STUDY MATERIAL

EXECUTIVE PROGRAMME

FINANCIAL AND STRATEGIC MANAGEMENT

MODULE 2

PAPER 8

ICSI

THE INSTITUTE OF
Company Secretaries of India
IN PURSUIT OF PROFESSIONAL EXCELLENCE
Statutory body under an Act of Parliament

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EXECUTIVE PROGRAMME – FINANCIAL AND STRATEGIC MANAGEMENT

The company secretaries by virtue of their expertise in the corporate laws and procedure are in eminently suitable position to:

(a) Present to the Board of Directors, the financial, legal and personnel aspects of modernisation, expansion, diversification of the existing projects of new projects;

(b) Obtain the decision from the Board; and

(c) Interact effectively with the financial institutions in the process of procuring the finance.

The legal aspects of finance are becoming increasingly important and a Company Secretary is expected to successfully and effectively handle, amongst other things, important aspects such as management of public issues, syndication of loans, obtaining project approvals, raising of finance through public deposits and debentures or bonds etc. All these essentials require expert knowledge of diverse and complex procedures involved. Realising that the services of a Company Secretary could be of immense use in this important area, it was thought necessary to include this paper with a view to equip the students with the requisite fundamentals of the Financial and Strategic Management.

It has been the endeavour to provide a blend of theoretical concepts and practical orientation. Topics, such as, raising finance from financial institutions, dividend policies, etc. requiring legal expertise and procedural knowledge have been written. Topics such as, project appraisal, financial planning, portfolio management and securities analysis, working capital management and capital budgeting decisions, strategic management, business policy; strategic analysis & planning have been written keeping in view the financial and strategic management principles and the practical utility. Ample number of practical problems and case studies have been added to aid the student in their learning process.

Strategy is a broad concept that covers a multitude of different issues, concepts and methods. Strategy requires a significant amount of work to understand and even the experts often find themselves searching for new ways to research and think about the topic. For managers and leaders, strategy is at the centre of the effort to create value for customers to respond to competitive challenges and to build strong organizations. All this leads to make optimum utilization of organization's material and human resources in order to achieve better financial performance, improved qualitative decisions, employee motivation, minimum resistance to change, etc. by using various theories, models and management techniques. An organization always operates in the environment of risk and uncertainty which is the result of operation of multiple forces i.e. economic, technological, legal, political, social and global. Strategic management helps the organization to develop set of decisions and actions resulting in formulation and implementation of strategies designed to achieve the objectives of an organization in a given frame work.

Though efforts have been made to provide a self-contained study material yet it may require regular supplementation as the subject is of a dynamic and fast changing nature. Students are advised to update their knowledge continuously by reading economic dailies, financial magazines and journal and other relevant literature including reference and suggested readings on the subject. Students are expected to learn the art of applying the principles of financial management and strategic management to real business situations and for this case studies in these area would prove to be of immense use.

Although care has been taken in publishing this study material, yet the possibility of errors, omissions and/or discrepancies cannot be ruled out. This publication is released with an understanding that the Institute shall not be responsible for any errors, omissions and/or discrepancies or any action taken in that behalf.

Should there be any discrepancy, error or omission noted in the study material, the Institute shall be obliged if the same are brought to its notice for issue of corrigendum in the Student Company Secretary e-bulletin. In the event of any doubt, students may write to the Directorate of Professional Development, Perspective Planning and Studies in the Institute for clarification at **academics@icsi.edu.**

EXECUTIVE PROGRAMME
Module 2
Paper 8
Financial and Strategic Management
(Max Marks 100)

Objective:

Part I: To provide knowledge of practical aspects of financial management so as to develop skills in taking financial and investment decisions.

Part II : To enable students to acquire multidimensional skills as to equip them to comprehend the process of strategy formulation.

Part I : Financial Management (60 marks)

Detailed Contents

1. **Nature and Scope of Financial Management:** Nature, Scope and Objectives of Financial Management; Risk-Return and Value of the Firm; Objectives of the firm; Profit Maximisation vs. Wealth Maximisation; Emerging roles of Finance Managers.

2. **Capital Budgeting:** Compounding and Discounting techniques – Concepts of Annuity and Perpetuity; Capital Budgeting Process; Techniques of Capital Budgeting- Discounted and Non- Discounted Cash Flow Methods; Capital Rationing; Risk Evaluation and Sensitivity Analysis.

3. **Capital Structure:** Introduction- Meaning and Significance; Optimal Capital Structure; Determinants of Capital Structure; Theories of Capital Structure; EBIT - EPS Analysis; EBITDA Analysis; Risk and Leverage; Effects of Leverage on Shareholders' Returns.

4. **Sources of raising long-term finance and Cost of Capital:** Sources, Meaning, Factors Affecting Cost of Capital; Methods for Calculating cost of capital; Weighted Average Cost of Capital (WACC); Marginal Cost of Capital.

5. **Project Finance :** Project Planning - Preparation of Project Report, Project Appraisal under Normal Inflationary and Deflationary Conditions; Project Appraisal by Financial Institutions - Lending Policies and Appraisal Norms by Financial Institutions and Banks; Project Review and Control; Social Cost and Benefit Analysis of Project. Term loans from Financial institutions and Banks; Lease and Hire Purchase Finance; Venture Capital Funds; Private Equity; International Finance and Syndication of Loans, Deferred Payment Arrangements; Corporate Taxation and its Impact on Corporate Financing; Financing Cost Escalation.

6. **Dividend Policy**: Introduction- Types; Determinants and Constraints of Dividend Policy; Forms of Dividend; Different Dividend Theories.

7. **Working Capital** : Meaning, Types, Determinants and Assessment of Working Capital Requirements, Negative Working Capital; Operating Cycle Concept and Applications of Quantitative Techniques; Management of Working Capital - Cash Receivables Inventories; Financing of Working Capital; Banking Norms and Macro Aspects; Factoring and Forfaiting.

8. **Security Analysis**: Measuring of Systematic and Unsystematic Risk; Fundamental Analysis (Economic, Industry and Company); Technical Analysis and Efficient Market Hypothesis.

9. **Portfolio Management**: Meaning, Objectives; Portfolio Theory -Traditional Approach; Markowitz Portfolio Theory; Modern Approach - CAPM Model; Economic Value Added; Sharpe Single & Multi Index Model; Risk Adjusted Measure of Performance.

10. **Introduction to Management:** An Overview of functions of management.

Part II : Strategic Management (40 Marks)

11. **Introduction to Strategic Management:** An Overview- Meaning & Process; Strategic Leadership; Functions and Importance for Professionals like Company Secretaries; Environmental Influences of Business- Characteristics and Components of Business Environment, Factors of Micro & Macro Environment of Business; Competitive Environment and Porter's Five Force Model.

12. **Business Policy and Formulation of Functional Strategy**: Introduction to Business Policy; Framework of Strategic Management; Strategic Decision Model; Vision; Mission; Objectives and Goals; Strategic Levels of the Organization; Formulation of Functional Strategy-Formulation of Financial; Marketing; Production; Human Resource and Logistics strategies.

13. **Strategic Analysis and Planning:** Situational Analysis, Strategic Choices-SWOT and TOWS Analysis; PERT (Programme Evaluation Review Technique) and CPM (Critical Path Method); Portfolio analysis- Boston Consulting Group (BCG) growth-share Matrix, Ansoff's Product Growth Matrix, ADL Matrix and General Electric (GE) Model; Strategic Planning; Strategic Alternatives-Glueck and Jauch and Michael Porter's Generic Strategies.

14. **Strategic Implementation and Control:** Issues in Strategy Implementation; Various Organizational Structures and Strategy Implementation; Leadership and its forms ; Strategic Change and Control.

15. **Analysing Strategic Edge :** Introduction to Business Process Reengineering; Concept of Benchmarking; Introduction to Total Quality Management and Six Sigma.

LIST OF RECOMMENDED BOOKS

MODULE 2

PAPER 8 : FINANCIAL AND STRATEGIC MANAGEMENT

The students may refer to the given books for further knowledge and study of the subject :

READINGS

1.	M Y Khan & P K Jain	: Basic Financial Management ; McGraw Hill Education (India) Pvt Ltd.
2.	R. P. Rustagi	: Financial Management – Theory, Concepts and Problems; Taxmann Publications (P) Ltd.
3.	Prasanna Chandra	: Investment Analysis and Portfolio Management ; McGraw Hill Education (India) Pvt Ltd.
4.	I M Pandey	: Financial Management; Vikas Publication House Ltd.
5.	Eugene F Brigham & Michael C Ehrhardt	: Financial Management – Theory and Practice; Cengage Learning (India) Pvt Ltd.
6.	J Van Horne & John M. Wachowicz	: Fundamentals of Financial Management ; Pearson Education Ltd.
7.	L.M. Prasad	: Strategic Management; Sultan Chand & Sons, New Delhi
8.	Upendra Kachru	: Strategic Management; McGraw Hill Education (India) Pvt Ltd.
9.	S N Chary	: Production and Operations Management; McGraw Hill Education (India) Pvt. Ltd.

ARRANGEMENT OF STUDY LESSONS

MODULE-2 PAPER 8
FINANCIAL AND STRATEGIC MANAGEMENT

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PRACTICAL QUESTIONS AND CASE STUDIES

Lesson 1
Nature, Significance and Scope of Financial Management

LESSON OUTLINE

LEARNING OBJECTIVES

Financial management means the management of finance of a business or an organization in order to achieve the financial objectives. In an organization the key objectives of financial management is to create wealth for business, generate cash and gain maximum profits from the investments of the business considering the risks involved.

Good financial management is very important for an organisation. It brings economic growth and development through investments, financing, and dividend and risk management decision which help companies to undertake better projects. Lack of financial management in business will lead to losses and closure of business.

The object of the study is to enable the students understand –

– Nature, Significance, and Scope of Financial Management

– Financial Management Decisions - Investment, Financial and Dividend

– Decision Making Process

– Objective of Financial Management

– Economic Value Added – real growth of the organization

– Liquidity and Profitability

– Financial Distress and Insolvency

– Role and Function of Finance Managers

If you want to rear financial blessings, you have to sow financially.

Joel Osteen

Thoughtful financial planning can easily take a backseat to daily life.

Suze Orman

MEANING OF FINANCE

Finance may be defined as an art or a science of managing money. It includes financial service and financial instruments. Finance is also referred as the provision of money at the time when it is needed. Finance function is the procurement of funds and their effective utilization in business concerns.

Webster's Ninth New Collegiate Dictionary defines finance as 'the Science on study of the management of funds' and the management of fund as the system that includes the circulation of money, the granting of credit, the making of investments, and the provision of banking facilities.

MEANING OF BUSINESS FINANCE

According to the **Wheeler**, "Business finance is that business activity which concerns with the acquisition and conversion of capital funds in meeting financial needs and overall objectives of a business enterprise". According to the **Guthumann** and **Dougall**, "Business finance can broadly be defined as the activity concerned with planning, raising, controlling, administering of the funds used in the business".

In the words of **Parhter** and **Wert**, "Business finance deals primarily with raising, administering and disbursing funds by privately owned business units operating in nonfinancial fields of industry".

Corporate finance is concerned with budgeting, financial forecasting, cash management, credit administration, investment analysis and fund procurement of the business needs to adopt modern technology and application suitable to the dynamic global environment.

DEFINITION OF FINANCIAL MANAGEMENT

Financial management is an integral part of overall management. It is concerned with the duties of the financial managers in the business firm. The term financial management has been defined by different experts as under :

"It is concerned with the efficient use of an important economic resource namely, capital funds". – **Solomon**

Financial management "as an application of general managerial principles to the area of financial decision-making. – **Howard and Upton**

Financial management "is an area of financial decision-making, harmonizing individual motives and enterprise goals". – **Weston and Brigham**

Financial management "is the operational activity of a business that is responsible for obtaining and effectively utilizing the funds necessary for efficient operations. – **Joseph and Massie**

Thus, financial management is broadly concerned with raising of funds, creating value to the assets of the business enterprise by efficient allocation of funds. It is the study of integration of the flow of funds in the most optimal manner to maximize the returns of a firm by taking proper decisions in utilizing the funds. In other words, raising of funds should involve minimum cost and to bring maximum retruns.

NATURE, SIGNIFICANCE AND SCOPE OF FINANCIAL MANAGEMENT

In modern times, we cannot imagine a world without the use of money. In fact, money is the life-blood of business in the present day world becasue all our economic activities are carried out through the use of money. For carrying on business, we need resources which are pooled in terms of money. It is used for obtaining physical and material resources for carrying out productive activities and business operations which affect sales and pay compensation to suppliers of resources, physical as well as monetary. Hence financial management is considered as an organic function of a business and has rightly become an important one.

A group of experts defines Financial Management as simply the task of providing funds needed by the business or

enterprise on terms that are most favourable in the light of its objectives. The approach, thus, is concerned almost exclusively with the procurement of funds and could be widened to include instruments, institutions and practices through which to raise funds. It also covers the legal and accounting relationship between a company and its sources of funds. Financial Management is certainly broader than procurement of funds and there are other functions and decisions too.

Other set of experts assume that finance is concerned with cash. Since every business transaction involves cash directly or indirectly, finance may be assumed to be concerned with everything that takes place in the conduct of a business. Obviously, it is too broad.

The third set of people whose point of view has been widely accepted considers Financial Management as procurement of funds and their effective utilisations in the business; though there are other organisations like schools, associations, government agencies etc., where funds are procured and used. So, Financial Management has not only to see that funds can be raised for installing plant and machinery at a cost; but it has also to see that additional profits adequately compensate for the costs and risks borne by the business while setting up the project.

Thus, from the point of view of a corporate unit, financial management is related not only to 'fund-raising' but encompasses wider perspective of managing the finances for the company efficiently. In the developed state of a capital market, raising funds is not a problem; the real problem is to put the capital resources to efficient use through effective financial planning, financial organisation and financial control and to deal with tasks like ensuring the availability of funds, allocating them for different uses, managing them, investing funds, controlling costs, forecasting financial requirements, doing profit planning and estimating rate of return on investment and assessment of working capital etc.

Financial Management, to be more precise, is, thus concerned with investment, financing and dividend decisions in relation to objectives of the company. Such decisions have to take care of the interests of the shareholders. They are upheld by maximisation of shareholders' wealth which depends upon increase in the net worth of capital invested in the business plus ploughed back profits for growth and prosperity of the company. It is for such reasons that the market is prepared to pay a lower or higher price for the shares of some company or the other. Nature of Financial Management therefore can be judged by the study of the nature of investment, financing and dividend decisions.
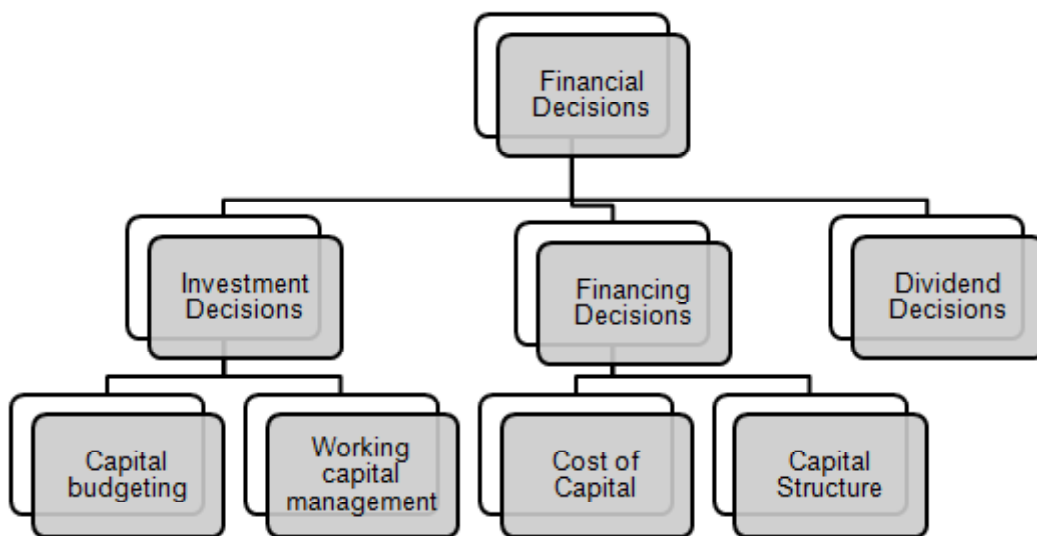
Types of Financial Decisions

INVESTMENT DECISIONS

Investment ordinarily means utilisation of money for profits or returns. This could be done by creating physical assets with the money and carrying on business or purchasing shares or debentures of a company or sometimes, though erroneously, purchasing a consumer durable like building. In an economy, money flows from one type of business to another depending upon profits expected or in a capital market securities of a concern are purchased or sold in the expectation of higher or lower profits or gains. However, within a firm, a finance manager decides that in which activity resources of the firm are to be channelised, and more important who should be entrusted with the financing decisions. A marketing manager may like to have a new show room, a production manager a new lathe and a personnel manager higher wages for labour, which may lead to regular and efficient production. Over and above, the top management may like to enter an entirely new area of production like a textile company entering electronics. All these are the ventures which are likely to increase profits. But resources are limited. Hence, the problem of accepting one proposal and leaving other persists.

