LPCPS
LUCKNOW PUBLIC COLLEGE OF PROFESSIONAL STUDIES

B.Com. (Hons.) Course

Semester – V

Paper: Business Finance

Dr. Ashish Kaushal
Associate Professor
Department of Management
Lucknow Public College of Professional Studies

CONTENTS

Chapter-1
Introduction to Financial Management

Companies do not work in a vacuum, isolated from everything else. It interacts and transacts with the other entities present in the economic environment. These entities include Government, Suppliers, Lenders, Banks, Customers, Shareholders, etc. who deal with the organisation in several ways. Most of these dealings result in either money flowing in or flowing out from the company. This flow of money (or funds) has to be managed so as to result in maximum gains to the company.

Managing this flow of funds efficiently is the purview of finance. So we can define finance as the study of the methods which help us plan, raise and use funds in an efficient manner to achieve corporate objectives. Finance grew out of economics as a special discipline to deal with a special set of common problems.

The corporate financial objectives could be to:

1. Provide the link between the business and the other entities in the environment and

2. Investment and financial decision making

Let us first look at what we mean by investment and financial decision making.

1. **Investment Decision:** The investment decision, also referred to as the capital budgeting decision, simply means the decisions to acquire assets or to invest in a project. Assets are defined as economic resources that are expected to generate future benefits.

2. **Financing Decision:** The second financial decision is the financing decision, which basically addresses two questions:

    a. How much capital should be raised to fund the firm's operations (both existing & proposed)

    b. What is the best mix of financing these assets?

Financing could be through two ways: debt (loans from various sources like banks, financial institutions, public, etc.) and equity (capital put in by the investors who are also known as owners/ shareholders). Shareholders are owners because the shares represent the ownership in the company.

Funds are raised from financial markets. Financial markets is a generic term used to denote markets where financial securities are teat. These markets include money markets, debt market and capital markets. We will understand them in detail later in the 3rd chapter.

Financing and investing decisions are closely related because the company is going to raise money to invest in a project or assets. Those who are going to give money to the company (whether lenders or investors) need to understand where the company is investing their money and what it hopes to earn from the investments so that they can assure themselves of the safety of their money.

The questions that you may thinking about right now are "Why do we need to learn finance? Shall we not leave it to the people who are going to specialise in finance? Finance won't help me in the area that I am going to work in, so why learn?" This is to say that the knowledge of finance does not add any value to you. Is it so? Think about it. When you get your pocket money from your parents, you do not go out and blow the whole lot in one day because if you do, your parents are not going to give you more money to last through that month. You quickly learn that you need to plan your expenditure so that the money lasts throughout the month and you may actually plan to save some of it. Those who do not get enough to meet their requirements, think about some clever means to raise more money (like falling sick!). Alternatively if they need more money for the month because of certain special events (like Valentine's day) they can plan to borrow money for a month and repay in the next month.

So you plan, raise and efficiently utilise funds that are your disposal (or at least try to). That a business organisation also needs to do the same can hardly be overemphasised. The scale of operations is much bigger and to efficiently manage funds at this scale, decisions cannot be taken without sound methodology. Finance teaches you this terminology.

For managing these funds the first thing you would need is information. External information has to be collected from the environment and accounting provides internal information about the firm's operations. Accounting can be defined as an information and measurement system that identifies, records, and communicates relevant information about a company's economic activities to people to help them make better decisions.

You would now agree that a company needs to manage its own funds efficiently but your question still remains "Why am I concerned with it?" Further arguing, you say that, "I am going to specialise in Marketing/ Information Technology/ Human Resource Management/ Operations Management and there is no need for me to learn finance. Also Finance is a separate function in my organisation (or the organisation that I am going to work for) and I am hardly going to use finance to work in my respective department."

Think again. Everything that you do has an impact on the profitability of the company (including drinking ten cups of coffee in a day!). So if you want to grow up to be the CEO of the company in a few years from now (which I undoubtedly think that you would love to) you should take the advice of the top CEOs.

> *79 per cent of the top CEOs rate Finance skills, as the most required for the CEO of the future.*

> ***KPMG survey***

Better take the CEOs advice. But don't get the feeling that only the CEOs require the Finance Skills, all other functions of management also cannot do without finance and the financial information.

Fields of Finance

The academic discipline of financial management may be viewed as made up of five specialized fields. In each field, the financial manager is dealing with the management of money and claims against money. Distinctions arise because different organizations pursue different objectives and do not face the same basic set of problems. There are five generally recognized areas of finance.

1. **Public Finance.** Central, state and local governments handle large sums of money, which are received from many sources and must be utilized in accordance with detailed policies and procedures. Governments have the authority to tax and otherwise raise funds, and must dispense funds according to legislative and other limitations. Also, government do not conduct their activities to achieve the same goals as private organizations. Businesses try to make profits, whereas a government will attempt to accomplish social or economic objectives. As a result of these and other differences, a specialized field of public finance has emerged to deal with government financial matters.

2. **Securities and Investment Analysis.** Purchase of stocks, bonds, and other securities involve analysis and techniques that are highly specialized. An investor must study the legal and investment characteristics of each type of security, measure the degree of risk involved with each investment, and forecast probable performance in the market. Usually this analysis occurs without the investor having any direct control over the firm or institution represented by the form of security. The field of investment analysis deals with these matters and attempts to develop techniques to help the investor reduce the risk and increase the likely return from the purchase of selected securities.

3. **International Finance.** When money crosses international boundaries individuals, businesses, and governments must deal with special kinds of problems. Each country has its own national currency; thus a citizen of the United States must convert dollars to French francs before being able to purchase goods or services in Paris. Most governments have imposed restrictions on the exchange of currencies, and these may affect business transactions. Governments may be

facing financial difficulties, such as balance-of-payments deficits, or may be dealing with economic problems, such as inflation or high levels of unemployment. In these cases, they may require detailed accounting for the flows of funds or may allow only certain types of international transactions. The study of flows of funds between individuals and organizations across national borders and the development of methods of handling the flows more efficiency are properly within the scope of international finance.

4.   **Institutional Finance.** A nation's economic structure contains a number of financial institutions, such as banks, insurance companies, pension funds, credit unions. These institutions gather money from individual savers and accumulate sufficient amounts for efficient investment. Without these institutions, funds would not be readily available to finance business transactions, the purchase of private homes and commercial facilities, and the variety of other activities that require organizations that perform the financing function of the economy.

5.   **Financial Management.** Individual businesses face problems dealing with the acquisition of funds to carryon their activities and with the determination of optimum methods of employing the funds. In a competitive marketplace, businesses and actively manage their funds to achieve their goals. Many tools and techniques have been developed to assist financial managers to recommend proper courses of action.

These tools help the manager determine which sources offer the lowest cost of funds and which activities will provide the greatest return on invested capital. Financial management is the field of greatest concern to the corporate financial officers and will be the major thrust of the approach we shall use in studying finance.

An overview of the five fields of finance is given in Figure 1.1.

Public Finance	**Securities and Investment Analysis**
● Used in central, state and local government. ● Examines taxes and other revenues. ● Pursues nonprofit goals.	● Used by individual and institutional investors. ● Measures risk in securities transactions. ● Measures likely return.
Institutional Finance ● Examines banks, insurances companies and pension funds. ● Studies saving and capital formation.	**International Finance** ● Studies economic transactions among nations. ● Concerned with flows among countries.
Financial Management ● Studies financial problems in individual firms. ● Seeks sources of low-cost funds. ● Seeks profitable business activities.	

FIGURE 1 : VARIOUS FIELDS OF FINANCE

Objectives of the Firm - Profit Maximisation and Wealth Maximisation

To put it simply, we might say that the goal of any business is to maximise the returns to the owners of the business. So the goal of finance is to help the business in maximising returns. But if you talk to the companies, you also hear about many other goals that they are pursuing at the same time. These goals could include maximisation of sales, maximisation of market share, maximisation of growth rates of sales, maximisation of the market price of the share (whether real or specifically pushed up to benefit the owners), etc. Individually speaking, managers would be more concerned with the money that they are making from the organisation and the benefits that they are receiving rather than care about what the owners are making!

As there could be many goals for the organisation, we should try and summarise the organisational goals in financial terms so that we can call them the financial goals. They boil down to two:

1.   Maximise profits or

2.   Maximise wealth

Maximise Profits

Let us first look at profit maximisation. Profit (also called net income or earnings) can be defined as the amount a business earns after subtracting all expenses necessary for its sales. To put it in an equation form:

Sales - Expenses = Profit

If you want to maximise profits, there are only two ways to do it. Either you reduce your expenses (also called costs) or you increase the sales (also called revenues). Both of these are not easy to achieve. Sales can be increased by selling more products or by increasing the price of the products. Selling more products is difficult because of the competition in the market and you cannot increase the price of the products without adding more features or value to it (assuming a competitive market). If you are a competitive company, reducing expenses beyond a certain level is possible only by reducing the investments in advertising, research and development, etc. which ultimately leads to reduction in sales in the long term and threatens the survival of the company. Profit maximisation goal assumes that many of the complexities of the real world do not exist and is, therefore, not acceptable.

Still, profit maximisation remains one of the key goals for the managers of the company because many managers' compensations are linked to the profits that the company is generating. Owners need to be aware of these goals and understand that it is the long-term viability of their companies that add value to them and not the short-term profitability.

Therefore, the long-term survival of the company should not be sacrificed for the short-term benefits.

Wealth Maximisation

Shareholders' wealth can be defined as the total market value of all the equity shares of the company. So when we talk about maximising wealth we talk about maximising the value of each share. How the decisions taken by the organisation affects the value of the organisation is reflected in the figure 1.1.

FIGURE 1.1. HOW FINANCIAL DECISIONS AFFECT THE VALUE OF THE ORGANISATION
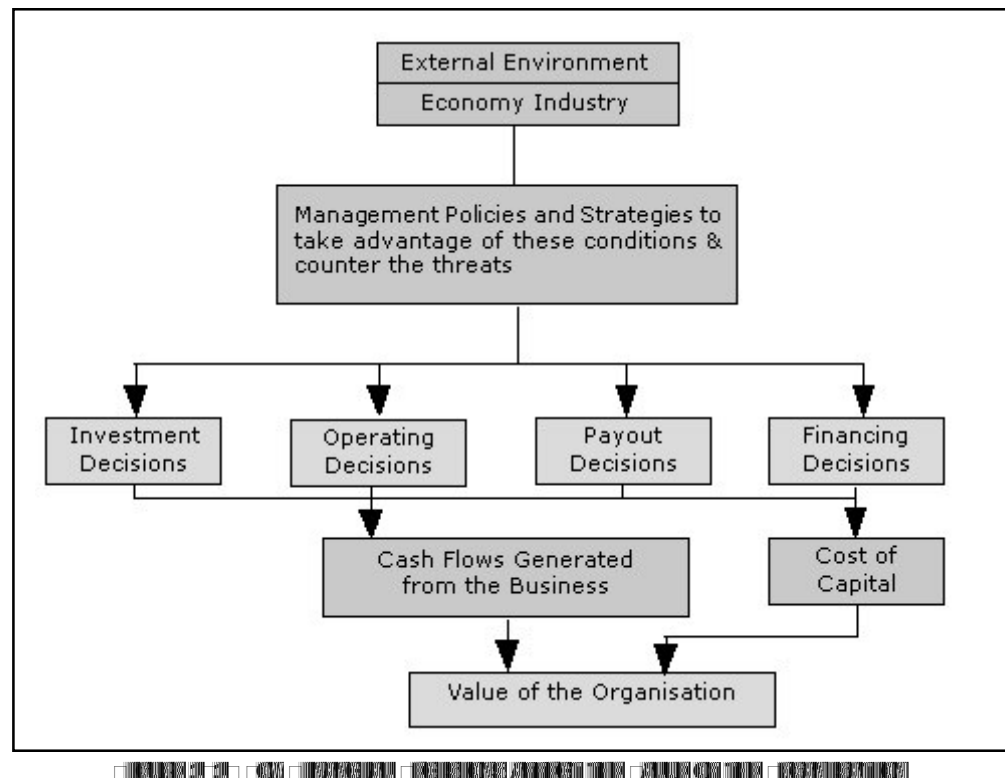
The shareholders' wealth maximisation goal gives us the best results because effects of all the decisions taken by the company and its managers are reflected in it. In order to employee use this goal, we do not have to consider every price change of our shares in the market as an interpretation of the worth of the decisions that the company has taken. What the company needs to focus on is the affect that its decision should have on the share price if everything else was held constant. This conflict of the decisions by the managers and the decisions required by the owners is known as the agency problem. How are companies solving this problem will be discussed later.

Scope of Financial Management

The approach to the scope and functions of financial management is divided, for purposes of exposition, into two broad categories: (a) The Traditional Approach, and (b) The Modern Approach.

Traditional Approach

The traditional approach to the scope of financial management refers to its subject-matter, in academic literature in the initial stages of its evolution, as a separate branch of academic study. The term 'corporation finance' was used to describe what is now known in the academic world as 'financial management'. As the name suggests, the concern of corporation finance was with the financing of corporate enterprises. In other words, the scope of the finance function was treated by the traditional approach in the narrow sense of procurement of funds by corporate enterprise to meet their financing needs. The term 'procurement' was used in a broad sense so as to include the whole gamut of raising funds externally. Thus defined, the field of study dealing with finance was treated as encompassing three interrelated aspects of raising and administering resources from outside: (i) the institutional arrangement in the form of financial institutions which comprise the organization of the capital market; (ii) the financial instruments through which funds are raised from the capital markets and the related aspects of practices and the procedural, aspects of capital markets; and (iii) the legal and accounting relationships between a firm and its sources of funds. The coverage of corporation finance was, therefore, conceived to describe the rapidly evolving complex of capital market institutions, instruments and practices. A related aspect was that firms require funds at certain episodic events such as merger, liquidation, reorganization and soon. A detailed description of these major events constituted the second element of the scope of this field of academic study. That these were the broad features of the subject-matter of corporation finance is eloquently reflected in the academic writings around the period during which the traditional approach dominated academic thinking. Thus, the issue to which literature on finance addressed itself was how resources could best be raised from the combination of the available sources.

The traditional approach to the scope of the finance function evolved during the 1920s and 1930s and dominated academic during the forties and through the early fifties. It has now been discarded as it suffers from serious limitations. The weaknesses of the traditional approach fall into two broad categories: (i) those relating to the treatment of various topics and the emphasis attached to them; and (ii) those relating to the basic conceptual and analytical framework of the definitions and scope of the finance function.

The first argument against the traditional approach was based on its emphasis on issues relating to the procurement of funds by corporate enterprises. This approach was challenged during the period when the approach dominated the scene itself. Further, the traditional treatment of finance was criticised because the finance function was equated with the issues involved in raising and administering funds, the theme was woven around the viewpoint of the suppliers of funds such as investors, investment bankers and so on, that is, the outsiders. It implies that no consideration was given to the viewpoint of those who had to take internal financial decisions. The traditional treatment was, in other words, the *outsider-looking-in approach.* The limitation was that internal decision making (i.e. *insider-looking out*) was completely ignored.

The second ground of criticism of the traditional treatment was that the focus was on financing problems of corporate enterprises. To that extent the scope of financial management was confined only to a segment of the industrial enterprises, as non-corporate organisations lay outside its scope.

Yet another basis on which the traditional approach was challenged was that the treatment was built too closely around episodic events, such as promotion, incorporation, merger, consolidation, reorganisation and so on. Financial management was confined to a description of these infrequent happenings in the life of an enterprise. As a logical corollary, the day-to-day financial problems of a normal company did not receive much attention.

Finally, the traditional treatment was found to have a lacuna to the extent that the focus was on long-term financing. Its natural implication was that the Issues involved in working capital management were not in the purview of the finance function.

The limitations of the traditional approach were not entirely based on treatment or emphasis of different aspects. In other words, its weaknesses were more fundamental. The conceptual and analytical shortcoming of this approach arose from the fact that it confined financial management to issues involved in procurement of external funds, it did not consider the important dimension of allocation of capital. The conceptual framework of the traditional treatment ignored what Solomon aptly describes as the *central issues of financial management.* These issues are reflected in the following fundamental questions which a finance manager should address. Should an enterprise commit capital funds to certain purposes do the expected returns meet financial standards of performance? How should these standards be set and what is the cost of capital funds to the enterprise? How does the cost vary with the mixture of financing methods used? In the absence of the coverage of these crucial aspects, the traditional approach implied a very narrow scope for financial management. The modern approach provides a solution to these shortcomings.

Modern Approach

The modern approach views the term financial management in a broad sense and provides a conceptual and analytical framework for financial making. According to it, the finance function covers both acquisition of funds as well as their allocations. Thus, apart from the issues involved in acquiring-external funds, the main concern of financial management is the efficient and wise allocation of funds to various uses. Defined in a broad sense, it is viewed as an integral part of overall management.

The new approach is an analytical way of viewing the financial problems of a firm. The main contents of this approach are what is the total volume of funds an enterprise should commit? What specific assets should an enterprise acquire? How should the funds required be financed? Alternatively, the principal contents of the modern approach to financial management can be said to be: (i) How large should an enterprise be, and how fast should it grow? (ii) In what form should it hold assets? and (iii) What should be the composition of its liabilities?

The three questions posed above cover between them the major financial problems of a firm. In other words, financial management, according to the new approach, is concerned with the solution of three major problems relating to the financial operations of a firm, corresponding to the three questions of investment, financing and dividend decisions. Thus, financial management, in the modem sense of the term, can be broken down into three major decisions as functions of finance: (i) The investment decision, (ii) The financing decision, and (iii) The dividend policy decision.

The investment decision relates to the selection of assets in which funds will be invested by a firm. The assets which can be acquired fall into two broad group: (i) long-term assets which yield a return over a period of time in future, (ii) short-term or current assets, defined as those assets which in the normal course of business are convertible into without diminution in value, usually within a year. The first of these involving the first category of assets is popularly known in financial literature as *capital budgeting*. The aspect of financial decision making with reference to current assets or short-term assets is popularly termed as *working capital management.*

Capital Budgeting is probably the most financial decision for a firm. It relates to the selection of an asset or investment proposal or course of action whose benefits are likely to be available in future over the lifetime of the project. The long-term assets can be either new or old/existing ones. The first aspect of the capital budgeting decision relates to the choice of the new asset out of the alternatives available or the reallocation of capital when an existing asset fails to justify the funds committed. Whether an asset will be accepted or not will depend upon the relative benefits and returns associated with it. The measurement of the worth of the investment proposals is, therefore, a major element in the capital budgeting exercise. This implies a discussion of the methods of appraising investment proposals.

The second element of the capital budgeting decision is the analysis of risk and uncertainty. Since the benefits from the investment proposals extend into the future, their accrual is uncertain. They have to be estimated under various assumptions of the physical volume of sale and the level of prices. An element of risk in the sense of uncertainty of future benefits is, thus, involved in the exercise. The returns from capital budgeting decisions should, therefore, be evaluated in relation to the risk associated with it.

Finally the evaluation of the worth of a long-term project implies a certain norm or standard against which the benefits are to be judged. The requisite norm is known by different names such as *cut-off* rate, *hurdle rate, required rate, minimum rate of return* and so on. This standard is broadly expressed in terms of the cost of capital. The concept and measurement of the cost of capital is, thus, another major aspect of capital budgeting decision. In brief, the main elements of capital budgeting decisions are: (i) the long-term assets and their composition, (ii) the business risk complexion of the firm, and (iii) concept and measurement of the cost of capital.

Working Capital Management is concerned wit the management of current assets. It is an important and integral part of financial management as short-term survival is a prerequisite for long-term success. One aspect of working capital management is the trade-off between profitability and risk (liquidity). There is a conflict between profitability and liquidity. If a firm does not have adequate working capital, that is, it does not invest sufficient funds in current assets, it may become illiquid and consequently may not have the ability to meet its current obligations and, thus, invite the risk of bankruptcy. If the current assets are too large, profitability is adversely affected. The key strategies and considerations in ensuring a tradeoff between profitability and liquidity is one major dimension of working capital management. In addition, the individual current assets should be efficiently managed so that neither inadequate nor unnecessary funds are

locked up. Thus, the management of working capital has two basic ingredients: (1) an overview of working capital management as a whole, and (2) efficient management of the individual current assets such as cash, receivables and inventory.

The second major decision involved in financial management is the financing decision. The investment decision is broadly concerned with the asset-mix or the composition of the assets of a firm. The concern of the financing decision is with the financing-mix or capital structure or leverage. The term capital structure refers to the proportion of debt (fixed-interest sources of financing) and equity capital (variable-dividend securities/ source of funds). The financing decision of a firm relates to the choice of the proportion of these sources to finance the investment requirements. There are two aspects of the financing decision. First, the theory of capital structure which shows the theoretical relationship between the employment of debt and the return of the shareholders. The use of debt implies a higher return to the shareholders as also the financial risk. A proper balance between debt and equity to ensure a trade-off between risk and return to the shareholders is necessary. A capital structure with a reasonable proportion of debt and equity capital is called the optimum capital structure. Thus, one dimension of the financing decision whether there is an optimum capital structure? And in what proportion should funds be raised to maximise the return to the shareholders? The second aspect of the financing decision is the determination of an appropriate capital structure, given the facts of a particular case. Thus, the financing decision covers two interrelated aspects: (1) capital structure theory, and (2) capital structure decision.

The third major decision of financial management is the decision relating to the dividend policy. The dividend should be analysed in relation to the financing decision of a firm. Two alternatives are available in dealing with the profits of a firm: they can be distributed to the shareholders in the form of dividends or they can be retained in the business itself. The decision as to which course should be followed depends largely on a significant element in the dividend decision, the dividend payout ratio, that is, what proportion of net profits should be paid out to the shareholders. The final decision will depend upon the preference of the shareholders and investment opportunities available within the firm. The second major aspect of the dividend decision is the factors determining dividend policy of a firm in practice.

To conclude, the traditional approach had a very narrow perception and was devoid of an integrated conceptual and analytical framework. It had rightly been discarded in current academic literature. The modern approach has broadened the scope of financial management which involves the solution of three major decisions, namely, investment, financing and dividend. These are interrelated and should be jointly taken so that financial decision-making is optimal. The conceptual framework for optimum financial decisions is the objective of financial management. In other words, to ensure an optimum decision in respect of these three areas, they should be related to the objectives of financial management.

Functions of Financial Management

The traditional function of financial management has been limiting the role of finance to raising and administrating of funds needed by the company to meet their financial needs. It broadly covered:

1. Arrangement of funds through financial institutions

2. Arrangement of funds through financial instruments

3. Looking after the legal and accounting relationship between a corporation and its sources of funds

This has outlived its utility. With the advent of technology and need to tighten ships because of competition, financial management became as much a science as art. Efficient allocation of funds became the imperative. The modern approach is an analytical way of looking at the financial problems of a firm with the main concerns like:

1. What is the total volume of funds committed

2. What specific assets should be acquired or divested

3. How should the funds required be financed and from which markets

The above questions relate to four broad decision areas, these are:

1. **Investment decision:** Decisions relating to investment in both capital and current assets. The finance manager has to evaluate different capital investment proposals and select the best keeping in view the overall objective of the enterprise. Capital Budgeting is the typical name given to this decision.

2. **Financing Decision:** Provision of funds required at the proper time is one of the primary tasks of the finance manager. Identification of the sources, deciding which types of funds to raise (debt or equity), and raising them is one of the crucial tasks.

3. **Dividend Decision:** Determination of funds requirements and how much of it will be generated from internal accruals and how much to be sourced from outside is a crucial decision. Equity holders are the owners and require returns, and how much money to be paid to them is a crucial decision.

4. **Working Capital Decision:** The investment in current assets is a major activity that a finance manager is engaged in a day to day basis. How much inventory to keep, how much receivables can be managed, and what is the optimum cash levels, are three of the key questions that are dealt with regularly.

All these decisions interact, investment decision cannot be taken without taking the financing decision, working capital decision also needs financing, dividend decision is a payout mechanism and has to be taken care of from financing. These tasks are divided and are taken care of by various entities.

Objectives of Financial Management

To make wise decisions a clear understanding of the objectives which are sought to be achieved in necessary. The objectives provide a framework for optimum financial decision-making. In other words, they are concerned with designing a method of operating the internal investment and financing of a firm. We discuss in this section the alternative approaches in financial literature. There are two widely-discussed approaches: (i) Profit maximisation approach and (ii) Wealth maximisation approach.

It should be noted at the outset that the term 'objective' is used in the sense of a goal or *decision criterion* for the three decisions involved in financial management. It implies that what is relevant is not the overall objective or goal of a business but an operationally useful criterion by which to judge a specific set of mutually interrelated business decisions, namely, investment, financing and dividend policy. The second point that should be clearly understood to that the term objectives provides a normative framework. That is the focus in financial literature is on what a firm should try to achieve and on policies that should be followed if certain goals are to be achieve. The implication is that these are not necessarily followed by firms in actual practice. They are rather employed to serve as a basis for theoretical analysis and do not reflect contemporary empirical industry practices. Thus, the term is used in a rather narrow sense of what a firm *should attempt* to achieve with its investment, financing and dividend policy decisions.

Profit Maximisation Decision Ceriterion

According to this approach, actions that increase profits should be undertaken and those that decrease profits are to be avoided. In specific operational terms, as applicable to financial management, the profit maximisation criterion implies that the investment, financing and dividend policy decisions of a firm should be oriented to the maximisation of profits.

The term 'profit' can be used in two senses. As a owner-oriented concept it refers to the amount and share of national income which is paid to the owners of business, that is, those who supply equity capital. As a variant it is described as profitability. It is an operational concepts and signifies economic efficiency. In other words, profitability refers to a situation where output exceeds input, that is, the value created by the use of resources is more than the total of the input resources. Used in this sense, profitability maximisation would imply that a firm should be guided in financial decision making by one test; select assets, projects and decisions which are profitable and reject those which are not. In the current financial literature, there is a general agreement that profit maximisation is used in the second sense.

