-i.e. phase of trade cycle.
- ii) Institutional structures of capital markets (Developed or undeveloped).
- iii) State regulations in financing (Debt Equity Norms, Dividend Payment Restrictions etc.
- iv) Taxation policy.
- v) Expectations of Investors in terms of safety, liquidity and profitability.
- vi) Lending policies of financial institutions.

## Internal Factors

Internal factors comprise those factors, which are related with internal conditions of the firm, as listed below:

- i) Nature of business
- ii) Size of Business
- iii) Age of the firm
- iv) Ownership structure
- v) Asset structure of the firm
- vi) Liquidity position of the firm
- vii) Expected return, cost and risk
- viii) Probabilities of regular and steady earnings
- ix) Attitude of management

It is practically inexpedient to consider all the factors at a time since they are antagonistic to each other. A prudent and skillful manager strives to strike a proper balance among these factors in the light of income, risk, control and flexibility factors.

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## 1.8 SUMMARY

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Investment decisions pertains to choice of outlets in which funds are to be deployed so as to maximize value of the firm where as financing decisions concern with funding of the outlets and dividend policy decision shed light on allocation of net earnings between retention and distribution.

The objective of a firm is to maximize the wealth of its shareholders. The wealth of the shareholders is measured through the market value of their shares. The Market value of a firm's share is nothing but the present value of its future earnings, discounted at the rate of return expected by its shareholders. In order to maximize the shareholders' wealth, only those projects, which yield a positive NPV, are accepted.

A rupee today is not equal to a rupee tomorrow. This is so because the rupee can be put to some productive use during the intervening period and thus made to earn. Like any limited resources, capital does not come free. It has a cost, which is termed as the time value of money. The mechanism by which we equate a rupee today with a rupee tomorrow is by bringing both the rupees on a common date, either today or tomorrow. Reducing them to today's value is called their present value. Similarly, reducing them to tomorrow's value is known as terminal value. The former involves discounting the future rupee to the present at the appropriate cost of money, while the latter involves compounding the rupee today to a future date.

Finance manager has to exercise great skill and prudence to strike a proper balance amongst external and internal factors influencing financial decisions.

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## **1.9 KEY WORDS**

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**Annuity** is an equalized stream of cash flows over a period of time.

**Capital Market** is where financial instruments are bought or sold.

**Capital Structure** is the composition of a firm's capital in terms of debt and equity.

**Cost of Capital** is a term used to refer to the weighted average of the cost of debt and equity.

**Equity** represents the share of an investor in a business.

**Internal Rate of Return (IRR)** is the rate at which the present value of a stream of cash inflows equals the initial outflow, so that the Net Present Value (NPV) of the set of given cash flows equals zero.

**Net Present Value** is the difference between the present values of cash inflows and cash outflows, when cash inflows are discounted at a suitable rate.

**Present Value** is value obtained when future cash flows are discounted to the present at a certain rate.

**Terminal Value** is the value obtained when current cash flows are compounded to the future at a certain rate.

**Time Value of Money** refers to the intrinsic value of money on account of

its alternate use potential.

**Financial Decisions** refer to decisions concerning financial matters of a business concern.

**Investment Decisions** refer to assets mix or utilization of funds. **Financing Decisions** refer to capital structure or optimal financing mix. **Dividend Policy Decisions** decide about allocation of business earnings.

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## 1.10 SELF-ASSESSMENT QUESTIONS

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1) Why is Time Value of Money independent of inflation and risk?

Differentiate Present Value and Terminal Value.

2) What is Net Present Value? How the NPV rule is related to the wealth maximization objectives of a firm?

3) What is IRR ? How does it relate to financing decisions? Can you use it for investment decisions of the accept/reject type?

4) What is Investment Decisions? How is it different from financing decisions?

5) Bring out the factors influencing long-term financial decisions of the firm ?

6) 'Obtaining Positive NPV implies the same thing as minimizing the cost of capital' Explain with examples.

7) Project a and B require equal amount of investment. Project a will yield Rs.3,000, 4,000 and 5,000 in the first, second and third years, respectively, project B, however, will yield Rs.5,000, 4,000 and 3,000, respectively in the first, second and third years. Which project is superior? Why

8) What will be the monthly time adjusted interest rate, which is equivalent to an annual interest rate of 15%?

Hint : if annual rate = R, and equivalent quarterly rate = r, We will have :  $(1 + R) = (1 + r)^4$ .

9) A client goes to the bank and borrows Rs.12,000. the Bank Manager requires the client to repay Rs.6,000 at the end of every year for three years. What interest rate was the client charged? What would be the interest rate if the Manager had instead asked the client to repay in five annual installments of Rs.4,000 at the beginning of every year starting from the date of borrowing?

10) Mr. X is considering to invest Rs.1 lakh in a project, which is expected to result in a net cash flow of Rs.20,000 at the end of each year for 8

**Financial Decisions:  
An Overview**

years. Mr. X will have to borrow the amount required for investment at the rate of 12% per annum. Should he undertake the project ?

- 11) Suppose Govinda is currently earning Rs.50,000. Next year he will earn Rs.60,000. Govinda is profligate and wants to consume Rs.75,000 this year. The current interest rate is 10%. What will be Govinda's consumption potential by next year if he consumes according to his desires this year?
- 12) Amir is a miser. He currently earns Rs.50,000 and will earn Rs.40,000 next year. He plans to consume only Rs.20,000 this year. The current interest rate is 10%. What will be Amir's consumption potential next year?
- 13) It is estimated that a firm has a pension liability of Rs.1 million to be paid in 24 years. To assess the value of the firm's stock, financial analyst wants to discount this liability back to the present. If the discount rate is 16%, what is the present value of this liability?
- 14) Consider a firm with a contract to sell a capital asset for Rs.70,000. Payment is to be received at the end of 2 years. The asset costs Rs.60,000 to produce. Given that the interest rate is 10%, did the firm make a profit on this item? That is the interest rate at which the firm breaks even?
- 15) You have won the Nagaland State Lottery. Lottery officials offer you the choice of the following alternate payouts:  
**Alternate 1** : Rs.10,000 1 year from now **Alternate 2** : Rs.20,000 5 years from now Which should you choose if the discount rate is a) 0% ?  
b) 10% ?  
c) 20% ?
- 16) You are considering to make an offer to buy some land for Rs.25,000 Your offer will be to pay Rs.5,000 down and for the seller to carry a contract for the remaining Rs.20,000. you would like to pay off the contract over six years at an interest of 18 per cent per year. For the first year, you wish to pay interest only each month. For the remaining five years, you are willing to pay off the contract in equal monthly installments. What will be your monthly payment for years 2 through 6 if the seller agrees to your terms?
- 17) Sukhdev wants to save money to meet two objectives. First, he would like to be able to retire twenty years from now and have a retirement income of Rs.30,000 per year for at least ten years. Second, he would like to purchase a plot of land five years from now at an estimated cost of Rs.15,000. He can afford to save only Rs.5,000 per year for the first five years. Sukhdev expects to earn 10 per cent per year on average from

investments over the next thirty years. What must his minimum annual savings be from years 6 through 20 to meet his objectives?

- 18) Deepak has asked your advice on the following problem. He has a mortgage loan on the family home that was made several years ago when interest rates were lower. The loan has a current balance of Rs.30,000 and will be paid off in twenty years by paying Rs.270 per month. He has discussed paying off the loan ahead of schedule with an officer of the bank holding the mortgage. The bank is willing to accept Rs.27,000 right now to pay it off completely. What advice would you offer to Deepak?
- 19) Which decisions comes first-investment or financing?
- 20) Explain, briefly, the nature and types of financial decisions.

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## 1.11 FURTHER READINGS

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## 1.12 ANSWERS

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### Activity 3

- (a) Rs.1102.50
- (b) Rs.3921.60
- (c) 13.42%, 13.65%, 13.86%

**Activity 4**

(b) First part –Rs.47.47, Rs.38.63 and Rs.33.44 Second part-Rs.39.56.  
Rs.32.19 and Rs.27.87

(c) Approximate -2)

Self assessment Questions/Exercises.

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## UNIT 2 COST OF CAPITAL

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### Objectives

The objectives of this unit are to:

- provide conceptual understanding of the cost of capital and its variants.
- illustrate the computation of cost of specific courses of long-term finance viz. long term debt and debentures, preference shares, equity shares, and retained earnings.
- discuss and illustrate the various weighting approaches and the Weighted Average Cost of Capital (WACC).
- examine the utility of cost of capital

### Structure

- 2.1 Introduction
- 2.2 Concept of Cost of Capital
  - 2.2.1 Components of Cost of Capital
  - 2.2.2 Classification of Cost of Capital
- 2.3 Computing Cost of Capital of Individual Components
  - 2.3.1 Cost of Long-term Debt
  - 2.3.2 Cost of Preference Capital
  - 2.3.3 Cost of Equity Capital
  - 2.3.4 Cost of Retained Earnings
- 2.4 Weighted Cost of Capital
- 2.5 Significance of Cost of Capital
- 2.6 Some misconceptions about the Cost of Capital
- 2.7 Summary
- 2.8 Keywords
- 2.9 Self Assessment Questions
- 2.10 Further Readings
- 2.11 Answers

Appendix 2.1: Share Valuation with Constant Growth in Dividends

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## 2.1 INTRODUCTION

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The Cost of Capital is an important financial concept. It links the company's long-term financial decisions with the shareholders' value as determined in

the market place. Two basic conditions must be fulfilled so that the company's cost of capital can be used to evaluate new investment:

- 1) The new investments being considered have the same risks as the typical or average investment undertaken by the firm.
- 2) The financing policy of the firm remains unaffected by the investments that are being made.

In this unit, we shall dilate upon the concept of the cost of capital and its classification, the process of computing cost of capital of individual components, weighted cost of capital, significance of cost of capital and a few misconceptions about the cost of capital.

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## **2.2 CONCEPT OF COST OF CAPITAL**

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The term cost of capital refers to the minimum rate of return that a firm must earn on its investments so as to keep the value of the enterprise intact. It represents the rate of return, which the firm must pay to the suppliers of capital for use of their funds.

The following are the basic characteristics of cost of capital :

- i) Cost of Capital is really a rate of return, it is not a cost as such.
- ii) A firm's cost of capital represents minimum rate of return that will result in at least maintaining (If not increasing) the value of its equity shares.
- iii) Cost of Capital as a rate of return is calculated on the basis of actual cost of different components of capital.
- iv) It is usually related to long-term capital funds.
- v) In operational terms, Cost of Capital in terms of rate, of return is used as discount rate, used to discount the future cash inflows so as to determine their present value and compare it with investment outlay.
- vi) Cost of Capital has three components:
  - a) Return at Zero Risk Level.
  - b) Premium for Business Risk.
  - c) Premium for Financial Risk.

The cost of capital may be put in the form of the following equation:

$$\mathbf{K = R_0 + b + f}$$

Where

K = Cost of Capital

$R_0$  = Return at zero risk level (Risk free returns)

$b$  = Premium for business risk

$f$  = Premium for financial risk

Thus,

- a) Cost of Capital with Business Risk > Cost of Capital with no risk; and
- b) Cost of Capital with financial risk > Cost of Capital with Business Risk > Cost of Capital with no risk.