Capital budgeting is a major aspect of investment decision making process. Investment decisions and capital budgeting are considered as synonymous in the business world. Investment decisions are concerned with the question whether adding to capital assets today will increase the revenue of tomorrow to cover costs. Thus investment decisions are commitments of monetary resources at different times in expectation of economic returns in future. Choice is required to be made amongst available resources and avenues for investment. As such investment decisions are concerned with the choice of acquiring real assets, over the time period, in a productive process. In making such a choice consideration of certain aspects is essential viz., need for investment, factors affecting decisions, criteria for evaluating investment decisions and selection of a particular alternative from amongst the various options available.

Investment decisions have, thus, become the most important area in the decision making process of a company. Such decisions are essentially made after evaluating the different proposals with reference to growth and profitability projections of the company. The choice helps achieve the long term objectives of the company i.e., survival and growth, preserving market share of its products and retaining leadership in its production activity. The company likes to avail of the economic opportunity for which investment decisions are taken viz., (1) expansion of the productive process to meet the existing excessive demand in local market, exploit the global market, and to avail of the advantages and economies of the expanded scale of production. (2) replacement of an existing asset, plant and machinery or building, necessary for taking advantages of technological innovations, minimising cost of production by replacing obsolete and worn out plants, increasing efficiency of labour, etc. (3) The choice of equipment establishes the need for investment decisions based on the question of quality and latest technology. (4) Re-allocation of capital is another area of investment, to ensure asset allocation in tune with the production policy. (5) Mergers, acquisitions, re-organisations and rehabilitation are all concerned with economic and financial involvement and are governed by investment decisions.

Thus, investment decisions encompass wide and complex matters involving the following areas:

– capital budgeting

– cost of capital

– measuring risk

– management of liquidity and current assets

– expansion and contraction involving business failure and re-organisations

– buy or hire or lease an asset.

Factors affecting investment decisions are essentially the ingredients of investment decisions. Capital is a scarce resource and its supply cost is very high. Optimal investment decisions need to be made taking into consideration such factors as are given below viz. (1) Estimation of capital outlays and the future earnings of

the proposed project focusing on the task of value engineering and market forecasting; (2) availability of capital and considerations of cost of capital focusing attention on financial analysis; and (3) a set of standards by which to select a project for implementation and maximising returns therefrom focusing attention on logic and arithmetic.

FINANCING DECISIONS

Financing decision is the next step in financial management for executing the investment decision once taken. A look at the balance-sheet of a sample company indicates that it obtains finances from shareholders, ordinary or preference, debentureholders on long-term basis, financial institutions as long-term loans, banks and others as short-term loans and the like. There are variations in the provisions governing the issue of preference shares, debentures, loan papers, etc. Financing decisions are concerned with the determination of how much funds to procure from amongst the various avenues available i.e. the financing mix or capital structure. Efforts are made to obtain an optimal financing mix for a particular company. This necessitates study of the capital structure as also the short and intermediate term financing plans of the company.

In more advanced companies, financing decision today, has become fully integrated with top-management policy formulation via capital budgeting, long-range planning, evaluation of alternate uses of funds, and establishment of measurable standards of performance in financial terms.

Financial decision making is concerned more and more with the questions as to how cost of funds be measured, proposals for capital using projects be evaluated, or how far the financing policy influences cost of capital or should corporate funds be committed to or withheld from certain purposes and how the expected returns on projects be measured.

Optimal use of funds has become a new concern of financing decisions and top managements in corporate sector are more concerned with planning the sources and uses of funds and measuring performance. New measurement techniques, utilising computers, have facilitated efficient capital allocation through financing decisions. Both Investment decision and financial decisions are jointly made as an effective way of financial management in corporate units. No doubt, the purview of these decisions is separate, but they affect each other. Financial decisions, as discussed earlier, encompass determination of the proportion of equity capital to debt to achieve an optimal capital structure, and to balance the fixed and working capital requirements in the financial structure of the company. This important area of financing decision making, aims at maximising returns on investment and minimising the risk. The risk and return analysis is a common tool for investment and financing decisions for designing an optimal capital structure of a corporate unit. It may be mentioned that debt adds to the riskiness of the capital structure of a firm. This part of financial management is the analysis of company through earnings before interest and taxes, variable costs, contribution. It is called a study of operating leverages. Further, the earnings per share to be given to shareholders is analysed through the technique of financial leverage. When study of both these aspects is made it is known as combined leverage.

DIVIDEND DECISIONS

The dividend decision is another major area of financial management. The financial manager must decide whether the firm should distribute all profits or retain them or distribute a portion and retain the balance. Theoretically, this decision should depend on whether the company or its shareholders are in the position to better utilise the funds, and to earn a higher rate of return on funds. However, in practice, a number of other factors like the market price of shares, the trend of earning, the tax position of the shareholders, cash flow position, requirement of funds for future growth, and restrictions under the Companies Act etc. play an important role in the determination of dividend policy of business enterprise. The finance manager has to take a decision regarding optimum dividend payout ratio, he also has to take decisions relating to bonus issue and interim dividend.

DECISION CRITERIA

Decision criteria depends upon the objective to be achieved through the instrumentality of decision making process. The main objectives which a business organisation pursues are maximisation of return and minimisation of costs.

A fair decision criterion should distinguish between acceptable and unacceptable proposals and solve the problem of selection of the best alternatives from amongst the various alternatives available in a given situation to achieve the above objectives. A fair decision criterion should follow the following two fundamental principles i.e. (1) the "Bigger and Better" principle; (2) "A Bird in Hand is Better than Two in the Bush" principle. The first principle suggests that bigger benefits are preferable to smaller ones; whereas the second one suggests that early benefits are preferable to later benefits.

Both the above principles are based on the assumption "other things being equal" which is a rare reality. But in practice the decision process very much adheres to these principles particularly in the areas of capital budgeting decisions and determining the cost of capital in project financing proposals.

Decision criteria in financial management can be studied under two separate heads viz. The criteria for investment decisions; and the criteria for the financing decisions.

Criteria for investment decisions are mainly concerned with planning and control of capital expenditure through budgeting process following the tools of analysis viz. pay back period, accounting rate of return, discounted cash flow methods e.g., net present value method, etc. We shall discuss these methods for evaluating investment decisions in detail in the study relating to capital budgeting. However, the essence and the inherent spirit in these techniques is based on logic which helps in the decision making process.

As a matter of fact, these techniques have been founded on the following decision criteria:

1. *Urgency:* The use of 'urgency' is treated as criterion for selection of investment projects in many corporate units/business enterprises/government set up. Urgency is assessed on the following basis:

    (a) it provides sufficient justification for undertaking a project;

    (b) it provides immediate contribution for attainment of objectives of the project; and

    (c) it maximises profits.

Although urgency as criterion lacks objectivity, being non-quantifiable, yet it definitely provides an ordinal ranking scale for selection of projects on preferential pre-exemption basis.

2. *Pay back:* Time is of essence while selecting this criterion for investment decisions. The decision is taken on the basis of quickness in pay off of the investments. Pay back simply measures the time required for cash flows from the project to return the initial investment to the firm's account. Projects, on the basis of this criterion, having quicker pay backs are preferred.

Pay back decision criterion does not follow the principles laid down above viz. "the bigger and better" and "bird in hand". It ignores the first principle completely as it does not take into account the cash flows after investment has been recovered. It also does not satisfy entirely the second principle as it assigns zero value to the receipts, subsequent to recovery of the amount.

3. *Rate of return:* It provides another decision criterion based on accounting records or projected statements to measure profitability as annual percentage of capital employed. Rate of return is arrived at following two different methods for treating income in the analysis which give different results. In the first case, average income generated from investment is taken after deduction of depreciation charge. In second case, the original cost is taken as denominator rather than average investment. This gives the simple yearly rate of return. This is based on "bigger and better" principle. This criterion can be applied either against average investment in the year selected for study or simply against initial cost.

4. *Undiscounted benefit-cost ratio:* It is the ratio between the aggregate benefits and the cost of project. Benefits are taken at face value. The ratio may be "gross" or "net". It is "gross" when calculated with benefits without deducting depreciation. In the net version, depreciation is deducted from benefits before computing the results. Both ratios give identical ranking. Net ratio equals the gross ratio minus 1. This relationship makes it simple to calculate gross ratio and then to arrive at net ratio.

This criterion is compatible with the "bigger and better" principle. But it does not follow the second principle of "bird in hand" as early receipts are given identical weights to later receipts in the project's life.

5. *Discounted benefit-cost ratio:* This ratio is more reliable as it is based on present value of future benefits and costs. It may also be gross or net like the one discussed earlier. It takes into account all incomes whenever received and to this extent complies with "bigger and better" principle. Early receipts are given more weight than late receipts on account of introduction of discount factor.

This ratio satisfies the requirements of both the principles and is a good criterion for decision making.

6. *Present value method:* This concept is useful as a decision criterion because it reveals the fact that the value of money is constantly declining as a rupee received today is more in value than the rupee at the end of a year. Besides, if the rupee is invested today it will fetch a return on investment and accumulate to Re. 1 $(1+i)$ at the end of 'n' period. Hence a rupee received at the end of 'n' period is worth $1/(1+i)^n$ now. Investment decisions require comparison of present value with the cost of assets, and if the present value exceeds the cost, the investment is rendered acceptable.

Another off-shoot of this criterion is net present value method which is closely related to cost-benefit ratio. It takes into account all income and its timing with appropriate weights. Here difference of present value of benefits and costs is considered as against the ratio in cost-benefit analysis. This criterion is useful for acceptance of projects showing positive net present value at the company's cost of capital rate. It can be used for choosing between mutually exclusive projects by considering whether incremental investment yields a positive net present value.

7. *Internal rate of return:* It is a widely used criterion for investment decisions. It takes interest factor into account. It is known as marginal efficiency of capital or rate of return over cost. It stipulates rate of discount which will equate the present value of the net benefits with the cost of the project. This method satisfies both these principles.

The criteria used in financing decisions, with particular reference to capital structure of a corporate unit can be discussed here precisely.

The capital structure of a corporate unit contains two important parameters viz., the owners' capital known as equity and the debt which represents interest of debenture holders in the assets of the company. The factors responsible for inclusion of debt in the capital structure of a company are tax-savings, easier to sell, lower cost of floatation and services, lower cost of capital, the advantage of leverage, no dilution of equity and probable loss of control, logical to consolidate and fund short-term indebtedness by a bond issue, advantageous in the inflationary trends of rising interest rates and improvement in financial ratios.

There is no alternative for a company to equity financing to meet its requirement for funds. Debt can be raised by a company only on an adequate equity base which serves as a cushion for debt financing. The study of effect of leverage is the main focus point to determine the best mix of debt and equity sources of funds. It is, therefore, desired to consider this criterion for financing decision making in relation to leverage and cost of capital.

OBJECTIVES OF FINANCIAL MANAGEMENT

Financial management of any business firm has to set goals for itself and to interpret them in relation to the objective of the firm. Broadly, there are only two alternative objectives a business firm can pursue viz.

    (a) Profit maximisation;

    (b) Shareholder Wealth maximisation.

(a) Profit Maximisation

According to Solomon, Price system directs managerial efforts towards more profitable goods or services. Prices are determined by the demand and supply conditions as well as the competitive forces, and they guide the allocation of resources for various productive activities.

In economic theory, the behavior of the firm is analysed in terms of profit maximization. The classical economic view of the firm, as put forward by Hayek (1950) and Fredman (1970), is that it should be operated in a manner that maximizes its profit. This occurs, in economic terms, when marginal revenue equals marginal cost. Profit maximization means that a firm either produces maximum output for a given amount of input, or uses minimum input for producing a given output. The underlying rationale of profit maximization is efficiency. It is assumed that profit maximisation causes the efficient allocation of resources under the competitive market condition, and profit is considered as the most appropriate measure of a firm's performance.

Thus, profit maximisation is considered as an important goal in financial decision-making in an organisation. It ensures that firm utilizes its available resources most efficiently under conditions of competitive markets.

But in recent years, under the changed corporate environment, profit maximisation is regarded as unrealistic, difficult, inappropriate and socially not much preferred goal for business organisation. It is argued that profit maximisation assumes perfect competition, and in the face of imperfect modern markets, it cannot be a legitimate objective of the firm. It is also argued that the objective of profit maximisation as a business objective developed in the 19th century when the business activity was self financing and based on assumption of private property and single entrepreneurship. The only aim of the entrepreneur then was to maximize his profit and enhance his own wealth, this objective could be easily satisfied by profit maximisation objective. The modern business environment is characterised by limited liability and a distinction between management and ownership. The various stakeholders of the firm are shareholder, lenders, customers, employees, government and society. In practice the objectives of all these stakeholders may differ and may even conflict with each other. The manager has a difficult task of reconciling and balancing these conflicting objectives. The goal of profit maximization overlooks the interest of other parties than the shareholders and is therefore crticised and considered as unrealistic, inappropriate and immoral.

Profit maximisation as corporate goal is criticised by scholars mainly on the following grounds:

   (i) It is vague conceptually.

   (ii) It ignores timing of returns.

  (iii) It ignores the risk factor.

  (iv) It may tempt to make such decisions which may in the long run prove disastrous.

   (v) Its emphasis is generally on short run projects.

  (vi) It may cause decreasing share prices.

 (vii) The profit is only one of the many objectives and variables that a firm considers.

(b) Shareholder Wealth Maximisation

According to Solomon, shareholder wealth maximization means maximizing the net present value of a course of action to shareholders. Net present value (NPV) or wealth of a course of action is the difference between the present value of its benefit and the present value of its costs.

Presently, maximisation of present value (or wealth) of a course of action is considered appropriate operationally flexible goal for financial decision-making in an organisation. The net present value or wealth can be defined more explicitly in the following way:

$$NPV = W = \frac{A_1}{(1+K_1)} + \frac{A_2}{(1+K_2)} + \frac{A_3}{(1+K_3)} + \frac{A_4}{(1+K_4)} + \ldots + \frac{A_n}{(1+K_n)} - Co = \frac{\sum\limits_{t=1}^{n} A_t}{\Sigma (1+K)^t} - Co$$

Where $A_1 \ldots \ldots A_n$ represent the stream of benefits expected to occur if a course of action is adopted. Co is the cost of that action and K is the appropriate discount rate, and W is the Net present worth or wealth which is the difference between the present worth or wealth of the stream of benefits and the initial cost.

The management of an organisation tries to maximises the present value not only for shareholders but for all including employees, customers, suppliers and community at large. This goal for the maximum present value is generally justified on the following grounds:

   (i) It is consistent with the object of maximising owners economic welfare.

  (ii) It focuses on the long run picture.

 (iii) It considers risk.