The rationale & behind profitability maximisation, as a guide to financial decision making, is simple. Profit is a test of economic efficiency. It provides the yardstick by

which economic performance can be judged. Moreover, it leads to efficient allocation of resources, as resources tend to be directed to uses which in terms of profitability are the most desirable. Finally, it ensures maximum social welfare. The individual search for maximum profitability provides the famous 'invisible hand' by which total economic welfare is maximised. Financial management is concerned with the efficient use of an important economic resource (input), namely, capital. It is, therefore, argued that profitability maximisation should serve as the basic criterion for financial management decisions.

The profit maximisation criterion has, however, been questioned and criticized on several grounds. The reasons for the opposition in academic literature all into two broad groups: (i) those that are based on misapprehensions about the workability and fairness of the private enterprise itself, and (2) those that arise out of the difficulty of applying this criterion management, refers to an explicit operational guide for the internal investment and financing of a firm and not the overall goal of business operations. We, therefore, focus on the second type of limitations to profit maximisation as an objective of financial management. The main technical flaws of this criterion are ambiguity, timing of benefits, and quality of benefits.

Ambiguity. One practical difficulty with profit maximisation criterion for financial decision making is that the term-profit is a vague and ambiguous concept. It has no precise connotation. It is amenable to different interpretations by different people. To illustrate, profit may be short term or long term; it may be total profit or rate of profit; it may be before-tax or before-tax or after-tax; it may be return on total capital employed or total assets or shareholders equity and so on. If profit maximisation is taken to be the objectives, the question arises, which of these variable of profit should a firm try to maximise? Obviously, a loose expression like profit of operational criterion for financial management.

Timing of Benefits. A more important technical objection to profit maximisation, as a guide to financial decision making, is that it ignores the differences in the time pattern of the benefits received from investment proposals or courses of action. While working out profitability, *'the bigger the better'* principle is adopted, as the decision is based on the total benefits received over the working life of the asset, irrespective of when they were received. Consider Table 1.1

	Alternative A (Rs. Lakhs)	Alternative B (Rs. Lakhs)
Period I	50	–
Period II	100	100
Period III	50	100
Total	**200**	**200**

It can be seen from Table 1.1 that the total profits associated with the alternatives, A and B, are identical. If the profit maximisation is the decision criterion, both the alternatives would be ranked equally. But the returns form both the alternatives differ in one important respect, while alternative A provides higher returns in earlier years,

the returns from alternative B are larger in later years. As a result, the two alternative courses of "action are not strictly identical. This is primarily because a basic dictum of financial planning is the earlier the better as benefits received sooner are more voluble than benefits'. received later. The reason for the superiority of benefits now over benefits later lies in the fact that the former can be reinvested to earn a return. This is referred to as time value of money. The profit maximisation criterion does not consider the distinction between returns received in different time periods and treats all benefits irrespective of the timing, as equally valuable. This not true in actual practice as benefits in early years should be valued more highly than equivalent benefits in later years. The assumption of equal value is inconsistent with the real world situation.

Quality of Benefits. Probably the most important technical limitation of profit maximistion as an operational objective, is that it ignores the quality aspect of benefits associated with a financial course of action. The term quality here refers to the degree of certainty with which benefits can be expected. As a rule, the more certain the expected return, the higher is the quality of the benefits. Conversely, the more uncertain/ fluctuating is the expected benefits, the lower is the quality of the benefits. An uncertain and fluctuating return implies risk to the investors. It can be safely assumed that the investors are risk-averters, that is they want to avoid or at least minimise risk. They can, therefore, be reasonably expected to have a preference for a return which is more certain in the sense that it has smaller variance over the years.

The problem of uncertainty renders profit maximisation unsuitable as an operational criterion for financial management as it considers only the size of benefits and gives no weight to the degree of uncertainty of the future benefits. This is illustrated in Table 1.2.

Table 1.2 Uncertainty About Expected Benefits (Profits)

State of Economy	Alternative A	Alternative B
Recession (Period I)	9	0
Normal (Period II)	10	10
Boom (Period III)	11	20
Total	**30**	**30**

It is clear from Table 1.2 that the total returns associated with the two alternatives are identical in a normal situation but the range of variations is very wide in case of alternative B, while it is narrow in respect of alternative A. To put it differently, the earnings associated with alternative. B are more uncertain (risky) as they fluctuate widely depending on the state. of the economy. Obviously, alternative A is better in terms of risk and uncertainty, The profit maximisation criterion fails to reveal this,

To conclude, the profit maximisation criterion is inappropriate and unsuitable as an operational objective of investment, financing and dividend decisions of a firm. It is not only vague and time value of money. It follows from the above that an appropriate operational decision criterion for financial management should (i) be precise and exact, (ii) be based on the 'bigger the better' principal, (iii) consider both quantity and quantity dimensions of benefits, and (iv) recognise the time value of money. The alternative to profit maximisation, that is wealth maximisation is one such measure.

Wealth Maximisation Decision Criterion

This is also known as value maximisation or net present worth maximisation. In current academic literature value maximisation is almost universally accepted as an appropriate operations decision criterion for financial management decisions as it removes the technical limitations which characterise earlier profit maximisation criterion Its operational features satisfy all the three requirement of a suitable operation objective of financial courses of action, namely, exactness, quality of benefits and the time value of money.

The value of an asset should be viewed in terms of the benefits it can produce. The worth of a course of action can similarly be judged in terms of the value of the benefits it produces less the cost of undertaking it. A significant element in computing the value of a financial course of action, is the precise estimation of the benefits associated with it. The wealth maximisation criterion is based on the measurement of benefits in the case of the profit maximisation criterion. Cash flow is a precise concept with a definite connotation. Measuring benefits in terms of case flow avoids the ambiguity associated with accounting profits. This is the first operational feature of the net present worth maximisation criterion.

The second important feature of the wealth maximisation criterion is that it considers is that it considers both the quantity and quality dimensions of benefit. At the same, it also incorporates the time value of money. The operational implication of the uncertainty and timing dimensions of the benefits emanating from a financial decision is that adjustment should be made in the cash flow pattern, firstly, to incorporate risk and, secondly, to make an allowance for differences in the timing of benefits. The value of a course of action must be viewed in teams of its worth to those providing the resources necessary for its undertaking. In applying the value maximisation criterion, the term value is used in terms of worth to the owners, that is, ordinary shareholders. The capitalisation (discount) rate that is employed is, therefore, the rate that reflects the time and risk preferences of the result of higher risk longer time period. Thus, a stream of case flows that is quite certain might be associated with a rate a 5 per cent, while a very risky stream may carry a 15 per cent discount rate.

For the above reason the net present value maximisation is superior to the profits maximisation as an operational objective. As a decision criterion, it involves a comparison of value to cost. An action that has a discounted value – reflecting both time and risk that exceeds its cost can be said to create value. Such actions should be undertaking. Conversely, actions, with lees value than cost, reduce wealth and should be alternative with the greatest net present value should be selected. In the words of Ezra Solomon,

> *"The gross present worth of a course of action is equal to the capitalised value of the flow of future expected benefit, discounted (or capitalised) at a rate which reflects their certainty or uncertainty. Wealth or net present worth is the difference between gross present worth and the amount of capital investment required to achieve the benefits being discussed. Any financial action which creates wealth or which has a net present worth above zero is a desirable one and should be undertaken. Any financial action which does not meet this test should be rejected.*

Chapter-2
Cost of Capital

Cost of Capital is the rate that must be earned in order to satisfy the required rate of return of the firm's investors. It can also be defined as the rate of return on investments at which the price of a firm's equity share will remain unchanged.

Each type of capital used by the firm (debt, preference shares and equity) should be incorporated into the cost of capital, with the relative importance of a particular source being based on the percentage of the financing provided by each source of capital. Using of the cost a single source of capital as the hurdle rate is tempting to management, particularly when an investment is financed entirely by debt. However, doing so is a mistake in logic and can cause problems.

Future Cost and Historical Cost

Future cost of capital refers to the expected cost of funds to be raised to finance a project. In contrast, historical cost represents cost incurred in the past in acquiring funds. In financial decisions future cost of capital is relatively more relevant and significant. While evaluating viability of a project, the finance manager compares expected earnings from the project with expected cost of funds to finance the project. Likewise, in taking financing decisions, attempt of the finance manager is to minimise future cost of capital and not the costs already defrayed. This does not imply that historical cost is not relevant at all. In fact, it may serve as a guideline in predicting future costs and in evaluating the past performance of the company.

Component Cost and Composite Cost

A company may contemplate to raise desired amount of funds by means of different sources including debentures, preferred stock, and common stocks. These sources constitute components of funds. Each of these components of funds involves cost to the company. Cost of each component of funds is designated as component or specific cost of capital. When these component costs are combined to determine the overall cost of capital, it is regarded as composite cost of capital, combined cost of capital or weighted cost of capital, The composite cost of capital, thus, represents the average of the costs of each sources of funds employed by the company. For capital budgeting decision, composite cost of capital is relatively more relevant even though the firm may finance one proposal with only one source of funds and another proposal with another source. This is for the fact that it is the overall mix of financing over time which is materially significant in valuing firm as an ongoing overall entity.

Average Cost and Marginal Cost

Average cast represents the weighted average of the costs of each source of funds employed by the enterprise, the weights being the relative share of each source of funds in the capita! structure. Marginal cost of capital, by contrast refers to incremental cost associated with new funds raised by the firm. Average cost is the average of the component marginal costs, while the marginal cost is the specific concept used to comprise additional cost of raising new funds. In financial decisions the marginal cost concept is most significant.

Explicit Cost and Implicit Cost

Cost of capital can be either explicit cost or implicit. The explicit cost of any source of capital is the discount rate that equates the present value of the cash inflows that are incremental to the taking of the financing opportunity with the present value of its incremental cash outlay. Thus, the explicit cost of capital is the internal rate of return of the cash flows of financing opportunity.

A series of each flows are associated with a method of financing. At the time of acquisition of capital, cash inflow occurs followed by the subsequent cash outflows in the form, of interest payment, repayment of principal money or payment of dividends. Thus, if a company issues 10 per cent perpetual debentures worth Rs. 10,00,000, there will be cash inflow to the firm of the order of 10,00,00. This will be followed by the annual cash outflow of Rs. 1,00,000. The rate of discount, that equates the present value of cash inflows with the present value of cash outflows, would be the explicit cost of capital.

The technique of determination of the explicit cost of capital is similar to the one used to ascertain IRR, with one difference, in the case of computation of the IRR, the cash outflows occur at the beginning followed by subsequent cash inflows while in the computation of the IRR, the cash outflows occur at the beginning followed by subsequent cash inflows, while in the computation of explicit cost of capital, cash inflow takes place at the beginning followed by a series of cash inflow subsequently.

The formula used to compute the explicit cost of capital (C) is:

$$CI_0 = \sum_{t=1}^{n} \frac{CO^t}{(1+C)^t} \qquad \qquad ...(1)$$

Where,

$\quad CI_0$ = net cash inflow in period O.

$\quad CO^t$ = cash outflow in period under reference

$\quad C$ = Explicit cost of capital

The explicit cost of an interest bearing debt will be the discount rate that equates the present value of the contractual future payments of interest and principal with the net amount of cash received today. The explicit cost of capital of a gift is minus 100 per cent, since no cash outflow will occur in future.

Similarly, explicit cost of retained earnings which involve no future flows to or from the firm is minus 100 per cent. This should not tempt one to infer that the retained earnings is cost free. As we shall discuss in the subsequent paragraphs, retained earnings do cost the firm. The cost of retained earnings is the opportunity cost of earning on investment elsewhere or in the company itself. Opportunity cost is technically termed as implicit cost of capital. It is the rate of return on other investments available to the firm or the shareholders in addition to that currently being considered. Thus, the implicit cost of capital may be defined as 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 this connection it may be mentioned that explicit costs arise when the firm raises funds for financing the project. It is in this sense that retained earnings has implicit cost. Other forms of capital also have implicit costs once they are invested, Thus in a sense, explicit costs may also be viewed as opportunity costs. This implies that a project should be rejected if it has a negative present value when its cash flows are discounted by the explicit cost of capital.

It is clear thus that the *cost of capital* is the rate of return a firm must earn on its investments for the market value of the firm to remain unchanged. Acceptance of projects with a rate of return below the cost of capital will decrease the value of the firm; acceptance of projects with a rate of return above the cost of capital will increase the value of the firm. The objective of the financial manager is to maximize the wealth of the firm's owners. Using the cost of capital as a basis for accepting or rejecting investments is consistent with this goal.

Risk

A basic assumption of traditional cost of capital analysis is that *the firm's business and financial risk are unaffected* by the acceptance and financing of projects.

Business risk is related to the response of the firm's earnings before interest and taxes, or operating profits, to changes in sales. When the cost of capital is used to evaluate investment alternatives, it is assumed that acceptance of the proposed projects will not affect the firm's business risk. The types of projects accepted by a firm can greatly affect its business risk.

If a firm accepts a project that is considerably more risky than average, suppliers of funds to the firm are quite likely to raise the cost of funds. This is because of the decreased probability of the fund suppliers' receiving the expected returns on their money. A long-term lender will charge higher interest on loans if the probability of receiving periodic interest from the firm and ultimately regaining the principal is decreased. Common stockholders will require the firm to increase earnings as compensation for increases in the uncertainty of receiving dividend payments or ably appreciation in the value of their stock.

In analyzing the cost of capital it is assumed that the business risk of the firm remains unchanged (i.e., that the projects accepted do not affect the variability of the firm's sales revenues). This assumption eliminates the need to consider changes in the cost of specific sources of financing resulting from changes in business risk. The definition

of the cost of capital developed in this chapter is valid only for projects that do not change the firm's business risk.

Financial risk is affected by the mixture of long-term financing, or the capital structure, of the firm. Firms with high levels of long-term debt in proportion to their equity are more risky than firms maintaining lower ratios of long-term debt to equity. It is the contractual fixed-payment obligations associated with debt financing that make a firm financially risky. The greater the amount of interest and principal (or sinking-fund) payments a firm must make in a given period, the higher the operating profits required to cover these charges. If a firm fails to generate sufficient revenues to cover operating charges, it may be forced into bankruptcy.

As a firm's financial structure shifts toward suppliers of funds recognize a more highly levered position the increased financial risk associated with the firm. They compensate for this increased risk by charging higher rates of interest or requiring greater returns, In short they react in much the same way as they would to increasing business risks.

Frequently the funds supplied to a firm by lenders will change its financial structure, and the charge for the funds will be based on the changed financial structure. In the analysis of the cost of capital in this chapter, however, the firm's financial structure is assumed to remain fixed. This assumption is necessary in order to isolate the costs of the various forms of financing. If the firm's capital structure were not held constant, it would be quite difficult to find its cost of capital, since the selection of a given source of financing would change the costs of alternate sources of financing. The assumption of a constant capital structure implies that when a firm raises funds to finance a given project these funds are raised in the same proportions as the firm's existing financing. The awkwardness of this assumption is obvious since in reality a firm raises funds in "lumps," it does not raise a mixture of small amounts of various types of funds.' For example, in order to raise Rs. l million a firm may sell either bonds, preferred stock, or common stock in the amount of Rs. l million; or, it may sell Rs. 400,000 worth of bonds, Rs. 100,000 worth of preferred stock, and Rs. 500,000 worth of common stock. Most firms will use the former strategy, but our analysis of cost of capital is based on the assumption that the firm will follow the latter strategy. More sophisticated approaches for measuring the cost of capital when a firm's capital structure is changing rare available.

The key factor affecting financing Costs

Since the cost of capital is measured under the assumption that both the firm's asset structure and its capital (financial) structure are fixed, the only factor that affects the various specific costs of financing is the supply and demand forces operating in the market for long-term funds. In other words, as a firm raises long-term funds at different points in time, the only factor affecting their cost is the riskless cost of the particular type of financing. Regardless of the type of financing used, the following relationship should prevail:

$$kj = rj + b + f \qquad\qquad\qquad ...(2)$$

where

kj = the specific cost of the various types of long-term financing, j

rj = the riskless cost of the given type of financing, j

b = the business risk premium

f = the financial risk premium

Equation 2 indicates that the cost of each specific type of capital depends on he riskless cost of that type of funds, the business risk of the firm, and the financial risk of the firm.

Since the firm's business and financial risk are assumed to be constant, the changing cost of each type of capital, *j*, over time should be affected only by changes in the *supply of and demand for* each type of funds, *j*. The cost of each type of capital to a given firm compared to the cost to another firm (i.e., the *inter firm* comparison) can differ because of differences in the degree of business and financial risk associated with each firm, since the riskless cost of the given type of funds remains constant. Different business and financial risk premiums are associated. with different levels of business and financial risk. These premiums are a function of the business risk, *b*, and financial risk, *f*, of a firm. For *intra firm* (i.e., time series) comparisons, the only differentiating factor is the cost of the type of financing, since business and financial risk are assumed to be constant An example may help to clarify these points.

Example

The W.T. L. Company's cost of long-term debt two years ago was 8 percent. This 8 percent was found to represent a 4- percent risk less cost of long-term debt, a 2-percent financial risk premium. and a 2- petcent financial risk premium. Currently, the risk less cost of long-term debt is 6 percent. How much would you expect the W. T. L.'s cost of debt to be today, assuming that the risk structure of the firm's assets (business risk) and its capital structure (financial risk) have remained unchanged? The previous business risk premium of 2 percent and financial risk premium of 2 percent will still prevail, since neither of these risks has changed in two years. Adding the 4 percent total risk premiums (i.e., the 2-percent business risk and the 2-percent financial risk premium) to the 6-percent riskless cost of long-term debt results in a cost of long-term debt to the W. T. L. Company of 10 percent. In this time-series comparison, where business risk and financial risk are assumed to be constant, the cost of the long-term funds changes only in response to changes in the riskless cost of a given type of funds.

Let us now suppose that there is another company, the Plate Company, for which the risk less cost of long-term debt is the same as it is for W. T. L. The Plate Company has a 2-percent business risk premium and a 4-percent financial risk premium because of the high degree of leverage in its financial structure. Although both companies are in the same type of business (and thus have the same business risk premium of 2 percent), the cost of long-term debt to the Plate Company is 12 percent (i.e., the dpercent riskless cost of money.

Although the relationship between *lj, b*, and *t*, is presented as linear in Equation A, this is only for simplicity; the actual relationship is likely to be much more complex mathematically. The only definite conclusion that can be drawn is that the cost of a

specific type of financing for a firm is somehow functionally related to the riskless cost of that type of financing adjusted for the firm's business and financial risk (i.e., that $kj = f(r; b, f)$.

The reader should recognize that the riskless cost of each type of financing, 'I, may differ considerably. In other words, at a given point in time the riskless cost of debt may be 6 percent while the riskless cost of common stock may he 9 percent. The riskless cost is expected to be different for each type of financing, j. The risk less cost of different maturities of the same type of debt may differ, since longer-term Issues are generally viewed as more risky.

Factors determining the cost of capital

There are several factors that impact the cost of capital of any company. This would mean that the cost of capital of any two companies would not be equal. Rightly so as these two companies would not carry the same risk.

- **General economic conditions:** These include the demand for and supply of capital within the economy, and the level of expected inflation. These are reflected in the riskless rate of return and is common to most of the companies.

- **Market conditions:** The security may not be readily marketable when the investor wants to sell; or even if a continuous demand for the security does exist, the price may vary significantly. This is company specific.

- **A firm's operating and financing decisions:** Risk also results from the decisions made within the company. This risk is generally divided into two classes:
  - Business risk is the variability in returns on assets and is affected by the company's investment decisions.
  - Financial risk is the increased variability in returns to the common stockholders as a result of using debt and preferred stock.

- **Amount of financing required:** The last factor determining the company's cost of funds is the amount of financing required, where the cost of capital increases as the financing requirements become larger. This increase may be attributable to one of the two factors:
  - As increasingly larger public issues are increasingly floated in the market, additional flotation costs (costs of issuing the security) and underpricing will affect the percentage cost of the funds to the firm.
  - As management approaches the market for large amounts of capital relative to the firm's size, the investors' required rate of return may rise. Suppliers of capital become hesitant to grant relatively large amounts of funds without evidence of management's capability to absorb this capital into the business.

Generally, as the level of risk rises, a larger risk premium must be earned to satisfy company's investors. This, when added to the risk-free rate, equals the firm's cost of capital.

Significance of the Cost of Capital

It should be recognized at the outset that the cost of capital is one of the most difficult and disputed topics in the finance theory. Financial experts express conflicting opinions as to the way in which the cost of capital can be measured. It should be noted that it is a concept of vital importance in the financial decision-making. It is useful as a standard for:

- evaluating investment decisions,

- designing a firm's debt policy, and

- appraising the financial performance of top management.

Investment evaluation The primary purpose of measuring the cost of capital is its use as a financial standard evaluating the investment projects. In the NPV method, an investment project is accepted if it has a positive NPY. The project's NPV is calculated by discounting its cash flows by the cost of capital. In this sense, the cost of capital is the discount rate used for evaluating the desirability of an investment project. In the IRR method, the investment project is accepted if it has an internal rate of return greater than the cost of capital. In this context, *the cost of capital is the minimum return on an investment project*. It is also known as the cutoff, or the target, or the hurdle rate.

An investment project that provides .positive NPV when its cash flows are discounted by the cost of capital makes a *net* contribution to the wealth of shareholders. If the project has zero NPV, it means that its a return just equal to the cost of capital, and the acceptance or rejection of the project will not affect the wealth of shareholders The cost of capital is the minimum required rate of return on the investment project that keeps the present wealth of shareholders unchanged. It may be, thus, noted that the cost of capital represents a financial standard for allocating the firm's funds, supplied by owners and creditors, to the various investment projects in the most efficient manner.

Designing debt policy The debt policy of a firm is significant influenced by the cost consideration. In designing the financing policy, that is, the proportion of debt and equity in the capital structure, the firm aims at cost of capital. The relationship between the cost of capital and the capital structure decision is discussed later on.

The cost of capital can also be useful in deciding about the methods of financing at a point of time. For example, cost may be compared in choosing between leasing and borrowing. Of course, equally important considerations are control and risk.

Performance appraisal Further, the cost of capital framework can be used to evluate the financial performance of top management. I Such an evaluation will involve a comparison of actual profitability of the investment projects undertaken by the firm with the project overall cost of capital, and the actual cost incurred by management in raising the required funds.

The cost of capital also plays a useful role in dividend decision and investment in current assets. The chapters dealing with these decisions show their linkages the methods of financing with the cost of capital.

Measurement

Time Value of Money

If an individual behaves rationally, then he would not equate money in hand today with the same value a year from now. In fact, he would prefer to receive today than receive after one year. The reasons sited by him for preferring to have the money today include:

1.   Uncertainty of receiving the money later.

2.   Preference for consumption today.

3.   Loss of investment opportunities.

4.   Loss in value because of inflation.

The last two reasons are the most sensible ones for looking at the time value of money. There is a 'risk free rate of return' (also called the time preference rate) which is used to compensate for the loss of not being able to invest at any other place. To this a 'risk premium' is added to compensate for the uncertainty of receiving the cash flows.

> Required rate of return = Risk free rate + Risk premium

The risk free rate compensates for opportunity lost and the risk premium compensates for risk. It can also be called as the 'opportunity cost of capital' for investments of comparable risk.

To calculate how the firm is going to benefit from the project we need to calculate whether the firm is earning the required rate of return or not. But the problem is that the projects would have different time frames of giving returns. One project may be giving returns in just two months, another may take two years to start yielding returns. If both the projects are offering the same %age of returns when they start giving returns, one which gives the earnings earlier is preferred.

This is a simple case and is easy to solve where both the projects require the same capital investment, but what if the projects required different investments and would give returns over a different period of time? How do we compare them? The solution is not that simple. What we do in this case is bring down the returns of both the projects to the present value and then compare. Before we learn about present values, we have to first understand future value.

Future Value

If we are getting a return of 10 % in one year what is the return we are going to get in two years? 20 %, right. What about the return on 10 % that you are going to get at the end of one year? If we also take that into consideration the interest that we get on this 10 % then we get a return of $10 + 1 = 11$ % in the second year making for a total return of 21 %. This is the same as the compound value calculations that you must have learned earlier

Future Value = (Investment or Present Value) * (1 + Interest) No. of time Periods

The compound values can be calculated on a yearly basis, or on a half-yearly basis, or on a monthly basis or on continuous basis or on any other basis you may so desire. This is because the formula takes into consideration a specific time period and the interest rate for that time period only.

To calculate these values would be very tedious and would require scientific calculators. To ease our jobs there are tables developed which can take care of the interest factor calculations so that our formulas can be written as:

Future Value = (Investment or Present Value) * (Future Value Interest Factor n,i)

where n = no of time periods and i = is the interest rate.

Let us look at an example of how we calculate the future value:

Example

Rs 7000 are invested at 5% per annum compound interest compounded annually. What will be the amount after 20 years?

Solution

Here i = 0.05, P = 7000, and n = 20. Putting it in the formula we get:

FV = 7000 x (1+0.05)20

FV = 7000 x 2.6533 = Rs 18573.1

We have taken a shortcut here. We looked at the future value of Rs 1 at the end of 20 years at 5% interest in the Future Value Interest Factor Table given at the end of this book (i.e. find the value of Future Value Interest Factor n,i)and found the figure to be 2.6533 and then substituted the figure here to get the answer.

Another way of doing it would be to use a scientific calculator and calculate the value that comes out to be the same.