### 2.1.1 Components of Cost of Capital

A firm's cost of capital comprises three components:

- **Return at Zero Risk Level :** This refers to the expected rate of return when a project involves no risk whether business or financial. For reference purpose return on sovereign bonds ( government securities) is taken as risk free rate
- Purchasing power risk arises due to changes in purchasing power of money.
- Money Rate Risk means the risk of an increase in future interest rates.
- Liquidity risk means the ability of a supplier of funds to sell his shares/ debentures bonds quickly.

### 2.2.2 Classification of Cost of Capital

Cost of Capital can be classified as follows:

- 1) **Explicit Cost and Implicit Cost :** Explicit cost is the discount rate that equate the present value of the expected incremental cash inflows with the present value of its incremental cash out flows. Thus, it is 'the rate of return of the cash flows of financing opportunity'. In contrast, implicit cost is the rate of return associated with the best investment opportunity for the firm and its shareholders that will be foregone if the project presently under consideration by the firm were accepted. In a nutshell, explicit costs relate to raising of funds while implicit costs relate to usage of funds.
- 2) **Average Cost and Marginal Cost:** The average cost is the weighted average of the costs of each components of funds. After ascertaining costs of each source of capital, appropriate weights are assigned to each component of capital. Marginal cost of capital is the weighted average cost of new funds raised by the firm.
- 3) **Future Cost of Capital :** Future cost of capital refers to the expected cost to be incurred in raising new funds while historical cost represents cost of capital incurred in the past in procuring funds for the firms. In

financial decision, making future cost of capital is relatively more relevant.

- 4) **Specific Cost and Combined Cost** : The costs of individual components of capital are specific cost of capital. The combined cost of capital is the average cost of capital as it is inclusive of cost of capital from all sources. In capital budgeting decisions, combined cost of capital is used for accepting /rejecting the investment proposals.

**Activity I**

1) Define the following :

- i) Explicit Cost      iii) Average Cost
- ii) Cost of Capital    iv) Marginal Cost

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2) Discuss various types of risks associated with the concept of Cost of Capital.

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3) State how Cost of Capital can help a firm in converting its future cash inflows in its present value.

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### **2.3 COMPUTING COST OF CAPITAL OF INDIVIDUAL COMPONENTS**

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Computation of cost of capital from individual sources of funds helps in determining the overall cost of capital for the firm. There are four basic sources of long-term funds for a business firm:

- i) Long-term Debt and Debentures,
- ii) Preference Share Capital,
- iii) Equity Share Capital,
- iv) Retained Earnings

Though not all of these sources may be tapped by the firm for funding its activities, each firm will have some of these sources in its capital structure.

The specific cost of each source of funds is the after-tax cost of financing. The procedure for determining the costs of debt, preference and equity capital as well as retained earnings is discussed in the following sub-sections.

### 2.3.1 Cost of Long-Term Debt

Cost of long-term debt represents the minimum rate of return that must be earned on debt financed investments if the firm's value is to remain intact. Long-term debt may be issued at par, at premium or discount. It may be perpetual or redeemable. The technique of computation of cost in each case has been explained in the following paragraphs.

- (a) The formula for computing the Cost of Long-term debt at par is

$$K_d = (1 - T) R$$

where

$K_d$  = Cost of Long-Term Debt

T = Marginal Tax Rate

R = Debenture Interest Rate

(1-T) is also known as tax shield, since interest paid on debt is a tax deductible expense. This effectively brings down the real cost of debt

Example, if a company has issued 10% debentures and the tax rate is 60%, the cost of debt will be

$$(1 - .6) 10 = 4\%$$

- (b) In case the debentures are issued at premium or discount, the cost of the debt should be calculated on the basis of net proceeds realized. The formula will be as follows.

$$K_d = \frac{I}{N_p} (1 - T)$$

Where

$K_d$  = Cost of debt after tax

I = Annual Interest Payment

**Financial Decisions:  
An Overview**

$N_p =$  Net Proceeds of Loans

$T =$  Tax Rate

Example, a company issues 10% irredeemable debentures of Rs. 1,00,000. The company is in 60% tax bracket.

$$\begin{aligned} \text{Cost of debt at par} &= \frac{\text{Rs. } 10,000}{\text{Rs. } 1,00,000} \times (1 - 60) \\ &= 4\% \end{aligned}$$

$$\text{Cost of debt issued at} = \frac{\text{Rs. } 10,000}{\text{Rs. } 90,000} \times (1 - 60)$$

10% discount = 4.44%

$$\text{Cost of debt issued at} = \frac{\text{Rs. } 10,000}{\text{Rs. } 1,10,000} \times (1 - 60)$$

10% Premium = 3.63%

- (c) For computing cost of redeemable debt, the period of redemption is considered. The cost of long-term debt is the investor's yield to maturity adjusted by the firm's tax rate plus distribution cost. The question of yield to maturity arises only when the loan is taken either at discount or at premium. The formula for cost of debt will be

$$\frac{1 + \frac{\text{Discount}}{\text{mp}} \left( \text{In case of premium } \frac{\text{Premium}}{\text{mp}} \right)}{\frac{p + nP}{2}} \times (1 - T) \times 100$$

where

$\text{mp} =$  maturity period

$p =$  nominal or par value

$nP =$  net proceeds i.e. (Par value - Discount + Premium)

Example, a firm issued 1,000, 10% debentures, each of Rs. 100 at 5% discount. The debentures are to be redeemed in the beginning of 11<sup>th</sup> year. The tax rate is 50%.

$$\begin{aligned} &\frac{100 + \frac{5,000}{10}}{1,00,000 + 95,000} \times (1 - 50) \\ &\frac{10,500}{97,500} \times 50 = 5.385\% \end{aligned}$$

- (d) In case of underwriting and other issuing costs, they are adjusted in the same way as discount is being adjusted in net proceeds and other

calculations.

Example, A company raised loan by selling 2,500 debentures with 10% rate of interest at premium at Rs. 5 per debenture (Par value = Rs. 100), redeemable in the 11<sup>th</sup> year. Underwriting and other issuance costs amounted to 3% of the proceeds. The tax rate is 50%

$$\begin{aligned}
 &= \frac{\left(25,000 - \frac{12,500}{10} + \frac{7,875}{10}\right)}{\left(\frac{2,50,000 + 2,54,25}{2}\right)} \times 3(1-5) \times 100 \\
 &= \frac{25,000 - 1250 + 788}{2,52,313} \times 0.5 \times 100 \\
 &= 4.865\%
 \end{aligned}$$

- (e) Yield to maturity method of computing cost of debt capital is an approximation method. A better method is that which converts yield to maturity into a discount rate. James C. Van Horne says “the discount rate that equates the present value of the funds received by the firm, net of underwriting and other costs with the present value of expected outflows. These outflows may be interest payments, repayment of principal or dividends”. It may symbolically be written as:

$$np = \sum_{t=1}^n \frac{(\text{cash outflows})^t}{(1+K)^t}$$

where

np = net amount available for use

(Cash outflows) = amount of interest after tax + amount of repayment of principal

t = time period

K = discount rate

Example, A company has issued 11% debentures for Rs. 2,00,000. The underwriting, brokerage and other issuance costs amount to Rs. 10,000. The terms of debenture issue provide for repayment of principal in 5 equal installments starting at the end of the first year. The tax rate is 60%.

$$\begin{aligned}
 \text{Cash inflow} &= \text{Rs. } 2,00,000 - \text{Rs. } 10,000 \\
 &= \text{Rs. } 1,90,000
 \end{aligned}$$

Cash Outflows

Year	Installment Rs.	Interest Rs.	Total Rs.	Discount Factor 14%	Present Value	Discount Factor 12%	Present Value
1	40,000	22,000	62,000	.877	54374	.893	55366
2	40,000	17,600	57,600	.769	44294	.797	37875
3	40,000	12,200	53,200	.675	35910	.712	30744
4	40,000	8,800	48,800	.592	28890	.630	25175
5	40,000	4,400	44,400	.519	23044	.576	
					186512		195067

$$12\% + \frac{(195067 - 190000)}{(195067 - 186512)}(14 - 12)$$

$$12\% + \frac{5067}{8555} \times 2 = 13.184\%$$

- (f) Effective cost of debt is lower than the interest paid to the creditors because the firm can deduct interest amount from its taxable income. The higher the tax rate, the lower the effective interest rate on debt and lower the cost of debt. Let us take an example.

There are two firms, A and B. The firm A has no debt and is totally financed by equity capital. The firm B has Rs. 200 lakhs outstanding debt and pays an interest rate of 10 per cent. The firm's net income after-taxes is calculated using three tax rates, 0, 25 and 50 per cent and the resulting values of net incomes are compared. Assume that the earnings before interest and taxes of both firms is Rs. 100 lakhs each.

**Tax Rates and Effective Cost of Debt Rs. in lakhs**

		0% tax rate		25% tax rate		50% tax rate	
		Firm A	Firm B	Firm A	Firm B	Firm A	Firm B
1	Earnings before-interest and taxes	100	100	100	100	100	100
2	Interest	0	20	0	20	0	20
3	Taxable income	100	80	100	80	100	80
4	Taxes	0	0	25	20	50	40
5	Net income after taxes (NIAT)	100	80	75	60	50	40
(a)	Difference	20		15		10	
(b)	Effective rate	10%		7.5%		5%	

**Notes :**

- a) NIAT of firm A - NIAT of firm B.  
b) (a) Rs. 200 lakhs of outstanding debt of firm B.

If no taxes were paid, the only difference between the net incomes of the two firms would be the interest expense incurred by the firm B. As the tax rate increases, this difference diminishes. In the case of 0% tax rate, we can say that the effective rate of debt is 10% (Rs. 20 / Rs. 200). In the case of 25% and 50%, it is 7.5% and 5%, respectively.

A simple formula for computing the cost of debt may be stated as follows:  
Effective cost of debt

$$= \text{Interest rate} \times (1.0 - \text{tax rates})$$

Substituting the data from the above example.

- 1) Effective cost of debt at 0% tax rate  
 $= 10\% \times (1.0 - 0.00)$   
 $= 10\%$
- 2) Effective cost of debt at 25% tax rate  
 $= 10\% \times (1.0 - 0.25)$   
 $= 7.5\%$
- 4) Effective cost of debt at 50% tax rate  
 $= 10\% \times (1.0 - 0.50)$   
 $= 5\%$

A more generalized way of calculating the cost of debt capital is to find out the discount rate, which equates the present value of post tax interest and principal repayments with the net proceeds of the debt issue i.e. (Par value x no. of bonds – Issue floatation cost). Mathematically this relationship can be expressed as follows:

$$Np = \sum_{t=1}^n \frac{I(1-T)}{(1+K)^t} + \frac{R}{(1+K)^n}$$

Where : np = net amount realised on debt issue

I = Annual interest payment

T = Tax rate applicable

R = Redemption Value

n = Maturity period of debt.