 (iv) It recognises the value of regular dividend payments.

  (v) It takes into account time value of money.

 (vi) It maintains market price of its shares.

(vii) It seeks growth in sales and earnings.

However, profit maximisation can be part of a wealth maximisation strategy. Quite often two objectives can be pursued simultaneously but the maximisation of profit should never be permitted to overshadow the objectives of wealth maximisation.

The objective of the firm provides a framework for optimal decision making in the area of business management. The term 'objective' should be used in the sense of 'decision criteria' for taking decisions involved in financial management. It means that what is relevant is not the overall objective of the business but operationally useful criterion against which the investment, financing and dividend policy decisions are to be judged. The objective of shareholder wealth maximisation is an appropriate and operationally feasible criterion to choose among the alternative financial actions. It provides an unambiguous measure of what financial management should seek to maximise in making investment and financing decisions on behalf of shareholders. Another point to note in this context is that objective provide a 'normative' framework. In other words, it implies that the focus is on what a firm should try to achieve and on policies that it should follow if the objectives are to be achieved.

PROFIT MAXIMISATION VERSUS SHAREHOLDER WEALTH MAXIMISATION

Profit maximisation is basically a single-period or, at the most, a short-term goal. It is usually interpreted to mean the maximisation of profits within a given period of time. A firm may maximise its short-term profits at the expense of its long-term profitability and still realise this goal. In contrast, shareholder wealth maximisation is a long-term goal and shareholders are interested in future as well as present profits. Wealth maximisation is generally preferred because it considers (1) wealth for the long-term, (2) risk or uncertainty, (3) the timing of returns, and (4) the shareholders' return. The following table provides a summary of the advantages and disadvantages of these two often conflicting goals.

Profit Maximisation Vs. Shareholder Wealth Maximisation

Goal	Objective	Advantages	Disadvantages
Profit maximisation	Large amount of profits	1. Easy to calculate profits 2. Easy to determine the link between financial decisions and profits	1. Emphasizes the short term 2. Ignores risk or uncertainty 3. Ignores the timing of returns 4. Requires immediate resources
Shareholder wealth maximisation	Highest market value of common stock	1. Emphasizes the long term 2. Recognizes risk or uncertainty 3. Recognizes the timing of returns 4. Considers return	1. Offers no clear relationship between financial decisions and stock price 2. Can lead to management anxiety and frustration

In other words, the conflict may emerge in the area of profit maximsation and wealth maximisation as an objective of financial management. Profit maximisation would be a measure of attaining profit in a firm and wealth maximisation would consider the effect of earning per share and dividend to shareholders. The objective of wealth maximisation would be fulfilled by increasing the market price of shares through decisions on future case flow dividends and earnings per shares but to maximise profit the financial manager may have to consider issues like – retained earnings, non-payment of dividends, investing funds in profitable outlets. The finance manager has to try and maximise profit without in any way affecting the shareholders wealth because primary goal of financial decision making is to achieve wealth maximisation. Profit maximisation is the narrow objective of financial management because profit is a test of economic efficiency but wealth maximisation is comprehensive objective of financial management, it goes beyond the quantitative aspects as it also considers qualitative benefits in a firm. Wealth maximisation objective is therefore, superior to the profit maximisation concept.
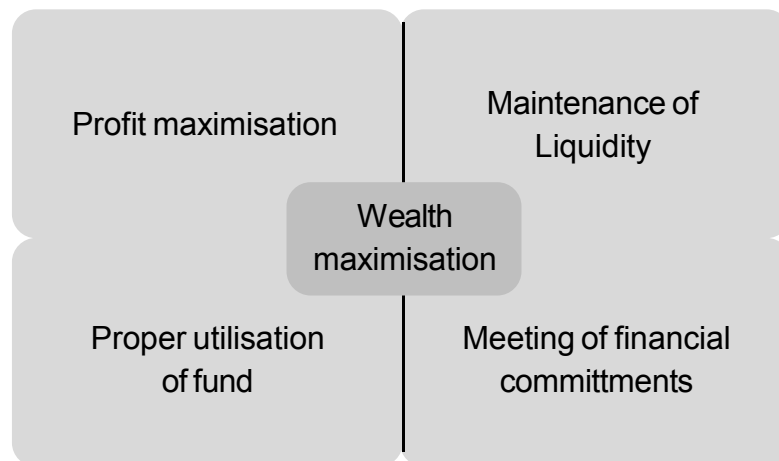
Economic Value-Added (EVA) – Means to Measure Shareholders Value Criteria

Economic value added (EVA) is the after tax cash flow generated by a business minus the cost of the capital it has deployed to generate that cash flow. Representing real profit versus paper profit, EVA underlines shareholder value, increasingly the main target of leading companies strategies. Shareholders are the players who provide the firm with its capital; they invest to gain a return on that capital.

The concept of EVA is well established in financial theory, buy only recently has the term moved into the mainstream of corporate finance, as more and more firms adopt it as the base for business planning and performance monitoring. There is growing evidence that EVA, not earnings, determines the value of a firm. There is difference between EVA, earnings per share, return on assets, and discounted cash flow, as a measure of performance.

Earnings per share tells nothing about the cost of generating those profits. If the cost of capital (loans, bonds, equity) as say, 15 per cent, then a 14 per cent earning is actually a reduction, not a gain, in economic value. Profits also increase taxes, thereby reducing cash flow.

Return on assets is a more realistic measure of economic performance, but it ignores the cost of capital. Leading firms can obtain capital at low costs, via favourable interest rates and high stock prices, which they can then invest in their operations at decent rates of return on assets. This tempts them to expand without paying attention to the real return, economic value-added.

Discounted cash flow is very close to economic value-added, with the discount rate being the cost of capital.

There are two key components to EVA. The net operating profit after tax (NOPAT) and the capital charge, which is the cost of capital times the amount of capital. In other words, it is the total pool of profits available to provide cash return to those who provided capital to the firm. The capital charge is the product of the cost of capital times the capital tied up in the investment. In other words, the capital charge is the cash flow required to compensate investors for the riskiness of the business given the amount of capital invested. On the one hand, the cost of capital is the minimum rate of return on capital required to compensate debt and equity investors for bearing risk-a cut-off rate to create value and capital is the amount of cash invested in the business, net of depreciation (Dierks and Patel, 1997). In formula form,

EVA = (Operating Profit) – (A Capital Charge)

EVA = NOPAT – (Cost of Capital x Capital)

However, in practical situations there are adjustments to both NOPAT and the capital employed to reduce non-economic accounting and financing conventions on the income statement and balance sheet.

These are adjustments that turn a firm's accounting book value into an economic book value, which is more accurate measure of the cash that investors have put at risk in the firm and upon which they expect to accrue some returns. These adjustments turn capital-related items into more accurate measures of capital and include revenue and expense related items in NOPAT, thus better reflecting the financial base upon which investors expect to accrue their returns. Furthermore, these adjustments are made to address the distortions suffered by traditional measures, such as return on equity, earnings per share and earnings growth, that change depending upon the generally accepted accounting principles adopted or the mix of financing employed.

Thus, EVA represents the value added to the shareholders by generating operating profits in excess of the cost of capital employed in the business. EVA will increase if:

    i. Operating profits grow without employing additional capital i.e., through greater efficiency.

    ii. Additional capital is invested in the projects that give higher returns than the cost of procuring new capital, and

    iii. Unproductive capital is liquidated i.e., curtailing the unproductive uses of capital.

Implementing EVA in a company is more than just patting one additional row in the income statement. It is of course some kind of change process which should be given some management effort. However, if right actions are taken straight from the beginning then implementing EVA should be one of the easiest change process that a company goes through. The actions might include e.g.:

– Gaining the understanding and commitment of all the members of the management group through training and discussing and using this support prominently during the process.

– Training of the other employees, especially all the key persons.

– Adopting EVA in all levels of organization.

However, there are a few common mistakes that are often made in implementing or using EVA. Most of them are bound up with either misunderstanding and thus misusing the concept at upper levels or not training all the employees to use EVA and thus not using the full capacity of the concept. These common mistakes include defining capital costs intentionally wrongly (usually too high for some reason), using EVA only in the upper management level and investing too little in training of employees.

Although EVA is a value based measure, and it gives in valuations exactly same answer as discounted cash flow, the periodic EVA values still have some accounting distortions.

That is because EVA is after all an accounting-based concept and suffers from the same problems of accounting rate of returns. In other words, the historical asset values that distort ROI also distort EVA values.

In EVA valuations, the historical asset values (book value) are irrelevant and only the cash flows are left to give the end result.

The financial manager as a measure of performance also function to find out return on equity, market captialisation and earning per share by adding the concept of Market Value Added (MVA). This works in close nexus to the economic value added concept. This concept shows the management the increase or decrease in the value of capital. Through this principle, the finance manager will be able to make the conflicting areas of conflict of the shareholders, debt investors and manager complementary.

VALUE OF FIRM-RISK AND RETURN

Financial decisions incur different degree of risk. An investor's decision to invest in risk free government bonds has less risk as interest rate is known and the risk of default is very less. On the other hand, an investor would incur more risk if he decides to invest in shares, as the return is not certain. However, the investor can expect a lower return from government bond and higher from shares. Risk and expected return move in tandem; the greater the risk the greater would be the expected return. The following figure shows the risk-return relationship.
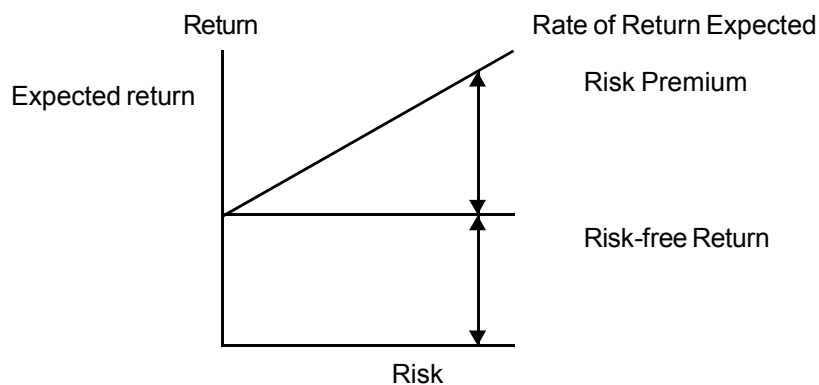
The Risk-return relationship

As discussed earlier, a finance manager has to take various types of decision- investment decisions, financing decisions and dividend decisions. A finance manager takes these decisions in the light of the objective of wealth maximisation as reflected in the market price of the shares. The finance manager should also know as to what are the factors which may affect the market price of the shares. The various decisions will be taken in the light of these factors, otherwise any attempt to achieve the objective of maximisation of market price of the shares may not be achieved.

A finance manager cannot avoid the risk altogether nor can he make a decision by considering the return aspect only. Usually, as the return from an investment increases, the risk associated with it also increases. In an attempt to increase the return, the finance manager will have to undertake greater degree of risk also. Therefore, a finance manager is often required to trade-off between the risk and return. At the time of taking any decision, the finance manager tries to achieve the proper balance between the consideration of risk and return associated with various financial management decisions to maximise the market value of the firm. A particular combination of risk and return where both are optimized may be known as Risk-return trade off and at this level of risk-return, the market price of the shares will be maximised.

The figure below demonstrates the relationship between market value of the firm, return and risk, on the one hand and financial management decision on the other.
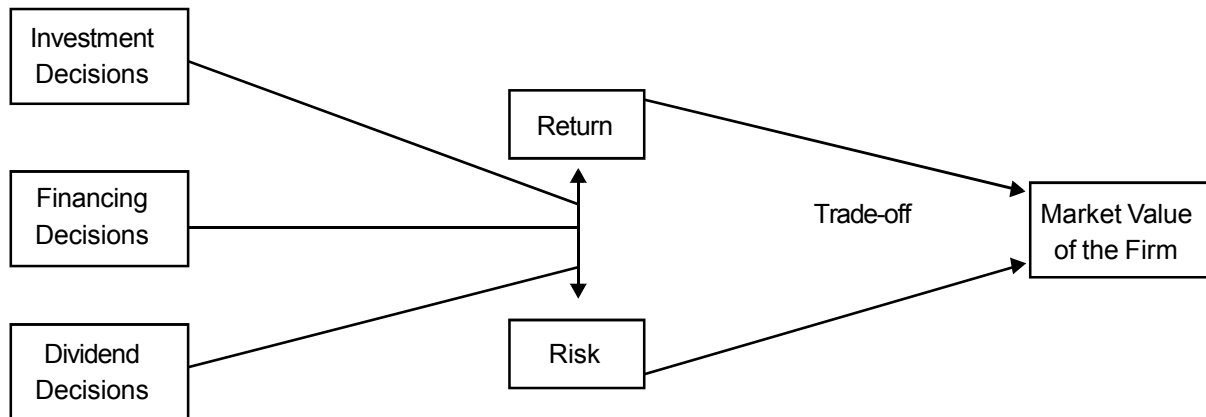
LIQUIDITY

Liquidity is an important concept in financial management and is defined as ability of the business to meet its short-term obligations. It shows the quickness with which a business/company can convert its assets into cash to pay what it owes in the near future. According to Ezra Soloman, it measures a company's ability to meet expected as well as unexpected requirements of cash to expand its assets, reduce its liabilities and cover up any operating losses. Liquidity, as a decision criterion, is widely used in financial management. It is used for managing liquid resources or current assets or near cash assets so as to enhance the effectiveness with which they are utilised with a view to minimising costs. It also focuses attention on the availability of funds. Enhancement of liquidity enables a corporate body to have more funds from the market.

While using liquidity as a decision criterion, the management makes use of ratios. They give a bird's eye view of the current liquidity position or shortages thereof. A company will like to have liquid resources for transaction purposes, as a precautionary measure and for speculative opportunities. The management's attitude towards these i.e., transaction motive, precautionary motive and speculative motive (taking advantage of lower prices of raw materials etc., in the market) is an important determinant of a company's liquidity position.

Liquidity is assessed through the use of ratio analysis. Liquidity ratios provide an insight into the present cash solvency of a firm and its ability to remain solvent in the event of calamities.

Current Ratio which is the ratio of current assets to current liabilities, is widely used by corporate units to judge the

ability to discharge short-term liabilities covering the period upto one year. The interpretation of the current ratio is that 'higher the ratio, greater is the ability of the firm to pay off its bills'.

Nevertheless, it is a crude ratio and does not take into account the difference amongst different categories of assets. For example, inventory may not be turned into cash as quickly as Account Receivables. The main difficulty that arises in treating inventory as a quick item is that unless one has ensured about the quality, condition and marketability of the inventory it may be impossible to turn it into cash immediately at the estimated value. Therefore, to assess quick liquidity position, inventory is excluded while calculating Quick Ratio. The ingredients of current assets while computing the Quick Ratio are cash, marketable securities and receivables. Besides cash, the other two items are near cash and at very short notice can easily be converted into cash. Therefore, for taking financial decisions particularly for assessing cash position of the company and its ability to discharge current obligations, Quick Ratio is frequently relied upon. Nevertheless, the main shortcoming of the Quick Ratio is that it ignores inventories and concentrates on cash, marketable securities and receivables in relation to current obligations although inventory is also a basic input in current ratio without which company's decision process cannot be complete.

Liquidity ratio enables a company to assess its Net Working Capital. Working Capital is denoted by the combination of current assets or current liabilities of a company, and for calculation of net working capital we deduct current liabilities from current assets. Having done so we are left with the ready money in our hands to meet day to day needs of the business. If we still want to know as to how much is available with the company per rupee of sales then Net Working Capital is divided by sales.

Tailor-made measurement can be devised for calculating liquidity ratio in different situations. For example, the principle of liquidity can be extended to study liquidity of receivables (or inventories) separately to enable the executives to take decisions about the collection period of bills.