A third way of doing this would be even more simple. Use a spreadsheet program. Let us see how we use Microsoft Excel to do the same.

Step 1: Go to the Insert menu and choose function. You get a screen that looks like this:
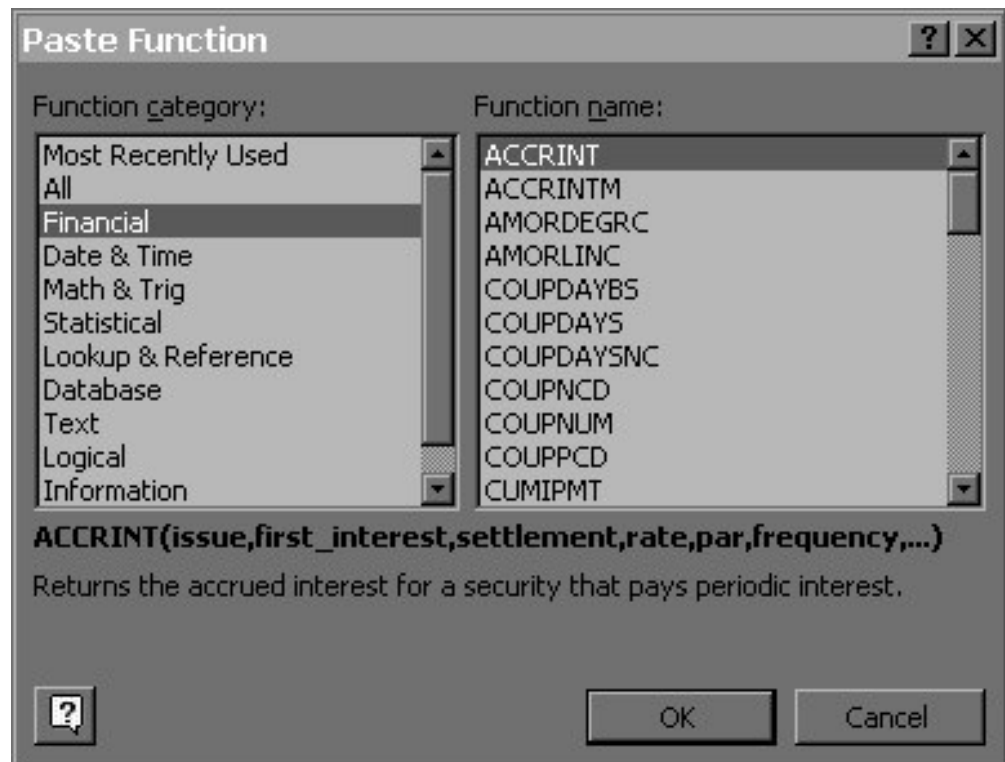
Step 2: In the financial function category choose FV (it stands for Future Value) and press OK.
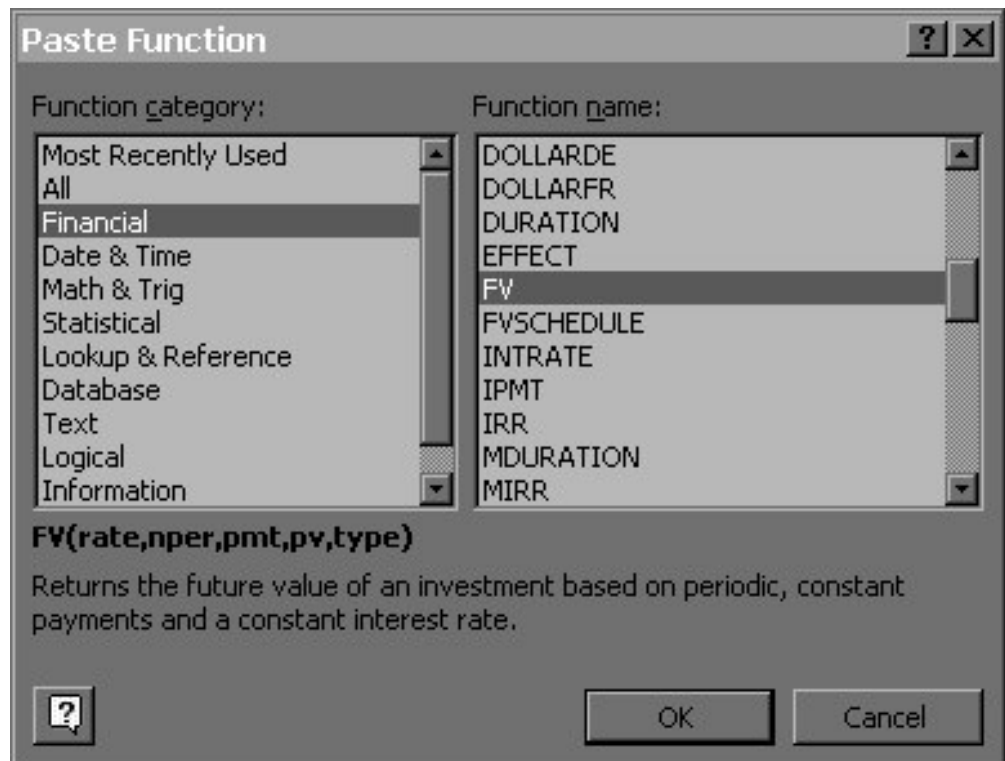
Step 3: You would get a screen that would look like this:

```
┌─FV──────────────────────────────────────────────────────────────────────┐
│                                                                           │
│          Rate  [                                      ] ▣  = number       │
│                                                                           │
│          Nper  [                                      ] ▣  = number       │
│                                                                           │
│           Pmt  [                                      ] ▣  = number       │
│                                                                           │
│            Pv  [                                      ] ▣  = number       │
│                                                                           │
│          Type  [                                      ] ▣  = number       │
│                                                                           │
│                                                                   =       │
│  Returns the future value of an investment based on periodic, constant    │
│  payments and a constant interest rate.                                   │
│            Rate is the interest rate per period.                          │
│                                                                           │
│   [?]     Formula result =                          [  OK  ]  [ Cancel ]   │
└───────────────────────────────────────────────────────────────────────────┘
```

Step 4: Insert the values as given in the example. Here r = I = 0.05, Nper is the number of periods = 20, Pmt is the periodic annuity (how to use it we will see a little later) = 0 in this case as there is no annual payment except the first one. Pv is the present value = Rs 7000 in this case and Type is a value representing the timing of the payment = 0 in this case as the investment is done at the end of the period 0 or at the start of the period 1. This also means that we get the returns at the end of the period 20 simultaneously when we make the last payment. Putting these values we get the following screen.

Note that the result of the figures that you input is shown in the formula result section where it is Rs 18,573.08. Compare this with the figure that you get from using the value from the table, a difference of Rs 0.02. Negligible.

What if the money was payable at the start of the period rather than at the end of the period? Here it does not matter as there is only one investment and that is also at the start of the first period. It would matter when we look at the future value of the annuity. But what is an annuity anyway?

```
┌─FV──────────────────────────────────────────────────────────────────────┐
│                                                                           │
│          Rate  [0.05                                 ] ▣  = 0.05          │
│                                                                           │
│          Nper  [20                                   ] ▣  = 20            │
│                                                                           │
│           Pmt  [0                                    ] ▣  = 0             │
│                                                                           │
│            Pv  [7000                                 ] ▣  = 7000          │
│                                                                           │
│          Type  [0|                                   ] ▣  = 0             │
│                                                                           │
│                                                     = -18573.08394        │
│  Returns the future value of an investment based on periodic, constant    │
│  payments and a constant interest rate.                                   │
│            Type is a value representing the timing of payment: payment     │
│                 at the beginning of the period = 1; payment at the end     │
│                 of the period = 0 or omitted.                             │
│                                                                           │
│   [?]     Formula result =($18,573.08)              [  OK  ]  [ Cancel ]   │
└───────────────────────────────────────────────────────────────────────────┘
```

Future Value of an Annuity

Annuity is defined as periodic payment every period for a number of periods. This periodic payment is the same every year only then it could be called an annuity. The compound value (future value) of this annuity can be calculated using a different formula:

$$\text{Future Value} = A\left[\frac{[(1+i)^n - 1]}{i}\right]$$

Here A is the constant periodic cash flow (annuity), i is the rate of return for one period and n is the number of time periods. The term within the brackets is the compound value factor of an annuity. We can also use the tables given at the end of the text book to calculate the compound values of the cash flows and the formula would change to:

Future Value = Annuity * (Future Value Annuity Factor$_{n,i}$)

Extending the same example we used above, if we were going to pay Rs 7000 every year for the next 20 years what is the value at the end of 20 years if the interest rate was 5 % compounded annually.

Example

An annual payment of Rs 7000 is invested at 5% per annum compounded annually. What will be the amount after 20 years?

Solution

Here i = 0.05, P = 7000, and n = 20. Putting it in the formula we get:

$$\text{Fugure Value} = 7000\left[\frac{[(1+0.005)^{20} - 1]}{0.05}\right]$$

FV = 7000 x 33.066 = Rs 2,31,462

We have taken a shortcut here. We looked at the future value of Rs 1 at the end of 20 years at 5% interest in the Future Value Annuity Factor Table given at the end of this book (i.e. find the value of Future Value Annuity Factor n,i)and found the figure to be 33.066 (try finding the figure yourself) and then substituted the figure here to get the answer. Another way of doing it would be to use a scientific calculator and calculate the value that comes out to be the same.

Let us see how we use Microsoft Excel to do the same. Insert the values as given in the example. Here r = I = 0.05, Nper is the number of periods = 20, Pmt is the periodic annuity = 7000. Pv is the present value = 0 in this case as it an annuity and Type is a value representing the timing of the payment = 0 in this case as the first investment is

done at the end of the period 1. Note that in the earlier case this also means that we get the returns at the end of the period 20 simultaneously when we make the last payment. Putting these values we get the following screen.

Can you find the answer? Yes, it is Rs 231,461.68 a difference of Rs 0.32 from the answer we got using the table above.

A variation on this would be that the payment made at the start of the period instead of the end of the period. This means that you earn extra interest for one year. The formula is slightly different in that the whole value is multiplied by (1+i) resulting in the following formula:

$$\text{Future Value} = A \left[\frac{[(1+i)^n - 1]}{i} \right] (1+i)$$

In the excel spreadsheet we just have to change the type to 1 to get the desired result.

The result now comes to Rs 243,034.76, which is nothing but the earlier figure of The result now comes to Rs 2,43,034.76, which is nothing but the earlier figure of Rs 2,31,461.68 multiplied by 1.05 (i.e. 1+i).

Still this leaves one problem unanswered: If the projects have different time spans (which could be as far apart as 50 years or more) how do we use the results that we get from here to compare. It becomes very difficult. Also we cannot be too sure of the discounting rates and cash flows so getting comparable values would be difficult to say the least. To solve this problem we solve for the present value.

Present Value

When we solve for the present value, instead of compounding the cash flows to the future, we discount the future cash flows to the present value to match with the investments that we are making today. Bringing the values to present serves two purposes:

1. The comparison between the projects become easier as the values of returns of both are as of today, and

2. We can compare the earnings from the future with the investment we are making today to get an idea of whether we are making any profit from the investment or not.

For calculating the present value we need two things, one, the discount rate (or the opportunity cost of capital) and two, the formula.

The present value of a lump sum is just the reverse of the formula of the compound value of the lump sum:

$$\Pr esentValue = \frac{FutureValue}{(1+i)^{n}}$$

Or to use the tables the change would be:

> Present Value = Future Value * (Present Value Interest Factor n,i)
>
> where n = no of time periods and i is the interest rate.

Let us look at an example of how we calculate the future value:

Example

Rs.2,00,000 is the amount that you require after 20 years for your retirement. How much should you invest now at 5% per annum compounded annually?

Solution

> Here i = 0.05, FV = 2,00,000, and n = 20. Putting it in the formula we get:

$$\Pr esentValue = \frac{200000}{(1+0.05)^{20}}$$

Solve this or use the present value table.

Using the present value interest factor table we find that present value of Rs 1 of 20 years from now at 5% interest is 0.3769. Multiplying it with the future value Rs 2,00,000 we get:
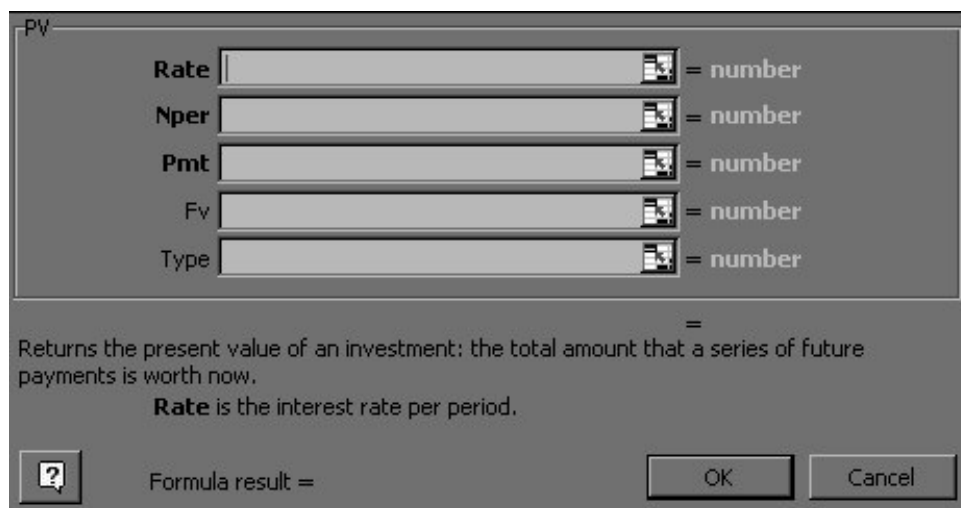
PV = 2,00,000 x 0.3769 = Rs 75,380

Let us see how we use Microsoft Excel to do the same.

Step 1: Go to the Insert menu and choose function. In the financial function category choose PV (it stands for Present Value) and press OK.
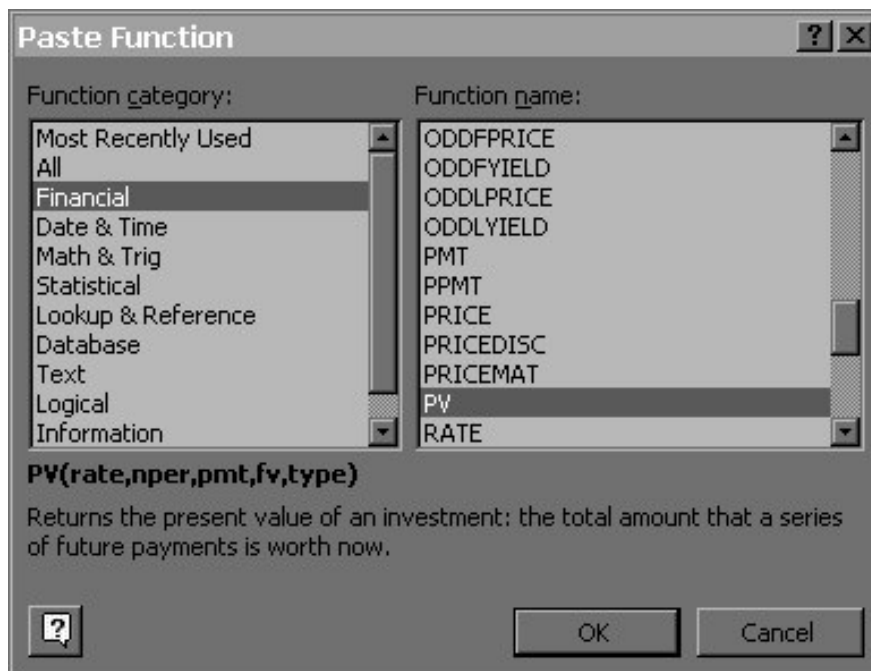
Step 3: You would get a seen that would look like this:

Step 4: Insert the values as given in the example. Here r = I = 0.05, Nper is the number of periods = 20, Pmt is the periodic annuity (how to use it we will see a little later) = 0 in this case as there is no annual payment except the first one. Fv is the future value = Rs 2,00,000 in this case and Type is a value representing the timing of the payment = 0 in this case. Putting these values we get the following screen.

Note that the result of the figures that you input is shown in the formula result section where it is Rs 75,377.89. Compare this with the figure that you get from using the value from the table, a difference of Rs 2.11. Negligible, but still higher than the differences we used to get in the future value. Can you tell why? This is because of the fact that while dividing you require numbers more than four digits to get accuracy.

What if the money was payable at the start of the period rather than at the end of the period? Here it does not matter as there is only one future value and that is also at the start of the first period. It would matter when we look at the present value of the annuity.

Present Value of an Annuity

The present value of an annuity can be calculated by:

$$\Pr esentValue = A\left[\frac{[(1+i)^n - 1]}{i(1+i)^n}\right]$$

Or to use the tables the change would be:

Present Value = Annuity * (Present Value Annuity Factor n,i)

Let us see an example

Example

You have been promised an annual grant of Rs 7000 every year for the next 20 years

If you can invest the amount at 5% per annum compounded annually what will be the amount you would require today to land up with the same position?

Solution

Here i = 0.05, A = 7000, and n = 20. Putting it in the formula we get:

Using the shortcut from the table we get:

$$\Pr esentValue = 7000 \left[\frac{[(1+0.05)^{20} - 1]}{0.05(1+0.05)^{20}} \right]$$

PV = 7000 x 12.4622 = Rs 87,235.4

We looked at the present value of an annuity of Rs 1 for 20 years at 5% interest in the Present Value Annuity Factor Table given at the end of this book (i.e. find the value of Present Value Annuity Factor n,i)and found the figure to be 12.4622 (try finding the figure yourself) and then substituted the figure here to get the answer. Another way of doing it would be to use a scientific calculator and calculate the value that comes out to be the same.

Let us see how we use Microsoft Excel to do the same. Insert the values as given in the example. Here r = I = 0.05, Nper is the number of periods = 20, Pmt is the periodic annuity = 7000 in this case. Fv is the future value = 0 in this case as it is an annuity and Type is a value representing the timing of the payment = 0 in this case as the first investment is done at the end of the period 1. Putting these values we get the following screen.

Can you find the answer? Yes, it is Rs 87,235.47 a difference of Rs 0.07 from the answer we got using the table above.

A variation on this would be that the payment made at the start of the period instead of the end of the period. This means that you earn extra interest for one year. The formula is slightly different in that the whole value is multiplied by (1+i) resulting in the following formula:

$$\Pr esentValue = A\left[\frac{[(1+i)^n - 1]}{i(1+i)^n}\right](1+i)$$

In the excel spreadsheet we just have to change the type to 1 to get the desired result.

The result now comes to Rs 91,597.25, which is nothing but the earlier figure of Rs 87,235.47 multiplied by 1.05 (i.e. 1+i).

Perpetuity

If the annuity is expected to go on forever then it is called a perpetuity and then the above formula reduces to:

$$\Pr esentValue = \frac{A}{i}$$

Perpetuities are not very common in financial decision making as no project is expected to last forever but there could be a few instances where the returns are expected to be for a long indeterminable period. Especially when calculating the cost of equity perpetuity concept is very useful.

For a growing perpetuity the formula changes to:

$$\Pr esentValue = \frac{A}{i - g}$$

All these calculations take into consideration that the cash flow is coming at the end of the period.

Valuing Securities

The objective of any investor is to maximise expected returns from his investments,

subject to various constraints, primarily risk. Return is the motivating force, inspiring the investor in the form of rewards, for undertaking the investment. The importance of returns in any investment decision can be traced to the following factors:

- It enables investors to compare alternative investments in terms of what they have to offer the investor.

- Measurement of past returns enables the investors to assess how well they have done.

- Measurement of historical returns also helps in estimation of future returns.

Why are we discussing the return so much? The value of the security to an investor is directly proportional to the return that he is expected to get from that security. Higher the return expected, higher is the value. But what are we going to do with the value of the security? Well, value of the security is the price that you are going to pay for that security. This means that the present value of the security is that value which is dependent on the return from the security and the risk profile of that security. Now let us go further on return.

The Components of Return

Return is basically made up of two components:

- The periodic cash receipts or income on the investment in the form of interest, dividends, etc. The term yield is often used in connection with the component of return. Yield refers to the income derived from a security in relation to its price, usually its purchase price.

- The appreciation (depreciation) in the price of the asset is referred to as capital gain (loss). This is the difference between the purchase price and the price at which the asset can be, or is, sold.

Measuring the Rate of Return

The rate of return is the total return the investor receives during the holding period (the period when the security is owned or held by the investor) stated as a %age of the purchase price of the investment at the beginning of the holding period. In other words it is the income from the security in the form of cash flows and the difference in price of the security between and the end of the holding period expressed as a %age of the purchase price of the security at the beginning of the holding period. Hence, total return can be defined as:

$$\text{Total Returns} = \frac{\text{Cash Payment received} + \text{Price change over the period}}{\text{Purchase price of the asset}}$$

The price change over the period, is the difference between the beginning (or purchase) price and the ending (or sales) price. This can be either positive (sales price exceeds purchase price) or negative (purchase price exceeds sales price).

The general equation for calculating the rate of return for one year is shown below:

$$K = \frac{[D_t + (P_t - P_{t-1})]}{P_{t-1}}$$

where   K   =   Rate of Return

P_t =   Price of the security at time "t" i.e. at the end of the holding period.

P_{t-1} =   Price of the security at time "t-1" i.e. at the beginning of the holding period or purchase price.

D_t =   Income or cash flows receivable from the security at time "t".

Valuing Debt Securities

Securities that promise to pay its investors a stated rate of interest and return the principal amount at the maturity date are known as debt securities. The maturity period is typically more than one year which is the key differentiating factor between them and the money market securities. Debt securities are usually secured. Debt securities differ according to their provisions for payment of interest and principal, assets pledged as a security and other technical aspects. In the case of bankruptcy of the corporation, the law requires that the debt holders should be paid off before the equity investors.

A legal agreement, called a trust deed, is drawn between the security holders and the company issuing the debt securities. Every security issued under it has the same right and protection. Trust deed is a complicated legal document containing restrictions on the company, pledges made by the company, and several other details. The trustee, usually a large bank or a financial institution, ensures that the issuing corporation keeps its promises and obeys the restrictions of the contract. The trustee is the watchdog for the debt securities holders because it is impossible for the individual holders to keep an eye on the functioning of the company.

Debt securities are different from term loans provided by the financial institutions and the banks to the company. Term loans are long term debt contracts under which a borrower agrees to make a series of interest and principal payments on specific dates to the lender. While this is true for debt securities also, term loans differ in one significant aspect that they are generally sold to one (or few) lenders especially financial institutions and banks, while debt securities (terms 'debentures' and 'bonds' will be used interchangeably for debt securities) are typically offered to the public. Another significant difference is that principal repayments in term loans are made along with the interest

payments but in debt securities it is usually a lump sum payment at the end of the period (or a series of payments).

Terms Associated with Debt Securities

There are several terms which are used when we talk about debt securities. Before we take a look at different kinds of debt securities available in the Indian market, let us first understand these terms.

Face Value/ Par Value

Value of the security as mentioned on the certificate of the security. Face values and par values are two terms which are used interchangeably. Corporate debentures are usually issued with Rs.100 face values and Government bonds with Rs.1 lac face values. Although the value of the debenture (or the Government bond) will fluctuate in price from the time they are issued until redemption, they are usually redeemed at maturity at their face value (unless a premium is to be given on redemption).

The face value is the amount on which the interest is calculated. Thus, a 15 per cent debenture with a face value of Rs.100 will pay debenture holders Rs.15 per debenture per year.

Coupon Rate

The coupon rate is the stipulated interest rate to be paid on the face value of a bond. It represents a fixed rupee amount that is paid periodically as long as the debtor is solvent. The period could be monthly, quarterly, semi-annually or annually. Zero-coupon bonds (discussed later) are also common. The coupon rate could be a fixed rate or a floating rate. The floating rate is normally pegged to a base rate (e.g. 1 per cent above bank rate) and fluctuates with the fluctuation in the base rate. The coupon rate is fixed after the issuing corporation's merchant banker has weighed the risk of default, the credit rating of the issuer, options attached with the issue, the investment position of the industry, the security backing of the debenture, and the appropriate market rate of interest for the firm's industry, size, and risk class. The goal is to pick a coupon rate that is just high enough to attract investors.

Interest payments

Debenture interest is usually paid semi-annually, though annual payments are not uncommon. In India we normally have registered debentures on which the interest is payable to the debenture holder whose name appears on the register when the payment is made. In developed countries, coupon bonds are also available which have a series of attached coupons that are clipped off at the appropriate times and sent to a bank for collection of the interest. Of course, now with the Electronic Clearing System, the interest can be directly deposited in the bank account of the bond holder.

Maturities

Debentures are sometimes grouped by the length of time until maturity that existed on the date the debenture was first issued. Money Market Securities mature in 364 days or less. Short-term debentures are those maturing within 1 to 3 years. Medium term debentures mature between 5 to 8 years and long term debentures are the ones who have a maturity life of 10 years or more.

Redemption

Redemption is the repayment of the debt security at or before maturity. Redemption could at par or at a premium to face value. A debt security will be redeemed before maturity if the issuer feels that he can borrow the same amount at a lower rate of interest or he does not require the funds any longer. If there is a premature redemption (redemption before the maturity date), a premium is usually paid to the debenture holders.

Call/ Put Options Provision

A call/ put option provision allow both the issuing company and the investor to redeem the bonds at a specified amount before the maturity date. Long term bonds (10 years or more) usually have a call/ put option is attached to the bond which is (usually) exercisable after every 5 year intervals. In this case the issuing company has a call option that it can call back the bonds and repay to the investors the principal and interest due till that date. If the issuer exercises his call option the investor has no recourse but to submit his bonds and get the money. Similarly the investor has a put option, in which case he has an option to return the bonds and get the principal and interest till that date. As in earlier case if the investor exercises his option, the company has no recourse but to pay the investor.