In the above eq., solving for K would yield the cost of debt capital. For solving, the above equation an approximation can be used which yield fairly close value.

$$K \cong \frac{I(1-T) + \frac{(R - NP)}{n}}{(R + NP)/2}$$

Amortisation of the Cost of issue: Since the issue flotation cost is tax deductible cost and can be amortized evenly over the duration of debt finance, the cost of debt capital would be K in the following equation.

$$Np = \sum_{t=1}^n \frac{I(1-T) - \frac{(R-NP)^t}{n}}{(1+K)^t} + \frac{R}{(1+K)^n}$$

An approximation for K is as follows

$$K \cong \frac{I(1-T) + \frac{(R-P)}{n}(1-T)}{(R+P)/2}$$

**Activity 2**

1. A firm intends to issue 1,000, 10% debentures each of Rs. 100. What is the cost of debt if the firm desires to sell at 5% premium. The tax rate is 50%.

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2. A firm issues 1,000, 10% debentures of Rs. 100 each at a premium of 5% with a maturity period of 10 years. The tax rate is 50%. Find the cost of capital.

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3. A company raises loan of Rs. 2,50,000 by 10% debentures at 5% discount for a period of ten years, underwriting costs are 3% and tax rate is 50%.

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### 2.3.2 Cost of Preference Capital

Cost of preference share capital represents the rate of return that must be earned on preferred stocks financed investments to keep the earnings available to residual stockholders unchanged. Cost of preference shares can be estimated by dividing the dividend stipulated per share by the current market price of the share.

$$\text{Cost of Preference Capital} = \frac{\text{Dividend}}{\text{Face Value} - \text{Issue Cost}}$$

Example, A Company is planning to issue 9% preference shares expected to sell at Rs. 85 par value. The costs of issuing and selling the shares are expected to be Rs. 3 per share.

The first step in finding out the cost of the preference capital is to determine the rupee amount of preference capital is to determine the rupee amount of preference dividends, which are stated as 9% of the share of Rs. 85 par value. Thus 9% of Rs. 85 is Rs. 7.65. After deducting the floatation costs, the net proceeds are Rs. 82 per share.

Thus, the cost of preference capital :

$$\begin{aligned} &= \frac{\text{Dividend per share}}{\text{Net proceeds after selling}} \\ &= \frac{\text{Rs. 7.65}}{\text{Rs. 82}} = 9.33\% \end{aligned}$$

Now, the companies can issue only redeemable preference shares. Cost of capital for such shares is that discount rate which equates the funds available from the issue of preference shares with the present values of all dividends and repayment of preference share capital. This present value method for cost of preference share capital is similar to that used for cost of debt capital; the only difference is that in place of 'interest', stated dividend on preferences

share is used. The cost of preference capital, which is redeemable, is the value of KP in the following equation

$$NP = \sum_{t=1}^n \frac{D}{(1+KP)^t} + \frac{R}{(1+KP)^n}$$

$$KP \cong \frac{D + (R - NP) / N}{(R + NP) / 2}$$

### 2.3.3 Cost of Equity Capital

“Cost of equity capital is the cost of the estimated stream of net capital outlays desired from equity sources” E.W. Walker.

According to James C. Van Horne, cost of equity capital can be thought of as the rate of discount that equates the present value of all expected future dividends per share, as perceived by investors at the margin as in the current market price per share.

In a nutshell, it is the discount rate, which equates present value of all expected dividends in future with net proceeds per share/current market price. It represents the minimum rate of return that must be earned on new equity stock financed investment in order to keep the earnings available to the existing residual owners of the firms unchanged.

Cost of equity capital is by far the most difficult to measure because of the following reasons:

- i) The cost of equity is not the out of pocket cost of using equity capital.
- ii) The cost of equity is based upon the stream of future dividends as expected by shareholders (very difficult to estimate).
- iii) The relationship between market price with earnings is known. Dividends also affect the market value (which one is to be considered).

The following are the approaches to computation of cost of equity capital:

- (a) **E/P Ratio Method** : Cost of equity capital is measured by earning price ratio. Symbolically,

$$\frac{E_o \text{ (current earnings per share)}}{P_o \text{ (current market price per share)}} \times 100$$

**The limitation of this method are:**

- Earnings do not represent real expectations of shareholders.
- Earnings per share is not constant.
- Which earnings-current earnings or average earnings (Not clear).

**The method is useful in the following circumstance:**

- The firm does not have debt capital.
- All the earnings are paid to the shareholders.
- There is no growth in earnings.

- (b) **E/P Ratio + Growth Rate Method** : This method considers growth in earnings. A period of 3 years is usually being taken into account for growth. The formula will be as follows.

$$\frac{E_0(1+b)^2}{P_0}$$

Where  $(1+b)^3$  = Growth factor, where b is the growth rate as a percentage and estimated for a period of three years.

Example, A firm has Rs. 5 EPS with 10% growth rate of earnings over a period of 3 years. The current market price of equity share is Rs. 50.

$$\frac{\text{Rs.}5(1+.10)^3}{\text{Rs.}50} \times 100$$

$$\frac{\text{Rs.}5(1.331)}{50} \times 100 = \frac{6.665}{50} \times 100$$

$$= 13.31\%$$

(c) **D/P Ratio Method** : Cost of equity capital is measured by dividends price ratio. Symbolically,

$$\frac{D_0 \text{ (Dividend per share)}}{P_0 \text{ (Market price per share)}} \times 100$$

Example, the market price of equity share is Rs. 15 and dividend rate is 15% (Par value Rs. 10 per share)

$$\frac{\text{Rs.}1.5}{\text{Rs.}15} \times 100 = 10\%$$

The following are the assumptions

- i) The risk remains the unchanged.
- ii) The investors give importance to dividend.
- iii) The investors purchase the shares at par value.

Under this method, the future dividend streams of a firm, as expected by the investors, are estimated. The current price of the share is used to determine shareholder's expected rate of return. Thus, if K is the risk-adjusted rate of return expected by investors, the present value of future dividends, discounted by  $K_e$  would be equal to the price of the share. Thus,

$$P = \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \frac{D_n}{(1+K_e)^n}$$

where,

P = price of the share

$D_1 \dots D_n$  = dividends in periods 1,2,3,...n,

$K_e$  = the risk adjusted rate of return expected by equity investors.

Given the current price P and values for future dividends 'Dt', one can calculate  $K_e$  by using IRR procedure. If the firm has maintained some regular

pattern of dividends in the past, it is not unreasonable to expect that the same pattern will prevail in future. If a firm is paying a dividend of 20% on a share with a par value of Rs. 10 as a level perpetual dividend, and its market price is Rs. 20, then

$$P = \frac{D}{K_e}$$

$$20 = \frac{2}{K_e}$$

$$K_e = \frac{2}{20} = 10\%$$

- d) **D/P + Growth Rate Method** : The method is comparatively more realistic as
- i) it considers future growth in dividends,
  - ii) it considers the capital appreciation.

This method is based on the assumption that the value of a share is the present value of all anticipated dividends, which it will give over an infinite time horizon. The firm is here viewed as a going concern with an infinite life.

Thus,

$$P_o = \frac{D_1}{K_e - g} \text{ or } K_e = \frac{D_1}{P_o} + g$$

Where,

$P_o$  = current price of the equity share

$D_1$  = per share dividend expected at the end of year 1

$K_e$  = risk adjusted rate of return expected on equity shares.

$g$  = constant annual rate of growth in dividends and earnings. 11

The derivation of the formula has been given in Appendix 2.1.

The equation indicates that the cost of equity share can be found by dividing the dividend expected at the end of the year 1 by the current price of the share and adding the expected growth rate.

Example, Raj Textiles Ltd. Wishes to determine its cost of equity capital,  $K_e$ . The prevailing market price of the share is Rs. 50 per share. The firm expects to pay a dividend of Rs. 4 at the end of the coming year 1998. The dividends paid on the equity shares over the past six years are as follows:

Year	Dividend (Rs.)
1997	3.80
1996	3.62
1995	3.47
1994	3.33

1993	3.12
1992	2.97

The firm maintained a fixed dividend payout from 1986 onwards. The annual growth rate of dividends,  $g$ , is approximately 5 per cent. Substituting the data in the formula,

$$\begin{aligned} \text{Rs. } 50 &= \frac{\text{Rs. } 4}{K_e - 0.05} \\ K_e &= \frac{\text{Rs. } 4}{\text{Rs. } 50} + 0.05 \\ &= 0.08 + 0.05 = 13\% \end{aligned}$$

The 13% cost of equity share represents the return expected by existing shareholders on their investment so that they should not disinvest in the share of Raj Textiles Ltd. And invest elsewhere.

(d) **Realised Yield Method:** One of the difficulties in using D/P Ratio and E/P Ratio for finding out  $K_e$  is to estimate the rate of expected return. Hence, this method depends on the rate of return actually earned by the shareholders. The most recent five to ten years are taken and the rate of return is calculated for the investor who purchased the shares at the beginning of the study period, held it to the present and sold it at the current prices. This is also the realized yield by the investor. This yield is supposed to indicate the cost of equity share on the assumption that the investor earns what he expects to earn. The limiting factors to the usefulness of this method are the additional conditions that the investors' expectation do not undergo change during the study period, no significant change in the level of dividend rates occurs, and the attitudes of the investors towards the risk remain the same. As these conditions are rarely fulfilled, the yield method has limited utility. In addition, the yield often differs depending on the time period chosen.

(e) **Security's Beta Method :** An investor is concerned with the risk of his entire portfolio, and that the relevant risk of a particular security is the effect that the security has on the entire portfolio. By "diversified portfolio", we mean that each investor's portfolio is representative of the market as a whole and that the portfolio Beta is 1.0. A security's Beta indicates how closely the security's returns move with from a diversified portfolio. A Beta of 1.0 for a given security means that, if the total value of securities in the market moves up by 10 per cent, the stock's price will also move up, on the average by the 10 per cent. If security has a beta of 2.0, its price will, on the whole, rise or fall by 20 per cent when the market rises or falls by 10 per cent. A share with  $-0.5$  beta will rise by 10 per cent, when the market drops by 20 per cent.

A beta of any portfolio of securities is the weighted average of the betas of the securities, where the weights represent the proportions of investments in each security. Adding a high beta (beta greater than 1.0) security to a diversified portfolio increases the portfolio's risk, and adding a low beta (beta less than zero) security to a diversified security reduces the portfolio's risk.

How is beta determined? the beta co-efficient for a security (or asset) can be found by examining security's historical returns relative to the returns of the market. Since, it is not feasible to take all securities, a sample of securities is used. In United States, such compilation of beta co-efficient is provided by companies, such as Value Line or Merrill Lynch. The Capital Asset Pricing Model (CAPM) uses these beta co-efficient to estimate the required rate of returns on the securities. The CAPM specifies that the required rate on the share depends upon its beta. The relationship is:

$$K_e = \text{riskless rate} + \text{risk premium} \times \text{beta}$$

Where,  $K_e$  = expected rate of return.

The current rate on government securities can be used as a riskless rate. The difference between the long-run average rate of returns between shares and government securities may represent the risk premium. During 1926-1981, this was estimated in USA to be 6 per cent. Beta co-efficient are provided by published data or can be independently estimated.