Liquidity of receivables is assessed through Average Collection Period (ACP). ACP tells us the average number of days receivables are outstanding i.e., the average time a bill takes to convert into cash. The inverse to this ratio is Receivables Turnover Ratio (RTR). Either of the two ratios can be used as both depict the slowness of recovery, but the readings are different. For financial decisions and to use liquidity as criterion the average collection period ratio, and receivables turnover ratio is used to help in taking corrective steps for maintaining the optimum liquid position for the company at any given time to avoid risk of losing goodwill and chances of bankruptcy. The ratio, in short, reveals the following results:

(1) Too low an average collection period may suggest excessively restricted credit policy of a company.

(2) Too high an average collection period (ACP) may indicate too liberal a credit policy. A large number of receivables may remain due and outstanding, resulting in less profits and more chances of bad debts.

Average collection period and receivables turnover ratio should be compared to the average age of accounts payable or accounts payable turnover ratio. Though adequate liquidity could be maintained by accelerating collections and deferring payments, yet this has its own limitations and drawbacks. It affects the credit standing of the company in business and banking circles.

In the same spirit, decisions are made to maintain a proper inventory level in the company. For the purpose, it becomes essential to assess the liquidity of inventory. Inventory Turnover Ratio i.e., cost of goods sold divided by average annual inventory, shows the rapidity with which inventory is turned into receivables through sales. The higher the ratio, the more efficient is the inventory management system of the company.

To conclude, liquidity, as a decision criterion is an important tool in financial management. Financial decisions are affected by liquidity analysis of a company in the following areas:

1. Management of cash and marketable securities;

2. Credit policy of a firm and procedures for realisation;

3. Management and control of inventories;

4. Administration of fixed assets;

5. Taking decisions for efficient use of current assets at minimum cost; and

6. Decisions to keep the company's position on sound basis to avoid eventualities.

The above analysis of liquidity suggests evaluation of current assets of a company. On liabilities side also, liquidity position is analysed and managed through assessment of long and medium term debts of the company, and the arrangements for their repayments. This is done purely from the precautionary point of view so that the company could be saved from the risk of bankruptcy for non-payment of its debt to the lenders.

PROFITABILITY

Profitability as a decision criterion is another important tool in financial management for taking decisions from different angles after evaluating the performance of the company in different spheres. For example, if it becomes essential for the company to examine profit per unit of sale then it is done by estimating profitability per rupee of sales. It is used as a measure of comparison and standard of performance. Similarly, there could be other ratios.

Because different users look at the profitability of a company from different angles, they use different ratios. Short-term creditors, long-term lenders, equity shareholders, investors, etc. all are interested in profitable operations of a concern. They use the ratios which best suit their requirements. Profitability can be related to sales or to total capital employed or to net worth of the company. But then different figures for profits are taken into account.

Profitability to sales ratio, reflects the company's ability to generate profits per unit of sales. If sales lack sufficient margin of profit, it is difficult for the business enterprise to cover its fixed cost, including fixed charges on debt, and to earn profit for shareholders. From investors point of view profits are compared by the investors as percentage to the capital employed in the business enterprise. Absence of adequate profitability ratio on sales reflects the company's inability to utilise assets effectively. This is analysed through the asset turnover ratio.

One of the important profitability ratios is profits on equity – profit figure after interest, before dividend and taxes, drawn from the profit and loss account is related to the equity of the shareholders as shown in balance sheet. This is an indicator of profits earned on funds invested by the owners. It is an indicator of actual returns received by them. This ratio may assume two forms:

(1) $\dfrac{\text{Earning available to common shareholders}}{\text{Total Equity}}$

(2) $\dfrac{\text{Net income after tax}}{\text{Total Equity}}$

[The ratio at (2) is used where the company has no preference shareholders].

Profit margin is another measure of viewing profitability. The revenue bearing property of sales can be easily assessed from the profit margin. It is derived by dividing operating income from business by sales. This ratio indicates the efficiency of operations as well as how products are priced. Inadequacy of profit margin is an evidence of company's inability to achieve satisfactory results. Pricing decisions are made by financial executives in consultation with the marketing departments of the company. Policy decisions relating to increase or decrease in price are taken in respect of different products keeping in view the competitiveness of the market. Profit margin ratio is constantly used by business executives for this purpose. To look into the cash generating capacity of sales, gross profit margin is used by deducting the cost of goods sold from sales and dividing by sales.

The gross profit margin ratio indicates the profits relative to sales after deduction of direct production cost. It indicates efficiency of production operations and the relationship between production costs and selling price.

The difference between the above two ratios i.e. gross profit margin and net profit margin ratios is that general and administrative expenses are excluded while computing gross margin. Thus, net profit margin ratio is calculated as under:

$$\text{Net Profit Margin (NPM)} = \frac{\text{Net Profit after Taxes}}{\text{Sales}}$$

NPM ratio is an indicator of company's ability to generate profits after paying all taxes and expenses. Decline in this ratio reflects the presence of either higher expenses relative to sales or higher tax burden on the company, affecting its profitability adversely. For assessment of profitability as a decision criterion return on investment (ROI) is a frequently used ratio.

Return on Investment: This is an important profitability ratio from the angle of shareholders and reflects on the ability of management to earn a return on resources put in by the shareholders. The beauty of the ROI ratio is that earning of the company can be viewed from different angles so as to take decisions on different causes responsible, to reduce or to enhance the profitability of the company. One way of finding out rate of return on assets employed in the company is to find the ratio of earnings before interest and taxes (EBIT) to capital employed. This ratio indicates operating income to the assets used to produce income.

Another way of computing the ratio of return is through the assets turnover ratio and margin of profit which gives the same results, as EBIT to capital employed. It may be seen from the following:

$$\frac{\text{EBIT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} = \frac{\text{EBIT}}{\text{Assets}}$$

A high ratio indicates efficient use of assets and low ratio reflects inefficient use of assets by a company.

Another off-shoot of profitability ratio is the times interest earned ratio, which gives a clue to the interest bearing capacity of the income character of business operations. This ratio relates operating profits to fixed charges created by the company's borrowings, and provides an indication of margin of safety between financial obligations and Net income after tax. A company may earn profits but may find it difficult to make payments of excess interest charges or may face inability to meet such obligations. EBIT should be 5 to 6 times interest charges as a satisfactory guideline for this ratio. Lenders, particularly banks and financial institutions, greatly rely on this ratio particularly in profitability assessment through projections of income of the borrower in the coming years after investment of borrowed funds.

In this way, we find that profitability as decision making criterion in financial management, is crucial for business managers. Business works as a system comprised of sub-systems. Different criteria assess different aspects and assist in viewing different situations which have an aggregate impact on business activity, and therefore form the basis of financial management.

COSTING AND RISK

In financial management, costing relates to the system adopted for assessing cost of capital from various sources viz., equity and preference shares, debentures/bonds, long-term borrowings from financial institutions, etc. Equity capital is owner's money employed in the business whereas borrowed funds are creditors' funds carrying an interest obligation and repayment schedule. There are thus, risks involved if interest is not paid or on account of default in repayment of principal. It is ordinarily expected that every rupee obtained on loan enhances the chances of increasing the returns on owners' capital and the net worth. The rate of interest on borrowed funds is usually lower than the returns expected by the investors or risk-takers in the business. Moreover, interest paid is deductible for tax purposes. The following illustration gives an idea of the phenomenon stated above:

	Company A	Company B
Total Capital	₹ 100	₹ 100
Owners' capital	₹ 100	₹ 50
Borrowed capital	NIL	₹ 50
Rate of earnings	20%	20%
Rate of interest	–	15%
Earnings before interest and taxes	₹ 20	₹ 20
Interest paid	–	₹ 7.50
Earnings before taxes	₹ 20	₹ 12.50
Taxes at 50%	₹ 10	₹ 6.25
Earnings after taxes	₹ 10	₹ 6.25
Percentage of earnings on owners' funds	10%	12.5%

But if the company is not able to earn sufficient returns, the returns on owners' funds are reduced and risk increases. Using borrowed funds or fixed cost funds in the capital structure of a company is called financial gearing. High financial gearing will increase the earnings per share of a company if earnings before interest and taxes are rising, as compared to the earnings per share of a company with low or no financial gearing. It may be understood that leverage and gearing are used interchangeably. (The former is used in the USA and the latter in U.K.). So at times when the economy is doing well, the shareholders of a highly geared company will do better than the shareholders of a low geared company. However, if the company is not doing well, when its profits before interest and taxes are falling, the earnings per share of highly geared company will fall faster than those of the low geared company. The higher this level of financial gearing, the greater the risk. Those who take risk should appreciate that in difficult times their reward will be below average but in good times they will receive above average rewards. The lower the levels of financial gearing, the more conservative are the financial policies of the company and the less will be deviations over time to earnings per share.

Risk is associated with fixed charges in the shape of interest on debt capital. Higher the fixed charges, the greater the chance that it will not be covered by earnings and so greater the risk. Large companies financed by heavy borrowings, need to continue to produce and search for new markets for their output. Any internal disturbance or external constraint that may hamper the company's production and sales will reduce inflow of funds but fixed interest charges have to be paid. A study of the effects of capital gearing on cost of capital is quite important for financial decisions. Given that a company has to minimise the cost of capital, it should fix up a level of gearing where is costs of capital is minimum.

As against the traditional theory of capital structure suggesting that the average cost of capital does depends on the level of gearing, the alternative theory on cost of capital as propounded by Modigliani and Miller argues that the cost of capital is independent of the capital structure. The essence of the Modigliani and Miller argument is the arbitrage process. Should the value of two firms with identical incomes and the same risk class ratios vary (which would be possible under the traditional theory) the investors would arbitrage so as to make the market value of the two firms equal. A key assumption of the model is that the investors can arbitrage between companies, and between loan and equity capital, without increasing the risk of their individual investment portfolios.

Despite all the above theoretical explanations the fact remains that debt is associated with risk which enhances with increase in the leverage. There are two major reasons for this increased risk viz., (1) interest is a fixed charge and is required to be paid by the company whether or not it earns profits; and (2) a substantial decrease in liquidity or increased demands from creditors for payment if the company has higher proportion of debt capital in its capital

structure. For these reasons, the risk of a company not being able to meet its obligations is greater than in the case of a company in which the proportion of borrowed sum is substantially smaller.

Distinction may be made between different types of risk to which an enterprise is exposed in the business environment.

The risk which we have discussed is financial risk that arises in relation to owners' return created by the utilization of funds in the enterprise particularly fixed cost securities i.e. debt and preference shares. Financial risk is distinguished from "business risks" which is associated with the chance of loss due to variability of return, in general, created by the enterprise and as such it is known as operating risk. It is concerned with EBIT (earning before interest and taxes) whereas financial risk is concerned with EAIT (earning after interest and taxes). If there is preference capital then the financial risk is concerned with earnings available to ordinary (equity) shareholders after dividends have been paid to preference shareholders. Financial risk encompasses the risk of possible insolvency and the variability in the earnings on equity. In case the enterprise does not employ debt or preference capital there will be no financial risk and over all risk for the firm will be low. It is only because of application of debt financing, that overall risk increases and originates into financial risk to equity holders.

Besides, there are other types of risk which are related to investment decisions and not cost of financial sources viz., purchasing power risk, market risk, interest rate risk, social or regulatory risk and other risks. Purchasing power risk affects all investors. The risk is associated with changes in the price level on account of inflation. Under inflationary conditions, the purchasing power of money decreases over time, and the investor is faced with the possibility of loss on account of investments made to the extent of inflation. Under inflationary conditions, therefore, the real rate of return would vary from the nominal rate of return (viz., the percent return on the face value of investment made). Interest rate risk is concerned with holders of the bonds due to changes in interest rates. These bonds are high quality bonds not subject to business or financial risk but their prices are determined by there prevailing level of interest rates in the market. As a result, if interest rate falls, the price of these bonds will rise and vice versa. The risk is more in case of long-term bonds because the rate of interest may fluctuate, over a wider range as compared to a short-term bond. As regards social and regulatory risks, they arise due to harsh regulatory measures like licensing, nationalisation, price controls limiting profits, etc. Other types of risks may depend upon the nature of investment. Detailed discussion is not required at this stage.

FINANCIAL DISTRESS AND INSOLVENCY

Generally the affairs of a firm should be managed in such a way that the total risk – business as well as financial – borne by equity holders is minimised and is manageable, otherwise, the firm would obviously face difficulties. In managing business risk, the firm has to cope with the variability of the demand for its products, their prices, input prices, etc. It has also to keep a tab on fixed costs. As regards financial risk, high proportion of debt in the capital structure entails a high level of interest payments. If cash inflow is inadequate, the firm will face difficulties in payment of interest and repayment of principal. If the situation continues long enough, a time will come when the firm would face pressure from creditors. Failure of sales can also cause difficulties in carrying out production operations. The firm would find itself in a tight spot. Investors would not invest further. Creditors would recall their loans. Capital market would heavily discount its securities. Thus, the firm would find itself in a situation called distress. It may have to sell its assets to discharge its obligations to outsiders at prices below their economic values i.e. resort to distress sale. So when the sale proceeds is inadequate to meet outside liabilities, the firm is said to have failed or become bankrupt or (after due processes of law are gone through) insolvent.

Failure of a firm is technical if it is unable to meet its current obligations. The failure could be temporary and might be remediable. When liabilities exceed assets i.e. the net worth becomes negative, bankruptcy, as commonly understood, arises. Technical bankruptcy can be ascertained by comparing current assets and current liabilities i.e. working out current ratio or quick ratio. On the other hand, solvency ratios indicate long term liquidity i.e. the ability of the firm to discharge its term-liabilities. Examples of solvency ratios are Debt to Equity ratio, Debt to total Funds Ratios, and Interest coverage ratio. Trend analysis should be made for the past three to five years to pick up signals of bankruptcy, if any.

FINANCIAL MANAGEMENT AS A SCIENCE OR AN ART

Financial Management is a subject within the compass of social science as it deals with people. Its nature is nearer to applied sciences as it envisages use of classified and tested knowledge as a help in practical affairs and solving business.

Theory of financial management is based on certain systematic principles, some of which can be tested in mathematical equations like the law of physics and chemistry. Financial management contains a much larger body of rules or tendencies that hold true in general and on the average. The use of computers, operations research, statistical techniques and econometric models find wide application in financial management as tools for solving corporate financial problems like budgeting, choice of investments, acquisition or mergers etc. This takes the financial management nearer to treatment as a subject of science. Nevertheless, there remains a wide scope for application of value judgement in financial decision making. Most practical problems of finance have no hard and fast answers that can be worked out mathematically or programmed on a computer. They must be solved by value judgement, intuition and the "feel" of experience. Thus, despite its frequent acceptance as an applied science, finance remains largely an art. Because, according to George A. Christy and Peyton Foster Roden (Finance: Environment and Decisions) knowledge of facts, principles and concepts is necessary for making decisions but personal involvement of the manager through his intuitive capacities and power of judgement becomes essential. This makes financial management and managing a company's finance both an art and a science. It requires a feel for the situation and analytical skills alongwith a thorough knowledge of the techniques and tools of financial analysis and the know-how to apply them and interpret the results.

A very interesting presentation has been made by Weston in his book "Methodology in Finance". The finance functions are mainly three viz., planning, organisation and financial control. In each of these finance functions elements of science and art can be observed. Wherever methodology is to be applied in decision making in all these areas, the subject matter becomes a science confronted with the framework of techniques and tools. On the other hand, when the question of choice to make selection out of the alternative results arises the subject matter becomes an art requiring human skills for value judgement. For example, in planning function, there are certain goals, which may be short-term goals or long-term goals. Each falls within the area of art. Another parameter of planning is estimating funds, which may again be short-term or long-term involving techniques and skills. When involvement to techniques is there the subject matter remains science and when the skills are required to be interpreted, the subject matter becomes an art. It so happens in all aspects of planning, organisation and control.