Issuing corporation will use the provision if the interest rates fall substantially below the coupon rates offered on the security and the investor will use the put option if he can get better returns elsewhere.

For bonds with call/ put options the yields are calculated to the nearest year at which the call/ put option is exercisable. This yield is known as yield to call (YTC) which is different from the yield to maturity (YTM).

Sinking Fund

A provision that requires the corporation to set aside a fixed amount each year to help provide for the orderly repayment of the debt issue.

Credit Rating

It is mandatory for the issuing companies to get the credit rating done on debt securities issues. Credit ratings are also mandatory for Commercial Paper and Fixed Deposits issues of the companies. Ratings reflect the probability of the companies going into default. The higher the rating, the lower the risk of default that is associated with the

issue. This also has an effect on the rate of interest offered on the issue. The methodology and the rating symbols remain the same as in money market securities.

Types of Debt Securities

There are several types of debt securities available in the market. The range includes Government Securities, debentures, deep discount bonds, zero coupon bonds, etc.

Government Securities

Government is one of the biggest borrowers from the capital and the money market. We have already taken a look at the money market securities offered by the Government as also the schemes run by it through the post office. Government Securities is the generic term applied to various kinds of debentures and bonds offered by the Government (centre or state) and quasi-governmental agencies.

The maturities of the Government securities range between 1-20 years and the return on the securities range between 5 to 7 per cent. The rates have significantly come down from the high yields of 14 per cent registered in 1996. Most of the Government Securities are bought by the banks, financial institutions, provident fund trusts, insurance companies.

There are two types of Government Securities that are offered:

Government of India Floating Rate Bonds Bonds which pay a floating rate depending upon the base rate announced by the RBI.

Government Securities Regular debentures which pay a fixed rate of return and the principal amount is returned on maturity. The last issue of government stock paid a coupon rate of 6.50 per cent.

The present yield on Government Securities is in the range of 5.50 - 7.00 per cent depending on the maturity.

Non-Convertible Debentures (NCDs)

NCDs are plain debenture securities issued by corporations. They are normally medium term in nature, maturing between 1 to 8 years and generally have a repayment schedule staggered over two to three years. They are secured by a collateral backing and credit rated. Interest rate offered on medium term NCDs is usually lower than the market rate so many times the companies offer a sop of equity warrants along with NCDs to sweeten the issue. Interest rate on the short term NCDs is in line with the market rate and depends upon the quality of the issuer.

Deep Discount Bond (DDB)

Usually long term with maturities exceeding 10 years, deep discount bonds are normally issued by blue chip corporations or financial institutions. Like money market securities, these bonds are issued at a discount to their face values. Because of long maturity

periods the discount is also higher, hence the term deep discount. Although long term maturity is the norm, short maturities are not uncommon, for example GE Capital had an issue of DDBs with a maturity period of 17 months and 29 days.

The first issue of DDBs was made by Small Industries Development Bank of India (SIDBI). Each DDB, with a face value of Rs.1,00,000, was issued at a discounted price of Rs.2,500 with a maturity period of 25 years from the date of allotment. Both the investors and SIDBI have an option of withdrawing or redeeming the bond (call & put options) respectively at the end of 5th, 9th, 12th, 15th, or 20th year from the date of allotment at the deemed value of Rs.5,300, Rs.9,600, Rs.15,300, Rs.25,000 and Rs.50,000 respectively.

After the success of the SIDBI issue, all the prominent financial institutions like IDBI, ICICI, etc. came out with the issues of DDBs. All these issues, however, were called by the institutions as the interest rates fell.

Zero Interest Bonds (ZIBs)

Very much alike DDBs, the only crucial difference is that these are issued at face values (DDBs are issued at a discount to face value) and the redemption is at a premium. Tax treatment of both is the same.

Secured Premium Notes (SPNs)

SPNs are bonds issued by corporations which are medium term in nature, maturing between 3 to 8 years. The advantage is the flexibility it offers in giving the returns as premium or interest payments depend upon the preferences of the holders.

The only issuer of SPNs in the Indian markets till now is TISCO Ltd. It issued SPNs of Rs.300 each. The repayment started after three years, and there was no payment of interest in between. The repayment went on for four years starting from the fourth year to seventh year. Every year there will be a payment of Rs.150 (totalling Rs.150*4=Rs.600 in four years). Rs.75 in this would be accounted for as principal repayment and the rest Rs.75 could be taken as a mixture of interest and premium at the option of the investor. (Rs.25 as interest + Rs.50 as premium; Rs.37.50 interest + Rs.37.50 premium; Rs.50 interest + Rs.25 premium).

The advantage of this was easier tax planning for the investor, but the tax authorities were not happy with this kind of an arrangement. TISCO also attached an equity warrant which was convertible into equity at a price which was at considerable discount to the market price prevailing at that time.

Floating Rate Bonds (FRBs)

Bonds whose interest payments fluctuate with changes in the general level of interest rates and are tied to a basic rate (known as the reference rate). The first issue in India

was from State Bank of India (SBI). It issued unsecured, redeemable, subordinated, floating interest rate bonds in the nature of promissory notes carrying a coupon rate of 3 per cent per annum above the bank's maximum term deposit rate.

Pass Through Certificates (PTCs)

Pass Through Certificates (PTCs) are debt securities that pass through income from debtors through intermediaries to investors. Primarily banks who have a strong retail loan portfolio are the intermediaries who issue these certificates. The most common form if pass through is mortgage backed security, in which the principal and and interest payment from the home loan (or car loan) takers are passed from the banks or savings agencies that pool and repackage them in the form of securities, to investors. The bank that collects the payments from debtors charges a fee fro its services, which is deducted from the income passed on to investors. These securities are credit rated and the interest payment is according to the rating. The rating (i.e. P1+) is followed by (So) to denote the transaction is that of securitization.

Rate of return of a Bond

In case of bonds, instead of dividends, the investor is entitled to payments of interest annually or semi-annually. The investor also benefits if there is an appreciation in the value of bond, otherwise there is the redemption of the bond at par value or at premium.

Using the present value formula developed above we can say that:

$$\text{Present Value of a Bond} = \sum_{t=1}^{n} \frac{\text{Interest Amount}}{(1+i)^t} + \frac{\text{Principal Amount}}{(1+i)^n}$$

Here interest amount is individually brought to its present value or we can apply the annuity factor table to get its present value. The principal amount is brought to its present value when it is due.

Or to use the tables the change would be:

Present Value = Interest Amount * (Present Value Annuity Factor$_{n,i}$) + Principal Amount
* (Present Value Interest Factor$_{n,i}$)

Example

A bond is paying 10 % interest per annum and is going to mature in the next two yeaRs At maturity it will pay its principal amount of Rs 100. If the expected return on bonds today are (i) 7 %, (ii) 10 % and (iii) 15 %, what value would you pay for the bond today.

Solution

Using the above formula for situation 2), we can say that

$$\text{Present Value of a Bond} = \sum_{t=1}^{2} \frac{\text{Interest Amount}}{(1.1)^t} + \frac{\text{Principal Amount}}{(1.1)^2}$$

$$\text{Present Value of a Bond} = \frac{10}{(1.1)^1} + \frac{10}{(1.1)^2} + \frac{100}{(1.1)^2}$$

Or to use the tables the change would be:

Present Value = 10 * (PVAF2,0.1)

        + 100 * (PVIF2,0.1)

Substituting the values we find that

Present Value = 100

This is no magic. When you are getting a 10 % return and also expect a 10 % return, the price you would pay would equal the par value of the bond. This means that if we expect higher return i.e. 15% in situation (iii) above, the price that we would be willing to pay for a bond returning only 10 % would be less than the par value. Similarly, if we expect lower return, i.e., 7% in situation (i) above, the price that we would be willing to pay for a bond returning 10 % would be higher than the par value. Can you find out the values for these two cases?

There are five variables in this case: (1) present value, (2) future value, (3) interest amount paid, (4) return expected and (5) time period. Properties of mathematics say that if any four of these five variables are given, you can always find the value of the fifth variable. You can attempt that yourself or turn over to solved examples to look at a similar case.

Valuing Equity Securities

Unlike debt and money market instruments, equity instruments represent the ownership interest in the company. As owners must put in their money in the venture before anybody would lend to them, equity is always issued before debt is released by the institutions. In fact the incorporation of the company requires that the promoters must pick up some shares in the company, only then the company can be incorporated. As equity represents the owners it is but logical that all the debt holders must be paid off before owners can claim any returns from the company. So the equity has the lowest-priority claim on earnings. Equity also has the last claim on the assets in case the company is liquidated (closed down).

This means that the equity carries the highest risk. Not without reason. The flip side of the coin is that the equity owners are also the owners of all the profits that remain after all the debt holders are paid their interest. The interest payment is fixed while there is no limit on the levels of profits that can accrue to the equity holders. Vice Versa does not apply here, the liability of the equity holders is limited to the level of investments that

they have put in into the company and not unlimited.

Unlimited profit sharing means that equity shares have an unlimited potential for dividend payments and price appreciation. Which is why investing in equity is so exciting and full of opportunities. At the same time the risk is also high because there is nothing fixed about earnings which can fluctuate widely depending upon the business environment. This is also the reason why this book will devote much more time to equity than on debt.

Shareholders, being the owners of the company, elect the board of directors and vote on major issues that affect the functioning and long term plans of the company. Major shareholders take up seats on the board of directors and influence the decisions that are taken. Small shareholders cannot exercise the same level of control so when they do not like the way the company is being run they simply sell their shares and invest their money somewhere else.

A shareholder, by virtue of being an owner, is normally entitled to four basic rights of ownership:

1. claim on a share of the company's undivided assets in proportion to number of shares held (this is not to say that he can return the shares and get a part of the assets, he will not get it),

2. proportionate voting power in the election of Directors and other business conducted at annual general meeting which can be exercised either by attending of the meeting or by Proxy,

3. dividends, when earned and declared by the Board of Directors, as also a proportionate share in the residual earnings which the company retains, and

4. pre-emptive right to subscribe to additional share offerings before they are offered to general investors unless a special resolution has been passed in the annual general meeting to the contrary.

The piece of paper which testifies the ownership position of the shareholder in a company is called a share certificate. The number of shares, their par value, the certificate number, distinctive numbers, the date of issue and the owner's name are mentioned on the share certificate.

Terms Associated with Equity Securities

Let us look at some of key terms that are associated with equity shares:

Stock

Ownership of a company represented by shares that are a claim on the company's earnings and assets.

Share

Unit of equity ownership in a company or in a mutual fund. This ownership is represented by a share certificate, which names the company and the shareholder.

Face Value/ Par Value

The value of one share as given on the share certificate of the company. The face value today can be either Rs.10 or below that number (but in multiples of Rs. 1) as specified by the Securities Law governing public limited companies. You will find many companies with a face value of less than Rs. 10, for example Rs. 5 (E.g Infosys Technologies, Maruti Udyog), Rs. 4 (iGate Global Solutions), Rs.2 (Satyam Computers) and even Rs.1 (e.g. Tata Consultancy Services, Hindustan Lever). Earlier Rs 100 and Rs 50 were the typical face values and you will still find shares with these face values, e.g. Dawn Mills has Rs 50 face value and Shri Dinesh Mills has Rs 100 face value per share.

The face value is the amount on which the dividend is calculated. Thus, a 15 per cent dividend on a share with a face value of Rs.10 will pay the share holder Rs.1.5 per share. This means that any dividend percentage has different meaning in Rupee terms as the face value changes. For example 100% dividend on 1 share of Rs 100 face value will get you Rs 100 but the same dividend percentage on 1 share of Rs 1 face value would get you only Rs 1.

Authorised and Paid-up Share Capital

Number of shares of stock provided for in the Articles of Association of a company is the authorized share capital. This figure is usually indicated in the Share Capital section of the Balance Sheet.

Paid-up share capital is the capital that has been issued and subscribed by the shareholders. Authorised capital is usually well in excess of the paid-up capital and a company cannot legally issue more shares than authorized. The number of authorized shares can be changed only by amendment to the Articles of Association for which a special resolution needs to be passed in the Annual General Meeting.

Figure 2.1 shows the Schedule 'A' of the Cosco India balance sheet, which gives us details on the authorized and paid-up capital of the company.

	As at 31ˢᵗ March, 99	As at 31ˢᵗ March, 98
Authorised:		
100,00,000 Equity Shares of Rs. 10/- each	1,00,000,000	1,00,000,000
Issued & Subscribed:		
41,61,000 Equity Shares of Rs. 10/- each (includes 19,20,000 Equity Shares allotted as fully paid up Bonus Shares by Capitalisation of Rs. 192 Lacs from General Reserve)	41,610,000	41,610,000

Figure 2.1 Authorised and Paid-up Share Capital

The second part in the figure talks about 'Issued & Subscribed Capital'. Issued Share Capital is that portion of the authorised capital that has been actually offered for subscription. Subscribed share capital is that portion of issued share capital, which has actually been subscribed and allotted. Paid-up share capital is that part of the subscribed capital for which consideration in cash or otherwise has been received. Therefore, subscribed share capital can be less than or equal to the issued share capital. Similarly paid-up share capital can be less than or equal to subscribed share capital. All these types of share capital also include the bonus shares that have been allotted by the organisation.

There is another term 'called-up share capital' which you may find in some of the balance sheets. It refers to that part of the subscribed capital, which shareholders have been required or demanded to pay but have not paid as yet. This comes in the case where the company has issued partly paid up shares and some shareholders have not paid the entire amount to make the shares fully paid up.

Book Value

The book value is calculated by adding reserves to the equity capital of the company, multiplied by the face value and divided by the equity capital of the company. Book value tells us how much each share is worth in the books of the company. So if a company has a face value of Rs.10, equity capital of Rs.10 crores and reserves of Rs.20 crores, then the book value of each Rs.10 share will be:

$$\text{Book Value} = \frac{(Rs.10cr + Rs.20cr)}{Rs.10cr} \times Rs.10 = Rs.30$$

The true worth of the share could be very different from the book value so calculated even when we are not taking the market price into consideration. Why this is so we will see later. Book and market values will usually be equal on the day the shares in a new corporation are issued, but after that only coincidence will ever make them equal at any given moment.

Earnings Per Share (EPS)

EPS can be defined as the company's profit allocated to each outstanding equity share. For instance, a company that earned Rs.10 crore last year and has 1 crore shares outstanding (with a face value of Rs.10 each) will report a EPS of

$$\text{EPS} = \frac{Rs.10cr}{1cr} = Rs.10$$

The profits that are used to calculate EPS are the profits that are left after paying interest to debt holders, taxes and dividend on preference shares. EPS is considered to be a key figure (and also misleading) in evaluating a share's outlook.

Stock Price Quotations

If you pick up any of the major newspapers (financial or non financial), they carry at least some of the quotations of the last day's trading on the major stock exchanges, be it National Stock Exchange (NSE), Bombay Stock Exchange (BSE), or any other stock exchange.

The usual format in a financial newspaper is to carry four prices (open, high, low, close) along with volumes of shares traded and number of trades. Price/ Earning Ratio (P/E) and market capitalization is also carried. They also carry the closing share price of the previous trading day in a bracket before starting with yesterday's prices as also carry the previous 52 week (one year) high/low prices for that share. The prices mentioned are for one share of the company.

Figure 2.2 shows two samples taken from the Business Standard and The Economic Times. See the reporting differences. The Business Standard carries more information on top 200 companies and different information is carried every day of the week.

Types of Equity Instruments

There are basically two types of equity instruments: equity shares and preference shares.

What we have been discussing till now in equity instruments applies as it is to equity shares. Preference shares are different.

Preference Shares

Sandwiched between debt holders and equity share holders, preference share holders have the promise of an assured dividend from the company and therefore assume less risk than that borne by equity share holders. They do not have any voting rights in the company. When a company fails to pay the dividend to them for two years in a row, then these shares get a voting right.

The preference shares are issued by only those companies who are paying a very low level of tax. Why? This is because although the returns desired by the preference share holders is at par with the returns offered by the fixed deposits, the cost to the company is after tax in case of preference shares while the interest paid on fixed deposits is tax deductible.

So a company which is paying 10 per cent dividend on preference shares ends up paying 11 per cent (including 10 per cent dividend tax). If the company pays no income tax [as in the case of a 100 per cent Export Oriented Unit (EOU)] then this is the cost to the company. If the company pays tax at the rate of 35 per cent then the before tax cost shoots above 14 per cent. Compared with a debt cost of 7 to 12 per cent for established companies, it is not a viable alternative at all to go in for preference shares if the tax liabilities are high. Therefore, preference shares would only be issued if the company requires a more permanent source of capital.

For the investor the biggest benefit of investing in a preference share is that the dividends are tax free in their hands. Which means if you are getting a dividend of 10 per cent from a preference share and you are in 30 per cent tax bracket, your net return is still 10 per cent which is equivalent to receiving an interest income of 13 per cent from fixed deposits or any other interest bearing source.

American / Global Depository Receipts (ADRs/ GDRs)

Equity shares that are offered in the international markets to international investors are issued in the form of Depository Receipts (DRs). If these DRs are issued for US investors in the US markets, then they are known as American Depository Receipts (ADRs). They can be listed on New York Stock Exchange (NYSE) or National Association of Securities Dealers Automated Quotations (NASDAQ) Exchange. If they are issued for international investors to be listed on Luxemborg Stock Exchange in Europe then they are called Global Depository Receipts (GDRs). What goes in the hands of the investors is not a share certificate but a 'receipt' of a share certificate which is lying with the depository. The benefits of keeping the shares in the depository include: ease of transfer, no bad deliveries, less registrar & book keeping problems, etc. DRs entitle the holders to get both dividend and capital gains. ADRs/ GDRs can be converted into equity shares any time as they represent equity shares anyway and the reverse conversion of equity shares into ADRs/ GDRs is allowed to the extent of the first conversion.

ADRs/ GDRs give an opportunity to foreign investors to buy the equity shares in Indian companies with the added benefits of trading in their own exchanges and without registering in India for buying and selling securities.

Equity and Debt: A Comparison

1. Equity shares do not carry any fixed charges on them. If the company does not generate positive earnings, it does not have to pay equity shares any dividends. This is very much in contrast to interest on debt, which must be paid regardless of the level of earnings.

2. Equity shares have no maturity date - it is permanent capital that does not have to be "paid back". While debt has a fixed maturity date and the debt taken has to be paid pack on that date.

3. Equity shares can, at times, be easier to sell than debt. It appeals to many investor groups because (1) equity shares typically carry a higher expected return than does preference shares or debentures, (2) equity shares provide investors with a better hedge against inflation than debentures, and (3) returns from capital gains on equity shares are not taxed until the gains are realised whereas the interest income on debentures is taxed regularly.

4. The sale of new equity shares gives voting rights, or even control if the stake is high enough, to the additional new share owners who are brought into the company.

While the debt and preference share owners do not have any voting rights (except in special conditions). For this reason, debt is preferred over additional equity financing. Equity financing is often avoided by small companies, whose owner managers are not willing to share control.

5. The use of debt enables the firm to acquire funds at a fixed cost, whereas the use of equity shares means that more shareholders will share in the firm's net profits.

6. The costs of underwriting and selling equity shares are usually higher than the costs of underwriting and selling preferred shares or debt, which puts additional burden on the companies raising resources. But the life and permanency of the equity shares more than compensates for the additional expenses in initial floatation.

Share Capital

Figure 2.2 shows the Schedule 'A' of the Cosco India balance sheet.

	As at 31ˢᵗ March, 99	As at 31ˢᵗ March, 98
Authorised:		
100,00,000 Equity Shares of Rs. 10/- each	1,00,000,000	1,00,000,000
Issued & Subscribed:		
41,61,000 Equity Shares of Rs. 10/- each (includes 19,20,000 Equity Shares allotted as fully paid up Bonus Shares by Capitalisation of Rs. 192 Lacs from General Reserve)	41,610,000	41,610,000

Figure 2.2 Share Capital

The first heading is 'Authorised', which means authorised share capital. Authorised share capital is the total amount of shares that a company is authorised to sell. 'Memorandum and Articles of Association' of the company provides the information about the number of shares that the company is authorised to sell and their par value. Par Value is the value per share established at the time of authorisation. Par value of the share establishes the minimum legal capital for the company and the shareholder must invest assets equal to that amount (whether in cash or by transferring the assets to the company). Par value multiplied by the number of authorised shares form the authorised capital.

Cosco India Ltd is authorised to sell 10,000,000 equity shares (10 million or 1 crore shares) of Rs 10 each. Here the par value is Rs 10 per share and the total number of shares that the company can sell is 1 crore. Therefore the total authorised capital is Rs 10 crore.

The authorised capital is not fixed forever and can be changed depending upon the requirements. To change the authorised capital, first the company has to take permission

from the shareholders by passing a resolution in the annual general meeting to modify the authorised capital figure in the 'Memorandum and Articles of Association' of the company. This change is then notified to the 'Registrar of Companies' (Government) and then incorporated in the balance sheet.

No formal entry is required for authorised share capital in the books of accounts. Can you explain why? This is because of the reason that there is no transaction of the authorised share capital.

The second part talks about 'Issued, Subscribed and Paid-up Capital'. Issued Share Capital is that portion of the authorised capital that has been actually offered for subscription. Subscribed share capital is that portion of issued share capital, which has actually been subscribed and allotted. Paid-up share capital is that part of the subscribed capital for which consideration in cash or otherwise has been received. Therefore, subscribed share capital can be less than or equal to the issued share capital. Similarly paid-up share capital can be less than or equal to subscribed share capital. All these types of share capital also include the bonus shares that have been allotted by the organisation.

There is another term 'called-up share capital' which you may find in some of the balance sheets. It refers to that part of the subscribed capital, which shareholders have been required or demanded to pay but have not paid as yet. This comes in the case where the company has issued partly paid up shares and some shareholders have not paid the entire amount to make the shares fully paid up.

As you can see in the figure 5.4, Cosco has an 'Issued and Subscribed' share capital of 41,60,000 shares of Rs 10/- each amounting to Rs 41,610,000. The figure was the same last year meaning that the company has not issued any new shares in the last one year. In brackets it also says that the figure includes 19,20,000 equity shares allotted as fully paid up bonus shares by capitalisation of Rs 192 lacs from General Reserve. This means that Rs 192 lacs have been transferred from general reserves to the share capital. As both of them belong to the shareholders, it is merely a book entry and does not represent a flow of cash.

As Cosco India Ltd is a listed company, this means that the company would

have issued shares to the public. The issue of new shares can be in five different ways:

1.   It can sell shares directly to the public.

2.   It can sell shares directly to selected investors.

3.   It can sell shares only to its existing shareholders.

4.   It can issue shares without any consideration to existing shareholders.

5.   It can issue shares as exchange for assets from other entities.

The first four would result in money or assets flowing in and the last one would result in no additional asset as it is merely a book entry.

Selling Shares Directly to Public: Public Issue

Selling shares directly to the public is known as 'public issue'. You would have seen companies issuing advertisements for sale of its equity shares in the newspapers and other media targeted at potential buyers. The company has to get its issue managed by a merchant banker (finance intermediaries specialising in raising money for the companies). Certain norms specified by the Securities and Exchange Board of India (SEBI) apply to the companies who want to raise money from the public. Additionaly there is a 'listing agreement' (specified by the stock exchanges where the company wants to list its shares for trading), which the company has to adhere to. Cosco India Ltd is listed on Bombay Stock Exchange and Delhi Stock Exchange, which means that it would have signed the listing agreement with both the stock exchanges separately. Both the listing agreements would nearly be the same with very minor differences.

Can you look at the newspapers and find out what is the rate that one share of Cosco is quoting at on these stock exchanges? This rate is known as the market price of the share. Market price of the share is influenced by a variety of factors, including expected future earnings, dividends, growth and other company specific and economic events. Market value of frequently traded shares are reported daily in newspapers such as The Business Standard, The Times of India, etc. and are available on the internet. Can you locate two web sites that give you the latest price information on Indian listed companies?

Selling Shares Directly to Select Investors: Private Placement

Selling shares directly to selected investors is known as 'private placement'. For making private placements the companies do not issue advertisements in the newspapers but offer shares directly to selected institutional investors like mutual funds and foreign institutional investors, etc. There is no obligation for the company to get its issue managed by a merchant banker but many of them employ financial intermediaries to help them sell the issue. Certain norms specified by the Securities and Exchange Board of India (SEBI) apply to the companies who want to raise money this way so as to protect the rights of existing shareholders. For example, the companies cannot issue shares below the average market price of the last six months. Of course, these guidelines apply to only those companies, which are listed on the stock exchange. Closely held companies can sell new shares to whomsoever they want and at whatever price per share that is mutually acceptable to the company and the buyers. However, this price cannot be less than the par value of the share.

Selling Shares only to existing Shareholders: Right Issue

The main difference between a public issue and a rights issue is that the rights issue is

only meant for the existing shareholders of the company. This means that the general public cannot subscribe to the issue. The right issue is made to shareholders in a ratio of their existing holdings. This means that if the shareholder holds 100 shares and the company want to offer right shares in the ratio of 1:1, the shareholder will get a right to subscribe to 100 shares. The shareholder can waive his right to subscribe to these shares and can pass it on or sell it to any other person who is interested in buying it.