The beta for Pan Am's stock was estimated by Value Line to be 0.95 in 1984. Long-term government bond rates were about 12 per cent in November 1984. Thus the required rate of return on Pan Am's stock in November 1984 was:

$$\text{Required Rate} = 12\% + 6\% \times 0.95 = 17.7\%$$

The use of beta to measure the cost of equity capital is definitely a better approach. The major reason is that the method incorporates risk analysis, which other methods do not. However, its application remains limited perhaps because it is tedious to calculate Beta value. Nevertheless, as the competition intensifies and the availability of funds and their cost become a challenge, finance managers will need this or similar approaches.

### **Activity 3**

1. A firm has Rs. 3 EPS and 10% growth rate of earnings over a period of 3 years. The current market price of equity share is Rs. 100. Compute the cost of equity capital.

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2. The current dividend paid by the company is Rs. 5 per share, the market price of the equity share is Rs. 100 and the growth rate of dividend is expected to remain constant at 10%. Find out the cost of capital.

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3. A firm issues 8% non-redeemable preference shares of Rs. 10 each for Rs. 1,00,000, underwriting costs are 6% of the sale price. Compute the cost of capital if shares are issued at discount of 2.5 percent and the premium of 5%.

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**2.3.4 Cost of Retained Earnings**

Corporate managers and some analysts normally consider the funds retained in the firm as cost free funds because it does not cost anything to the firm to make use of a part of its earnings not distributed to the shareholders.

However, this is not true. It definitely cost the shareholders something and this is an opportunity cost representing sacrifice of the dividend income, which the shareholders would have otherwise received it and invested the same elsewhere to earn a return thereon. Thus, the minimum cost of retained earnings is the cost of equity capital (Ke).

Ezra Solomon suggested the concept of external yield to measure cost of retained earnings.

Algebraically, the approach can be explained as:

$$\left( \frac{d1}{P0} + G \right) (1 - TR) (1 - B)$$

$$= K_e (1-TR) (1-B)$$

where

$K_e$  = Cost of equity capital based on dividend growth method

TR = Shareholders' Tax Rate

B = Percentage Brokerage cost

Example

A firm's cost of equity capital is 12% and Tax rate of majority of shareholders is 30%. Brokerage is 3%.

$$= 12\% (1-0.30) (1-0.03)$$

$$= 8.15\%$$

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## 2.4 WEIGHTED COST OF CAPITAL

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Weighted cost of capital, also known as composite cost of capital, overall cost of capital or weighted marginal cost of capital, is the average of the costs of each sources of funds employed by the firm, properly weighted by the proportion they hold in the capital structure of the firm.

### 2.4.1 Choice of Weights

The weights to be employed can be book values, market values, historic or target. Book value weights are based on the accounting values to assess the proportion of each type of fund in the firm's capital structure. Market value weights measure the proportion of each type of financing at its market value. Market value weights are preferred because they approximate the current value of various instruments of raising funds employed by the company.

Historic weights can be book or market weights based on actual data. Such weights, however, would represent actual rather than desired proportions of various types of capital in the capital structure. Target weights, which can also be based on book or market values, reflect the desired capital structure proportions. In the firm's historic capital structure is not much different from 'optimal' or desired capital structure, the cost of capital is both the cases is mostly similar. However, from a strictly theoretical point of view, the target market value weighting scheme should be preferred.

Marginal weights are determined on the basis of financing mix in additional new capital to raised for investments. The new capital raised will be the marginal capital. The propositions of new capital raised will be the marginal weights.

**Activity 4**

1) How is the cost of retained earnings computed?

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2) List out three types of weights, which may be used for computing weighted average cost of capital of the firm.

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**2.4.2 Computation of The Weighted Cost of Capital**

**Example**

A firm has the following capital structure and after tax costs for the different sources of funds used:

Source of Funds	Amount Rs.	Proportion %	After tax cost %
Debt	20,00,000	20	4.50
Preference Shares	10,00,000	10	9.00
Equity Shares	30,00,000	30	11.00
Retained Earnings	40,00,000	40	10.00
	1,00,00,000	100	

On the basis of book value, the cost of equity capital will be calculated as follows:

Method of Funds	Proportion%	Cost %	Weighted cost %
Debt	20	4.50	0.90
Preference Shares	10	9.00	0.90
Equity Shares	30	11.00	3.30
Retained Earnings	40	10.00	4.00
			9.10%

Example 2: Quality products is a consumer products company with well-established brand names. The cost of capital of quality products is estimated

at the end of 1996 for use in evaluating investment proposals in 1997. The data for Quality Products Ltd. are as follows:

Financial data for Quality Products Ltd.

Rs. '0000

Source	Book Value Rs.	Market Value Rs.	Current Interest rate %
Debentures (7 <sup>1</sup> / <sub>2</sub> %)	45	29	13.2
Debentures (9 <sup>1</sup> / <sub>2</sub> %)	50	42	13.2
Debentures (14%)	75	78	13.2
Other debt	210	192	13.2
Total debt	380	341	13.2
Preference shares (7%)	20	10	14.0
Equity shares	720	824	

Equity Share Data Years

	1991	1992	1993	1994	1995	1996
Dividend per share	1.45	1.60	1.77	2.05	2.28	2.48
Earnings per share	2.97	3.73	4.21	4.83	4.86	4.95
Price per share	24.00					50.000

**Explanatory Notes**

- Interest rates on the three debentures issues were set at the rate (13.2%) on the recently issued debentures of the firm, which is selling close to par. This was considered to be the best estimate.
- Other debt includes different types of loans from financial institutions and other privately placed debentures.
- Market value is based on interest rates provided in the firm's annual report.
- Preference share is Rs. 100 par: current market price is Rs. 50 per share.

Since the firm's dividend and earnings have been growing steadily since, 1991, the constant growth model can be used to estimate cost of equity. Though dividends have grown at a slightly higher rate than earnings, one may assume that shareholders would expect them to grow at the same earnings (10.8%). Also, assume, on the basis of the past record that the shareholders expect a dividend of Rs. 2.60 in 1997. Thus:

$$K_e = \frac{D}{P} + g$$

$$= \frac{\text{Rs. 2.60}}{\text{Rs. 50}} + 0.108$$

$$= 16\%$$

If the investors expect the dividends to grow at the higher rate (11.3%), the cost of equity capital works out to 16.5%.

Applying the beta method, we obtain a somewhat higher number. Beta for Quality Products is assumed to be 0.85. Interest rate on government bonds (riskless rate) in 1996 would be, say, 12 per cent. The market risk premium is 6%.

Thus

$$K_e = \text{Riskless rate} + \text{Risk premium} \times \text{beta}$$

$$= 12\% + 6\% \times 0.85$$

$$= 17.1\%$$

Thus, the cost of capital for Quality Products Ltd.

	Amount Rs.	Weight	Cost	Weight x Cost
Debt	341	0.29	7.1	2.1
Preference Shares	10	0.01	14.0	0.1
Equity Shares	824	0.70	17.0	11.9
Total	1175	1.00	17.0	14.9

Weighted Average Cost of Capital : 14.1%

**Explanation**

- Market values of debt, preference and equity shares are used.
- Current interest rate on debt is adjusted for tax rate of 46 per cent, which is the firm’s effective rate  $13.2\% (1-0.46) = 7.1\%$
- Current preference dividend rate of 14% is used.

**Activity 5**

1) Compare Beta value of equity shares of any one company listed on Indian stock exchanges and list out the problems you faced in this regard.

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- 2) Compute overall cost of capital of an Indian company of your choice. List out the steps you took for this purpose and the problems faced by you.

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- 3) Try to know from the Finance Manager of an Indian Company:

- i) Do they compute the overall cost of capital of their company?

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- ii) For what purpose?

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- iii) If not, why not?

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## **2.5 SIGNIFICANCE OF COST OF CAPITAL**

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The determination of the firm's cost of capital is important because

- i) Cost of capital provides the very basis for financial appraisal of new capital expenditure proposals and thus serves as acceptance criterion for capital expenditure projects.
- ii) Cost of capital helps the managers in determine the optimal capital structure of the firm.

- iii) Cost of capital serves as the basis for evaluating the financial performance of top management.
- iv) Cost of capital also helps in formulating dividend policy and working capital policy
- v) Cost of capital can serve as capitalization rate, which can be used to determine capitalization of a new firm.

**Activity 6**

1) List three uses of Cost of Capital.

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2) What is Weighted Average Cost of Capital?

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3) The following details are available:

Equity (Expected Dividend 12%)	Rs. 10,00,000
Tax Rate	50%
10% Preference	Rs. 5,00,000
8% Loan	Rs. 15,00,000

You are required to calculate Weighted Average Cost of Capital.

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**2.6 SOME MISCONCEPTIONS ABOUT COST OF CAPITAL**

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The cost of capital is a central concept in financial management linking the investment and financing decisions. A few misconceptions in this regard are as follows:

- i) The concept of cost of capital is academic and impractical
- ii) It is equal to the dividend rate.
- iii) Retained earnings are either cost free or cost significantly less than external equity.
- iv) Depreciation has no cost.
- v) The cost of capital can be defined in terms of an accounting based manner.
- vi) If a project is heavily financed by debt, its weighted average cost of capital is low.

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## **2.7 SUMMARY**

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The cost of capital of a firm is mainly used to evaluate investment projects. It represents minimum acceptable rate of return on new investments. The basic factors underlying the cost of capital for a firm are the degree of risk associated with the firm, the taxes it must pay, and the supply of and demand of various types of financing.

In estimating the cost of capital, it is assumed that, (1) the firms are acquiring assets, which do not change their business risk, and (2) these acquisitions are financed in such a way as to leave the financial risk unchanged. In order to estimate the cost of capital, we must estimate rates of return required by investors in the firm's securities, including borrowings, and average those rates according to the market values of the various securities currently outstanding.

While the cost of debt and preference capital is the contractual interest/dividend rate (adjusted for taxes), the cost of equity capital is difficult to estimate.

Broadly, there are six approaches to estimate the cost of equity, namely, the E/P method, E/P + Growth method, D/P method, D/P + Growth method, Realised yield method and using the Beta co-efficient of the share. Weighted cost of capital is computed by assigning book weights or market weight.

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## **2.8 KEY WORDS**

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**Cost of Capital** is the minimum rate of return that must be earned on investment to maintain the value of firm.

**Marginal Weights** are determined on the basis of financing mix of additional capital.

**Cost of Equity Capital** is the discount rate, which equates present value of all expected dividends in future with net proceeds per share / current market price.

**Business Risk** is a possibility and the firm will not be able to operate successfully in the market.

**Financial Risk** is the possibility that the firm will not earn sufficient profits to make payment of interest on loans and/or to pay dividends.