Thus, in the entire study of financial management whether it is related to investment decision, financing decisions i.e. deciding about the sources of financing, or dividend decision, there is a mixture of science as well as art. When techniques for analytical purposes are used it is science and when choice in appreciation of the results is made it is an art. Thus, people will like to call financial management as science as well as art. But it is better if we say that the discipline of financial management has both the aspects of science as well as art; where there is theory of systematic knowledge it is science and where there is application it is art.

FUNCTIONS OF FINANCIAL MANAGER

To achieve the objective of the financial management i.e. to maximise the owner's wealth, the financial executives have to perform variety of tasks to discharge their responsibilities. With the evolution of finance from being mere a descriptive study to the one that is highly developed discipline, the role of financial managers has also undergone a sea change. His areas of responsibilities now extend far beyond keeping records, reports, the firm's cash position, paying bills and obtaining funds, and he is now concerned with and is fully involved in the decision making processes to decide investment of funds in assets, determining the best mix of financing and dividends in relation to overall valuation of the firm. The responsibilities of the financial manager are linked to the goal of ensuring liquidity, profitability or both and is also related to the management of assets and funds of any business enterprise. When the Financial Manager is involved in management of asset, he is performing the role of the decision-maker

and when he is managing funds, he is performing the staff function. In the light of different responsibilities of the financial manager, he performs mainly the following duties:

1. *Forecasting of Cash Flow:* This is necessary for the successful day to day operations of the business so that it can discharge its obligations as and when they arise. In fact, it involves matching of cash inflows against outflows and the manager must forecast the sources and timing of inflows from customers and use them to pay the liability.

2. *Raising Funds:* The Financial Manager has to plan for mobilising funds from different sources so that the requisite amount of funds are made available to the business enterprise to meet its requirements for short term, medium term and long term.

3. *Managing the Flow of Internal Funds:* Here the Manager has to keep a track of the surplus in various bank accounts of the organisation and ensure that they are properly utilised to meet the requirements of the business. This will ensure that liquidity position of the company is maintained intact with the minimum amount of external borrowings.

4. *To Facilitate Cost Control:* The Financial Manager is generally the first person to recognise when the costs for the supplies or production processes are exceeding the standard costs/budgeted figures. Consequently, he can make recommendations to the top management for controlling the costs.

5. *To Facilitate Pricing of Product, Product Lines and Services:* The Financial Manager can supply important information about cost changes and cost at varying levels of production and the profit margins needed to carry on the business successfully. In fact, financial manager provides tools of analysis of information in pricing decisions and contribute to the formulation of pricing policies jointly with the marketing manager.

6. *Forecasting Profits:* The Financial manager is usually responsible for collecting the relevant data to make forecasts of profit levels in future.

7. *Measuring Required Return:* The acceptance or rejection of an investment proposal depends on whether the expected return from the proposed investment is equal to or more than the required rate of return. An investment project is accepted if the expected return is equal or more than the required rate of return. Determination of required rate of return is the responsibility of the financial manager and is a part of the financing decision.

8. *Managing Assets:* The function of asset management focuses on the decision-making role of the financial manager. Finance personnel meet with other officers of the firm and participate in making decisions affecting the current and future utilisation of the firm's resources. As an example, managers may discuss the total amount of assets needed by the firm to carry out its operations. They will determine the composition or a mix of assets that will help the firm best achieve its goals. They will identify ways to use existing assets more effectively and reduce waste and unwarranted expenses.

The decision-making role crosses liquidity and profitability lines. Converting the idle equipment into cash improves liquidity. Reducing costs improves profitability.

9. *Managing Funds:* Funds may be viewed as the liquid assets of the firm. In the management of funds, the financial manager acts as a specialised staff officer to the Chief Executive of the company. The manager is responsible for having sufficient funds for the firm to conduct its business and to pay its bills. Money must be located to finance receivables and inventories, to make arrangements for the purchase of assets, and to identify the sources of long-term financing. Cash must be available to pay dividends declared by the board of directors. The management of funds has therefore, both liquidity and profitability aspects. If the firm's funds are inadequate, the firm may default on the payment of liabilities and may have to pay higher interest. If the firm does not carefully choose its financing methods, it may pay excessive interest costs with a subsequent decline in profits.

LESSON ROUND-UP

– Financial Management deals with procurement of funds and their effective utilizations in the business and concerned with investment, financing and dividend decisions in relation to objectives of the company.

– Investment decisions are essentially made after evaluating the different project proposals with reference to growth and profitability projections of the company.

– Financing decisions are concerned with the determination of how much funds to procure from amongst the various avenues available i.e. the financing mix or capital structure.

– Dividend decision is to decide whether the firm should distribute all profits or retain them or distribute a portion and retain the balance.

– Profit maximization ensures that firm utilizes its available resources most efficiently under conditions of competitive markets.

– Wealth maximization means the management of an organization maximizes the present value not only for shareholders but for all including employees, customers, suppliers and community at large.

– Economy value added is the after cash flow generated by a business minus the cost of capital it has deployed to generate that cash flow.

– Liquidity means ability of the business to meet short-term obligations. It shows the quickness with which a business/company can convert its assets into cash to pay what it owes in the near future.

– Profitability ratio reflects on the ability of management to earn a return on resources put in by the shareholders evaluating the performance of the company in different spheres

– Affairs of the firm should be managed in such a way that the total risk – business as well as financial borne by equity shareholders is minimised and is manageable.

SELF-TEST QUESTIONS

(These are meant for re-capitulation only. Answers to these questions are not to be submitted for evaluation)

1. Discuss the nature and scope of Financial Management.

2. What is justification for the goal of maximising the wealth of shareholders?

3. Critically examine the goals of maximisation of profit and maximisation of return on equity.

4. "The goal of profit maximisation does not provide us with an operationally useful criterion." Comment.

5. Financial management has changed substantially in scope and complexity in recent decades. How do you account for this trend? In what directions has emphasis in the field been shifted?

6. "Investment, financing and dividend decisions are interrelated". Comment.

7. What criteria should you adopt in making financial decisions in your company? Discuss with reference to the costing of funds decisions.

8. Write short notes on:

    (a) Liquidity;

    (b) Profitability;

    (c) Costing and risk;

    (d) Financial distress.

9. Discuss the responsibilities of a financial manager in a corporation.

10. "The financial manager has the role of balancing conflicting goals". Discuss

11. "Wealth maximisation is superior criteria compared to profit maximisation". Comments

Lesson 2
Capital Budgeting

LESSON OUTLINE

– Time Value of Money

– Planning and Control of Capital Expenditure

– Capital Budgeting Process

– Techniques of Capital Budgeting- Discounted and Non- Discounted Cash Flow Methods,

– Choice of Methods

– Capital Rationing;

– Risk Evaluation and Sensitivity Analysis,

– Simulation for Risk Evaluation

– Inflation, Uncertainty and Evaluation using Statistical Decision Theory

– Analysis of Capital Budgeting, Decisions- Some Case Studies

– LESSON ROUND UP

– SELF TEST QUESTIONS

LEARNING OBJECTIVES

Capital Budgeting is one of core and most difficult task of a finance manager. In capital budgeting cum investment appraisal decision, a finance manager is to co-ordinate with project managers, bankers and promoters to get different data for his analysis. Capital budgeting requires use of various methods including statistical techniques.

The object of the study lesson is to enable the students to understand:

– Time value of money

– Need and importance of Capital Budgeting

– Factors Including Investment Decisions

– Kinds of Capital Budgeting Decisions

– Planning of Capital Expenditure

– Capital Expenditure Control

– Capital Rationing

– Capital Budgeting Process

– Various methods of Capital Budgeting.

– Risk Evaluation and Sensitivity Analysis

– Simulation for Risk Evaluation

"Capital Budgeting is long term planning for making and financing proposed capital outlays"

– Charles T. Horngreen

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TIME VALUE OF MONEY

Introduction

One of the most fundamental concepts in finance is that money has a "time value." That is to say that money in hand today is worth more than money that is expected to be received in the future. The reason is straightforward: A rupee that you receive today can be invested in such a way that you will have more than a rupee at some future time.

Suppose "A" win a Prize in a contest and he has got two options.

    A. Receive ₹10,000 now

    OR

    B. Receive ₹10,000 in three years

Which option should "A" choose?

If A is a rational person he would choose to receive ₹10,000 now. After all, three years is a long time to wait. Why would any rational person defer payment into the future when he or she could have the same amount of money now? For most of us, taking the money in the present is just natural. So at the most basic level, the time value of money demonstrates the concept of time value:

   "A rupee today is worth more than a rupee tomorrow."

The time value of money serves as the foundation for all other notions in finance. It impacts business finance, consumer finance, and government finance. Time value of money results from the concept of interest.

Why ₹ 1 received today is worth more than ₹ 1 received after a time period

There are four primary reasons why a rupees to be received in the future is worth less than a rupees to be received immediately.

1. Presence of positive rates of inflation which reduce the purchasing power of rupees through time. Suppose rate of petrol about one year back was ₹ 65 per litre and now it is ₹ 72 per litre. This may be observed that in this example purchase power of rupee in terms of petrol purchased has decreased from 1/65 to 1/72.

2. A rupee today is worth more today than in the future because of the opportunity cost of lost earnings — that is, it could have been invested and earned a return between today and a point in time in the future.

3. Thirdly, all future values are in some sense only *promises,* and contain some uncertainty about their occurrence. As a result of the risk of default or non-performance of an investment, a rupee in hand today is worth more than an expected rupee in the future.

4. Finally, human preferences typically involve impatience, or the preference to consume goods and services now rather than in the future.

Use of Time Value of Money

Some standard calculations based on the time value of money are:

Present Value: Present value refers to the current worth of a future sum of money or stream of cash flows given a specified rate of return. Present Value of a cash flow is calculated on the basis of formula as given below

$$PV = \text{Cash Flow}/ (1+r)^t$$

Here r refers to required rate of return and t refers to the time period.

Example

Find Present Value of ₹ 80,000 to be received after five years when required rate of return is 10%

Present Value = 80000/ $(1+0.10)^5$

$\qquad$ = ₹ 49,674

Assume in the same example, the rate of return is 15%,

Present Value will be $\quad$ = 80000/ $(1+0.15)^5$

$\qquad$ = ₹ 39,774

The above calculation shows, higher the discount rate, the lower the present value of the future cash flows.

Future Value of a lump sum

Future value of a lump sum refers to the value after a certain period of time at the given rate of interest.

It may be calculated by using the following formula

$FV_t = CF_0 * (1+r)^t$ *OR* $FV_t = PV * (1+r)^t$

Where FV_t = Future Value after a period t

r = Rate of return

PV= Present Value

Example. Find present value of maturity value of ₹ 10,000 which has been given on 15% interest for five years while required rate of return is 10%.

FV of ₹ 10,000 @ 15% after five years = ₹ 10,000 $(1+0.15)^5$ = ₹ 20,113.57

Present Value of ₹ 20,113.57 which is to be received after 5 years = ₹20,113.57/ $(1+0.10)^5$ = ₹ 12,488.94

Present Value of a Lump Sum

Present value of a future cash flow (inflow or outflow) is the amount of current cash that is of equivalent value to the decision maker. Discounting is used to determine the present values of series of future cash flows. The compound interest rate used for discounting cash flows is also called the discount rate.

The present values can be worked out for any combination of number of years and interest rate. The following formula can be used to calculate the present value of a lump sum to be received after some future periods:

$$PV = \frac{F_n}{(1+i)^n} = F_n[(1+i)^{-n}]$$

The term in parenthesis i.e. $(1+i)^{-n}$ is the discount factor or present value factor (PVF), and it is always less than 1 for positive I, indicating that a future amount has a smaller present value. We can rewrite the above equation as under :

Present value = Future value × Present value factor of Rs. 1

$PV = F_n × PVF_{n,i}$

$PVF_{n,i,}$ is the present value factor for n periods at i rate of interest.

Annuity

An annuity is a stream of regular periodic payment made or received for a specified period of time. In an ordinary annuity, payments or receipts occur at the end of each period.

Future Value of an Annuity: Expressed algebraically, FVA_n is defined as future (compound) value of an annuity, R the periodic receipt (or payment), and n is the length of the annuity and the formula for FVA_n is:-

$FVA_n = R(I + i)^{n-1} + R(1+i)^{n-2} + \ldots\ldots + R(I + i)^1 + R(1+i)^0$

As we can see, FVA_n is simply equal to the periodic receipt (R) times the "sum of the future value interest factors at i percent for time periods 0 to n-1. As a shortcut, If R be the periodic payments, the amount FVA_n of the annuity is given by:

$$FVA_n = R\frac{(1+i)^n - 1}{i}$$

OR

$$FVA_n = R(FVIFAi,n)$$

Where $FVIFA_{i,n}$ stands for the future interest factor of an annuity at i% for n periods. Table for FVA_n at different rates of interest may be used conveniently, if available, to work out problems.

The value of expression $\dfrac{(1+i)^n - 1}{i}$ or $FVIFA_{i,n}$ can easily be found through financial tables.

Example: Find the amount of an annuity if payment of ₹ 5,000 is made annually for 7 years at interest rate of 14% compounded annually.

Solution

Here R = ₹ 5,000, n = 7, i = 0.14

FVA = ₹ 5000 x FVIFA (7, 0.14) = 5000 X 10.7304915 = ₹ 53,650.25

Example: A person is required to pay four equal annual payments of Rs.5,000 each in his deposit account that pays 8% interest per year. Find out the future value of annuity at the end of 4 years.

Solution

$$FVA = R\left[\frac{(1+i)^n - 1}{i}\right]$$

= ₹ 5,000 (4.507) = ₹ 22,535

Example: ₹ 2,000 is invested at the end of each month in an account paying interest 6% per year compounded monthly. What is the amount of this annuity after 10th payment? Given that $(1.005)^{10} = 1.0511$

Solution:

We have

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

'i' being the interest rate (in decimal) per payment period over n payment period.

Here, i = .06/12 = .005, n = 10.

Required amount is given by A = P.A (10, .005) = 2000 x 10.22 = ₹ 20,440.

Present Value of an Annuity: Sometimes instead of a single cash flow the cash flows of the same amount is received for a number of years. The present value of an annuity may be expressed as follows:

$$PVA_n = \frac{R}{(1+i)^1} + \frac{R}{(1+i)^2} + \ldots \frac{R}{(1+i)^{n-1}} + \frac{R}{(1+i)^n}$$

$$= R\left(\frac{1}{(1+i)^1} + \frac{1}{(1+i)^2} + \ldots \frac{1}{(1+i)^{n-1}} + \frac{1}{(1+i)^n}\right)$$

$$= R(PVIF_{i,1} + PVIF_{i,2} + PVIF_{i,3} + \ldots + PVIF_{i,n})$$

$$= R(PVIF_{i,n})$$

Where,

PVA_n =Present value of annuity which has duration of n years

R= Constant periodic flow

i=Discount rate and,

$(PVIF_{i, n})$ =Present value interest factor of an (ordinary) annuity at i percent for n periods.

Example: Find out the present value of a 4 year annuity of ₹ 20,000 discounted at 10 per cent.

Solution

P VA = Amount of annuity × Present value (r, n) Now, i = 10%, N = 4 years

$$= ₹\ 20,000\left[\frac{(1+0.1)^4 - 1}{0.1(1+0.1)^4}\right]$$

= ₹ 20,000 X 3.170

= ₹ 63,400

Example: Determine the present value of ₹ 700 each paid at the end of each of the next six years. Assume an 8 per cent of interest.

Solution

As the present value of an annuity of ₹ 7000 has to be computed. The present value factor of an annuity of Re. 1 at 8 per cent for 6 years is 4.623. Therefore, the present value of an annuity of ₹ 7000 will be: 4.623 × 7,000 = ₹ 32,361

Perpetuity

Perpetuity is an annuity in which the periodic payments or receipts begin on a fixed date and continue indefinitely or perpetually. Fixed coupon payments on permanently invested (irredeemable) sums of money are prime examples of perpetuities.