Issuing shares without any consideration to existing shareholders: Bonus Issue

The first three types discussed issues that raise money. A company can also issue new shares without any consideration to its existing shareholders. This type of an issue is called 'bonus issue.' As in the rights issue, the company offers additional shares to its existing shareholders in a particular ratio of their existing shareholding. How can it do that when the company has a value attached to each share? The company transfer the money from reserves & surplus (a part of shareholder's money) to share capital, in other words, simply a book entry where the total funds available to the company does not change. The money for the bonus issue of shares comes from 'Reserves & Surplus', which means that the total shareholders funds remain constant.

Issuing shares as exchange for assets from other entities

When a company takes over the assets of another company or merges that company with it, it usually issues shares instead of paying the other company or its shareholders. The consideration paid for acquisition is usually more than the book value of the assets transferred (Can you explain why?). It could be due to the fact the goodwill of the assets of the company is also transferred or it could be because of the fact that the assets are in working condition and add significantly add to the value of the company. There are several methods of valuation of the future benefits that accrue from the assets, but these are outside of the purview of this book. These methods are discussed in detail in any good valuation book.

Issuing Shares at Par or at Premium

The consideration that the company gets by selling its shares does not necessarily have to be the face value (par value) per share. The company can issue shares 'at par' or 'at premium'. At par means that the company will charge only the par value for every share issued. This means that if Cosco issues shares at par, what will be the amount it will get per share? (Ans: Rs 10). At premium means that the company can charge an amount per share which is more than the par value per share. This additional amount is called the share premium and is shown as a separate head in the 'Reserves & Surplus' category.

Reserves & Surplus

General Reserves is the name given to the aggregate amount of corporate earning that has been reinvested in the business. There is another reserve called share premium reserve, which represents the premium charged when the company issued shares. The third is the surplus that comes from the profit and loss account. All these together constitute 'Reserves and Surplus'. The reserve and surplus as a whole increases each year by the net income that is retained in the company and decreases by losses.

You should note that the reserves and surplus does not mean cash. In fact, the company can have large reserves and surplus position and be without cash or it can have a lot of cash and a very small reserves and surplus balance. Although both cash and reserves & surplus usually increase when a company earns, the amount by which each one increases is usually different. Two reasons can be attributed for this difference.

1.   The net profit of the company is calculated on accrual basis and not on a cash basis. Therefore, reserves & surplus would show increase on an accrual basis as against cash, which will only show increase if there is real inflow of cash.

2.   The cash generated from the net profit can be invested in assets, can be used to pay off loans or spend in any number of ways, both of which would not affect net income or reserves and surplus. For example, if a Managing Director buys a Mercedes car for himself on company's account, he is basically making an expense that would not be reflected in the net income or reserves and surplus but would be reflected in the cash position of the company.

To summarise cash is an asset and retained earning is one of the sources of financing (along with share issues and loans) that a company can use for its business purposes.

In the figure 2.3 below, you can see the reserves and surplus figures of Cosco.

Figure 2.3 Reserves & Surplus

There are three items that you can notice in the figure. Let us discuss each one of them one by one. The share premium account shows a balance of Rs 31,230,000 which is unchanged from the last year closing balance. This means that company did not issue

any new shares in the last one year. It also means that the company would have issued shares at a premium somewhere in the past. When these shares were issued cannot be interpreted from the information given and no other information on that is available in this annual report. Searching information from other resources, we come to know that a company had issued shares at a premium of Rs 30 per share. Can you calculate, how many new shares has the company issued? Simple calculations would tell you that the company issued 1,041,000 shares (31,230,000 divided by 30).

Coming to the second item, we see the general reserve has an addition of Rs.7,921,724 in the last year's figure to bring the total to Rs.72,699,057. Now this addition has come again from the same head appropriations in the profit and loss account where it says 'transfer to general reserve' and the same figure is mentioned. There was a different amount transferred to the balance sheet last year. There is no stipulation that a particular amount should be transferred, it only depends on the company's requirements. Why did it not transfer more money can be traced to the fact that profits have been lower this year as compared to last year.

The third item shows the profit and loss account heading. But most of the companies report it under the heading 'Reserves & Surplus' as it belongs to the shareholders. Here also the figure has remained unchanged from the last year. This means that the next profit was appropriated fully and no extra surplus from the profit and loss account was carried to the balance sheet this time. If you look at the profit and loss account in Annexure I, you see an item in appropriations at the end of the profit and loss account which says balance carried to balance sheet. This confirms that no profit was carried to balance sheet from profit and loss account this year. For the last year, it shows the figure of Rs.3,500,000/- which would now be a part of the figure of 8,500,000 that is shown now.

$$\text{Present Value of a Share} = \sum \frac{\text{Dividend Amount}}{(1+i)^t} + \frac{\text{Expected Future Value of the Share}}{(1+i)^t}$$

At the end of reserves & surplus, where it shows previous year figures, the additions work out to Rs 14,980,907 which is exactly the sum that you get when you add the two amounts that were transferred last year to the balance sheet under their respective heads.

A stocks rate of return

In case of shares the first component is "Dt" which is nothing but the income in cash from dividends and the second component is the price change (appreciation and depreciation).

This means that the price you are willing to pay for a share today is a function of the dividends that you expect to receive and the present value of the expected future share price.

But what if you are going to hold the share to maturity and not sell. Then your only return is the dividend amount. This means that this perpetual dividend is what you would use to value the share. So you simply use the perpetuity formulas mentioned above for constant or growing dividends.

Finding out the present value of the share seems easy-Doesn't it! Now comes the tedious question, what return do you expect from the security? Now every security has a different risk profile and you being a rational human being would expect a return that is commensurate with the risk that you are going to bear. So let us devote some time to understand the nature of risk and then how do we use this knowledge to reach the desired rate of return on the share.

Risk

Risk and return go hand in hand in investments and finance. One cannot talk about returns without talking about risk, because, investment decisions always involve a trade - off between risk and return. Risk can be defined as the chance that the actual outcome from an investment will differ from the expected return. This means that, the more variable the possible outcomes that can occur (i.e. the broader the range of possible outcomes), the greater the risk.

Risk and Expected Rate of Return

The width of a probability distribution of rates of return is a measure of risk. The wider the probability distribution, the greater the risk or the greater the variability of return or greater the variance. An investor cannot expect greater returns without being willing to assume greater risks.

Sources of Risk

- **Interest Rate Risk.** It is the variability in a security's return from changes in the level of interest rates.

- **Market Risk.** Market risk refers to the variability of returns due to fluctuations in the securities market.

- **Inflation Risk.** With rise in inflation there is reduction of purchasing power, hence this is also referred to as purchasing power risk and affects all securities.

- **Business Risk.** This refers to the risk of doing business in a particular industry or environment and it gets transferred to the investors who invest in the business or company. It may be caused by a variety of factors like heightened competition, emergence of new technologies, development of substitute products, shifts in consumer preferences, etc.

- **Financial Risk.** Financial risk arises when companies resort to financial leverage or the use of debt financing. The more the company resorts to debt financing, the

greater is the financial risk as it creates fixed interest payments due to debt or fixed dividend payments on preference stock thereby causing the amount of residual earnings available for common stock dividends to be more variable than if no interest payments were required. It is avoidable to the extent that management have the freedom to decide to borrow or not to borrow funds.

- **Liquidity Risk.** This risk is associated with the secondary market which the particular security is traded in. A security which can be bought or sold quickly without significant price concession is considered liquid. The greater the uncertainty about the true element and the price concession , the greater the liquidity risk. Securities that have ready markets like treasury bills have lesser liquidity risk.

Measurement of Total Risk

Risk is associated with the dispersion in the likely outcomes. Dispersion refers to variability. If an asset's return has no variability, it has no risk. An investor analysing a series of returns on an investment over a period of years needs to know something about the variability of its returns or in other words the asset's total risk.

There are different ways to measure variability of returns. The range from the highest possible to lowest possible rate of return is one measure, but the range is based only on two extreme values.

A more popular way of measuring variability of returns is standard deviation. The standard deviation is simply the square root of the variance of the rates of return.

$$\sigma = \sqrt{\sum_{i=1}^{n} \left[P_i (k_i - \bar{k})^2 \right]}$$

where, s = standard deviation

    Pi = probability associated with the ith possible outcome

    ki = rate of return from the ith possible outcome

    k = expected rate of return

    n = number of outcomes

Portfolios and Risk

An investment portfolio refers to the group of assets that is owned by an investor. When an investor invests all his funds in a single security, it is more in the nature of speculation than of an investment, because the returns to the investor are based on the future of the single asset, making it a very risky proposition. Generally, in order to reduce risk, investors hold on to a diversified portfolio which might contain equity capital,

bonds, real estate, savings accounts and various other assets. In other words, the investor does not put all his eggs into one basket.

Diversifiable and Non-diversifiable Risk

The fact that returns on stocks do not move in perfect tandem means that risk can be reduced by diversification. But the fact that there is some positive correlation means that in practice risk can never be reduced to zero. So there is a limit on the amount of risk that can be reduced through diversification. The lower the degree of positive correlation, the greater is the amount of risk reduction that is possible.

The amount of risk reduction achieved by diversification also depends on the number of stocks in the portfolio. As the number of stocks in the portfolio increases, the diversifying effect of each additional stock diminishes.

Risk reduction through diversification

Risk

Total risk of the portfolio

Diversifiable
Risk

Nondiversifiable
Risk

Number of securities in the portfolio
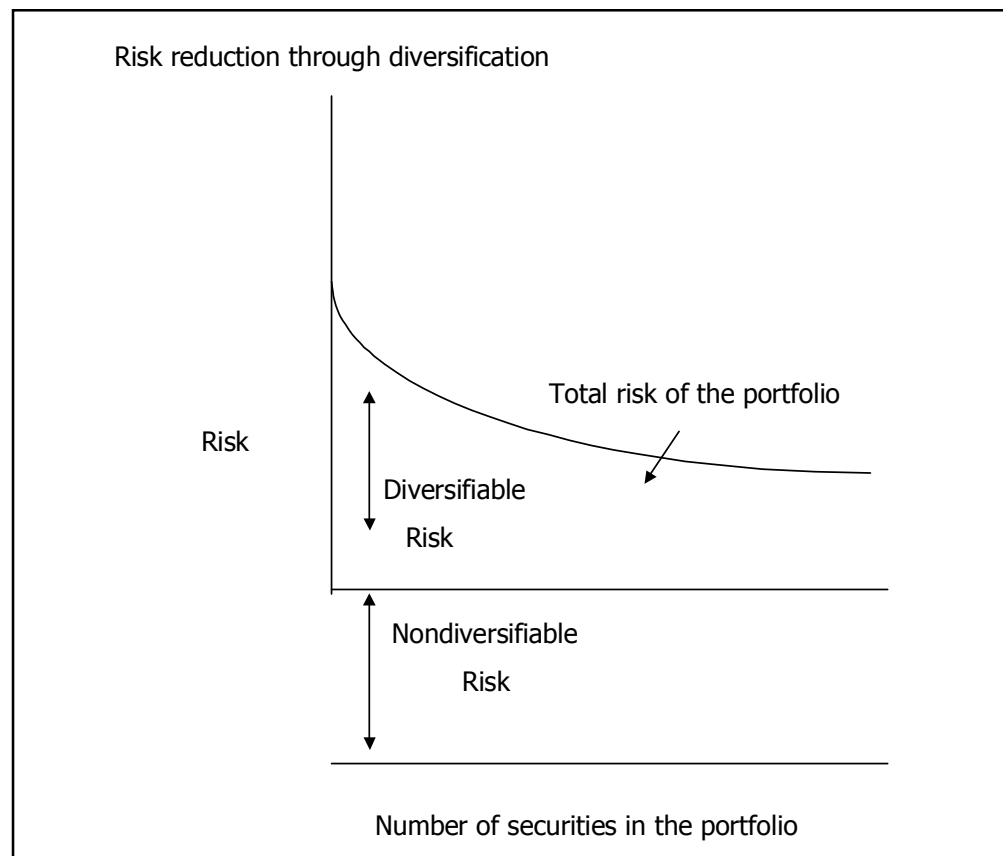
As you can see that the major benefits of diversification are obtained with the first 10 to 12 stocks, provided they are drawn from industries that are not closely related. Increases beyond this point continue to reduce the total risk but the benefits are marginal.

It is also apparent that it is the diversifiable risk that is being reduced unlike the non-diversifiable risk which remains constant whatever your portfolio is.

Nondiversifiable risk is that part of total risk (from various sources like interest rate risk, inflation risk, financial risk, etc.) that is related to the general economy or the stock market as a whole and hence cannot be eliminated by diversification. Nondiversifiable risk is also referred to as market risk or systematic risk.

Diversifiable risk on the other hand, is that part of total risk that is marginal to the company or industry and hence can be reduced by diversification. Diversifiable risk is also called unsystematic risk or specific risk.

Risk of Stocks in a Portfolio

A portfolio's standard deviation is a good indicator of the risk of a portfolio, to the extent that if adding a stock to the portfolio increases the portfolio's standard deviation, the stock adds risk to the portfolio. But the risk that a stock adds to a portfolio will depend not only on the stock's total risk, its standard deviation , but on how that risk breaks down into diversifiable and nondiversifiable risk. If an investor holds only one stock , there is no question of diversification, and this risk is therefore the standard deviation of the stock. For a diversified investor , the risk of a stock is only that portion of total risk that cannot be diversified or its nondiversifiable risk. The nondiversifiable risk is generally measured by Beta coefficient. Beta measures the relative risk associated with any individual portfolio as measured in relation to the risk of market portfolio. The market portfolio represents the most diversified portfolio of risky assets an investor could buy since it includes all risky assets.

The relative risk can be expressed as:

$$\beta = \frac{\text{Non - diversifiable risk of asset or potfolio}}{\text{risk of market portfolio}}$$

Thus, the Beta coefficient is a measure of the non-diversifiable or systematic risk of an asset relative to that of the market portfolio.

- A Beta of 1.0 indicates an asset of average risk.

- A Beta coefficient greater than 1.0 indicates above-average risk - stocks whose returns tend to be more risky than the market.

- A Beta coefficient less than 1.0 indicates below-average risk, i.e., less riskier than market portfolio.

In case of market portfolio all the diversification possible has been done-thus the risk of market is all non-diversifiable which an investor cannot avoid. Similarly, as long as the asset's returns are not perfectly positively with returns from other assets, there will be some way to diversify away its unsystematic risk. As a result beta depends only on non-diversifiable risks.

The beta of a portfolio is nothing but the weighted average of betas of the securities

that constitute the portfolio, the weights being the proportions of investments in respective securities.

Measurement of Beta

The systematic relationship between the return on the security or a portfolio and the return on the market can be described using a simple linear regression, identifying the return on a security or portfolio as the dependent variable Kj and the return on market portfolio as the independent variable Km, in the single-index model or market model developed by William Sharpe.

This can be expressed as:

$$K_j = \alpha_j + \beta_j K_m + e_j$$

The Beta parameter bj in the model represents the slope of the above regression relationship and measures the responsiveness of the security or portfolio to the general market and indicates how extensively the return of the portfolio or security will vary with changes in the market return. The Beta coefficient of a security is defined as the ratio of the security's covariance of return with the market to the variance of the market. This can be calculated as follows:

$$\beta_j$$

The Alpha parameter "a" is the intercept of the fitted line and indicates what the return of the security or portfolio will be when the market return is zero. For example, a security with an a of +2 per cent would earn 2 percent even when the market return was zero and would earn an additional 2 percent at all levels of market return. The converse is true if a security has a of -2 percent. The positive a thus represents a sort of bonus return and would be a highly desirable aspect of a portfolio or security while a negative a represents a penalty to the investor.

The third term ej is the unexpected return resulting from influences not identified by the model. Frequently referred to as random or residual return, it may take on any value but is generally found to average out to zero.

The Capital Asset Pricing Model (CAPM)

The CAPM developed by William F Sharpe, John Linter and Jan Mossin is one of the major developments in financial theory. The CAPM establishes a linear relationship between the required rate of return of a security and its systematic or undiversifiable risk or beta.

This relationship as defined by CAPM can be used to value an equity share.

Mathematically the relationship between the share's return and the market return can be depicted by the following formula:

Here

R_s stands for return expected on the security,

R_f stands for risk-free return,

R_m stands for return from the market portfolio and

β stands for beta.

This relationship means that if the market goes up by 10 % and the security price also goes up by 10 %, and vice versa, the beta is said to be 1.00, i.e., there is a perfect correlation between return from the security and return from the market. If the beta is 2.00 the security price would up or down by twice the %age of change of the market. If the beta is 0.00 then no correlation exists between the market movement and the security price movement.

It is easy to see that the required return for a given security increases with increases in its beta.

Assumptions

The CAPM is based on a list of critical assumptions, some of which are as follows :

- Investors are risk-averse and use the expected rate of return and standard deviation of return as appropriate measures of risk and return for their portfolio. In other words, the greater the perceived risk of a portfolio, the risk-averse investor expects a higher return to compensate the risk.

- Investors make their investment decisions based on a single-period horizon, i.e., the next immediate time period.

- Transaction costs in financial markets are low enough to ignore and assets can be bought and sold in any unit desired. The investor is limited only by his wealth and the price of the asset.

- Taxes do not affect the choice of buying assets.

- All individuals assume that they can buy assets at the going market price and they all agree on the nature of the return and risk associated with each investment.

In the CAPM, the expected rate of return can also be thought of as a required rate of return because the market is assumed to be in equilibrium. The expected return is the return from an asset that investors anticipate or expect to earn over some future period. The required rate of return for a security is defined as the minimum expected rate of return needed to induce an investor to purchase it.

Investors can earn a riskless rate of return by investing in riskless assets like treasury bills. This risk free rate of return is designated Rf and the minimum return expected by the investors. In addition to this, because investors are risk-averse, they will expect a risk premium to compensate them for the additional risk assumed in investing in a risky asset.

Required Rate of Return = Risk-free rate + Risk premium

The CAPM provides an explicit measure of the risk premium. It is the product of the Beta for a particular security j and the market risk premium $K_m - R_f$.

Risk premium = $b_j (K_m - R_f)$

This Beta co-efficient 'bj' is the non-diversifiable risk of the asset relative to the risk of the market. If the risk of the asset is greater than the market risk, i.e., b exceeds 1.0, the investor assigns a higher risk premium to asset j, than to the market.

The Security Market Line

The plot of relationship between the required rate of return (kj) and non-diversifiable risk(beta) as expressed in CAPM will produce a graph of the SML as shown below
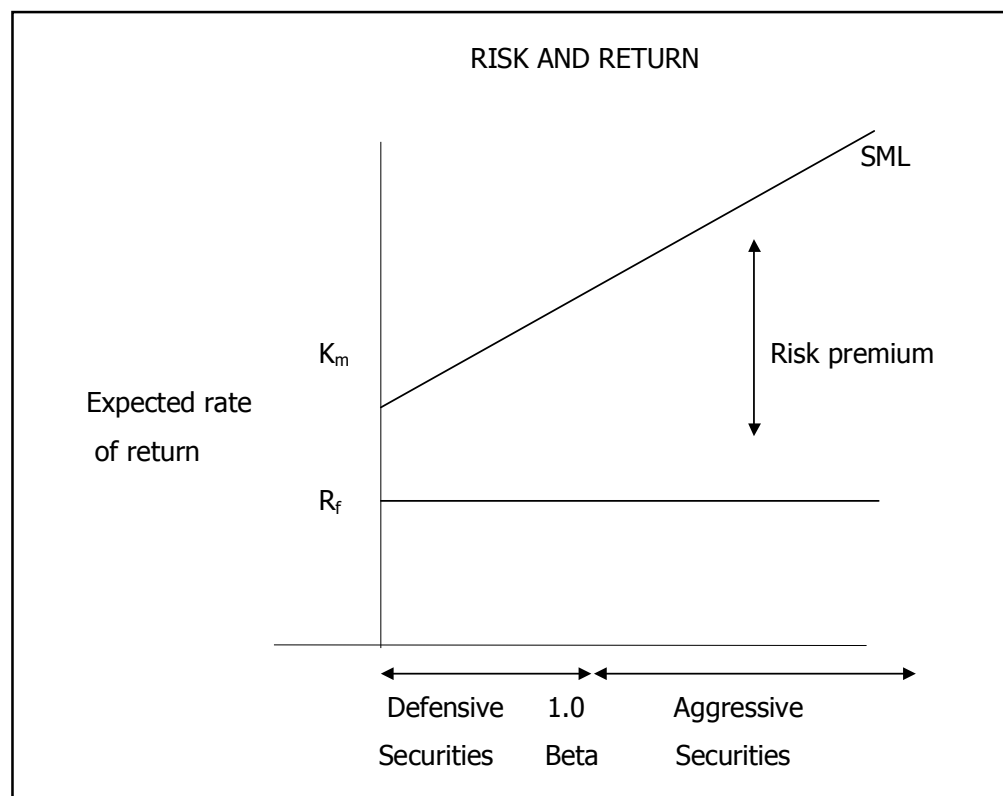

As per the CAPM assumptions any individual security's expected return and beta statistics should lie on the SML. The SML intersects the vertical axis at the risk-free

rate of return Rf and km - Rf is the slope of the SML. Since all securities are expected to plot along the SML, the line provides a direct and convenient way of determining the expected/required return of a security if we know the Beta of the securities. The SML can also be used to classify securities. Those with betas greater than 1.00 and plotting on the upper part of the SML are classified as aggressive securities while those with betas less than 1.00 and plotting on the lower part of the SML can be classified as defensive securities which earn below-average returns.

Asset pricing implications of the SML

One of the major assumptions of the CAPM is that the market is in equilibrium and that the expected rate of return is equal to the required rate of return for a given level of market risk or beta. In other words, the SML provides a framework for evaluating whether high-risk stocks are offering returns more or less in proportion to their risk and vice versa.

Once a security's expected rate of return and beta have been computed they may be plotted with reference to the SML. If the security's required rate of return , the security may be over or under priced and may fall below or above the SML.
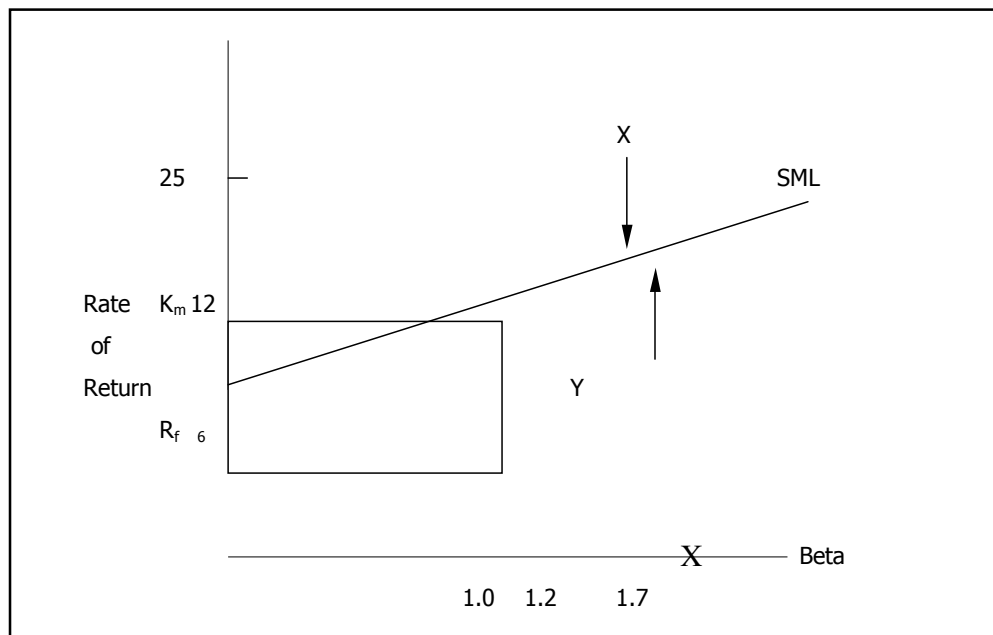
From the figure we see that Rf = 6% and km = 12%.

Two securities X and Y have been shown in the figure. Both X and Y should have been on the SML but obviously are not. Taking the case of X first, the expected rate of return from X is around 25%. But at a beta of around 1.2, using the SML we see that the required rate of return need be only around 13%. This tells us that security X is undervalued or priced too low because its average rate of return is inappropriately high for the level of risk it bears.

On the other hand, Security Y with a beta of around 1.7 requires a rate of return of around 16% but its expected return is only about 7%. This tells us that the asset is overvalued or overpriced and hence unattractive because it is expected to produce a return lower than stocks with similar betas. These two assets should move toward their equilibrium - required return positions on the SML (i.e., expected rate of return should be equal to required rate of return and correspond to their respective betas).

To reach equilibrium and their required rate of return positions on the SML both stocks have to go through a temporary price adjustment. In order to reach equilibrium, assuming betas remain the same, the expected return of X has to be brought down to be equal to the required rate of return and be plotted on the SML. To accomplish this, the purchase price has to be sufficiently increased. Similarly, for security Y, the purchase price has to be sufficiently reduced so that the expected return rises to be the same level as the required rate of return.

In practice, investors will be interested in purchasing security X because it offers more than proportionate returns in comparison to the risk. This demand will push up the price of X as more of it is purchased and correspondingly bring down the returns. This process will continue till it reaches the equilibrium price and the expected returns are the same as the required returns.

In the case of security Y, investors will be tempted to sell as it offers less than the required rate of return. This increase in the supply of Y will drive down its price and correspondingly increase the return until the expected return rises enough to reach the SML and the security is once again in equilibrium.

Thus, the CAPM provides many useful insights for the finance manager to maximise the value of the firm. It shows the type of risk for which shareholders require compensation in the form of higher risk premium, and hence higher returns. Because finance managers also perform the investment function on behalf of shareholders, they must keep sight of the returns shareholders expect for taking risks.

Now let us look at another part of the investment decision, i.e., what cash flows to include and what cash flows to exclude.