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## 2.9 SELF-ASSESSMENT QUESTIONS/ EXERCISES

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- 1) Why is the cost of capital considered as the minimum acceptable rate of return on an investment?
- 2) In using the cost of capital to evaluate investment projects, why is it necessary to assume that the acceptance of projects and the financing structure would not attract the business and financial risks?
- 3) How is the Cost of Debt Capital ascertained? Give examples.
- 4) You have just been communicated, “since we are going to finance this project with debt, its required rate of return should only be the cost of debt”. Do you agree or disagree? Explain.
- 5) How will you calculate the Cost of Preference Share Capital?
- 6) Which method of calculating the cost of equity shares would be most appropriate for the following firms:
  - a) A profitable firm that has never paid a dividend, but has had steady growth in earnings.
  - b) An electricity company that has paid a dividend every year for the last eighty years.
  - c) A firm that has grown very rapidly until two years ago, when capacity problems in the industry produced severe price cutting in the firm’s major product line. At the same time management decided to invest heavily in facilities to manufacture a new product. So far, the manufacturing process has not worked properly. The firm lost Rs. 5 crores last year, and the price of its equity share has dropped by 20 per cent.
- 7) How would you find the cost of capital for proprietorship or partnership firm? Can you think of any ways to do this? List them.
- 8) “Retained earnings are cost free” comment.
- 9) Discuss various uses of the concept of Cost of Capital.
- 10) Determine the cost of capital for the following securities. These are  
20 issued by different firms and the tax rate is 40 per cent.
  - a) A seven-year debenture with a coupon interest of 10 per cent. The debentures matures in five years and has a current market price of Rs. 90 as against its par value of Rs. 100.
  - b) A preference share pays 7 per cent dividend. Par value is Rs. 100 per share and its current market price is Rs. 80.

- c) The historical average rate of return earned by equity shareholders of the firm C has been about 17% per year until very recently. The dividends of the firm have grown at an average rate of 13% per year over the same period. The financial Express and another financial fortnightly have issued a report indicating the problems of the firm with government's regulatory agencies and forecasted that dividends and earnings of the firm will grow at no more than the overall growth rate of the economy which is 5 per cent. The dividends are likely to be Rs. per share. The price of the firm's share adversely reacted to the report dropping from Rs. 100 to Rs. 50.

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## 2.10 FURTHER READINGS

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## 2.11 ANSWERS

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### Activity 2

- i) 4.76% ii) 4.64% iii) 5.62%

### Activity 3

- i) 3.99 ii) 15% iii) 8.11% and 8.73%

### Activity 6

- iii) 7.67%

**Share Valuation with Constant Growth in Dividends**

Assuming so the most recent dividend, and that  $g$  is the growth rate in dividend

$$P_0 = \frac{D_0(1+g)^1}{(1+Ke)^1} + \frac{D_0(1+g)^2}{(1+Ke)^2} + \frac{D_0(1+g)^4}{(1+Ke)^4} \dots\dots\dots (1)$$

Multiplying each side of the equation by  $(1+Ke)/(1+g)$  and subtracting the resulting equation from (1),

$$\frac{P_0(1+Ke)}{1+g} - P_0 = D_0 - \frac{D_0(1+g)^4}{(1+Ke)^4} \dots\dots\dots (2)$$

As  $Ke$  is assumed to be greater than  $g$ , the second term on the right hand side of (2) is zero, Thus

$$P_0 \left( \frac{1+Ke}{1+g} - 1 \right) = D_0 \dots\dots\dots (3)$$

$$P_0 (Ke - g) = D_0 (1 + g)$$

$$P_0 = \frac{D_1}{Ke - g} \dots\dots\dots (4)$$

- **Premium for Financial Risk :** It refers to the risk arising out of pattern of capitalization. In general, it may be said that a firm having a higher debt content in its capital structure is more risky as compared to a firm which has a comparatively low debt content.

Besides financial risk and business risk, the following risks also affect the cost of capital;

- **Premium for Business Risk:** Business risk is the possibility that the firm will not be able to operate successfully in the market. Greater the business risk, the higher will be the cost of capital. It is generally determined by the capital budgeting decisions.

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## UNIT 3 CAPITAL STRUCTURE DECISIONS

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### Objectives

The objectives of this unit are to:

- define and distinguish capital structure
- explain briefly the important Characteristics of various long term sources of funds.
- dilate upon the criteria for determining pattern of capital structure.
- analyse EBIT-EPS and ROI-ROE relationship.
- examine critically theories of capital structure-decision
- identify the factors influencing capital structure decision
- evaluate the relevance of debt equity ratio in public enterprises.

### Structure

- 3.1 Introduction
- 3.2 Conceptual Framework
- 3.3 Characteristics of Important long term sources of Funds
- 3.4 Criteria for determining pattern of Capital Structure
- 3.5 Risk and Capital Structure
  - 351 EBIT – EPS Analysis
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  - 361 Net Income Approach
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- 3.8 Relevance of Debt-equity ratio in Public enterprises
- 3.9 Summary
- 3.10 Key words
- 3.11 Self Assessment Questions/Exercises
- 3.12 Further Readings

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## 3.1 INTRODUCTION

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Planning the capital structure is one of the most complex areas of financial decision making because of the inter-relationships among components of the capital structure and also its relationship to risk, return and value of the firm. For a student of finance, the term capital usually denotes the long-term funds of the firm. Debt capital and ownership capital are the two basic components of capital. Equity capital, as one of the components of capitalization, comprises equity share capital and retained earnings. Preference share capital is another distinguishing component of total capital. In this unit, characteristics of important long-term sources of funds, EBIT-EPS analysis, ROI-ROE analysis, factors influencing capital structure, theories of capital structure decision, etc are narrated briefly. In the end, relevance of debt-equity ratio in public enterprises is also discussed.

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## 3.2 CONCEPTUAL FRAMEWORK

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According to Gerstenberg, “ capital structure refers to the makeup of a firm’s capitalization”. In other words, it represents the mix of different sources of long-term funds. E.F. Brigham defines the term as the percentage share of each type of capital used by the firm-Debt, preference share capital and equity capital (equity share capital paid up plus retained earnings). According to E.W.Walker, concept of capital structure includes the following:

- The proportion of long-term loans;
- The proportion of equity capital and
- The proportion of short-term obligations
- In general, the experts in finance define the term capital structure to include only long-term debt and total Stockholders’ investment.

Financial structure means the composition of the entire left hand side (liabilities side) of the balance sheet. Financial structure refers to all the financial resources marshaled by the firm. It will include all forms of long as well as short-term debts and equity.

Thus, practically speaking, there is no difference between the capital structure (as defined by walker) and financial structure.

In brief,

Capital structure = proportions of all types of Long-Term capital

Financial structure = Proportions of all types of Long-Term and Short-Term capital  
Capitalisation = Total Long-Term capital

### 3.3 CHARACTERISTICS OF IMPORTANT LONG-TERM SOURCES OF FUNDS

The four major sources of Long-Term funds in a firm are equity(or ordinary) shares preference shares, retained earnings and long term debt. Many financial analysts and managers tend to think of preference shares as a substitute of debt, as the amount of dividend to be paid is fixed. The difference is that the preference dividend, unlike debt interest, is not a tax-deductible expense. It does not have a fixed maturity date. Preference shareholders have a prior claim to receive income from the firm's earning through dividends. Convertible debentures have the features of both debt and equity capital.

The main focus in the discussion that follows is on deciding the mix of debt and equity which a firm should employ in order to maximize shareholder wealth. Because of the secondary position relative to debt, suppliers of equity capital take greater risk and therefore, must be compensated with higher expected returns. The distinguishing characteristics of debt, preference share capital, equity share capital and Retained Earnings are summarized in Table 3.1.

### 3.4 CRITERIA FOR DETERMINING PATTERN OF CAPITAL STRUCTURE

While choosing a suitable pattern of capital structure for the firm, finance manager should keep into consideration certain fundamental principles. These principles are militant to each other. A prudent finance manager strikes golden mean among them by giving proper weightage to them.

**Table 3.1: Characteristics of Long-Term Sources of Funds**

Debt	Preference Share Capitals	Equity share capital	Retained Earnings
Firm must pay back money with interest.	Preference dividends are limited in amount to rate specified in the agreement.	Money is raised by selling ownership rights.	Lower amount of money for current dividends but can increase future dividends.
Interest rate is based on risk of Principal and interest payments as perceived by lenders	Dividends are not legally required to be paid. But dividend on equity shares cannot be paid unless preference shareholders are paid dividend. Now payment of dividend to preference shareholders for a number of years gives them the voting rights.	Value of the share is determined by investors.	Shareholders forgo dividend income but they do not lose ownership rights, if new equity shares are issued.

Amount of money to be repaid is specified by debt contract.	No maturity but usually callable	Dividends are not contractually payable. No maturity.	Funds are internal No need for external involvement.
Lenders can take action to get their money back	Usually no voting rights except as per (2) above.	Voting rights can create change in ownership.	Cost of issuing securities is avoided.
Lenders get preferred treatment in liquidation	Preference share-holders come next, when lenders are paid in liquidation.	Equity shareholders get the residual assets prorata after lenders & preference shareholders claims are met in liquidation.	It is related to dividend policy decisions.
Interest payments are tax-deductable	preference Dividends are not tax-deductable.	Equity dividends are not tax-deductable,	

### 3.4.1 Cost Principle

According to this principle, ideal pattern of capital structure is one that tends to minimize cost of financing and maximize the value per share. Cost of capital is subject to interest rate at which payments have to be made to suppliers of funds and tax status of such payments. Debt capital is cheaper than equity capital from both the points of view. According to this, the use of debt capital in the financing process is immensely helpful in raising income of the company.

### 3.4.2 Risk Principle

This principle suggests that such a pattern of capital structure should be designed so that the firm does not run the risk of bringing on a receivership with all its difficulties and losses. Risk principle places relatively greater reliance on common stock for financing capital requirements of the corporation and forbids as far as possible the use of fixed income bearing securities.

### 3.4.3 Control Principle

While designing sound capital structure for the firm and for that matter choosing different types of securities, finance manager should also keep in mind that controlling position of residual owners remains undisturbed. The use of preferred stock as also bonds offers a means of raising capital without

jeopardizing control. Management desiring to retain control must raise funds through bonds and preference capital.

### **3.4.4 Flexibility Principle**

According to flexibility principle, the management should strive for such combinations of securities that enable it to maneuver sources of funds in response to major changes in need for funds. Not only several alternatives are open for assembling required funds but also bargaining position of the corporation is strengthened while dealing with the suppliers of funds (through bonds).

### **3.4.5 Timing Principle**

Timing is always important in financing more particularly in a growing concern. Maneuverability principle is sought to be adhered in choosing the types of funds so as to enable the company to seize market opportunities and minimize cost of raising capital and obtain substantial savings. Important point that is to be kept in mind is to make the public offering of such securities as are greatly in demand. Depending on business cycles, demand of different types of securities oscillates. Equity share during boom is always welcome.

#### **Activity 1**

- 1) What is capital structure? How is it different from financial structure?  
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- 2) Bring out in brief, characteristics of equity share capital  
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- 3) List out sources of long – term finance used by a company of India origin.  
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- 4) Discuss the criteria for determining pattern of capital structure.
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### 3.5 RISK AND CAPITAL STRUCTURE

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A firm's capital structure should be developed keeping in view risk focus because the risk affects the value of the firm. Risk can be considered in two ways:

- a) The capital structure should be consistent with the business risk of the firm, and
- b) The capital structure results in a certain level of financial risk to the firm.

Business risk is the relationship between the firm's sales and its earnings before interest and taxes (EBIT). In general, the greater the firm's operating leverage i.e. the use of fixed operating costs-the higher is the business risk. In addition to operating leverage, revenue stability and cost stability also affect the business risk of the firm. The revenue stability means the variability of the firm's sales revenues which depends on the demand and the price of the firm's products. Cost stability refers to the relative predictability of input prices such as labour and material. The more predictable these prices are the less is the business risk. Business risk varies among firms. Whatever their lines of business, the business risk is not affected by capital structure decisions. In fact, capital structure decisions are influenced by the business risk. Firms with high business risks, tend to have less fixed operating costs. Let us take an example to illustrate the implications of business risk for capital structure decisions.