The formula for evaluating perpetuity is relatively straight forward. Two points which are important to understand in this regard are:

a. The value of the perpetuity is finite because receipts that are anticipated far in the future have extremely low present value (today's value of the future cash flows).

b. Additionally, because the principal is never repaid, there is no present value for the principal.

c. Therefore the price of perpetuity is simply the coupon amount over the appropriate discount rate or yield.

Calculation of Multi Period Perpetuity: The formula for determining the present value of multi-period perpetuity is as follows:

$$PVA\infty = \frac{R}{(1+i)^1} + \frac{R}{(1+i)^2} + \frac{R}{(1+i)^3} + ... + \frac{R}{(1+i)^\infty} = \sum_{n=1}^{\infty} \frac{R}{(1+i)^n} = \frac{R}{i}$$

Where

R = the payment or receipt each period

i = the interest rate per payment or receipt period

Example: Uday wants to retire and receive Rs. 3,000 a month. He wants to pass this monthly payment to future generations after his death. He can earn an interest of 8% compounded annually. How much will he need to set aside to achieve his perpetuity goal?

Solution

R = ₹ 3,000

i = 0.08/12 or 0.00667

Substituting these values in the above formula, we get

PVA = ₹ 3,000
        0.00667

     = ₹ 4,49,775

If he wanted the payments to start today, he must increase the size of the funds to handle the first payment. This is achieved by depositing ₹ 4,52,775 (PV of normal perpetuity + perpetuity received in the beginning = (₹ 4,49,775 + ₹ 3,000) which provides the immediate payment of ₹ 3,000 and leaves ₹ 4,49,775 in the fund to provide the future ₹ 3,000 payments.

Calculation of Growing Perpetuity: A stream of cash flows that grows at a constant rate forever is known as growing perpetuity.

The formula for determining the present value of growing perpetuity is as follows:

$$PVA = \frac{R}{(1+i)^1} + \frac{R(1+g)}{(1+i)^2} + \frac{R(1+g)^2}{(1+i)^3} + ... + \frac{R(1+g)^\infty}{(1+i)^\infty} = \sum_{n=1}^{\infty} \frac{R(1+g)^{n-1}}{(1+i)^n} = \frac{R}{i-g}$$

Example: Assuming that the discount rate is 7% per annum, how much would you pay to receive ₹ 500, growing at 5%, annually, forever?

Solution

$$PVA = \frac{R}{i-g}$$

$$= \frac{₹ 500}{.07 - .05} = ₹ 25,000$$

Sinking Fund

It is the fund which is created for a specified purpose by way of sequence of periodic payments over a time period at a specified interest rate.

Size of the sinking fund deposit is computed by using the formula i.e. FVA=R[FVIFA$_{(i,n)}$, where FVA is the amount to be saved, R, the periodic payment, n, the payment period.

Example: ABCL Company has issued debentures of ₹ 50 lakhs to be repaid after 7 years. How much should the company invest in a sinking fund earning 12 percent per annum in order to be able to repay debentures?

Solution

A (CVFA $_{r,\,t}$) = 50,00,000

A (CVFA $_{0.12,\,7}$) = 50,00,000

$$A = \frac{50,00,000}{CVFA_{0.12,7}}$$

$$A = \frac{50,00,000}{10.089} = ₹\ 4.96\ \text{lakh}$$

Net Present Value

Net Present Value is the difference between the sum total of present values of all the future cash inflows and outflows:

Algebraically:

$$NPV = \frac{R_1}{(1+k)^1} + \frac{R_2}{(1+k)^2} + \frac{R_n}{(1+k)^n} + \frac{W_n}{(1+k)^n} + \frac{S_n}{(1+k)^n} - C$$

If cash outflow is also expected to occur at some time other than initial investment (non-conventional cash flows) then formula would be

$$NPV = \left[\frac{R_1}{(1+k)^1} + ... + \frac{R_n}{(1+k)^n} + \frac{S_n}{(1+k)^n} + \frac{W_n}{(1+k)^n} \right] - \left[C_0 + \frac{C_1}{(1+k)^t} + ... + \frac{C_n}{(1+k)^n} \right]$$

NPV   = Net Present Value

R = Cash inflow at different time period

k = Rate of discount or cost capital

t = 1 = first period in the sum

n = The last period in the sum

S$_n$ = Salvage value in period n

W$_n$ = Working capital in period n

C = Cost of investment plus Working Capital

Example

A Company has invested ₹ 8,00,000 in a business and expects a series of cash flow as per given details

Year	Cash Inflow (₹)	Additional Cash Outflow (₹)
1	2,50,000	Nil
2	4,20,000	1,05,000
3	3,50,000	Nil
4	2,50,000	10,000

At the end of fourth year company made a sale of scrap for ₹ 2,40,000 and realized ₹ 30,000 from working capital. Find Net Present Value (NPV) if required rate of return is 10%

Present Value of Cash Inflows = ₹ {(2,50,000/ $(1+0.10)^1$+ 4,20,000/$(1+0.10)^2$ + 3,50,000/$(1+0.10)^3$ + 2,50,000/$(1+0.10)^4$ + 2,40,000$(1+0.10)^4$+ 30,000$(1+0.10)^4$} = ₹ 11,92,507

Present Value of Cash Outflows = ₹ {(8,00,000 + 1,05,000 / $(1+0.10)^2$ + 10,000$(1+0.10)^4$} = ₹ 8,93,607

Net Present Value = Present Value of Cash Inflows - Present value of Cash Outflows

= ₹ 11,92,507- ₹ 8,93,507= ₹ 2,98,900

CAPITAL BUDGETING

DEFINITIONS

According to the definition of **Charles T. Horngreen**, "Capital budgeting is a long-term planning for making and financing proposed capital outlays".

According to the definition of **G. C. Philippatos**, "Capital budgeting is concerned with the allocation of the firms source financial resources among the available opportunities".

The consideration of investment opportunities involves the comparison of the expected future, streams of earnings from a project with the immediate and subsequent streams of earning from a project, with the immediate and subsequent streams of expenditure".

According to the definition of **Richard** and **Green law**, "Capital budgeting is acquiring inputs with long-term return".

According to the definition of **Lyrich**, "Capital budgeting consists of planning development of available capital for the purpose of maximizing the long-term profitability of the concern".

INTRODUCTION

The word Capital refers to be the total investment of a company of firm in money, tangible and intangible assets, whereas budgeting as defined by **Rowland** and **William** "is the art of building budgets. Budgets are the blue print of a plan and action expressed in quantities and manners".

The examples of capital expenditure includes :

1. Purchase of fixed assets such as land and building, plant and machinery, good will, etc.

2. The expenditure relating to addition, expansion, improvement and alteration to the fixed assets.

3. The replacement of fixed assets.

4. Research and development project.

CAPITAL BUDGETING- PLANNING AND CONTROL OF CAPITAL EXPENSES

In modern times, the efficient allocation of capital resources is a most crucial function of financial management. This function involves organisation's decision to invest its resources in long-term assets like land, building

facilities, equipment, vehicles, etc. All these assets are extremely important to the firm because, in general, all the organisational profits are derived from the use of its capital in investment in assets which represent a very large commitment of financial resources, and these funds usually remain invested over a long period of time.

The future development of a firm hinges on the capital investment projects, the replacement of existing capital assets, and/or the decision to abandon previously accepted undertakings which turns out to be less attractive to the organisation than was originally thought, and divesting the resources to the contemplation of new ideas and planning. For new projects such as investment decisions of a firm fall within the definition of capital budgeting or capital expenditure decisions.

Capital budgeting refers to long-term planning for proposed capital outlays and their financing. Thus, it includes both raising of long-term funds as well as their utilisation. It may, thus, be defined as the "firm's formal process for acquisition and investment of capital." To be more precise, capital budgeting decision may be defined as "the firms' decision to invest its current fund more efficiently in long-term activities in anticipation of an expected flow of future benefit over a series of years." The long-term activities are those activities which affect firms operation beyond the one year period. Capital budgeting is a many sided activity. It contains searching for new and more profitable investment proposals, investigating, engineering and marketing considerations to predict the consequences of accepting the investment and making economic analaysis to determine the profit potential of investment proposal. The basic feature of capital budgeting decisions are:

(1) current funds are exchanged for future benefits;

(2) there is an investment in long-term activities; and

(3) the future benefits will occur to the firm over series of years.

NEED FOR CAPITAL INVESTMENT

This is the logical question and the answer to that is rather easy. The following factors give rise to the need for capital investments:

(a) Wear and tear of old equipments.

(b) Obsolescence.

(c) Variation in product demand necessitating change in volume of production.

(d) Product improvement requiring capital additions.

(e) Learning-curve effect.

(f) Expansion.

(g) Change of plant site.

(h) Diversification.

(i) Productivity improvement.

Some of these factors are self-explanatory. However, we add a few explanatory lines on a few of these factors. Obsolescence occurs when alternative methods of equipments for performing a function become available which are significantly better either in terms of quality of newness of the product or plant safety. In a high consumption economy like U.S.A. this problem is acute. In an economy like India, the problem of obsolescence is still rare. Only in certain investments for manufacturing export products (e.g. garments, jute goods, cotton textiles), this problem exists. Product improvements require changes in equipments and this problem is also not an important factor in influencing capital investment decisions in India, expecting changes special product qualities like radios, transistors, televisions etc. Learning curve consideration influences capital decisions in the sense that new equipments might be such as to cut down learning time and effect considerable saving on training expenses. For reasons such as expansion, new sources of raw materials, new markets, labour conditions, transportation or termination of a lease, an entire plant may have to be relocated. The cost of removing a plant is enormous and management may decide to undertake modernisation through a complete new layout and

equipment purchases. Many progressive companies seek out new markets and new products. They may even like to acquire another company for purpose of diversification. All these require major capital investments. In some industries, wage escalation may force management to acquire labour-saving equipment machinery to effect saving on wages and at the same time improve productivity.

INVESTMENT DECISIONS – MANAGEMENT PERSPECTIVE

Usually, in investment problems, much attention is focussed on how to choose among alternative projects, so that one is tempted to believe that this constitutes the only problem in capital decisions. However, if we examine carefully, it is easy to realise that choice among alternatives is only one facet *albeit* the important facet of the problem from the top management perspective. The other facets are implementation and control as applied to all phases of capital investment, and these are important aspects because in the ultimate analysis, the top management is accountable to Board of directors and owners for the success or failure of investment plans.

Let us examine in brief how investment decisions are influenced by management perspective. Obviously, we have to start with the company objectives which provide the broad guidelines to policies, plans and operations. A possible objective might be to maximise return on investment in which case the management might seek to minimise investment by selecting only a few capital projects that yield the highest returns. On the other hand, the objective may be to maximise sales volume and in that case all capital investment that yield a net profit (may be small) would be made without undue concern. If the management is guided by a growth objective, expansionary investment involving high capital cost would be undertaken.

Within the board company objectives, top management also reviews the competitive position of the company and if the competition is sharper, the management looks out continuously to evaluate and upgrade the equipments to achieve greater efficiency at least cost. In big companies, the management sets out policies to guide lower levels of management in the search for evaluation of and initiation of capital projects.

Top management has also to keep watch on company funds which finance investments. It cannot allow funds to lie idle just because suitable project is not at hand. The cost of idle funds is substantial and hence the need for looking out for suitable investment opportunities. If such opportunities exist then the management must spare funds and if existing funds are inadequate it should raise funds externally. It should be remembered that if there is no profitable investment opportunity with in the company, the dividend policy of the company should be liberal. Funds for capital investment must be arranged on a long-term basis otherwise borrowings short and investing long can lead to lack of liquidity and consequent troubles. The major sources of long-term funds are long-term borrowing, new equity capital (sale of stock) and retained earnings. Sometimes, a change in the inventory system also releases funds by effecting reduction in inventory to be carried. The selection of the right source of funds is again influenced by management's own belief and value judgement and such other factors like outsider control, dilution of equity, price earnings ratio, cost of funds etc.

And finally, the top management is usually concerned with implementation and control aspects of investment projects. Specific responsibilities are to be assigned to specific individuals or cells and progress reports have to be carefully studied. In big projects, improved methods like programme evaluation review technique (PERT) or critical path method (CPM) may be used.

IMPORTANCE OF CAPITAL BUDGETING

Capital budgeting decisions are of paramount importance in financial decision. So it needs special care on account of the following reasons:

   (1) Long-term Implications: A capital budgeting decision has its effect over a long time span and inevitably affects the company's future cost structure and growth. A wrong decision can prove disastrous for the long-term survival of firm. It leads unwanted expansion of assets, which results in heavy operating cost to the firm. On the other hand, lack of investment in asset would influence the competitive position of the firm. So the capital budgeting decisions determine the future destiny of the company.

(2) *Involvement of large amount of funds:* Capital budgeting decisions need substantial amount of capital outlay. This underlines the need for thoughtful, wise and correct decisions as an incorrect decision would not only result in losses but also prevent the firm from earning profit from other investments which could not be undertaken.

(3) *Irreversible decisions:* Capital budgeting decisions in most of the cases are irreversible because it is difficult to find a market for such assets. The only way out will be to scrap the capital assets so acquired and incur heavy losses.

(4) *Risk and uncertainty:* Capital budgeting decision is surrounded by great number of uncertainties. Investment is present and investment is future. The future is uncertain and full of risks. Longer the period of project, greater may be the risk and uncertainty. The estimates about cost, revenues and profits may not come true.

(5) *Difficult to make:* Capital budgeting decision making is a difficult and complicated exercise for the management. These decisions require an over all assessment of future events which are uncertain. It is really a marathon job to estimate the future benefits and cost correctly in quantitative terms subject to the uncertainties caused by economic-political social and technological factors.

FACTORS INFLUENCING INVESTMENT DECISION

We shall now study the factors, which have specific or general relevance to capital investment decisions. We have realised already that capital investment decisions are not governed by one or two factors, because the investment problem is not simply one of replacing an old equipment by a new one, but is concerned with replacing an existing process in a system with another process which makes the entire system more effective. We discuss below some of the relevant factors that affects investment decisions:

(i) *Management outlook:* If the management is progressive and has an aggressive marketing and growth outlook, it will encourage innovation and favour capital proposals which ensure better productivity or quality or both. In some industries where the product being manufactured is a simple standardised one, innovation is difficult and management would be extremely cost conscious. In contrast, in industries such as chemicals and electronics, a firm cannot survive, if it follows a policy of 'make-do' with its existing equipment. The management has to be progressive and innovation must be encouraged in such cases.

(ii) *Competitor's Strategy:* The competitors' strategy regarding capital investment exerts significant influence on the investment decision of a company. If competitors continue to install more equipment and succeed in turning out better products, the existence of the company not following suit would be seriously threatened. This reaction to a rival's policy regarding capital investment often forces decision on a company.

(iii) *Opportunities created by technological change:* Technological changes create new equipment which may represent a major change in process, so that there emerges the need for re-evaluation of existing capital equipment in a company. Such changes may justify new investments. Sometimes the old equipment which has to be replaced by new equipment as a result of technical innovation may be downgraded to some other applications. A proper evaluation of this aspect is necessary, but is often not given due consideration. In this connection, we may note that the cost of new equipment is a major factor in investment decisions. However, the management should think in terms of incremental cost, not the full accounting cost of the new equipment because cost of new equipment is partly offset by the salvage value of the replaced equipment. In such analysis an index called the disposal ratio becomes relevant.

$$\text{Disposal ratio} = \frac{\text{Salvage value / Alternative use value}}{\text{Installed cost}}$$

(iv) Market forecast: Both short and long run market forecasts are influential factors in capital investment decisions. In order to participate in long-run forecast for market potential critical decisions on capital investment have to be taken.

(v) Fiscal incentives: Tax concessions either on new investment incomes or investment allowance allowed on new investment decisions, the method for allowing depreciation deduction allowance also influence new investment decisions.

(vi) Cash flow Budget: The analysis of cash-flow budget which shows the flow of funds into and out of the company, may affect capital investment decision in two ways. First, the analysis may indicate that a company may acquire necessary cash to purchase the equipment not immediately but after say, one year, or it may show that the purchase of capital assets now may generate the demand for major capital additions after two years and such expenditure might clash with anticipated other expenditures which cannot be postponed. Secondly, the cash flow budget shows the timing of cash flows for alternative investments and thus help management in selecting the desired investment project.