Cash Flow

In considering investment decisions, it does not matter whether outlays are

termed 'capital' or 'revenue' nor whether inflows are turned 'profit', 'depreciation', 'tax allowance', or whatever. All outlays and income must be taken into account.

Cash flows in this context is not the same as the cash flow through a bank account, nor is it identical to accounting profit, since changes in the later can occur without any change taking place in the cash flow.

For purposes of investment appraisal, the cash flow is the incremental cash receipts less the incremental expenditures solely attributable to the investment in question.

The future costs and revenues associated with each investment alternative are:

1. **Capital costs:** These cover (a) the long-term capital outlays necessary to finance a project, and (b) working capital. Typically additional working capital will be required to cover a higher inventory, or a larger number of debtors, and to be worth while the project must earn a turn on this capital as well as on the long-term capital.

2. **Operating costs:** Running costs of the operations that are required to generate income. These include both the variable and the fixed costs.

3. **Revenue:** Realisations from the sale of goods produced as well as other income which is not directly attributable to operations but contributes to the profitability of the operations.

4. **Depreciation:** In the case of the discounting methods of appraisal, the recovery of capital is automatically allowed for from the net cash flow, so depreciation need not be included as an accounting provision. This has the important advantage that the discounting profitability assessment is not affected by the pattern of accounting depreciation chosen.

5. **Residual value:** As with working capital, the residual assets of the project may have a value. This residual value should be included with the net cash flow.

An investment decision implies the choice of an objective, a technique or appraisal, and length of service-the project's life. The objective and technique must be related to definite period of time.

No matter how good a company's maintenance policy, its technological forecasting ability, or its demand forecasting ability, uncertainty will always be present because of the difficulty of predicting the length of project's life.

The actual assessment of a project's profitability is a team exercise in which the expertise of economist, the market researcher, the engineer, and the controller must all be brought together. The outcome of their collaboration will be a forecast of the cash flow over a period of yeaRs If this period is incorrectly estimated, the whole analysis will be wrong or at least grossly inaccurate.

As a rule, in investment appraisal, one of two assumptions is adopted-either the cash flow is assumed to be known with certainty, or the best estimate is used. The assumption of certainty is generally unacceptable, so allowance must be made for the risk inherent in the proposed adoption of the 'best' estimate. To the expected outcome, probabilities can be attached to sales, costs, and other elements of the investment proposal to allow for risk.

The application of risk analysis enables management to answer the following questions: (1) What is the profitability resulting from given estimates of costs and revenues from the project, if they are achieved? and (2) What is the likelihood of such estimates being achieved?

This then enables top management to concentrate on those factors that are critical to the financial success of the project, such as selling price, sales volume, capital cost, and so forth.

Measuring cash flows is not a very tedious job if they exist, but always remember you are talking about future projections in these cash flows and projections are perceptions that change with each person.

The Weighted Average Cost of Capital

Assumptions of the cost of capital model

A. **Constant business risk:** We assume that any investment being considered will not significantly change the firm's business risk. Therefore the overall cost of capital would not change with the changing nature of investments in different markets.

B. **Constant financial risk:** Management is assumed to use the same financial mix as it used in the past with the same combination of debt and equity.

C. **Constant dividend policy:**

1. For ease of computation, it is generally assumed that the firm's dividends are increasing at a constant annual growth rate. Also, this growth is assumed to be a function of the firm's earning capabilities and not merely the result of paying out a larger percentage of the company's earnings.

2. We also implicitly assume that the dividend payout ratio (dividend/net income) is constant.

Computing the weighted cost of capital

A firm's weighted cost of capital is a function of (l) the individual costs of capital, (2) the capital structure mix, and (3) the level of financing necessary to make the investment. The individual costs of capital helps in deciding the weigtage that has to be given to the different modes of financing. The capital structure mix decides level of the debt that the company would take up. The level of financing helps in working out the amount that the company could shell out of its own and deciding whether and how much to finance from outside sources.

Determining individual costs of capital

a) **Cost of Debt:** As we discussed in the last chapter the before-tax cost of debt is found by trial-and-error by solving for kd in

$$PV = PV_0 = \sum_{t=1}^{n} \left(\frac{Interest_t}{(1+k_d)^t} \right) + \frac{Principal}{(1+k_d)^n}$$

where   PV   =   the market price of the debt, less flotation costs,

Interestt   =   the annual interest paid to the investor each year,

Principal   =   the maturity value of the debt

kd   =   before-tax cost of the debt (before-tax required rate of return on debt)

n   =   the number of years to maturity.

The after-tax cost of debt equals $= kd(1 - T)$.

b) **Cost of preference share** (required rate of return on preference share), kps, equals the dividend yield based upon the net price (market price less flotation costs) or

$$k_{ps} = \frac{dividend}{net\ price} = \frac{D}{NP_o}$$

c) **Cost of equity share:** There are three measurement techniques to obtain the required rate of return on equity shares as discussed in the last chapter. The first is the perpetuity growth model, also known as the dividend growth model. A variation on the same is to look at the floatation of a new equity share and include the floatation costs when determining the cost of capital. The second one is the CAPM model. The third one derives its value from the value of the debt of the company.

i)   Dividend growth model

   a.   Cost of internally generated common equity, ks

$$k_s = \frac{dividend\ in\ year\ 1}{market\ price} + \left(\begin{array}{c} annual\ growth \\ in\ dividends \end{array} \right)$$

$$k_s = \frac{D_1}{P_o} + g$$

   b.   Cost of new equity share, k_{ns}

$$k_{ns} = \frac{D_1}{NP_o} + g$$

where NP_o = the market price of the equity share less flotation costs incurred in issuing new shares.

ii) **Capital asset pricing model:** As discussed in the last chapter the expected cost of equity share is dependent on the risk profile of the share versus the market as a whole.

$$k_s = k_f + b(k_m - k_f)$$

where k_s = the cost of equity share

k_f = the risk-free rate

b = beta, measure of the stock's systematic risk

k_m = the expected rate of return on the market

iii) **Risk-Premium Approach:** All these models are very useful for companies that have their shares listed in the market or about to get them listed. What about the companies that are privately owned. The best way to do it for these companies is to find the general risk premium and take the company specific cost of debt (which is supposed to include the risk premium of the company) and then add the two to find out the equity cost of the company.

$$k_s = k_d + RP_s$$

where k_s = cost of equity share

k_d = cost of debt

RP_s = risk-premium of equity share

2. Determining capital structure mix

3. The individual costs of capital will be different for each source of capital in the firm's capital structure. If the company uses debt to the level of fifty percent of its investment, then the cost of debt should get 50% weightage in the capital structure.

To use the cost of capital in investment analyses, we must compute a weighted or overall cost of capital.

3. **Level of financing and the weighted average cost of capital**

The weighted marginal cost of capital specifies the composite cost for each additional rupee of financing. The firm should continue to invest up to the point where the marginal internal rate of return earned on a new investment (IRR) equals the marginal cost of new capital.

Effect of additional financing on the cost of capital would be threefold.

a.   Issuing new equity share will increase the firm's weighted cost of capital because external equity capital has a higher cost than internally generated common equity.

b.   As we use additional debt and preference shares, their cost may increase, which will result in an increase in the weighted cost of capital.

c.   The increase in the firm's weighted marginal cost of capital curve will occur at the total rupee financing level when all the cheaper funding will be consumed by the firm's investments, given the targeted debt- equity ratio. The increase in the weighted cost of capital will occur when the total financing from all sources equals:

Procedure for determining the weighted marginal cost of capital curve is given below for ready reference.

1.   Determine financial mix to be used.

2.   Calculate the level of total financing at which the cost of equity capital increases.

3.   Calculate the costs of each source of capital.

4.   Compute the weighted marginal costs of capital at different levels of total financing.

5.   Construct a graph that compares the internal rates of return of available investment projects with the weighted marginal costs of capital.

Calculation of Weighted average cost of capital

WACC basic computation is given by the formula given below

$$k_o = k_s \left(\frac{E}{D+E} \right) + k_d [1\text{-}T] \left(\frac{D}{D+E} \right)$$

where:

k_o =   the weighted average cost of capital

k_s =   the cost of equity capital

k_d =   the before-tax cost of debt capital

T   =   the marginal tax rate

E/(D+E)   =   percentage of financing from equity

D/(D+E)   =   percentage of financing from debt

(D+E)   =   Total capital employed by the firm

In the formula above we are assuming that the capital has two components only, debt

and equity. If the preference capital is also there then it is simply added to it the way other two are denoted.

The cost of capital and cash flows are then utilised to evaluate a project by using an evaluation method.

Chapter-3
Operating and Financial Leverage

One of the most important of the various financial decisions is how much leverage a firm should employ.

A fundamental decision made by any business is the degree to which it incurs fixed costs. A fixed cost is one that remains the same regardless of the level of operations. As sales increase, fixed costs don't increase in the same proportion. Some fixed costs do not increase at all till a particular point. As a result, profits can rise faster during good times. On the other hand, during bad times fixed costs don't decline, so profits fall more rapidly than sales do.

The degree to which a firm locks itself into fixed costs is referred to as its leverage position. The more highly leveraged a firm, the riskier it is because of the obligations related to fixed costs that must be met whether the firm is having a good year or not. At the same time, the more highly leveraged the greater the profits during good times. This presents a classic problem of making a decision where there is a trade-off between risk and return.

There are two major types of leverage - financial and operating. Financial leverage is specifically the extent to which a firm gets its cash resources from borrowing (debt) as opposed to issuance of additional shares of (equity). The greater the debt compared to equity, the more highly leveraged the firm because debt legally obligates the firm to interest payments. These interest payments represent a fixed cost.

Operating leverage is concerned with the extent to which a firm commits itself to high levels of fixed costs other than interest payments. A firm that rents property using cancellable leases has less leverage than a firm that commits itself to a long-term noncancellable lease does. A firm that has substantial vertical integration has created a highly leveraged situation. Consider what happens if a company vertically integrates by acquiring its raw materials' supplier. Raw materials will now cost the company less, because it doesn't have to buy them from an outside firm. But when times are bad, the firm will have to bear the fixed costs associated with the supplier subsidiary. Had there still been two separate companies, the big company could have simply slowed its purchases of raw materials from supplier without having to bear its fixed costs.

In the cases of both financial and operating leverage, the crucial question is how much leverage is appropriate. We can't answer that question in absolute terms, but we will

help you understand the topic. This understanding should make it simpler to make appropriate choices or to understand what went into making the choices your firm has already made.

Operating Leverage

While decisions about financial leverage is strictly the domain of the firm's highest levels of management, operating leverage is an issue that directly affects the line managers of the firm. The level of operating leverage a firm selects should not be made without input from the managers directly involved in the production process. For example, one of the most significant operating leverage issues is the choice of technology levels. Selection of the highest level of technology available is not always in the best interests of the business.

Suppose that we are opening a chain of copy centres. Each centre will provide a full service operation. Customers can drop work off in the morning and pick it up later in the day or the week. The employees will do the actual photocopying. We are faced with the choice of renting a relatively slow copy machine, or the newest technology machine, which is considerably faster. The faster machine is also considerably more expensive to lease.

It will generally be the case that newer technology has a higher fixed cost and lower variable cost than the older technology. Variable costs are those that vary directly with volume. If we double the number of copies made, we double the amount of paper, printing ink toner, and labour time needed for making the copies. One of the principle functions of new technology is to reduce the variable costs of production.

It may turn out that a machine that can reduce the variable costs is more expensive to make, and thus has a higher purchase or lease price than the older generation machine. However, even if it doesn't cost more to make, its manufacturer will charge more for the new machine than for the older machine. Intuitively, if the new machine is in some respect better than the old machine (that is, it lowers the variable cost without reducing quality), and doesn't cost more to buy, then no one will buy the older machine. Thus, anytime we see two technologies being sold side by side, such as slow and fast copy machines, we can expect the faster machine to have a higher rental fee or purchase price, and therefore a higher fixed cost.

Let's assume that we could lease the slower, older technology copy machine for Rs 10,000 per year, or a faster, newer technology copy machine for Rs 15,000 per year. Both produce photocopies of equal quality. Both use the same quantities of paper and ink toner, but the faster machine requires less operating time. Therefore, the labour cost is much lower for the faster machine. As a result, the variable cost of copies on the slow machine is 30 paise each, while the variable cost of copies from the fast machine is only 25 paise each. Is the faster machine the better bet?

That depends. Suppose we sell each copy for 50 paise. Then, for each copy we sell we receive 50 paise and spend extra 30 paise or 25 paise (depending on our choice of machine) for the variable costs. The difference between the price and the variable costs is referred to as the contribution margin. This margin represents the amount of money available to be used to pay fixed costs and provide the firm with a profit.

If we use the slower machine, we receive 50 paise and spend 30 paise, leaving 20 paise to be used toward paying the rent on the copy machine. If we sell enough copies, there will be enough individual contributions of 20 paise a piece to pay the full Rs 10,000 rent and leave some receipts for a profit.

So in operating leverage the decision boils down to the production levels that we have or we anticipate and on that basis we decide the amount of fixed costs that we are willing to bear. All this leads itself to breakeven analysis or cost-volume-profit analysis that you have learned earlier.

Financial Leverage

Let's start our discussion of financial leverage with an example. Assume you were to buy a small building as a piece of investment property. You buy the building for Rs 1,00,000 and pay the full amount in cash.

Suppose that an year later you sell the building for Rs 1,30,000. Your pre-tax profit is Rs 30,000. This is a 30% pre-tax return on your original investment of Rs 1,00,000.

As an alternative to paying the full Rs 1,00,000 cash for the investment, you might have to put Rs 10,000 cash down and borrow Rs 90,000 from the bank at 15% interest. This time when you sell the property for Rs 1,30,000 you repay Rs 90,000 to the bank, along with Rs 13,500 interest. After deducting your original Rs 10,000 investment, Rs 16,500 is left as a pre-tax profit. This is a pre-tax return of 165% on your Rs 10,000 investment. Compare the 30% we calculated earlier to this rate of return of 165%. That's financial leverage for you!

Note that we had a net profit of Rs 30,000 without leverage, but only Rs 16,500 in the leveraged case. Although we earned a higher return, we had less profit. That's because in the unleveraged case we had invested Rs 1,00,000 of our money, but in the leveraged case we had invested only Rs 10,000. If we have additional investment opportunities available to us, we could have invested our full Rs 1,00,000, borrowed Rs 900,000, and had a pre-tax profit of Rs 165,000 on the same investment that yields Rs 30,000 in the unleveraged situation. Financial leverage can not only increase your yield from investments, but can also allow you to consider projects that are much larger than what would be feasible without borrowing.

Suppose, however, that the property were sold after one year for Rs 70,000 rather than Rs 1,30,000. On Rs 1,00,000 unleveraged investment, the loss would be Rs 30,000 before taxes. This would be a 30% loss on our original Rs 1,00,000 investment.

In the leveraged case, the loss will be magnified. We would have to repay the bank the Rs 90,000 loan plus Rs 13,500 of interest. These payments total to Rs 1,03,500, which is Rs 33,500 greater than the Rs 70,000 proceeds from the sale. Further, we've lost our initial Rs 10,000 investment. The total loss is Rs 43,500 before taxes. On our initial investment of Rs 10,000, this constitutes a loss of 435 percent. That's financial leverage too!

Let us put that into a table so as to see the effect of financial leverage more clearly.

Original investment	Amount Borrowed	Profit/ (Loss)	Profit/ (Loss) as percentage of original investment
1,00,000	-	30,000	30 %
10,000	90,000	30,000	1,65 %
1,00,000	-	(30,000)	(30 %)
10,000	90,000	(30,000)	4,35 %

Clearly when the firm is going to accept this level of leverage it must decide if the 165% possible gain is worth the risk of a 435% loss. Whether it is or not depends on the likelihood of the increase in value versus the probability of a decline. Of course it can accept a lower level of leverage but still the interplay of debt and equity would be there and a study of its effects in both the good times and the bad times would be important.

If the project really was a sure thing, leverage would certainly make sense but projects are rarely sure things. Yet, managers should try to decide how confident they are of the success of a project, and weigh that confidence against the implications for the firm if the project does indeed fail. Not all managers rate the same project as being equally likely to succeed. Some managers feel a particular project is great, while others may not think as highly of it.

Further, even if all managers agreed on how likely a project were to succeed, they would not all make the same decision about financial leverage. Some managers and firms tend to be more averse to risk than others. There are gamblers and conservatives. Usually shareholders align themselves with a firm that they feel does things the way they want them done. A person dependent on a steady level of income from share dividends might prefer to buy the share of a firm that shuns leverage and prefers a steady, if lesser income. A person looking for large potential appreciation in share price might prefer the share of a firm that is highly leveraged.

How Much Financial Leverage Is Enough

In practice, the leverage decision is based on firm policy. Some firms raise almost all of their funds from issuing share to shareholders and from earnings retained in the firm. Other firms borrow as much as they possibly can and raise additional money from shareholders only when they can no longer raise any additional money by borrowing. Most firms are somewhere in the middle. In the example that we discussed above, you didn't have to borrow Rs 90,000 or nothing; you could have chosen to borrow some amount in between the two. Likewise, some firms maintain one-fourth as much debt as equity, some firms equal amounts of debt and equity, and some firms more debt than equity.

The firm's top corporate managers and the board of directors make this decision. Generally, project managers evaluating the potential of individual projects do not make the decision of issuing share or borrowing money.

Debt or Equity?

In making a decision regarding whether additional funds should be raised from issuing debt or equity, there are several factors to be considered. The first rule of financial leverage is that it only pays to borrow if the interest rate is less than the rate of return on the money borrowed. If your firm can borrow money and invest it at a high enough rate so that the loan can be repaid with interest and still leave some after-tax profit for your shareholders, then your shareholders have profited. They have made extra profit with no extra investment. This greatly magnifies the rate of return on the amount they invested.

Why are lenders so generously allowing you to benefit at their expense? How can there be a system where a firm can increase profits to its shareholders without extra investment from them? The key is risk. The shareholders of your company don't increase their investment, but they do increase their risk. The lender may not reap all of the possible profits from the use of his money. But the lender does earn a contractually guaranteed rate of return. The lender gets back his money plus a set amount of interest, whether we make a fortune or lose our shirts.

The amount that lenders let you borrow depends largely on your available collateral. Merely desiring to be highly leveraged doesn't guarantee that you can borrow enough to be highly leveraged. Because the lender isn't a partner if you strike it rich, he doesn't want to be a partner if you go bankrupt.

Assuming that you have enough collateral to borrow as much as you might want, what factors should you consider in trying to arrive at a reasonable level of leverage? To a great degree, your desired leverage position depends on the degree to which your sales and profits fluctuate. The greater the fluctuation in sales and profits, the less leverage you can afford. If your firm is a stable, noncyclical firm that makes money in good times and bad, then use of debt will help improve the rate of return earned by your shareholders. If cyclical factors in your industry or the economy at large tend to cause your business to have both good and bad years, then debt entails a greater risk.

For example, the petrochemicals industry, with its huge capital requirements has traditionally been highly leveraged. The results have been very large profits during the good years, but substantial losses during periods when petrochemical prices falls.

Cyclical factors shouldn't scare companies away from having any debt at all. The key is to accumulate no more interest and principal repayment obligations than can reasonably be met in bad times as well as good. Ultimately, considering the variability of your profit stream, a decision must be made regarding the level of extra risk you are willing to take to achieve a higher potential rate of return on shareholder investments.

Impact of Financial Leverage

Financial leverage acts as a lever to magnify the influence of fluctuations. Any fluctuation in earnings before interest and taxes (EBIT) is magnified on the earnings per share. (EPS) by operation of leverage. The greater the degree of leverage, the wider the variation in EPS given any change in EBIT. The following illustration would explain how leverage technique works.

Illustration

Pramila company is capitalised with Rs. 10,00,000 divided in 1,000 common shares of Rs. 1,000 each. The management wishes to raise another Rs. 10,00,000 to finance a major programme of expansion through one of our possible financing plans. The management may finance the company with :

(I)   all common stock,

(II)   Rs. 5 lakhs in common stock and Rs. 5 lakhs in debt at 5 per cent interest, or

(III)   all debt at 6 per cent interest or

(IV)   Rs. 5 lakhs in common stock and Rs. 5 lakhs in preferred stock with 5 per dividend.

The company's existing earnings before interest and taxes (EBIT) amounted to Rs. 1,20,000. Corporation tax is assumed to be 50 percent.

Solution:

Impact of financial leverage, as observed earlier, will be reflected in earnings per share available to common stockholders. To calculate, the EPS in each of the four alternative EBIT has to be first of all calculated:

	Proposal A Rs.	Proposal B Rs.	Proposal C Rs.	Propsal D Rs.
EBIT	120000	120000	120000	120000
Less Interest	-	25000	60000	-
EBT	120000	95000	60000	120000
Less Taxes @ 50%	60000	475000	30000	60000
EAT	60000	475000	30000	60000
Preferred Dividend	-	-	-	25000
Earnings Available to Common stock holders	60000	47000	30000	35000
No of Equity Shares	20000	15000	10000	15000
EPS	3.0	3.67	3.0	2.33

Thus, when EBIT is Rs. 1,20,000, proposal B involving a total capitalisation of 75 percent common stock and 25 per cent debt would be the most favorable with respect to earnings per share. It may further be noted that proposition of common stock in total capitalisation is the same in both the proposals B and D but EPS is altogether different because of induction of preferred stock. While preferred stock dividend is subject to taxes where as interest on debt is tax-deductible expenditure resulting in variation in EPS in proposals B and D. With a 50 percent tax rate the explicit cost of preferred stock is twice the cost of debt.

We have so far assumed that level of earnings would remain the same even after the expansion of funds. Now assume that level of earnings before interest and taxes doubles the present level in correspondence with increase in capitalisation, changes in earnings per share to common stockholders under different alternatives would be as follows:

Illustration

	Proposal A Rs.	**Proposal B** Rs.	**Proposal C** Rs.	**Propsal D** Rs.
EBIT	2,40,000	2,40,000	2,40,000	2,40,000
Less Interest	-	2,5000	60,000	-
EBT	2,40,000	2,15,000	1,80,000	2,40,000
Less Taxes @ 50%	1,20,000	1,07,000	90,000	1,20,000
EAT	1,20,000	1,07,000	90,000	1,20,000
Less: Preferred Dividend	-	-	-	25000
Earnings Available to Common stock holders	1,20,000	1,07,000	90,000	1,20,000
No of Equity Shares	20,000	15,000	10,000	15,000
EPS	6	7.17	9	6.33
EPS before Additional Issue	3	3	3	3

It is evident from illustration that increase in earnings before interest and taxes is magnified on the earnings per share where debt has been inducted. Thus, in proposal B and *d* where debt comprises a portion of total capitalisation, EPS would increase by more than twice the existing level while in proposal A EPS has improved exactly in proportion to increase in earnings before interest and taxes. Since dividend in preferred stock is a fixed obligation and is less than the increase in earnings, EPS in proposal D also increases more than twice the rise in earning.

Another important conclusion that could be drawn from the above illustration is that the larger the ratio of debt to equity, the greater the return to equity. Thus, in proposal C where debt represents 50 per cent of the total capitalisation, EPS is magnified three times over the existing level while in proposal B where debt has furnished one-third

of the total funds, increase in EPS is little more than double the earlier level. This volatility of earning operates' during contraction of income as well as during an expansion.

Likewise, financial leverage magnifies all losses sustained by the company. Assume that the Rekha Company expects to sustain a toss of Rs. 60,000 before interest and taxes, loss per share under the different alternatives would be:

Ilhrstration

	Proposal A	Proposal B	Proposal C	Propsal D
	Rs.	Rs.	Rs.	Rs.
Loss before interest and Taxes	–60,000	–60,000	–60,000	–60,000
Add: Interest	-	25,000	60,000	-
Loss Per Share	3	5.67	12	4

Thus loss per share is highest under alternative C where proportion of debt is, as high as 50 per cent of the total capitalisation and the lowest in proposal A where leverage is zero. This is why the phrase 'financial leverage magnifies both profits and loss is very often quoted to explain magic of the financial leverage.

Thus, the financial leverage is useful as long as the borrowed capital can be made to pay the company more than what it costs. Naturally it will become source of decrease in profit rates when it costs more than what it earns. To what extent debt capital should be used in order to improve earnings of the company is a major financing problem facing a finance manager. It should be remembered here that the financial leverage offers

financial advantages only up to a point. Beyond that point debt financing may be detrimental to the company. For instance, as we expand the use of debt' in our capital structure, lenders will perceive a greater financial risk for the company. For that reason, they may raise the average interest rate we pay, and place certain restrictions on the company. Furthermore, concerned equity stockholders' may drive down the price of the stock forcing the management away from the company's main objectives of maximizing

overall value of the company in the market. Thus, before using the financial leverage as a technique of improving net earnings of the company, its impact on EPS must carefully weighed .

A graphical presentation of a financing plan

A financing plan that consisted of Rs.40,000 of 5-percent bonds, 500 shares of Rs. 4 preferred stock, and 1,000 shares of common stock was used to illustrate financial leverage in Table 3.1. This financing plan can be illustrated graphically; like all plans of this type, it can be plotted as a straight line. This is because it is affected only by the deduction of certain fixed rupees costs. Plotting two values of EBIT Rs.10,000 and Rs.14,000-and associated earnings per share of Rs. 2 and Rs. 4 gives us the line in Figure 3.1.

This line shows the earnings per share associated with each level of EBIT. It is interesting to note that the line intersects the EBIT axis at Rs.6,000. This value of EBIT represents the level at which the firm's earnings per share are equal to zero. This zero intercept can be verified by looking at Case 2 in Table 3.1. At levels of EBIT below Rs.6,000, the firm would have negative EPS. This portion of the graph has not been included.