#### Example

Raj Cosmetics Ltd., engaged in the process of planning its capital structure, has obtained estimates of sales and associated levels of EBIT. The sales forecasting group feels that there is a 25 percent chance that sales will be Rs. 4,00,000 a 50 percent chance that sales will be Rs. 6,00,000 and 25 percent the sales will total Rs. 8,00,000. These data are summarised Table 3.2.

**Table 3.2: Estimated sales and Associated levels of EBIT**

(000)

Probability of Sales	0.25	0.50	0.25
Sales	400	600	800
-Variable operating costs (50% of Sales)	200	300	400
-Fixed Operating Costs	200	200	200
Earnings before interest and taxes (EBIT)	0	100	200
	—	—	—

The EBIT data, i.e. Rs.0,100 or 200 thousands at probability levels of 25%, 50% and 25% respectively reflect the business risk of the firm and has to be taken into consideration when designing a capital structure.

The firm's capital structure affects the firm's financial risk arising out of the firm's use of financial leverage which is reflected in the relationship between EBIT and EPS. The more fixed cost financing, i.e. debt and preference capital in the firm's capital structure, the greater is the financial risk. Suppliers of funds will raise the cost of funds if the financial risk increases. Let us take an example to illustrate this point.

Raj Cosmetics Let. Is now considering seven – alternative capital structure. Stated in terms of debt ratio) i.e. Percentage of debt in the total capital) these are 0,10,20,30,40,50, and 60, per cent. Assume that (1) the firm has no current liabilities, (2) that its capital structure currently contains all equity (25,000 equity shares are outstanding at Rs. 20 par value), and (3) the total amount of capital remains constant at Rs.5,00,000.

**Table 3.3: Capital Structure Associated with Alternative Debt Ratios**

Debt Ratio%	Total Assets (Rs.000)	Debt (Rs. 000)	Equity (Rs. 000) $4 = 2 - 3$ $4 = 2 - 3$	Equity Shares outstanding (Numbers 000) $5 = (4 \text{ Rs. } 20)$
1	2	3		
0	500	0	500	25.00
10	500	50	450	22.50
20	500	100	400	20.00
30	500	150	350	17.50

As debt increases, the interest rate also increase with the increase in financial leverage (i.e. debt ratios). Hence, the total interest on all debt also increase (as successive debenture issues carry higher interest rates) as shown in Table 3.4.

**Table 3.4: Interest amount at Various levels of Debt**

Capital Structure % of Debt 1	Debt (Rs.000) (1)	Interest Rate on all debt % (2)	Interest amount (Rs.000) (3 = 1*2)
0	0	0.0	0.00
10	50	9.0	4.50
20	100	9.5	9.50
30	150	10.0	15.00
40	200	11.0	22.00
50	250	13.5	33.75
60	300	15.5	49.50

### 3.5.1 EBIT-EPS Analysis for Capital Structure

Using the levels of EBIT in table 3.2, number of equity shares in the columns 5 of table 3.3. and interest values calculated in table 3.4, the calculation of EPS for debt ratios of 0,30, and 60 percent respectively is shown in Table 3.5. the effective tax rate is assumed to be 40 percent.

**Table 3.5: Calculation of EPS for alternative Debt ratio**

Probability	0.25	0.50	0.25
When Debt ratio =			
Less Interest (Table 3.4)	0.00	100.00	200.00
	0.00	0.00	0.00
Earnings after taxes	—	—	—
Less Taxes (0.40)	0.00	100.00	200.00
	0.00	40.00	80.00
Earnings after taxes	—	—	—
EPS (25,000) shares (table 3.3)	0.00	60.00	120.00
	0.00	2.40	4.80
When Debt ratio = 30%			
EBIT	0.00	100.00	200.00
Less Interest	15.00	15.00	15.00
	—	—	—
Earnings before taxes	(15.00)	85.00	185.00
Less Taxes (0.40)	(6.00)	34.00	74.00
	—	—	—
Earnings after taxes	(9.00)	51.00	111.00
EPS (17,500 shares)	(0.51)	2.91	6.34
When Debt ratio = 60%			
EBIT	0.00	100.00	200.00
Less Interest	49.50	49.50	49.0
	—	—	—
Earnings before taxes	(49.50)	50.50	150.50
Less Taxes (0.40)	(19.80) (a)	20.20	60.20
	—	—	—
Earnings after taxes	(29.70)	30.30	90.30
EPS (10,000 Shares)	2.97	3.03	9.03

**Notes:** a ) It is assumed that the firm received the tax benefits from its loss in the current period, as a result of carrying forward and setting off the loss against in the following periods.

Following the same procedure as in Table 3.5, we may obtain EPS for other debt ratios. Table 3.6 gives expected EPS at 50% probability level (to be viewed as typical level ) for seven alternative debt ratios along with the Standard deviation and co-efficient of variation of expected EPS.

**Table 3.6: Expected EPS, Standard. Deviation and Co-efficient of variation of EPS at 50% probability level for alternative debt ratios**

<b>Capital structure debt ratio (%)</b>	<b>Expected EPS (Rs.) (1)</b>	<b>Standard deviation of EPS (Rs.) (2)</b>	<b>Co-efficient of variation (2) + (1) = (3)</b>
0	2.40	1.70	0.71
10	2.55	1.88	0.74
20	2.72	2.13	0.78
30	2.91	2.42	0.83
40	3.12	2.83	0.91
50	3.18	3.39	1.07
60	3.03	4.24	1.40

**Notes:** The standard deviation ( ) represents the square root of the sum of the product of each deviation from the mean of expected value squared and the associated probability of occurrence of each outcome. This is the most common statistical measure of assets risk.

The co-efficient of variation is calculated by dividing the standard deviation for an asset by its mean or expected value. The higher the co-efficient of variation, the riskier is the asset.

Table 3.6 shows that as the firm's financial leverage increases, its co-efficient of variation of EPS also increases, signifying that the higher level of risk is associated with higher levels of financial leverage.

The relative risk of the two of the capital structures at debt ratio=0% and 60% respectively is illustrated in Figure 3.1 by showing the subjective probability distribution of

EPS associated with each of them. As the expected level of EPS increase with increasing financial leverage, the risk also increases which is reflected in the relative dispersion of each of the distributions. As the higher levels of financial EPS increase. There are chances that there will be negative EPS depending on the probabilities of occurrence of the expected results.

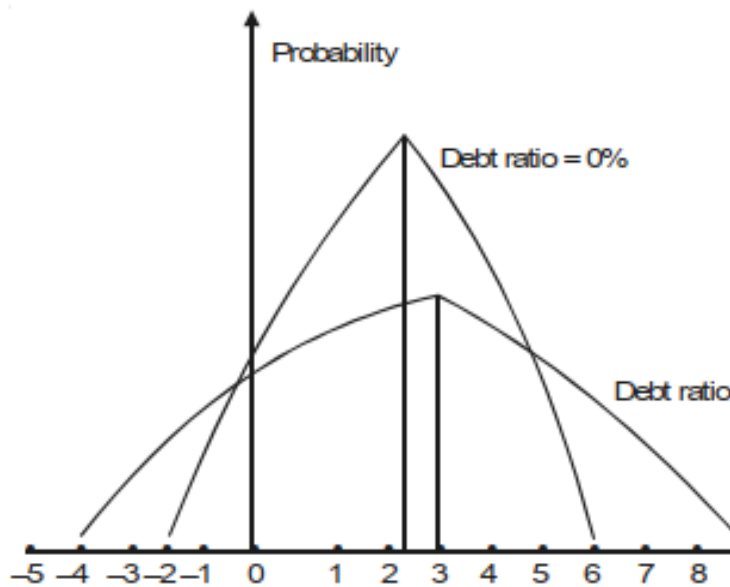
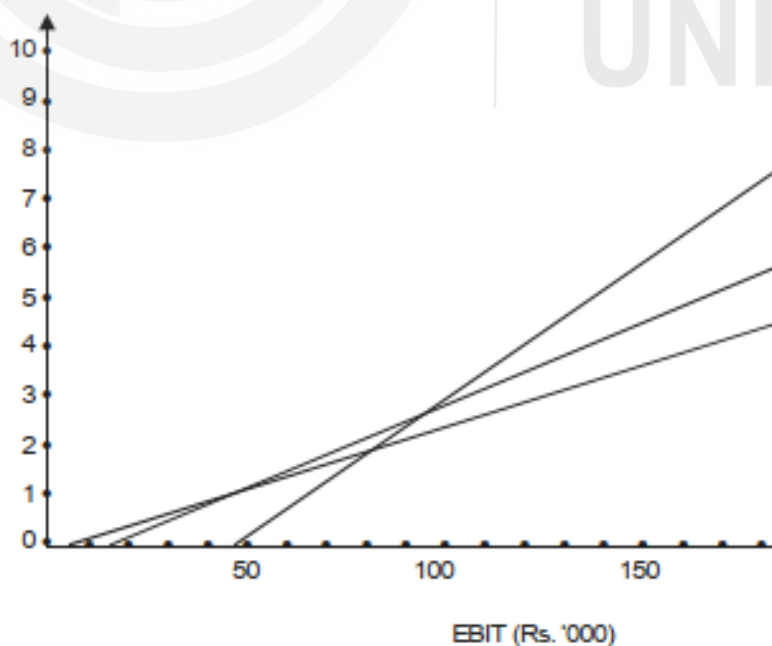


Figure 3.1: A Graphic Presentation of Probability Distribution of EPS at Alternative Debt Ratios.

The EBIT –EPS analysis helps in choosing the capital structure which maximizes EPS over the expected range of EBIT. Since EBIT is one of the major factors which affects the market value of the firm’s shares, EPS can as well be used to measure the effect of various capital structure on shareholders’ wealth. The relationship between EBIT and EPS of the firm to analyse the effect of capital structure on results to the shareholders has been graphically shown in Figure 3.2 where data from Table 3.7 are used.



Figures 3.2: A Graphic comparison of selected structures for Raj Cosmetics Ltd.

**Table 3.7 : EBIT-EPS Coordinates (Selected Capital Structures)**

Capital structure debt ratio (%)	EBIT	
	Rs.1,00 000	Rs.2,00,000
	Earnings per share	
0	2.40	4.80
30	2.91	6.34
60	3.03	9.03

Expected earnings before interest and taxes are assumed to be constant because only the effect of financing costs such as interest and preference dividends on equity shareholders' earnings is to be analysed. Thus, the business risk is assumed constant.

Graphically, the risk of each capital structure can be seen in the context of the financial breakeven point. (i.e. EBIT-axis intercept). Below the x-axis, negative EPS would result. The higher the financial breakeven point and the steeper the slope of the capital structure line, the greater the financial risk.

The assessment of the capital structure can also be made by using ratios.

With increased financial leverage, the ability of the firm to service its debt decreases. Thus, the times Earned Interest Ratio (i.e. EBIT divided by interest) ratio also measures firm's financial leverage and associated risk.