(vii) Non-economic factors: A new equipment may make the workshop a pleasant place and permit more socialising on the job. The effect would be reduced absenteeism and increased productivity. It may be difficult to evaluate the benefits in monetary terms and as such we call this as non-economic factor. Let us take one more example. Suppose the installation of a new machine ensures greater safety in operation. It is difficult to measure the resulting monetary saving through avoidance of an unknown number of injuries. Even then, these factors give tangible results and do influence investment decisions.

RATIONALE OF CAPITAL BUDGETING DECISIONS

The rationale behind the capital budgeting decisions is efficiency. A firm has to continuously invest in new plant or machinery for expansion of its operations or replace worn out machinery for maintaining and improving efficiency. The main objective of the firm is to maximise profit either by way of increased revenue or by cost reduction. Broadly, there are two types of capital budgeting decisions which expand revenue or reduce cost.

1. **Investment decisions affecting revenue:** It includes all those investment decisions which are expected to bring an additional revenue by raising the size of firm's total revenue. It is possible either by expansion of present operations or the development of new product in line. In both the cases fixed assets are required.

2. **Investment decisions reducing costs:** It includes all those decisions of the firms which reduces the total costs and leads to increase in its total earnings i.e. when an asset is worn out or becomes outdated, the firm has to decide whether to continue with it or replace it by new machine. For this, the firm evaluates the benefit in the form of reduction in operating costs and outlays that would be needed to replace old machine by new one. A firm will replace an asset only when it finds it beneficial to do so. The above decision could be followed decisions following alternative courses: i.e. Tactical investment decisions to strategic investment decisions, as briefly defined below.

3. **Tactical investment decisions:** It includes those investment decisions which generally involves a relatively small amount of funds and does not constitute a major departure from what the firm has been doing in the past.

4. **Strategic investment decisions:** Such decisions involve large sum of money and envisage major departure from what the company has been doing in the past. Acceptance of strategic investment will involve significant change in the company's expected profits and the risk to which these profits will be subject. These changes are likely to lead stock-holders and creditors to revise their evaluation of the company.

KINDS OF CAPITAL BUDGETING DECISIONS

Generally the business firms are confronted with three types of capital budgeting decisions (i) the accept-reject decisions; (ii) mutually exclusive decisions; and (iii) capital rationing decisions.

(i) Accept-reject decisions: Business firm is confronted with alternative investment proposals. If the proposal is accepted, the firm incur the investment and not otherwise. Broadly, all those investment proposals which yield a rate of return greater than cost of capital are accepted and the others are rejected. Under this criterion, all the independent prospects are accepted.

(ii) Mutually exclusive decisions: It includes all those projects which compete with each other in a way that acceptance of one precludes the acceptance of other or others. Thus, some technique has to be used for selecting the best among all and eliminates other alternatives.

(iii) Capital rationing decisions: Capital budgeting decision is a simple process in those firms where fund is not the constraint, but in majority of the cases, firms have fixed capital budget. So large number of projects compete for these limited budget. So the firm ration them in a manner so as to maximise the long run returns. Thus, capital rationing refers to the situations where the firm have more acceptable investments requiring greater amount of finance than is available with the firm. It is concerned with the selection of a group of investment out of many investment proposals ranked in the descending order of the rate of return.

PLANNING OF CAPITAL EXPENDITURE

From the above discussion, it is evident that capital budgeting is concerned with activities ranging from planning the availability, allocation and control of expenditure of long-term as well as short-term investment funds.

Planning of capital expenditure could be done to finance the capital expenditure plans of the company for short-term or long-term periods and hence the long-term plan budget and short-term plan budget.

A. As regards long-term plan budget, the period covered under the planning is three to five or more years. The planning for such expenditure assumes a composite form involving all aspects of economic forecasts for the outlook of entire industry in which the company performs with its unit and forecast for the company with probable or expected coverage of market share. On the basis of this forecast, plant managers estimate their prospective capital expenditure, the marketing managers plan their market shares, the personnel managers assess the requirements for manpower and technical hands to achieve targeted production results, and the finance mangers plans, for the funds to be made available for investment taking into consideration the above requirements. The long-range capital budget is continually revised with changing economic conditions, the marketing environment, structure of wages and the inflationary pressures in the economy. It is flexible in nature and oriented towards a long-range growth planning for the company.

B. As regards short-period Capital budgeting, involving short-range planning for funds, it covers expenditure for a short duration involving the period covered within one or two years. It does not involve large capital expenditure but covers temporary need for funds for different departments within the company depending upon the degree of urgency, profitability and savings to be achieved with reference to the capital costs to be incurred. Short run capital expenditure plans get converted into long-term plans of capital expenditure. Short-term capital expenditure plan is known as operating budget and is concerned with revenues and expenses related to firms daily operations.

Significance of planning for capital expenditure is derived only with major investment proposals and the use of funds over a long period. The most important factor affecting the planning horizon is the rate of change in technology in the industry. The advancement in technology may warrant capital investment for short as well as long period depending upon the changing pace of technology and technological obsolescence: long-term plan, however, helps the company to analyse its need and directions into the distant future involving a technological change.

CAPITAL EXPENDITURE CONTROL

Planning and control are inter-linked and consecutive steps for the successful implementation of any programme. Planning done for incurring capital expenditure is followed by control devices to assess the divergencies between

the expected and achieved results. Control for capital expenditure is expressed keeping in view the above objective.

It may be recalled that capital expenditure is classified into three main forms viz.:

(1) expenditure made to reduce costs;

(2) expenditure made to increase revenue;

(3) expenditure which is justified on non-economic grounds.

With exercise control over capital expenditure in any of the above categories, the capital expenditure analysis should concentrate on three types of outlays viz.: (1) Major projects, (2) Routine expenditure, and (3) Replacement.

As regards major projects, strategic investment may be made for expansion of productive capacity or achieving product innovation or preparing barriers against capital fluctuations. In the second type of outlay, routine expenditure may be working condition improvement, maintenance expenditure, competition oriented expenditure etc. Thirdly, replacement need may arise to avoid capital wastage for existing equipment to check its disposal value or it may be obsolescence replacement. In all circumstances, proper attention is to be devoted in analysing the need for the capital expenditure so that it would be curtailed to the minimum required.

One important aspect of control device is to match the demand schedule for the capital for the company and the supply of capital from different sources. Demand comes for capital from all departments and it is at this level control could be exercised to keep the demand at the bare minimum required for the objective inherent in capital investment decisions. Supply of capital, on the other hand, is a scarce commodity and the company has to incur expenditure for availing it. This necessitates for the finance manager to exercise economy in capital expenditure so that optimum benefit could be obtained with the use of scarce capital sources. This establishes the need for capital rationing to impose constraints on capital expenditure under prevailing market conditions and place self-imposed constraints to check the funds being raised from outside agencies like borrowings. Thus, the device of capital rationing is adopted to control capital expenditure.

CAPITAL BUDGETING PROCESS

It is a complex process which may be divided in the following phases:

I. Identification of Investment Opportunities: Mere identification or possible alternatives is not all that is

required in any search for investment proposals. The best proposal needs to be discovered and considered. Capital expenditure proposals should come from different segments of the enterprise. Personnel working at different levels in the organisation should be encouraged to participate in the discovery of best available proposals for capital outlays within the limits of their authority, knowledge and experience. It is better if management establishes well-defined guidelines for searching investment proposals so that no useful idea remains uncommunicated and no redundant proposal pass through the processing stage.

Proposals regarding capital expenditure do not originate at the level of the controller or the budget committee. The requirements for fixed-assets expenditure are forwarded by the managers of different operating units or departments. It is, however, better if such proposals are accompanied by commercial and technical assumptions on which these are based and duly supported with details relating to the following matters;

   (a) Market potential for the product and yearly sales forecasts for different years.

   (b) Raw material requirements and their supply position.

   (c) Technical details relating to physical facilities and flow diagrams.

   (d) Financial implications.

Capital expenditure proposals may also originate at the top management level of the company. The Chief Executive may carry out survey relating to physical facilities, new market, development of new products, stage of technology and the like. Such efforts may lead to discovery of certain useful alternatives which should be screened and evaluated in the same way as originating at lower levels.

II. Assembling Investment Purpose: Economic performance like return on investment as calculated in a number of ways under different methods furnishes the most important criterion used for evaluating fixed assets investment proposals. But here also the technique to be used for evaluating economic performance should be clearly defined and communicated. There are also occasions when non-economic criteria like competition, risk, legal requirements, and social responsibilities become the over-riding considerations in evaluating different investment proposals. But it does not mean that criteria once established holds good under all circumstances and for all times to come. Relevance and reliability of criteria should be continuously reviewed.

All those proposals which are conflicting and do not deserve further consideration are rejected so that only useful alternatives are analysed in detail. Economic evaluation generally plays an important role in the screening process. Along with screening, there is also the need for blending together and unifying different capital projects under the total capital expenditure programme. In this way, conflicting and duplicate proposals would be eliminated and taken together all of them contribute to the accomplishment of some higher objectives. Co-ordination will be greatly facilitated in different proposals for capital outlays are related to each other.

II. Decision Making: It would be useful if different proposals are properly classified and diagnosed before their evaluation. Investment proposals may be classified on the basis of the degree of risk involved or the extent to which they are postponable. In terms of reasons for the expenditure, the proposals may be classified whether they result in replacements, betterments or additions to assets. In the process, certain mutually exclusive and conflicting proposals will be eliminated. If the firm enjoys sufficient resources to finance all the remaining projects which are profitable, ranking them in order of preference is not a serious problem. But in reality, the number of proposals are generally larger than the amount of funds available with the firm, and the controller wants to recommend only the most desirable of them. As a matter of fact, some of the good proposals are also rejected even when they are profitable.

IV. Budgeting Capital Expenditure: Capital budgeting refers to the process of planning the investment of funds in long-term assets of the enterprise. Its purpose is to help management control capital expenditure. With the help of capital budgeting, management is able not only to reject poor investment decisions but also to select, in order of priority the projects which are most profitable and consistent with the objectives and targets set.

Additions, replacement and betterments require additional funds to be committed to long-term assets, and are

thus included in the capital budget which is typically prepared for a year. Capital budget is a snapshot of the plan and projects for the coming year for which approval is sought. Capital budget should be flexible so as to eliminate some of the projects already included but allow addition of new projects that deserve consideration. Inclusion of certain projects in the capital budget and its approval by the management does not mean that actual expenditure has been authorised. Rather, it offers an opportunity to look at each project even from the view point of the total organisation. There is also the need of reconcile capital budget with other budgeting activities of the enterprise for example, cash revenue and expense budgets.

V. Implementation and Controlling of Projects: Another important aspect of planning and control of capital outlays is to devise a procedure to exercise control over projects while in process. Controlling of projects in process generally falls within the purview of the financial manager. He is concerned with laying down the procedure to ensure that completion satisfies the norms with respect to cost, time and purpose of expenditure. Variations from approved plans together with reasons should promptly be reported to responsible authorities for deviations. The observations and up-to-date progress report provide sufficient information to the management about the exact stage and status of all major projects.

VI. Follow-up and Performance Report: The project manager or the manager originating the investment proposal, is responsible for submitting its completion report on the basis of which management normally proceeds to carry out the post completion audit. Follow up implies comparing and reporting actual results with the projected result of investment proposal so as to evaluate the performance and outcome in proper perspective. It is required, however, that procedures and format of follow-up should be clearly defined and communicated. Frequency and duration of audit should also be clearly indicated. Audit personnel should also be provided with broad guidelines as to the extent of economic and non-economic evaluation they are expected to carry out.

A project below a certain size may be audited locally by the staff of the departmental manager. But projects involving a number of departments or above a certain size should be audited by a certain group. The latter approach claims uniformity, efficiency and detailed review of the project as its main advantages. The post-completion audit helps managemnt in a number of ways:

    (a) to validate the existing capital expenditure, planning and control procedures and methods;

    (b) to evaluate results;

    (c) to highlight reasons for projects failure; and

    (d) to judge soundness of proposals originating at different levels in the organisaiton.

INVESTMENT CRITERIA

A sound and systematic investment criteria is absolutely necessary to appraise the economic worth of an investment proposal. It is because of the fact that huge sums of scarce financial and other resources are to be sunk almost irrevocably within a limited span of time for which returns and rewards are uncertain and expected to accrue over a long period of time in the future. A sound investment criteria at least should provide the following:

    1. a means of distinguishing between acceptable and non-acceptable projects;

    2. ranking of projects in order of their desirability;

    3. choice among several alternatives;

    4. a criteria which is applicable to any conceivable investment project independent of others;

    5. recognising the fact that the bigger benefits are preferable to smaller one and early benefits are preferable to later benefits;

    6. helping to choose among mutually exclusive projects, one which maximises the shareholders wealth.

CAPITAL BUDGETING TECHNIQUES

A wide variety of techniques are used for evaluating investment proposals. The most commonly used techniques are as follows:

Traditional or Non- discounted cash flow techniques

- Pay Back method
- Average Rate of Return (ARR) Method

Modern or Discounted cash flow techniques

- Net Present Value (NPV) Method
- Internal Rate of Return (IRR) Method
- Profitability Index (PI) or Benefit cost ratio (BC) Method
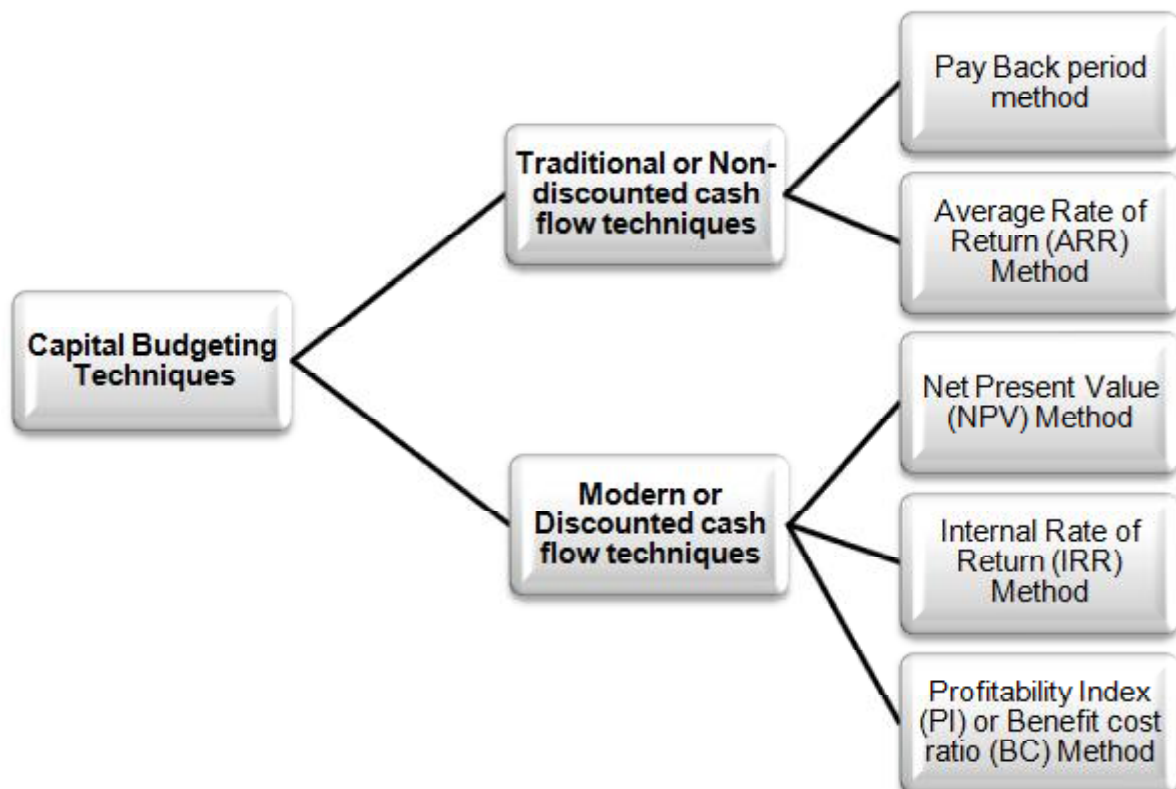
Every method is designated with some purpose in view and as such different methods are not equally useful to every firm and under all circumstances. However, proper understanding of these techniques will help the management to determine the most suitable technique to be used and thus make better investment decisions keeping in view the business situation, particular requirements of the firm and nature of investment proposals.