A graphical illustration of different degrees of financial leverage The type of graphical presentation in Figure 3.7 can be used to illustrate differences in financial leverage. Suppose we want to compare the financing plan in the preceding example with an alternate plan. The alternate plan involves Rs. 20,000 of 5-percent debt, 250 shares of Rs. 4 preferred stock,

$$\frac{Rs.\,3,500}{2,000} = Rs.\,1.75\,/\,sh$$
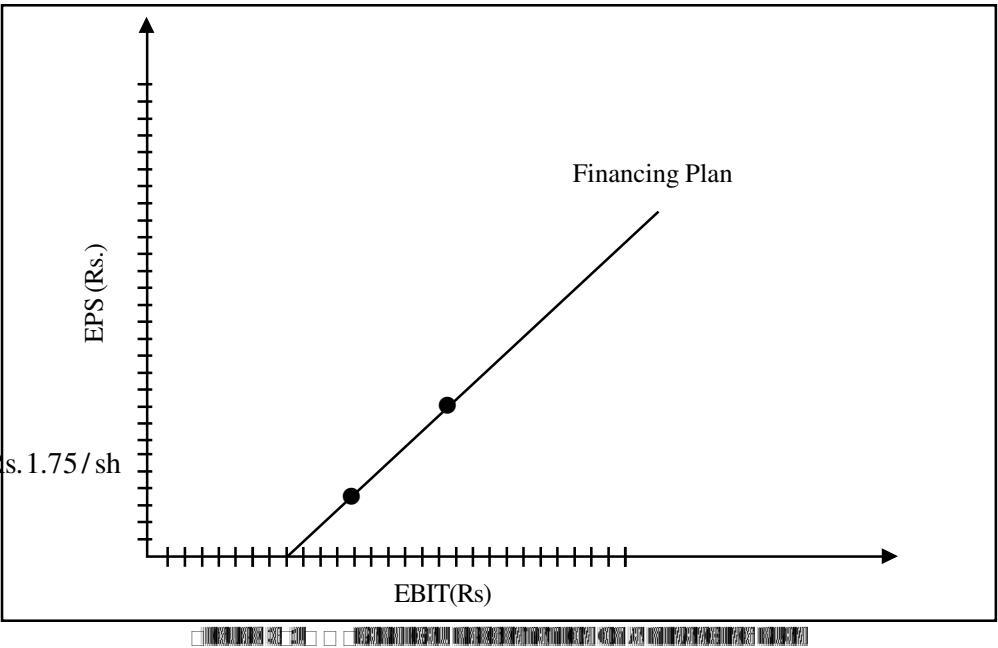
and 2,000 shares of common stock. The annual interest payment will be Rs.1,000 (.05 × Rs.20,000) and the annual preferred dividend payment will be Rs.1,000 (Rs.4/sh. × 250 sh.). in order to graph this plan, two sets of EBIT -EPS coordinates are required. The EPS associated with EBIT values of Rs.10,000 and Rs.14,000 are calculated below.

		40%	
	Rs.		Rs.
EBIT	10,000		14,000
I	1,000		1,000
EBT	9,000		13,000
–T (50%)	4,500		6,500
–P	1,000		1,000
EPC	3,500		3,500

EPS: $\dfrac{Rs.\,5,500}{2,000} = Rs.\,2.75\,/\,sh$

+56%

A 40-percent increase in the firm's EBIT will result in a 56-percent increase in EPS. Applying Equation 3.6 to these values yields

$$\frac{+56\%}{+40\%} = 1.4$$

The value of 1.4, when compared to the financial leverage value of 2.5 calculated earlier indicates that this plan has a lower degree presented initially. Each of these plans is graphed m Figure 3.8, The original plan, first graphed in Figure 3.1, is labeled plan A; the current plan is labeled plan B.

F█████ █ █ A C██████ C██████ ███ C███████ ███████ █████
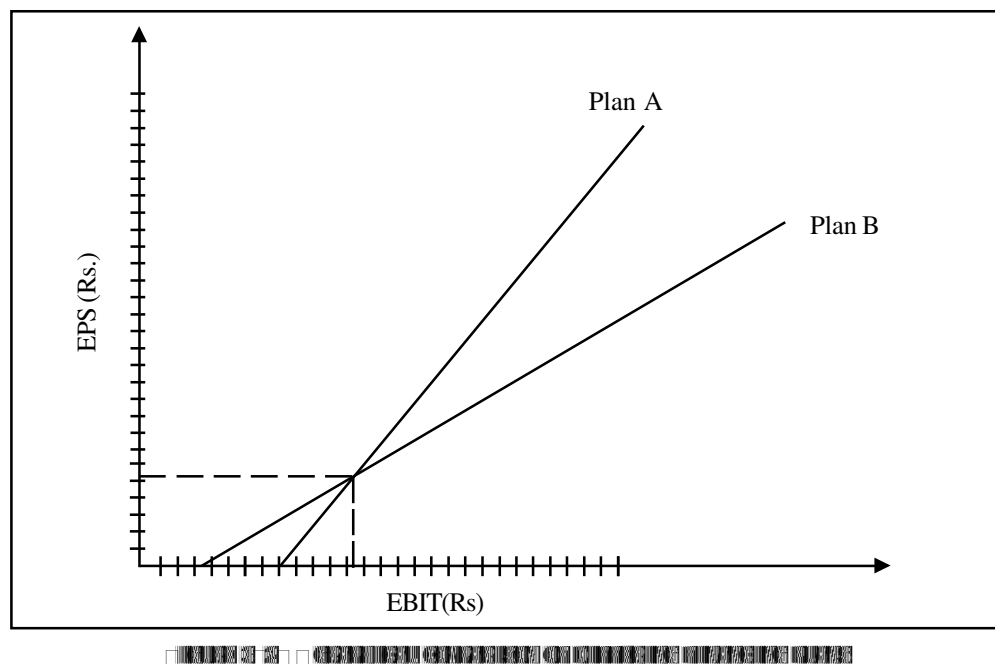
As Figure 3.8 illustrates, the slope of plan A is steeper than that of plan B This indicates that plan A has more financial leverage than plan B· This result is as expected, since the ratio of the change in EPS for a given change in EBIT is 2.5 for plan A and 1.4 for plan B. The higher this ratio is, the more leverage a plan has. The reader should recognize from Figure 3·8 that financing plans with higher degrees of leverage have steeper slopes when plotted on EBIT -EPS axes.

The point of intersection of each plan with the EBIT axis represents the amount of earnings before interest and taxes necessary for the firm to cover its fixed financial charges, that is, the point at which EPS = 0. This point of intersection can be thought of a *financial break-even point* since it represents the level of EBIT necessary for the firm to break even on its fixed financial charges. The break-even EBIT for plan A is Rs. 6,000, and for plan B it is Rs. 3,000 In other words, earnings before interest and taxes of less than Rs.6,000 with plan A or less than Rs.3,000 with plan B will result in a loss, or negative EPS.

The point labeled X in Figure 3.2 represents, the point of intersection between plan A loss, or negative EPS. and plan B· It indicates that at a level of EBIT of Rs.9,000, EPS of Rs. 1.50 would result under either plan. At levels of EBIT below Rs.9,000, plan

B results in higher levels of EPS; while at levels of EBIT above Rs,9,COO, plan- A results in higher levels of EPS. The usefulness of this type of analysis is discussed in Chapter on Capital Structure while discussing methods of evaluating financing plans.

Combined Leverage

The operating leverage has its effects on operating risk and is measure by the percentage change in EBIT due to percentage change in sales. The financial leverage has its effects on financial risk and is measured by rthe percentage change in EPS due t percentage change in EBIT. Since both these leverages are closely concerned with ascertaining the ability to cover fixed charges (fixed-operating costs in the case of operating leverage and fixed-financial costs in the case of financial leverage), if they are combined, the result is total leverage and the risk associated with combined leverage is known as total risk. Symbolically,

$$DCL = DOL \times DFL \tag{14.11}$$

Where   DCL = Degree of combined leverage

              DOL = Degree of operating leverage

              DFL = Degree of financial leverage

Substituting the values of DOL and DFL, we have:

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

$$DCL = \frac{\% \text{ change in EBIT}}{\% \text{ change in sales}}$$

$$DCL = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBIT} - 1} \frac{\text{Contribution}}{\text{EBIT} - 1}$$

Thus, the DCL measures the percentage change in EPS due to percentage change in sales. If the degree of operating leverage of a firm is 6 and its financial leverage is 2.5, the combined leverage of this a firm would be 15(6 X 2.5). That is, 1 per cent change in sales would bring about 15 per cent change in EPS in the direction of the change in sales. The combined leverage can work in either direction. It will be favourable if sales increase and unfavourable when sales decrease because changes in sales will result in more than proportionate returns in the form of EPS.

The usefulness of DCL lies in the fact that it indicates the effect that sales changes will have on EPS. Its potential is also great in the area of choosing financial plans for new investments. If, for example, a firm begins to invest heavily in more risky assets than usual, the operating leverage will obviously increase. If it does not change its financing

policy, that is, the capital structure remains constant, there would be no change in its financial leverage. As a result, the combined leverages would increase causing an increase in its total risk. The firm, in order to keep its risk constant, may like to lower its financial leverage. This could be done if the new investments are financed with more equity than the firm has used in the past. This would lower the financial leverage and compensate for the increased operating leverage caused by investment in more risky investments. If the operating leverage has decreased due to low fixed costs, the firm can afford to have a more levered financial plan to keep the total risk constant at the same time having the same prospects of magnifying effects on EPS due to change in sales.

Solved Problems

1. B Corporation is considering a new project which will require the purchase of a new machine at a cost of 250,000. The project will also require use of a machine which has been fully depreciated but which could be sold today for 30,000. In addition, the firm expects an increase in net working capital investment of 60,000 in the first year of the project. What is the incremental net investment at the outset of this project? How much of this incremental net investment will the firm be able to depreciate?

Solution

The incremental investment includes both the cash required to purchase the new machine and the after-tax disposal value of the old machine, which is calculated as follows:

Gain on sale = Market value - Book value = 30,000 -0 = 30,000.

Taxes on gain = Gain Tax rate = (30,000)(0.40) = 12,000

Thus the firm's incremental investment flows are:

Cost of new machine :	250,000
Increase in net working capital	60,000
Market value of old machine	-30,000
Tax on gain of sale of old machine :	12,000
Incremental investment outlay	292,000

The firm's depreciable value for tax purposes will be only the 250,000 cost of the new machine. (If the old machine had remaining book value, the incremental tax basis would be reduced by the loss of this book value.)

2. The Stupid Company is considering a project requiring the purchase of a new machine costing Rs 200,000. The machine will be depreciated on a straight-line

basis over its economic life of five years. The project, however, has only a three-year life and the machine will be sold after three years for an estimated Rs 30,000. In addition, the firm will be able to recover Rs 6,000 of working capital investment. What is the after-tax cash flow in year 3 from the sale of this machine and the recovery of the working capital investment? Assume that the firm's marginal tax rate is 40 percent.

Solution

The net cash flow in the final year are after-tax cash flows, including the tax effect of any asset sale. Note that there is no tax effect on the recovery of working capital investment since the recovery involves the collection of accounts receivable and the sale of inventory which has no tax effect (other than those represented by revenues and expenses).

Gain or loss on asset sale :

Market value of asset	30,000
Less : Book value of aset [200-(3)(40)]	80,000
Loss of sale of asset	50,000
Calculating year 3 after-tax cash flows :	
Taxes saved due to loss on sale [(50)(0.40)]	20,000
Decreases in working capital investmen	6,000
Net after-tax cash flow in year 3	56,000

3. The following figures relate to two companies: *(Rs lakhs)*

	P Ltd.	Q Ltd.
Sales	500	1,000
Variable costs	200	300
Contribution	300	700
Fixed costs	150	400
	150	300
Interest	50	100
Profit before Tax	100	200

You are required to:

(i) Calculate the operating, financial and combined leverages for the two companies; and

(ii) Comment on the relative risk position of them.

Solution: Calculation of leverage :

$$\text{Operating leverage} = \frac{\text{Contributi on}}{\text{Earning before Interest \& Tax}}$$

P Ltd
$$= \frac{\text{Rs. 300lakhs}}{\text{Rs.150lakhs}} = 2$$

Q Ltd
$$= \frac{\text{Rs. 700lakhs}}{\text{Rs.300lakhs}} = 2.33$$

$$\text{Financial leverage} = \frac{\text{Earning before Interest \& Tax}}{\text{Profit before Tax}}$$

P Ltd
$$= \frac{\text{Rs. 150lakhs}}{\text{Rs.100lakhs}} = 1.5$$

Q Ltd
$$= \frac{\text{Rs. 300lakhs}}{\text{Rs.200lakhs}} = 1.5$$

$$\text{Combined leverage} = \frac{\text{Contributi on}}{\text{Earning before Tax}}$$

(i.e., Operating leverage × Financial leverage)

P Ltd
$$= \frac{\text{Rs. 300lakhs}}{\text{Rs.100lakhs}} = 3$$

Q Ltd
$$= \frac{\text{Rs. 700lakhs}}{\text{Rs.200lakhs}} = 3.5$$

Comment on the relative risk position of P Ltd. and Q Ltd.

(a) **Operating Leverage:** The operating leverage of Q Ltd. is higher than P Ltd.'
     and hence Q Ltd. is exposed to higher business risk than P Ltd. A firm will face
     business risk when the EBIT does not vary in direct proportion with the change in
     sales.

(b) **Financial Leverage:** The financial leverage of both the companies is same
     i.e., 1.5.

(c) **Combined Leverage:** When we study the overall risk of the companies, is
     carrying higher risk than P Ltd.

4.   **(i) Find the operating leverage from the following data:**

     Sales   Rs. 50,000
     Variable Costs   60%
     Fixed costs   Rs. 12,000

(ii)   Find the financial leverage from the following data:

Net Worth   Rs. 25,00,000

Debt/Equity   3/1

interest rate   12%

Solution:

(i)   Calculation of Operating level rage:

Particulars	(Rs.)
Sales	50,000
Less: Variable Costs (60% of Sales)	30,000
Contribution	20,000
less: Fixed Costs	12,000
Operating Profit	8,000

Operating leverage = Contribution/Operating profit

$$= Rs.\ 20,000/Rs.\ 8,000 = 2.5$$

(ii)   Calculation of Financial Leverage

Working Notes:

Calculation of debt and interest thereon:

(a)   Debt   =Rs. 25,00,000 × 3   = Rs. 75,00,000

(b)   Interest on debt   = Rs. 75,00,000 × 12/100   = Rs. 9,00,000

	Rs.
Operating Profit	20,00,000
Less: Interest on debt	9,00,000
Profit before tax	11,00,000

Financial Leverage = Operating profit/Profit before tax

$$= Rs.\ 20,00,000/Rs.\ 11,00,000 = 1.82$$

5.   Calculate the operating leverage, financial leverage and combined leverage from the following data under Situations I and II and Financial Plans A and B:

Installed capacity   4,00 unit

Actual Porduction and sales   75% of the Capacity

Selling Price   Rs. 30 per Unit

Variable Cost	Rs. 15 per Unit	
Fixed cost:		
Under Situation I	Rs. 15, 000	
Under Situation II	Rs. 20,000	
Capital structure:	Rs.	

Financial Plan	A	B
Equity	10,000	15,000
Debt (rate of Interest at 20%)	10,000	5,000
	20,000	20,000

Solution: (i) Calculation of Operating Leverage

Operating Leverage = (Contribution/operating profit)

Rs.

	Situation I	Situation II
Sales	90,000	90,000
Less: variable cost	45,000	45,000
(3,00 unit@ Rs. 30 per unit)		
Contribution	45,000	45,000
Less: Fixed Costs	15,000	20,000
Operating profit (EBIT)	30,000	25,000

$$\text{Operating Leverage} = \frac{\text{Rs. } 45,000}{\text{Rs. } 30,000} = 1.5 \quad \frac{\text{Rs. } 45,000}{\text{Rs. } 25,000} = 1.8$$

(ii) Calculation of financial leverage

$$\text{Financial leverage} = \frac{\text{Operating profit}}{\text{Profit before tax}}$$

Financial plan	A	B
Situation I	30,000	30,000
Operation profit		
Less: Interest on debt	2,000	1,000
profit before tax PBT	28,000	29,000
Financial leverage	=	$= \dfrac{\text{Rs.30,000}}{\text{Rs.29,000}}$
	= 1.07	= 1.04

Financial plan	A	B
Situation II	25,000	25,000
Operation profit	2,000	1,000
Less: Interest on debt	23,000	24,000
PBT		

Financial leverage =

$$\frac{\text{Rs. }25,000}{\text{Rs. }23,000} = \qquad \frac{\text{Rs. }25,000}{\text{Rs. }24,000} = 1.04$$

$$= 1.09$$

(iii) Calculation of combined leverages

Combined leverage = Operating Leverage × Financial Leverage

Financial plan	A	B
Situation I	(1.5×1.07)	(1.5×1.04)
Situation II	(1.8×1.09)	(1.8×1.04)
	= 1.96	= 1.87

Chapter-4
Capital Budgeting

Meaning, Importance, rationale of capital budgeting, nature of investment decision, the administrative framework, Methods of Appraisal, Capital Rationing, Inflation and capital budgeting, Capital Budgeting under Risk and Uncertainties

Meaning, Importance & Rationale of Capital Budgeting

A firm conducts its business in a rapidly changing and highly competitive environment. The changing environment poses both opportunities and threats for the company. For example, change in Government policy may cause change in prices of inputs and outputs, demand and supply of products/services. Similarly, technology change may cause the production cost change. Also the cash inflows and outflows cannot be ascertained with accuracy. Therefore, evaluation of investment projects under uncertainty and risk become important.

Characteristically, a capital budgeting decision involves largely irreversible commitment of resources that is generally subject to a significant degree of risk. Such decisions have far reaching effects on a company's profitability and flexibility over the long-term, thus requiring that they be part of a carefully developed strategy that is based on reliable forecasting procedures.

Capital Budgeting

Capital budgeting may be defined as the decision-making process by which, firms evaluate the purchase of major fixed assets, including buildings, machinery, and equipment It also covers decisions to acquire other firms, either through the purchase of their common stock or groups of assets that can be used to conduct an ongoing business. Capital budgeting scribes the firm's formal planning process for the acquisition and investment of capital and results in a capital budget that is the firm's formal plan for the expenditure of money to purchased assets.

A capital-budgeting decision is a two-sided process. First, the analyst must evaluate a proposed project to calculate the likely or expected return from the project. This calculation generally begins with expenditure of the project's service life and a stream of cash flowing into the firm over the life of the project. The calculation of expected, turn may be done by two methods: a *internal rate of return,* or (b) *net present value,* These two methods are discussed later in this unit.

The second side of a capital-budgeting decision is to determine the required return from a project. We may calculate the likely return to be 12 percent but the question is whether this is good enough for the proposal to be accepted. In order to determine whether the return is adequate, the aualyst must evaluate the degree of risk in the project and then must calculate the, required return for the given risk level. Two techniques may be used to perform this analysis. The *weighted-average cost of capital* is used when the new proposal is assumed to have the same degree of risk as the firm's existing activities. The *capital asset pricing model* is used if the risk in the project is viewed *as* different from the firm's current risk level.

Capital budgeting is important for the future well-being of the firm; it is also a complex, conceptually difficult topic. A, we shall see later in this chapter, the optimum capital budget-the level of investment that maximizes the present value of the firm is simultaneously determined by the interaction of supply and demand forces under conditions of uncertainty. Supply forces refer to the supply of capital, the firm or its *cost of capital schedule.* Demand forces relate to the investmenl opportunities open to the firm, as measured by the *stream of revenues* that will result from an investment decision *Uncertainty* enters the decision because it is impossible to know exactly either the cost of capital or the stream of revenues that will be derived from a project.

Significane of Capital Budgeting

A number of factors cornbine to make capital budgeting perhaps the most important decision with which financial management is involved. Further, a departments Of a firm-production, marketing, and so on, are vitally affected by the capital budgeting decisions, so all executives, no matter what their primary responsibility, must be aware of how capital budgeting decisions are made, These points are discussed in this section.

Long Term Effects

First and foremost, the fact that the results continue over an extended period means that the decision maker loses some of his flexibility. He must make a commitment into the future. For example, the purchase of an asset with an economic life of ten years requires a long period of waiting before the final results of the action can be known. The decision maker must commit funds for this period, and, thus, he becomes a hostage of future events.

Asset expansion is fundamentally related to expected future sales. A decision to buy or to construct a fixed asset that is expected to last five years involves an implicit five-year sales forecast. Indeed, the economic life of a purchased asset represents an implicit forecast for the duration of the economic life of the asset. Hence, failure to forecast accurately will result in over investment or under investmnent in fixed assets.

An erroneous forecast of asset requirements can result in serious consequences. If the firm has invested too much in assets, it will incur unnecessarily heavy expenses. If it

has not spent enough on fixed assets, two serious problems may arise. First, the firm's equipment may not be sufficiently modern to enable it to produce competitively. Second, if it has inadequate capacity, it may lose a portion of its share of the market to rival firms. To regain lost customers typically requires heavy selling expenses, price reduction, product improvements, and so forth.

Timing the Availability of Capital Assets

Another problem is to phase properly the availability of capital assets in order to have them. come "on stream" at the correct time. For example, the executive vice-president of a decorative tile company gave the authors an illustration of the importance of capital budgeting. His firm tried to operate near capacity most of the time. For about four years there had been intermittent spurts in the demand for its product; when these spurts occurred, the firm had to turn away orders. After a sharp increase in demand, the firm would add capacity by renting an additional building, then purchasing and installing the appropriate equipment. It would take six to eight months to have the additional capacity ready. At this point the company frequently found that there was no demand for its increased output-other firms had already expanded their operations and had taken an increased share of the market, with the result that demand for this firm had leveled off. If the firm had properly forecast demand and had planned its increase in capacity six months or one year in advance, it would have been able to maintain its market-indeed, to obtain a larger share of the market.

Quality of Capital Assets

Good capital budgeting will also improve the timing of asset acquisitions and the quality of assets purchased. This situation follows from the nature of capital goods and their producers. Firms do not order capital goods until they see that sales are beginning to press on capacity. Such occasions occur simultaneously for many firms. When the heavy orders come in, the producers of capital goods go from a situation of idle capacity to one where they cannot meet all the orders that have been placed. Consequently, large backlogs accumulate. Since the production of capital goods involves a relatively long work-in-process period, a year or more of waiting may be involved before the additional capital goods are available. This factor has obvious implications for purchasing agents and plant managers.

Asset expansion is fundamentally related to expected future sales. A decision to buy or to construct a fixed asset that is expected to last five years involves an implicit five-year sales forecast. Indeed, the economic life of a purchased asset represents an implicit forecast for the duration of the economic life of the asset. Hence, failure to forecast accurately will result in over investment or under investmnent in fixed assets.

An erroneous forecast of asset requirements can result in serious consequences. If the firm has invested too much in assets, it will incur unnecessarily heavy expenses. If it has not spent enough on fixed assets, two serious problems may arise. First, the firm's

equipment may not be sufficiently modern to enable it to produce competitively. Second, if it has inadequate capacity, it may lose a portion of its share of the market to rival firms. To regain lost customers typically requires heavy selling expenses, price reduction, product improvements, and so forth.

Timing the Availability of Capital Assets

Another problem is to phase properly the availability of capital assets in order to have them. come "on stream" at the correct time. For example, the executive vice-president of a decorative tile company gave the authors an illustration of the importance of capital budgeting. His firm tried to operate near capacity most of the time. For about four years there had been intermittent spurts in the demand for its product; when these spurts occurred, the firm had to turn away orders. After a sharp increase in demand, the firm would add capacity by renting an additional building, then purchasing and installing the appropriate equipment. It would take six to eight months to have the additional capacity ready. At this point the company frequently found that there was no demand for its increased output-other firms had already expanded their operations and had taken an increased share of the market, with the result that demand for this firm had leveled off. If the firm had properly forecast demand and had planned its increase in capacity six months or one year in advance, it would have been able to maintain its market-indeed, to obtain a larger share of the market.

Quality of Capital Assets

Good capital budgeting will also improve the timing of asset acquisitions and the quality of assets purchased. This situation follows from the nature of capital goods and their producers. Firms do not order capital goods until they see that sales are beginning to press on capacity. Such occasions occur simultaneously for many firms. When the heavy orders come in, the producers of capital goods go from a situation of idle capacity to one where they cannot meet all the orders that have been placed. Consequently, large backlogs accumulate. Since the production of capital goods involves a relatively long work-in-process period, a year or more of waiting may be involved before the additional capital goods are available. This factor has obvious implications for purchasing agents and plant managers.

Raising Funds

Another reason for the importance of capital budgeting is that asset expansion typically involves substantial expenditures Before a firm spends a large amount of money, it must make the proper plans-large amounts of fund are not available automatically. A firm contemplating, major capital expenditure program may need to arrange its financing several years in advance to be sure of having the funds required for the expansion.

Raising Funds Another reason for the importance of capital budgeting is that asset expansion typically involves substantial expenditures Before a firm spends a large

amount of money, it must make the proper plans-large amounts of fund are not available automatically. A firm contemplating, major capital expenditure program may need to arrange its financing several years in advance to be sure of having the funds required for the expansion.

Ability to Compete

Finally, it has been said with a great deal of truth that many firms fail, not because they have too much capital equipment but because they have too little. While the conservative approach of having a small amount of capital equipment may be appropriate at times, such an approach may also be fatal if a firm's competitors install modern, automated equipmen that permits them to produce a better product and sell it at a lower price. The same thing also holds true for nations: If United States firms fail to modernize but those of other nations do, then the u.s. will not be able to compete in world markets Thus, an understanding of business investment behavior and of factors that motivate firms to undertake investment programs is vital for congressional leaders and others involved in governmental policy making.