### 3.5.2 ROI-ROE Analysis

In the preceding section, we looked at the relationship between EBIT and EPS. Pursuing a similar type of analysis, we may look at the relationship between the ROI and ROE for different levels of financial leverage.

#### Example:

Raj Ltd., which requires an investment outlay of Rs. 200 lakhs, is considering two capital structures propositions:

Capital Structure X Capital Structure Y

(Rs. in lakhs) (Rs. in lakhs)

Equity 200 Equity 100

Debt 0 Debt 100

Tax rate = 50 percent Cost of Debt = 12 percent

Based on the above information, the relationship between ROI and ROE would be as shown in Table 3.8.

**Table 3.8: Relationship between ROI and ROE under capital structures X and Y**

Particulars	ROI	EBIT	Int.	Profit before tax	Profit after tax	Tax	Return on Equity
Capital Structure X	5%	10	0	10	5	5	2.5%
	10%	20	0	20	10	10	5.0%
	15%	30	0	30	15	15	7.5%
	20%	40	0	40	20	20	10.0%
	25%	50	0	50	25	25	12.5%
Capital Structure Y	5%	10	10	0	0	0	0.0%
	10%	20	10	10	5	5	5.0%
	15%	30	10	20	10	10	10.0%
	20%	40	10	30	15	15	15.0%
	25%	50	10	40	20	20	20.5%

Return on Equity is equity earnings divided by Net worth. Looking at the relationship between ROI and ROE, we find that

- 1) The ROI under capital structure X is higher than the ROE under capital structure Y (ROI is less than the cost of Debt).
- 2) The indifference value of ROI is equal to the cost of Debt.
- 3) The ROE under capital structure X (ROI is more than the cost of Debt).

### Capital Structure

#### Decisions

Mathematically this relationship can be expressed as:

$$ROE = [ROI + (ROI-r) D/E] (1-t)$$

Where r = Cost of Debt D/E = Debt- Equity Ratio t = tax rate

Applying the above equation when D/E Ratio is 1, we may calculate the value of ROE for two values of ROI namely, 15 percent and 20 percent.

$$ROI = 15\% \quad ROE = [15+(15-10) 1]0.5 = 10 \%$$

$$ROI = 20\% \quad ROE = [20+(20-10) 1]0.5 = 15\%$$

The results are the same as we see in Table 3.8.

#### Activity 2

- 1) Leverage decision is the same as capital structure decision. Do you agree? Give one reason.

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2) Distinguish between EBIT and EPS.

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3) Collect the figures of any company and do the EBIT-EPS analysis by making necessary assumptions.

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4) With a real company example, make ROI-ROE analysis.

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### **3.6 THEORIES OF CAPITAL STRUCTURE**

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A firm should try to maintain an optimum capital structure with a view to maintaining financial stability. The optimum capital structure is obtained when the market value per equity share is the maximum. In order to achieve the goal of identifying an optimum debt-equity mix, it is necessary for the finance manager to be familiar with the basic theories underlying the capital structure of corporate enterprises.

1. NI Approach
2. NOI Approach
3. MM Approach
4. Traditional Approach

Common assumptions of the theories of capital structure decision are as follows:

- i) Preference share capital is merged with debt. The firm employs only debt and equity capital.
- ii) There are no corporate taxes.
- iii) EBIT is not expected to grow.
- iv) The firm's total financing remains constant.
- v) The business risk does not change with the growth of business firm.
- vi) All investors have the same subjective probability distribution of the future expected earnings for a given firm.

### 3.6.1 Net Income (NI) Theory

According to this approach, capital structure decision is relevant to the valuation of the firm in as much as change in the pattern of capitalization brings about corresponding change in the overall cost of capital and total value of the firm. This theory, also known as fixed ke theory, was propounded by David Durand.

The critical assumptions of this theory are

- i) There are no corporate taxes.
- ii) The debt content does not change risk perception of the investors.
- iii) The cost of debt is less than the cost of equity.

The theory works like this.

“As the proportion of cheaper debt funds in the capital structure increases, the weighted average cost of capital decreases and approaches the cost of debt.

This theory recommends 100% debt financing is optimal capital structure. The following are the strengths of NoI approach:

- i) it tries to explain the effects of borrowings on overall cost of capital.
- ii) It explains and emphasizes on favourable financial leverage.
- iii) However, the theory ignores the risk consideration.

### 3.6.2 Net Operating Income (NoI) approach

This approach, also propounded by Durand, is just opposite of Net Income (NI) approach. According to this approach overall cost of capital and value of the firm are independent of capital structure decision and change in degree of financial leverage does not bring about and change in value of the firm and cost of capital.

The approach is based on the following assumptions:

- i) The overall cost of capital ( $k_0$ ) remains constant for all degrees of debt equity mix or leverage.
- ii) There are no corporate taxes.
- iii) The market capitalizes the value of the firm as a whole.
- iv) The advantage of debt is set off exactly by increase in the equity capitalization rate.

### **Capital Structure**

According to the NOI Approach, the value of a firm can be determined by the following equation;

$$V = \frac{\text{EBIT}}{K_0}$$

Where:

V = Value of firm;

$K_0$  = Overall cost of capital

EBIT = Earnings before interest and tax.

Thus, according to Net Operating Income (NOI) Approach, any capital structure will be optimum.

The following are the strengths of NOI approach:

- i) it emphasizes on the role of NOI in the determination of total value of the firm,
- ii) According to this theory, new investment proposals should be based on NOI approach

This theory seems to ignore the behavioral aspect of financing function of management.

### **3.6.3 Modiglian- Miller (MM) Theory**

The Modigliani-Miller (MM) approach is similar to the Net Operating Income (NOI) approach. It supports the NOI approach providing behavioural justification for the independence of the total valuation and the cost of capital of the firm from its capital structure. In other words, MM approach maintains that the weighted average cost of capital does not change with change in the capital structure of the firm.

The following are the three basic propositions of the MM approach:

- i) The overall cost of capital ( $K_0$ ) and the value of the firm (V) are independent of the capital structure.
- ii) The cost of equity (KE) is equal to capitalization rate of a pure equity

stream plus a premium for the financial risk.

- iii) The cut-off rate for investment purposes is completely independent of the way in which an investment is financed.

The MM approach is subject to the following assumptions:

- 1) Capital markets are perfect.
- 2) All firms within the same class will have the same degree of business risk.
- 3) All investors have the same expectation of a firm's net operating income (EBIT).
- 4) The dividend pay-out ratio is 100%.
- 5) There are no corporate taxes. However, this assumption was removed later.

The "arbitrage process" is the operational justification of MM hypothesis. The term 'Arbitrage' refers to an act of buying an asset or security in one market having lower price and selling it in another market at a higher price. The consequence of such action is that the market price of the securities of the two firms exactly similar in all respects except in their capital structures can not for long remain different in different markets. Thus, arbitrage process restores equilibrium in value of securities. This is because in case the market value of the two firms which are equal in all overvalued firm would sell their shares, borrow additional funds on personal account and invest in the undervalued firm in order to obtain the same return on smaller investment outlay. The use of debt by the investor for arbitrage is termed as 'home made' or 'personal leverage'.

The following are limitations of MM's theory-

- i) Rates of interest are not the same for the individuals and the firms.
- ii) Transactional costs are involved.
- iii) Homemade leverage is not perfect substitute for corporate leverage.
- iv) The effectiveness of arbitrage process is limited.

Since corporate taxes do exist, MM agreed in 1963 that the value of the firm will increase and overall cost of capital will decline because of tax deductibility of interest payments. A levered firm should have, therefore, a greater market value as compared to an unlevered firm. The value of the levered firm would exceed that of the unlevered firm by an amount equal to the levered firm's debt multiplied by the tax rate. The formula is-

## Capital Structure

### Decisions

$$V_i = V_u + B_t$$

Where :

$V_i$  = Value of levered firm

$V_u$  = Value of an unlevered firm  $B$  = Amount of Debt and

$t$  = Tax rate

### 3.6.4 Traditional Approach

The traditional theory assumes changes in  $K_e$  at different levels of debt equity rate. It is the middle of the two extremes of NI and NOI.

Beyond a particular point of debt-equity mix,  $k_e$  rises at an increasing rate. There are three stages:-

**Stage I**– Introduction of debt-Net Income rises; cost of equity capital rises because of risk but less than earnings rate leading to decline in overall cost of capital and increase in Market value.

**Stage II** – Further Application of debt: cost of equity capital rises-net income – debt cost increases – value same.

**Stage III** – Further Application of debt – cost of equity capital is very high – value goes down.

#### Example

Raj Cosmetics Ltd. has estimated the following rates of return (Column (3) of the Table 3.9. Table 3.9 also gives the seven capital structures from the debt ratios ranging from 0% to 60% and expected EPS in Rs. (from Table 3.6).

From these data, it is possible to work out the expected share values in each of the alternative capital structures. Calculations are set out in column 4 of the Table 3.9.

**Table 3.9: Calculation of Share Value Estimate Associated with Alternative Capital Structures for Raj Cosmetics Ltd.**

Capital structure debt ratio (%) (1)	Expected EPS (Rs.) (From Table 3.6) (2)	Estimated required rate of return Esti. by the Co.) (3)	Estimated Share Value (Rs.) (4)
0	2.40	0.115	20.87
10	2.55	0.117	21.79
20	2.72	0.121	22.48
30	2.91	0.125	23.28
40	3.12	0.140	22.29
50	3.18	0.165	19.27
60	3.03	0.190	15.95

Table 3.9 shows that the maximum share value occurs at the capital structure associated with the debt ratio of 30%. This is the optimal capital structure. It is noticeable that EPS is maximized at 50% debt ratio, while the share value is maximized at 30% debt ratio. This discrepancy arises because EPS maximization approach does not consider the risk as reflected in required rates of return.

In addition to the analysis of the EBIT-EPS, required rates of returns and share value, certain other factors are also taken into account in determining the capital structure for the firm. These are listed below:

- Adequacy of cash flow to service debt and preference shares
- Having stable and predictable revenues
- Limitations imposed by previous contractual obligations
- Management Preference and attitudes towards risk
- Assessment of the firm's risk by financial institutions and other agencies
- Capital market conditions and investor preferences
- Considerations of corporate control.

**Activity 3**

1) In what manner are the corporate taxes relevant to capital structure decision?

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2) Contrast traditional and M-M position regarding optimal capital structure.

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3) Name of single most important factor which determines the capital structure of a company.

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4) Try to know from Finance Manager of any two companies:

i) What is their present capital structure?

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ii) What are the factors which determine their capital structure?

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iii) Do they intend to change their capital structure in the near future ? why?

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5) Show arbitrage process with an example.

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### **3.7 FACTORS INFLUENCING PATTERN OF CAPITAL STRUCTURE**

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Following are the major factors which should be kept in view while determining the capital structure of a company:

#### **1) Size of Business**

Smaller firms confront tremendous problems in assembling funds because of their poor creditworthiness. Investors feel loath in investing their money in securities of these firms. Lenders prescribe highly restrictive terms in lending. In view of this, special attention should be

paid to maneuverability principle. This is why common stock represents major portion of this capital in smaller concerns. Larger concerns have to employ different types of securities to procure desired amount of funds of reasonable cost because they find it very difficult to raise capital at reasonable cost of demand for funds is restricted to a single source.