Application of the Concept

At the applied level, the capital budgeting process is much more complex than what it looks. Projects do not just appear, a continuing stream of good investment opportunities results from hard thinking, careful planning, and, often, large outlays for research and development Moreover, some very difficult measurement problems are involved: the sales and costs associated with particular projects must be estimated, frequently many years into the future, in the face of great uncertainty. Finally, some difficult conceptual and empirical problems arise over the methods of calculating rates of return and the cost of capital.

Businessmen are required to take action, however, even in the face of the kinds of problems described; this requirement has led to the development of procedures that assist in making optimal investment decisions.

Difficulties in Capital Budgeting

While capital expenditure decisions are extremely important, they also pose difficulties, which stem from three principal sources:

- *Measurement Problems* Identifying and measuring the costs end benefits of a capital expenditure proposal tends to be difficult. This is more so when a capital expenditure has a bearing on some other activities of the firm (like cutting into the sales of some existing product) or has some intangible consequences (like improving the morale of workers).

- *Uncertainty* A capital expenditure decision involves costs and benefits that extend far into future. It is impossible to predict exactly what will happen in future. Hence, there is usually a great deal of uncertainty characterizing the costs and benefits of a capital expenditure decision.

- *Temporal Spread* The costs and benefits associated with a capital expenditure decision are spread out over a long period of time, usually years for industrial projects and 20-50 years for infrastructural projects· Such a temporal spread creates some problems in estimating discount rates and establishing equivalences.

Project Classification

Project analysis entails time and effort. The costs incurred in this exercise must be justified by the benefits from it. Certain projects, given their complexity and magnitude, may warrant a detailed analysis while others may call for a relatively simple analysis. Hence firms normally classify projects into different categories. Each category is then analysed somewhat differently.

While the system of classification may vary from one firm to another, the following categories are found in most classifications.

Mandatory Investment These are expenditures required to comply with statutory requirements. examples of such investments are pollution control equipment, medical dispensary, fire fitting equipment, clr5che in factory premises, and so on. These are often non-revenue producing investments. In analyzing such investments the focus is mainly on finding the most cost-effective way of fulfilling a given statutory need.

Replacement Projects Firms routinely invest in equipments meant to replace Obsolete and inefficient equipments, even though they may be in a serviceable condition. The objective of such investments is to reduce costs (of labor, raw material, and power), increase yield, and improve quality. Replacement projects can be evaluated in a fairly straightforward manner, though at times the analysis may be quite detailed.

Expansion Projects These investments are meant to increase capacity and/or widen the diistribution network. Such investments call for an explicit forecast of growth. Since this can be risky and complex, expansion projects normally warrant more careful analysis than replacement projects Decision relating to such projects are taken by the top management.

Diversification Projects These investments are aimed at producing new products or Services or entirely new geographical areas. Often diversiftcation projects entail substantial risks, involve large outlays, and require considerable managerial effort and attention. Given their strategic importance, such projects call for a very thorough evaluation, both quantitative and qualitative. Further, they require a significant involvement of the board of directors.

Research and Development Projects R&D projects absorbed a very Small proportion of capital budget in most Indian companies. Things, however, are changing. Companies are now allocating mote funds to R&D projects, more so in knowledge-intensive

industries. R&D projects are characterized by numerous uncertainties and typically involve sequential decision-making. Hence the standard DCF analysis is not applicable to them. Such projects are decided on the basis of managerial judgment. Firms, which rely more on quantitative methods, use decision tree analysis and option analysis to evaluate R&D projects.

Miscellaneous Projects This is a catch-all category that includes items like interior Decoration, recreational facilities, executive aircrafts, landscaped gardens, and so on.

There is no standard approach for evaluating these projects and decisions regarding them are based on personal preferences of top management.

Rationale

The rationale underlying the capital budgeting decision is efficiency. Thus, a firm must replace worn and obsolete plants and machinery, acquire fixed assets for current and new products and make strategic investment decisions. This will enable the firm to achieve its objective of maximizing profits either by way of increased revenues or cost reductions. The quality of these decisions is improved by capital budgeting. Capital budgeting decision can be of two types: (i) those which expand revenues, and (ii) those which reduce costs.

Investment Decision Affecting Revenues. Such investment decisions are expected to bring in additional revenue, thereby raising the size of the firm's total revenue. They can be the result of either expansion of present operations or the development of new product lines. Both types of investment decisions involve acquisition of new fixed assets and are income-expansionary in nature in the case of manufacturing firms.

Investment Decisions Reducing Costs Such decisions, by reducing costs, add to the earnings of firm. A classic example of such investment decisions is the replacement proposals when an asset wears out or becomes outdated. The firm must decide whether to continue with the existing assets or replace them. The firm evaluates the benefits from the new machine in terms of lower operating cost and the outlay that would be needed to replace the machine. An expenditure on a new machine may be quite justifiable in the light of the total cost savings that result.

A fundamental difference between the above two categories of investment decision lies in the fact that cost-reduction investment decisions are subject to less uncertainty in comparison to the revenue-affecting investment decisions. This is so because the firm has a better 'feel' for potential cost savings as it can examine past production and cost data. However, it is difficult to precisely estimate the revenues and costs resulting from a new product line, particularly when the firm, knows relatively little about the same.

Nature of Investment Decision

Typical examples of capital budgeting decisions are:

- expansion projects;

- replacement projects;

- selection among alternatives; and

- buy or lease decisions.

Good capital budgeting decisions, based on sound investment appraisal procedures, should improve the timing of capital acquisitions as well as the quality of capital acquisitions.

Investment in expansion/ modernisation is one of the main sources of economic growth, since it is required not only to increase the total capital stock of equipment and buildings, but also to employ labour in increasingly productive jobs as old plant is replaced by new.

The Administrative Framework

Successful administration of capital investments by a company involves

1. Generation of investment proposals

2. Estimation of cash flows for the proposals

3. Evaluation of cash flows

4. Selection of projects based upon an acceptance criterion

5. Continual reevaluation of investment projects after their acceptance

Depending upon the firm involved, investment proposals can emanate from various sources. For purposes of analysis, projects may be classified into one of five categories.

1. New products or expansion of existing products

2. Replacement of equipment or buildings

3. Research and development

4. Exploration

5. Others

The fifth category comprises miscellaneous items such as the expenditure of funds to comply with certain health standards or the acquisition of a pollution-control device. For a new product, the proposal usually originates in the marketing department. On the other hand a proposal to replace a piece of equipment with a more sophisticated model usually emanates from the production area of the firm, in each case, efficient administrative procedures are needed for channeling in-

Most firms screen proposals at multiple levels of authority. For a proposal originating in the production area, the hierarchy of authority might run from (1) section chiefs to

(2) plant managers to (3) the vice-president for operations to (4) a capital expenditures committee under the financial manager to (5) the president to (6) the board of directors. How high a proposal must go before it is finally approved usually depends upon its size. The greater the capital outlay, the greater the number of screens usually required. Plant managers may be able to approve moderate-sized projects on their own, but only higher levels of authority approve larger ones. Because the administrative procedures for screening investment proposals vary greatly from firm to firm, it is not possible to generalize. The best procedure will depend upon the circumstances.

The level and type of capital expenditure appear to be important to investors, as they convey information about the expected future growth of earnings. John J. McConnell and Chris J. Muscarelia test this notion with respect to the level of expenditures of a company. They find that an increase in capital-expenditure intentions, relative to prior expectations, results in increased stock returns around the time of the announcement, and vice versa for an unexpected decrease.

Investment Ideas: Who Generates?

Investment opportunities have to be identified or created; they do not occur automatically? Investment proposals of various types may originate at different levels within a firm. Most proposals, in the nature of cost reduction or replacement or process or product improvement take place at plant level. The contribution of top management in generating investment ideas is generally confined to expansion or diversification projects. The proposals may originate systematically or haphazardly in a firm. The proposal for adding a new product may emanate from the marketing department or from the plant manager who thinks of a better way of utilizing idle capacity. Suggestions for replacing an old machine or improving the production techniques may arise at the factory level. In view of the fact that enough investment proposals should be generated to employ the firm's funds fully well and efficiently, a systematic procedure for generating proposals may be evolved by a firm.

In a number of Indian 'companies, more than 50 per cent of the investment ideas are generated at the plant level. The contribution of the board in idea generation is relatively insignificant. However, some companies depend on the board for certain investment ideas. Other companies depend on research centers for investment ideas.

Is the investment idea generation primarily a bottom-up process in India? In UK, both bottom up as well as top-down processes exist.4 The Indian practice is more like that in USA. Petty and Scott's study (1981) showed that project initiation was a bottom-up process in USA, with about 82 per cent of investment proposals coming from divisional management and plant personnel. 5 However, it is to be noted that the small number of ideas generated at the top may represent a high percentage in terms of investment value, so that what looks to be an entirely bottom-up process may not be really so.

Indian companies use a variety of methods to encourage idea generation. The most common methods used are: (a) management sponsored studies for project identification, (b) formal suggestion schemes, and (c) consulting advice. Most companies use a combination of methods. The offer of financial incentives for generating investment idea is not a popular practice. Other efforts employed by companies in searching investment ideas are: (a) review of researches done in the country or abroad, (b) conducting market surveys, and (c) deputing executives to international trade fairs for identifying new products/technology.

Once the investment proposals have been identified, they could be submitted for scrutiny any time. However, some companies do specify a submission time.

Developing Cash Flow Estimation

Estimation of cash flows is a difficult task because the future is uncertain. Operating managers with the help of finance executives should develop cash now estimates. The risk associated with cash nows should also be property handled and should be taken into account in the decision process. Estimation of cash nows requires collection and analysis of all qualitative and quantitative data, both financial and non-financial in nature. Large companies would have a management information system providing such data.

Executives in practice do not always have clarity about estimating cash flows. A large number of companies do not include additional working capital while estimating the investment project cash flows. A number of companies also mix up financial flows with operating flows. Although the companies claim to estimate cash flows on incremental basis, some of them make no adjustment for sale proceeds of existing assets while computing the project's initial cost.

Most Indian companies choose an arbitrary period of 5 or 10 years for forecasting cash flows. This was because companies in India largely depended on government-owned financial institutions for financing their projects, and these institutions required 5 to 10 years forecasts of the project Cash flows.

Evaluation

The evaluation of projects should be performed by a group of experts who have no are to grind. Far example, the production people may be generally interested in having the most modem type of equipments and increased production even if productivity is expected to be low and goods cannot be sold. This attitude can bias their estimates of cash nows of the proposed projects. Similarly, marketing executives may be too optimistic about the sales prospects of goods manufactured, and overestimate the benefits of a proposed new product. It is therefore, necessary to ensure that an impartial group scrutinizes projects and that objectivity is maintained in the evaluation process.

A company in practice should take all care in selecting a method or methods of investment evaluation. The criterion or criteria selected should be a true measure of evaluating if the investment is profitable (in terms of cash flows), and it should lead to the net increase in the company's wealth (that is, its benefits should exceed its cost adjusted for time value and risk). It should also be seen that the evaluation criteria do not discriminate between the investment proposals. They should be capable of ranking projects correctly in terms of profitability. The net present value method is theoretically the most desirable criterion as it is a true measure of profitability; it generally ranks projects correctly and is consistent with the wealth maximisation criterion. In practice, however, managers' choice may be governed by other practical considerations also.

A formal financial evaluation of proposed capital expenditures has become a common practice among companies in India. A number of companies have a formal financial evaluation of almost three-fourths of their investment rojects. Most companies subject more than 50 per cent of the projects to some kind of formal evaluation. However, projects, such as replacement or worn-out equipment, welfare and statutorily required projects below certain limits, small value items like office equipment or furniture, replacement of assets of immediate requirements, etc., are not often formally evaluated.

Methods of Evaluation

As regards the use of evaluation methods, most Indian companies, use payback criterion. In addition to payback and/or other methods, some companies also use internal rate of return (IRR) and net present (NPV) methods. A few companies use accounting rate of return (ARR) method. IRR is the second most popular technique in India.

The major reason for DCF techniques not being as popular as payback is the lack of familiarity with DCF on the part of executives. Other factors are lack of technical people and sometimes unwillingness of top management to use the DCF techniques. One large manufacturing and marketing organisation, for example, thinks that conditions of its business are such that the DCF techniques are not needed. By business conditions the company perhaps means its marketing nature, and its products being in seller's markets. Another company feels that replacement projects are very frequent in the company, and therefore, it is not necessary to use DCF techniques for such projects.

The practice of companies in India regarding the use of evaluation criteria is similar to that in USA. A study by Schall, Sundem and Geiljsbeak (1978) showed that whereas 86 per cent of the firms used either the internal rate of return or net present value models, only 16 per cent used such discounting techniques without using the payback period or average rate of return methods. The tendency of US firms to use naive techniques as supplementary tools has also been reported in other studies. However, firms in USA have come to depend increasingly on the DCF techniques, particularly IRR. According to Rockley's study (1973X the British companies use both DCF

techniques and return on capital, sometimes in combination and sometimes solely, in their investment evaluation; the use of payback is wide-spread. A recent study by Pike shows that the use of the DCF methods has significantly increased in UK in 1992, and NPV is more popular than IRR. However, this increase has not reduced the importance of the traditional methods such as payback and return on investment. Payback continues to be employed by almost all companies.

One significant difference between practices in India and USA is that payback is used in India as a 'primary' method and IRRJNPV as a 'secondary' method, while it is just the reverse in USA. Indian managers feel that payback is a convenient method of communicating an investment's desirability, and it best protects the recovery of capital- a scarce commodity in the developing countries.

Cut-off Rate

In the implementation of a sophisticated evaluation system, the use of a minimum required rate of return is necessary. The required rate of return or the opportunity cost of capital should be based on the riskiness of cash flows of the investment proposal; it is compensation to investors for bearing the risk in supplying capit81 to finance investment proposals.

Not all companies in India specify the minimum acceptable rate of return. Some of them compute the weighted average cost of capital (WACC) as the discount rate. WACC is defined either as: (i) after-tax cost of debt x weight + after-tax cost of equity x weight (cost of equity is taken as 25 per cent (a judgmental number) and weights are in proportion to the sources of capital used by a specific project); (ii) (after tax cost of borrowing × borrowings + dividend rate × equity) dividend by total capital.

Business executives in India are becoming increasingly aware of the Importance of the cost of capital, but they perhaps lack clarity among them about its computation. Arbitrary judgment of management also seems to plays role in the assessment of the cost of capital. The fallacious tendency of equating borrowing rate with minimum rate of return also persists in the case of some companies. In USA, a little mom than 50 per cent companies have been found using WACC as cut-off rate. In UK, only 14 per cent firms were found to attempt any calculation of the cost of capital. As in USA and UK, companies in India have a tendency to equate the minimum rate with interest rate or cost of specific source of finance. The phenomenon of depending on management judgement for the assessment of the cost of capital is prevalent as much in USA and UK as in India.

Recognition of Risk

The assessment of risk is *an* important aspect of an investment evaluation. In theory, a number of techniques are suggested to handle risk. Some of them, such as the computer simulation technique are not only quite involved but are also expensive to use. How do companies handle risk in practice?

Companies in India consider the following as the four most important contributors of investment risk: selling price, product deman4 technological changes and government policies. India is fast changing from sellers' market to buyers' market as competition is intensifying in a large number of products; hence uncertainty of selling price and product demand are being realised as important risk factors. Uncertain government policies (in areas such as custom and excise duty and import policy), of course, , a continuous source of investment risk in developing countries like India.

Sensitivity analysis and *conservative forecasts* are two equally important and widely used methods of handling investment risk in India. Each of these techniques is used by a number of Indian companies with other methods while many other companies use either sensitivity analysis or conservative forecasts with other methods. Some companies also use shorter payback and inflated discount rates (risk-adjusted discount rates).

In US4 risk adjusted discount rate is used by 90 per cent companies while only 10 per cent use payback and sensitivity analysis. This is also confirmed by another US study by Petty and Scott (1981). In Rockley's survey of the British companies only one firm out of 69 used sensitivity analysis.3 The contrasts in risk evaluation practices in India, on the one hand, and USA and UK, on the other, are sharp and significant. Given the complex nature of risk factors in developing countries, risk evaluation cannot be handled through a single number such as NPV calculation based on conservative forecasts or risk-adjusted discount rate. Managers must know the impact on project profitability of the full range of critical variables. Hastie, an American businessman, strongly advocates the use of sensitivity analysis for risk handling and casts doubt on the survey results in USA. He states: 'there appear to be more corporations using sensitivity analysis than surveys indicate. In some cases firms may not know that what they are undertaking is called 'sensitivity analysis', and it probably is not in the sophisticated, computer oriented sense.....................Typically, analysts or middle managers eliminate the alternative assumptions and solutions in order to simplify the decision making process for higher management"

Capital Rationing

Indian companies, by and large, do not have to reject profitable investment opportunities for lack of funds, despite the capital markets not being so well developed. This may be due to the existence of the government-owned financial system which is always ready to finance profitable projects. Indian companies do not use any mathematical technique to allocate resources under capital shortage which may sometimes arise on account of internally imposed restrictions or management's reluctance to raise capital from outside. Priorities for allocating resources are determined by management, based on the strategic need for and profitability of projects.

Authorization

It may not be feasible in practice to specify standard administrative procedures for approving investment proposals. Screening and selection procedures may differ from one company to another. When large sums of capital expenditures are involved, the authority for the final approval may rest with top management. The approval authority may be delegated for certain types of investment projects. Delegation may be affected subject to the amount of outlay, prescribing the selection criteria and holding the authorized person accountable for results.

Funds are appropriated for capital expenditures after the *final* selection of investment proposals. The formal plan for the appropriation of funds is called the *capital budget.* Generally, the senior management tightly controls the capital expenditures. Budgetary controls may be rigidly exercised, particularly when a company is facing liquidity problem. The expected expenditure should become a part of the annual capital budget, integrated with the overall budgetary system.

Top management should ensure that funds are spent in accordance with appropriations made in the capital budget. Funds for the purpose of project implementation should be spent only after seeking formal permission from the financial manager or any other authorized person.

In India, as in UK, the power to commit a company to specific capital expenditure and to examine proposals is limited to a few top corporate officials. However, the duties of processing the examination and evaluation of a proposal are somewhat spread throughout the corporate management staff in case of a few companies.

Senior management tightly control capital spending. *Budgetary control* is also exercised rigidly. The expected capital expenditure proposals invariably become a part of the annual capital budget in all companies. Some companies also have formal long-range plans covering a period of 3 to 5 years. Some companies feel that long-range plans have a significant influence on the evaluation and I funding of capital expenditure proposals.

Qualitative Factors and Judgement

In theory, the use of sophisticated techniques is emphasized since they maximise value to shareholders. In practice, however, companies, although tending to shift to the formal methods of evaluation, give considerable importance to qualitative factors. Most companies in India are guided, one time or other, by three qualitative factors: *urgency, strategy,* and *environment.* All companies think that urgency is the most important consideration while a large number thinks that strategy plays a significant role. Some companies also consider intuition*,* security and social considerations as important qualitative factors. Qualitative factors like employees' morals and safety, investor and

customer image, or companies in USA consider legal matters important in investment analysis.

Due to the significance of qualitative factors, judgment seems to play an important role. Some typical responses of companies about the role of judgment are:

- Vision of judgment of the future plays an important role. Factors like market potential, possibility of technology change, trend of government policies etc., which are judgmental, play important role.

- The opportunities and constraints of selecting a project, its evaluation of qualitative and quantitative factors, *and* the weightage on every bit of pros and cons, cost-benefit analysis, etc., are essential elements of judgment. Thus, it is inevitable for any management decision.

- Judgment and intuition should definitely be used when a decision of choice has to be made between two or more, closely beneficial projects, or when it involves changing the long-term strategy of the company. For routine matters, liquidity and profits should be preferred over judgment.

- It (judgment) plays a very important role in determining the reliability of figures with the help of qualitative methods as well as other known financial matters affecting the projects.

We feel that what businessmen call intuition or (simply) judgment is in fact informed judgment based on experience. A firm growing in a favourable economic environment will be able to identify profitable opportunities without making NPV or IRR computation. Businessmen often act more intelligently than they talk.

Strategic Aspects of Investment Decision

Recently, a lot of emphasis has been placed on the view that a business firm facing a complex and changing environment will benefit immensely in terms of improved quality of decision-making if capital budgeting decisions are taken in the context of its overall strategy. This approach provides the decision-maker with a central theme or a big picture to keep in mind at all times as a guideline for effectively allocating corporate financial resources. As argued by a chief financial officer: Allocating resources to investments without a sound concept of divisional and corporate strategy is a lot like throwing darts in a dark room.

A businessman argues as follows:

> *We have* erred *too long by exaggerating the 'improvement in decision-making' that* might *result from the adoption of DCF or* other *refined evaluation techniques. What is* needed *are approximate answers to the precise problems* rather *than precise* answer *to the approximate problems*

> *There is little value* in refining *an analysis* that *does* not *consider* tire most *appropriate alternative and does not utilise sound. Management should spend its time improving the quality of assumptions and* assuring *that all the* strategic questions *have been asked rathe*r *than implementing and using more refined evaluation techniques. (Emphasis added).*

In fact a close linkage between capital expenditure, at least major ones, and strategic positioning exists which has led some searchers to conclude that the set of problems companies refer to as capital budgeting is a task for general management rather than financial analyst Some recent empirical works amply support the practitioners concern for strategic considerations in capital expenditure planning and control. It is therefore B myopic point of view to ignore strategic dimensions or to assume that they are separable from the problem of efficient resource allocations addressed by capital budgeting theory.

Most companies in India consider strategy as an important factor in investment evaluation. What are the specific experiences of the companies in India in this regard? Examples of six companies showing how they defined their corporate strategy are given as follows:

- To remain market leader by highest quality and remunerative prices. This company undertook the production of a new range of product (which was marginally profitable) for competitive reasons.

- To have moderate growth for saving taxes and to set up plants for forward and backward integration.

- Our strategy is to grow, diversify and expand in related fields of technology only. Any project, which is within the strategy and satisfied profitability yardsticks, is accepted. This company found a low-profit chemical production proposal acceptable since it came within its technological capabilities.

- Strategy involves analysis of the company's present position, nature of its relationship with the environmental forces, company's evaluation of company's strong and weak points.

- To take up new projects for expansion in the fields which are closer to present project/technology. This company rejected a profitable project (of deep sea fishing and ship budding) while it accepted a marginally profitable project (of paint systems) since it was very close to its current heat transfer technology.

- To stay in industrial intermediate and capital goods line, and in the process to achieve threefold profits in real terms over a 5-year period. This company rejected a highly profitable project (of manufacturing mopeds) since it was a consumer durable and accepted a marginal project.

One more example is that of an Indian subsidiary of a giant multinational that looks for projects in high technology, priority sector. This company even sold one of its profitable non-priority sector division to a sister concern to maintain is high-tech priority sector profile.

Strategic management has emerged as a systematic approach in properly positioning companies in the complex environment by balancing multiple objectives. In practice, therefore, a comprehensive capital expenditure planning and control system will not simply focus on profitability, as assumed by modern finance theory, but also on growth, competition, balance of products, total risk diversification, and managerial capability. There are umpteen examples in the developing countries Like India where unprofitable ventures are not divested even by the private sector companies because of their desirability from the point of view of consumer and employees, in particular and society, in general. Such considerations are not at all less important than profitability since the ultimate legitimating and survival of companies (and certainly that of management) hinges on them. One must appreciate the dynamics of complex forces influencing resource allocation in practice; it is not simply the use of the most refined DCF techniques.

Certain other practical considerations are as follows:

- Apart from the profitability of the project, other features like its (project's) critical utility in the production of the main product, strategic importance of capturing the new product first, adapting to the changing market environments, have a definite bearing on investment decisions. Technological developments plays critical role in guiding investment decisions. Government policies and concessions also have a bearing on these.

- Investment in production equipment is given top priority among the existing products and the new project. Capital investment for expansion in existing lines where market potential is proved is given first priority. Capital investment in new projects is given the next priority. Capital investment for buildings, furniture, cars, office equipments etc., is done on the basis of availability of funds and immediate needs.

These statements reinforce the need for a strategic framework for problem- solving under complexities and the relevance of strategic considerations in investment planning. It also implies that resource allocation is not simply a matter of choosing most profitable new projects. What is being stressed is that the strategic framework provides a higher level screening and an integrating perspective to the whole system of capital expenditure planning and control. Once strategic questions have been answered, investment proposals may be subjected to DCF evaluation.

Capital Budgeting Decision-making levels

For planning and control purposes, three levels of decision-making have been identified:

- operating

- administrative, and

- strategic.

Capital budgeting could be categorized into those three levels.

Openrting capita budgeting may include routine minor expenditures, such as on office equipment, and lower level management can easily handle it.

Strategic capital budgeting involves large investments such as acquisition of new business or expansion in a new line of business. Strategic investment are unique and unstructured, and they cast a significant influence on the direction of the business. Top management therefore, generally handles such investments.

Administrative capital budgeting falls in-between these two levels. It involves medium-size investments such as expenditure on expansion of existing line of business. Administrative capital budgeting decisions are semi-structured in nature, and can be handled by middle management.

Keeping in view the different decision-making levels, capital expenditures could be classified in a way which would reflect the appropriate managerial efforts to be placed in planning and controlling them.! One useful classification (i) strategic projects, (ii) expansion in the new line of business, (iii) general replacement projects, (iv) expansion in the existing line of business, and (v) statutory required and welfare projects. Further, each of these categories could be sub-classified according to funds required by the projects.