## 2) Form of Business Organisation

Control principle should be given higher weightage in private limited companies where ownership is closely held in a few hands. This may not be so imminent in the case of public limited companies whose shareholders are large in number. In proprietorship or partnership form of organisation, control is undoubtedly an important consideration because control is concentrated in a proprietor or a few partners.

## 3) Nature of Enterprise

Business enterprises which have stability in their earnings or which enjoy monopoly regarding their products may go for debentures or preference shares since they will have adequate profits to meet the recurring cost of interest/fixed dividend. This is true in case of public utility concerns. On the other hand, companies which do not have this advantage should rely on equity share capital to a greater extent for raising their funds. This is, particularly, true in case of manufacturing enterprises.

## 4) Stability of earnings

With greater stability in sales and earnings, a company can insist on the fixed obligation debt with less risk. But a company with irregular income will not choose to burden itself with fixed charge. Such company should depend upon the sale of stock to raise capital.

## 5) Age of Company

Younger companies generally find it difficult to raise capital in the initial years because of greater uncertainty involved in them and also because they are not known to suppliers of funds. It would therefore, be worthwhile for such companies' accord to higher weightage to maneuverability factor. In a sharper contrast to this, established companies with good earnings record are always in comfortable position to raise capital from whatever sources they like. Leverage principle should be insisted upon in such concerns.

## 6) Purpose of Financing

In case funds are required for some directly, productive purposes the company can afford to raise the funds by issue of debentures. On the other hand, if the funds are required for non-productive purposes,

providing more welfare facilities to the employees the company should raise the funds by issue of equity shares.

### **7) Market Sentiments**

Times of boom investors generally want to have absolute safety. In such cases, it will be appropriate to raise funds by issue of debentures. At other periods, people may be interested in earnings high speculative incomes; at such times, it will be appropriate to raise funds by issue of equity shares.

### **8) Credit Standing**

A company with high credit standing has greater ability to adjust sources of funds upwards or downwards in response to major changes in need for funds than one with poor credit standing. In the former case, the management should pay greater attention to maneuverability factor.

### **9) Period of Finance**

The period for which finance is required also affects the determination of capital structure of companies. In case, funds are required, say, for 5 to 10 years, it will be appropriate to raise them by issue of debentures. However, if the funds are required more or less permanently, it will be appropriate to raise them by issue of equity shares.

### **10) Legal Requirements**

Companies Act, Banking Co. Act etc. influence the capital structure considerations. The relative weightage assigned to each of these factors will vary widely from company to company depending upon the characteristics of the company, the general economic conditions and the circumstances under which the company is operating. Companies issue debentures and preference shares to enlarge the earnings on equity shares, while equity shares are issued to serve as a cushion to absorb the shocks of business cycles and to afford flexibility. Of course, greater the operating risk, the less debt the firm can use, hence, in spite of the fact that the debt is cheaper the company should use it with caution.

### **11) Tax Considerations**

The existing taxation provision makes debt more advantageous in relation to stock capital in as much as interest on bonds is a tax deductible expense whereas dividend is subject to tax. In view of prevailing corporate tax rates in India, the management would wish to raise degree of financial leverage by placing greater reliance on borrowing.

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### 3.8 RELEVANCE OF DEBT – EQUITY RATIO IN PUBLIC ENTERPRISES

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It is generally argued that the practical significance of the debt-equity ratio is limited in the case of public enterprises in many countries because most of the loans are derived from the government itself or from public sector financial institutions. The government as the owner as well as the lender, has access to all the information it needs about the financial health of the enterprise and does not need to refer to any favourable ratio to derive confidence before making loans to it. Even when the public enterprises are allowed to borrow from private banks or from foreign financial institutions, there is a government guarantee in one form or another that the loans will be removed and lightened by adoption of appropriate policy measures.

Since all this has the effect of making institutional arrangements for sharing risk and thus reducing the disadvantages of debt, a case could be made for justifying higher debt-equity ratios for public enterprises. A few observations in this regard are made as under :

- a) Since not all of the public enterprises are wholly owned and financed (through loans) by government and there are many joint ventures, so that institutional arrangements for diluting risks are not always available to these enterprises, it has to be appreciated that in real life, public enterprises have to face the bias of the lending agencies (local or foreign) towards this measure of the strength of their capital structure.
- b) In most of the countries public enterprises ministries e.g. planning and finance, for a critical scrutiny and appraisal of their proposals. In any case, the government owned financial institutions can be expected to raise points also at the risk of further lending to an enterprise, the debt-equity ratio of whose capital structure is not in line with the normal or which does not appear to be quite sound in context of its financial prospects. Many of the worthwhile plans of investment in public enterprises, whether for replacement and rehabilitation of existing assets or for expansion and diversification, require significant amounts of foreign exchange. If these resources are arranged from foreign lending agencies like the world Bank/IDA, the creditors make it a point to specify adherence to a range of 'healthy' debt-equity ratios (and also to a conservative dividend disbursement policy) till their loans are repaid.
- c) It is also desirable from the enterprise's own point of view to see that a sufficiently high proportion of equity is maintained in its capital structure because it should enable it some freedom of action in the matter of retaining its earnings for its "self-financed" projects or for financing a part of its working capital, provided, of course, that it is in the happy position of making profits. In the case of other enterprises which operate

at a loss (whether because of government imposed pricing policies or because of their inefficiencies), there is usually a demand for concerting at least a part of their loan capital into equity capital. When such proposals are being formulated and examined, the question of a reasonable or proper debt-equity ratio for the type of enterprises under consideration is raised sooner or later.

- d) With an inappropriately high debt-equity ratio, the initial cost of a project/ manufacturing facility put up by a public enterprise has the effect of increasing the fixed costs of operation through the capitalization of interest during construction. This is likely to place the enterprise in a disadvantageous position vis-à-vis its competitors and can lead to a vicious cycle of accumulation of losses, under utilization of capacity, low morale of workers and management inefficiencies, short-term (and strategically unsuitable) solutions and further losses. Having once been trapped in this situation, it is difficult indeed for the enterprise to extricate itself and rehabilitate its capital structure, particularly when the Government department's ministries are not very prompt in analyzing the causes of these problems and providing the requisite reliefs.
- e) There cannot be must argument with the proposition that, in long run, the equity portion of a public enterprise must not be regarded as a device of cash convenience and as a no-cost input, because it certainly has an opportunity cost for the economy as a whole. Public enterprises have, as a general rule, to operate under pricing and operating policies dictated by their owner government's socio-economic (and political) objectives. Debt- equity ratio is one device by which the enterprise can be considered to have been compensated for its expenses/losses on meeting these additional obligations.
- f) If a certain range of debt-equity ratios is adopted for enterprise in a particular sector of the economy, it can result in fixing a concessional rate of interest/return on the capital mix (loan at market rate plus equity at zero percent).

It may, thus, be concluded that the view that the practical significance of the debt-equity ratio is limited in the case of public enterprise is not based on a complete appreciation of all the factors in which these enterprises have to operate in many developing countries. While the private sector analogy in this respect may have to be qualified suitably when applied to the public enterprise situation in a particular country, it will remain a useful indicator, both with the administrative ministers and with the enterprise managements, to assess the strength of their capital structures.

**Activity 4**

- 1) Bring out five factors that influence capital structure.

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- 2) “Debt Equity Ratio is not relevant for public enterprises” Comment.

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**3.9 SUMMARY**

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A firm’s capital structure is determined by the mix of long-term debt and equity it uses in financing its operations. Financial structure means the composition of the entire left hand side of the balance sheet. The basic differences in debt (including preference shares) and equity capital are in respect of the voting rights, the claims on income and assets, and the tax treatment. Timing, flexibility, cost, risk and control principles are the criteria for determining pattern of capital structure.

A firm’s capital structure should be consistent with its business risk and result in an acceptable financial risk. The EBIT-EPS analysis can be used to evaluate various capital structure in the light of the degree of financial risk and the returns to the equity shareholders. The EBIT-EPS analysis shows how the desirable capital structure gives the maximum EPS.

The mathematical relationship between ROI is  $[(ROE + ROI - r) D/E] (1-t)$

NI and NOI theories of capital structures are extreme. The MM analysis suggests that the optimal capital structure does not matter and that as much debt as possible should be used because the interest is tax-deductible. The MM hypothesis is criticized because of its unreal assumptions. Tax adjustment makes it more realistic.

The traditional approach to capital structure indicates that the optimal capital structure for the firm is one in which the overall cost of capital is minimized and the share value is maximized.

The cost of debt increases beyond a certain level of leverage.

Certain qualitative considerations such as cash flow, corporate control, contractual obligations, management's risk tolerance, etc. are taken into consideration while determining the capital structure.

The practical significance of Debt-Equity ratio for public enterprises is limited and has different perspectives.

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### **3.10 KEYWORDS**

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**Capital Structure** is the proportions of all types of long-term capital. **Financial Structure** is the proportions of all types of long-term and short-term capital.

**EBIT** = Earnings before Interest and taxes.

**EPS** = Earnings per share

**NI Approach** says more usage of debt will enhance the value of the firm.

**NOI Approach** says that the total value of the firm remains constant irrespective of the debt-equity mix. Arbitrage refers to an act of buying a security in one market having lower price and selling it in another market at a higher price. The consequence of such action is that the market price of the securities will become the same.

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### **3.11 SELF ASSESSMENT QUESTIONS/EXERCISES**

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- 1) What is a firm's capital structure? How is it different from financial structure?
- 2) Under the traditional approach to capital structure, what happens to the cost of debt and cost of equity as the firm's financial leverage increases?
- 3) Explain ROI-ROE analysis.
- 4) Explain the EBIT-EPS approach to the capital structure. Are maximizing value and maximizing EPS the same?
- 5) Khosla Ltd. had made the following forecast of sales, with the associated probability of occurrence.

Sales Rs.	Probability
2,00,000	0.20
3,00,000	0.60
4,00,000	0.20

The company has fixed operating costs of Rs.1,00,000 per year and variable operating costs represent 40% of sales. The existing capital structure consists of 25,000 equity shares of Rs. 10 each. The market place has assigned the following discount rates to risky earnings per share.

Co-efficient of variation of EPS	Estimated Required Returns %
.43	15
.47	16
.51	17
.56	18
.60	22
.64	24

The company is considering changing its capital structure by increasing debt in the capital structure vis-à-vis capital. Different debt ratios are considered, given here with the estimate of the required interest rate on all debt.

Debt Ratio	Interest on all debt
20%	10%
40%	12%
60%	14%

The tax rate is 40% percent.

- a) Calculate the expected earnings per share, the standard deviation of EPS and the co-efficient of variation of EPS for the three proposed capital structures.
- b) Determine the optimal capital structure, assuming (i) maximization of EPS and (ii) maximization of share value.
- c) Construct a graph showing relationship in (b).
- 6) Critically examine various theories of capital structure.
- 7) Narrate the factors influencing capital structure.
- 8) Explain the criteria for determining pattern of capital structure.
- 9) Discuss the relevance of debt-equity ratio for Indian Public Enterprises.
- 10) Assume the figures of an Indian company and examine the relevance of MM's theory of capital structure.

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