Traditional or Non- Discounted Cash Flow Techniques

As the name suggested, these techniques do not discount the cash flows to find out their present worth. There are two such techniques available i.e. (i) the Payback period method, and (ii) the Accounting rate of Return method. These are essentially rules of thumb that intuitively grapple with the trade-off between net investment and operating cash inflows. Both these traditional evaluation methods have been discussed on next page:

1. The Payback Period Method

This technique estimates the time required by the project to recover, through cash inflows, the firms initial outlay. Beginning with the project with the shortest payout period, different projects are arranged in order of time required to recapture their respective estimated initial outlays. The payback period for each investment proposal is compared with the maximum period acceptable to management and proposals are then ranked and selected in order of those having minimum payout period.

While estimating net cash inflows for each investment proposal, the following considerations should be borne in mind:

(i) Cash inflows should be estimated on incremental basis so that only the difference between cash inflows of the firm with and without the proposed investment project is considered.

(ii) Cash inflows for a project should be estimated on an after-tax basis.

(iii) Since non-cash expenses like depreciation do not involve any cash outflows, estimated cash inflows form a project should be adjusted for such items.

Let us consider an example. Say, a project requires ₹ 25,000 as initial investment, and it will generate an annual cash inflow of ₹ 5,000 for ten years then pay back period will be five years, calculated as follows:

$$\text{Pay back period} = \frac{\text{Initial Investment}}{\text{Annual cash inflows}}$$

$$= \frac{\text{Rs. } 25,000}{\text{Rs. } 5,000} = 5 \text{ years}$$

The annual cash inflow is calculated by taking into account the amount of net income on account of the asset (or project) before depreciation but after taxation.

Sometimes there are projects where the cash inflows are not uniform. In such a case cumulative cash inflows will be calculated and by interpolation exact payback period can be calculated.

For example if the project need an initial investment of ₹ 25,000 and the annual cash inflow for five years are ₹ 6,000, ₹ 9,000, ₹ 7,000, ₹ 6,000 and ₹ 4,000 respectively. The pay back period will be calculated as follows:

Year	Cash inflow ₹	Cumulative cash-inflow ₹
1.	6,000	6,000
2.	9,000	15,000
3.	7,000	22,000
4.	6,000	28,000
5.	4,000	32,000

It is evident form the above table that in 3 years ₹ 22,000 has been recovered and ₹ 3,000 is left of initial investment of ₹ 25,000. It indicates that payback period is between 3 to 4 years calculated as follows:

$$\text{Pay back period} = 3 \text{ years} + \frac{3,000}{6,000}$$

$$= 3.5 \text{ years.}$$

Decision Rule for Payback Method:

Accept the project if the payback period calculated for it is less than the maximum set by the management. Reject the project if it is otherwise. In case of multiple projects, the project with shorter payback period will be selected. In essence, payback period shows break-even point where cash inflows are equal to cash out flows.

Any inflows beyond this period are surplus inflows.

Advantages of Payback Period Method:

1. It is easy to understand and calculate, thus, investment proposals can be ranked quickly.

2. For a firm experiencing shortage of cash, the payback technique may be used with advantage to select investments involving minimum time to recapture the original investment.

3. The payback period method permits the firm to determine the length of time required to recapture through cash flows, the capital expenditure incurred on a given project and thus helps it to determine the degree of risk involved in each investment proposal.

4. This is ideal in deciding cash investment in a foreign country with volatile dynamic political position where a long-term projection of political stability is difficult.

5. This is, likewise, more preferred in case of industries where technological obsolescence comes within short period; say electronic industries.

6. This method is a good indicator of liquidity. If an entrepreneur is interested to have greater liquidity for the firm, he can choose the proposal, which will provide early cash inflows.

Disadvantages of Payback Method:

1. The payback method ignores the time value of money and treats all cash flows at par. Thus, projects A and B with the following cash flows are treated equally:

Years	Cash Flows	
	Project A ₹	**Project B ₹**
1.	5,000	2,000
2.	4,000	3,000
3.	3,000	4,000
4.	2,000	5,000
Investment	14,000	14,000

Although Pay Back period is 4 years for both the projects, project A is preferable since it recovers larger amount of money during the initial years.

The pay back method, therefore, ignores the fact that amount of cash received today is more important than the same amount received after say, 2 years.

2. The payback method does not consider cash flows and income that may be earned beyond the payout period so it is not good measure of profitability. It gives misleading results.

3. Moreover, it does not take into account the salvage or residual value, if any, of the long-term asset.

4. The payback technique ignores the cost of capital as the cut-off factor affecting selection of investment proposals.

Suitability of using Payback Period of Medhod :

Payback period method may be successfully applied in the following circumstances:

(i) where the firms suffers from liquidity problem and is interested in quick recovery of fund than profitability;

(ii) high external financing cost of the project;

(iii) for projects involving very uncertain return; and

(iv) political and economic pressures.

It may, therefore, be said that payback period is defined as the measure of project's liquidity and capital recovery rather than its profitability.

2. The Average Accounting Rate of Return (ARR) Method

This method is designated to consider the relative profitability of different capital investment proposals as the basis for ranking them – the fact neglected by the payout period technique. Since this method uses accounting rate of return, it is sometimes described as the financial statement method. Rate of return is calculated by dividing earnings by capital invested. The numerator, i.e., earnings can be interpreted in a number of ways. It might mean income after taxes and depreciation, income before taxes and depreciation, or income after taxes but before depreciation. Since both numerator and denominator carry different meanings. It is not surprising if one comes across a number of variations of the average rate of return method. However, the two common variations are:

(a) Average Rate of Return in Original Investment:

$$= \left(\frac{\text{Net earnings after Depreciation and Taxes}}{\text{No. of years project will last}} \right) \div \text{Original Investment}$$

(b) Average Rate of Return on Average Investment:

$$= \left(\frac{\text{Net earnings after Depreciation and Taxes}}{\text{No. of years project will last}} \right) \div \text{Average Investment}$$

Average investment is estimated by dividing the total of original investment and investment in the project at the end of its economic life by 2. The approach of dividing average annual after-tax earnings of the project by its original investment makes no attempt to incorporate the fact of gradual recovery of investment over time, hence tends to undertake the average rate of return. The average investment approach on the other hand, gives best result when original investment is evenly recovered over the economic life of the project which may not always be the case.

Decision Rule for Average of Rate of Return Method:

Normally, business firm determine rate of return. So accept the proposal if

ARR > Minimum rate of return (cut off rate)

and Reject the project if

ARR < Minimum rate of return (cut off rate)

In case of more than one project, where a choice has to be made, the different projects may be ranked in descending or ascending order of their rate of return. Project below the minimum rate will be dropped. In case of project yielding rate of return higher than minimum rate, it is obvious that project yielding a higher rate of return will be preferred to all.

Advantages of Average Rate of Return Method:

   (i) Earnings over the entire life of the project are considered.

   (ii) This method is easy to understand, simple to follow. Accounting concept of income after taxes is known to every student of accountancy.

Disadvantages of Average Rate of Return Method:

   (i) Like the payback technique, the average return on investment method also ignore the time value of money. Consideration to distribution of earnings over time is important. It is to be accepted that current income is more valuable than income received at a later date.

   (ii) The method ignores the shrinkage of original investment through the process of charging depreciation allowances against earnings. Even the assumption of regular recovery of capital over time as implied in average investment approach is not well founded.

(iii) The average rate of return on original investment approach cannot be applied to a situation where part of the investment is to be made after the beginning of the project.

(iv) Since ARR can be calculated by using different methods, so results are not the same. Thus, the identification of right method to compare with cut of rate is difficult to apply.

(v) Its major limitation is that ARR is based on accounting principle and not on cash flow analysis.

Suitability of using ARR Method:

If the project life is not long, then the method can be used to have a rough assessment of the internal rate of return. The present method is generally used as supplementary tool only.

Comparison between Average Rate of Return and Payback Method:

The average rate of return method and its comparison with payback method may be illustrated as follows:

Suppose there are two investment proposals A and B each with capital investment of ₹ 20,000 and depreciable life of 4 years. Assume that following are the estimated profit and cash inflows when annual straight line depreciation charged is ₹ 5,000.

Period	Project A		Project B	
	Book Profits ₹	Net Cash Inflows ₹	Book Profits ₹	Net Cash Inflows ₹
1.	4,000	9,000	1,000	6,000
2.	3,000	8,000	2,000	7,000
3.	2,000	7,000	3,000	8,000
4.	1,000	6,000	4,000	9,000
Total	10,000	30,000	10,000	30,000
Average rate of return on original investment	12.5%		12.5%	

If evaluated in terms of average rate of return method, the two projects are equally favourable. However, project A is more favourable than project B since it provides larger cash inflows in the initial period (i.e. Quicker Payback).

Discounted Cash Flow (DCF) Method

The traditional techniques like the Payback period or Accounting rate of return takes no account of the time value of the money. But money received today is much more valuable than the some money received later. Present inflationary conditions magnify the difference. This is the principal fact that modern analysis technique like Discounted Cash flow have incorporated to improve on the past procedures. Under this method, the cash flow discounted at the projects discount rate to the present time, is a present value. Analysis concentrate on the incremental cash flow of a project. Discounted cash flow method involves following steps:

1. Computation of cash flows i.e. both inflows and out flows (preferably after tax) over the life of the project.

2. Applying the discount factor to the cash flows.

3. Totalling discounted cash-inflows and comparing it with discounted cash outflows.

Broadly, there are three discounted cash flow methods for evaluating capital investment proposals i.e.

A. Net Present Value Method

    B. Internal Rate of Return Method

    C. Profitability Index or Benefit Cost (B/C) Ratio Method.

A. Net Present Value Method (NPV)

The net present value method is understood to be the best available method for evaluating the capital investment proposals. Under this method, the cash outflows and inflows associated with each project are ascertained first. Cash inflows are worked out by adding depreciation to profit after tax arising to each project. Since the cash outflows and inflows arise at different point of time and cannot be compared, so both are reduced to the present values at the rate of return acceptable to the management. The rate of return is either cost of capital of the firm or the opportunity cost of capital to be invested in the project. The assumption under this method remain that cash inflows are reinvested at the same discount rate.

In essence, Net Present Value is the difference between the sum total of present values of all the future cash inflows and outflows:

Algebrically:

$$NPV = \frac{R_1}{(1+k)^1} + \frac{R_2}{(1+k)^2} + ... + \frac{R_n}{(1+k)^n} + \frac{W_n}{(1+k)^n} + \frac{S_n}{(1+k)^n} - C$$

$$NPV = \sum_{t=1}^{n} \frac{R_t}{(1+k)^t} + \frac{S_n + W_n}{(1+k)^n} - C$$

If cash outflow is also expected to occur at some time other than initial investment (non-conventional cash flows) then formula would be

$$NPV = \left[\frac{R_1}{(1+k)^1} + ... + \frac{R_n}{(1+k)^n} + \frac{S_n}{(1+k)^n} + \frac{W_n}{(1+k)^n} \right] - \left[C_0 + \frac{C_1}{(1+k)^t} + ... + \frac{C_n}{(1+k)^n} \right]$$

$$NPV = \sum_{t=1}^{N} \frac{R_t}{(1+k)^t} + \frac{S_n + W_n}{(1+k)^n} - \sum_{t=1}^{N} \frac{C_t}{(1+k)^t} - C_0$$

NPV = Net Present Value

R=Cash inflow at different time period

k=Rate of discount or cost capital

t=1 = first period in the sum

n=The last period in the sum

S_n=Salvage value

W_n=Working capital

C=Cost of investment plus Working Capital

Decision Rule of using NPV Method:

If   NPV > Zero : Accept the project

        NPV < Zero : Reject the project

        NPV = Zero : Firm is indifferent to accept or reject the project.

Advantages of NPV Method:

   (i) Income over the entire life of the project is considered.

   (ii) The method takes into account time value of money.

   (iii) The method provides clear acceptance so interpretation is easy.

   (iv) When projects involves different amount of investment, the method may not provide satisfactory answers.

   (v) This method considers the firm objective of wealth maximisation concept for the shareholders.

Disadvantages of NPV Method:

   (i) As compared with the first two methods, the present value approach is certainly more difficult to understand and apply. It requires special skill for calculation.

   (ii) An additional difficulty in this approach is encountered when projects with unequal lives are to be evaluated.

   (iii) It is difficult to determine the firm cost of capital or appropriate rate of discount.

Suitability of NPV Method:

Net present value is the most suitable method in those circumstances where availability of resources is not a constraint. The management authority can accept all those projects having Net Present Value either Zero or positive. This method shall maximise shareholders wealth and market value of share which is the sole aim of any business enterprise.

B. Internal Rate of Return (IRR)

The internal rate of return refers to the rate which equates the present value of cash inflows and present value of cash outflows. In other words, it is the rate at which net present value of the investment is zero. If the Net Present Value is positive, a higher discount rate may be used to bring it down to equalise the discount cash inflows and vice versa. That is why Internal Rate of Return is defined as the break even financing rate for the project.

The necessary steps to be followed in applying this method are:

   (i) Project the net cash benefit of an investment during the whole of its economic life. Future cash flows should be estimated after taxes, but before depreciation and interest.

   (ii) Determine the rate of discount that equates the present value of its future cash benefits to its present investment. The rate of discount is determined by the method of trial and error.

   (iii) Compare the rate of discount as determined above with the cost of capital or any other cut-off rate, and select proposals with the highest rate of return as long as the rate is higher than the cost of capital or cut off rate.

Assuming conventional cash flows, mathematically the Internal Rate of Return is represented by that rate of, such that

$$C = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + ... + \frac{CF_n}{(1+r)^n} + \frac{S_n}{(1+r)^n} + \frac{W_n}{(1+r)^n}$$

$$C = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} + \frac{S_n}{(1+r)^n} + \frac{W_n}{(1+r)^n}$$

$$C = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} + \frac{S_n + W_n}{(1+r)^n}$$

$$O = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} + \frac{S_n + W_n}{(1+r)^n} - C$$

For non-conventional cash flows the equation would be

$$0 = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} + \frac{S_n + W_n}{(1+r)^n} - \sum_{t=1}^{n} \frac{C_1}{(1+k)^t}$$

r = the internal rate of return

CF_t = cash inflows at different time periods

S_n = salvage value in period n

W_n = working capital adjustment in period n

C = cash outlays at different time periods

k = cut off rate, the rate below which a project will not be accepted, which is normally the cost of capital

n = life of the project

Decision Rule:

If Internal Rate of Return i.e.

r > k (cut off rate) Accept the investment proposal

r < k Reject the investment proposal

r = k Indifferent

In case of several investment proposals the projects may be ranked according to their Internal Rate of Return, the project with highest Internal Rate of Return, is ranked first and so on. Acceptance of more than one project may follow in order of priority.

Computation of Internal Rate of Return:

The computation of Internal Rate of Return is relatively complicated and difficult compared to Net Present Value. One has to follow trial and error exercise to ascertain Internal Rate of Return (r) which equates the cash inflows and outflows of the investment proposals. Under net present value, k is known, but under this method it is worked out.

Initially the Internal rate of return (r) may give

NPV > 0 r > k (higher rate will be tried)

NPV = 0 r = k

NPV < 0 r < k (lower rate will be tried)

To calculate the exact figure, we use the method of interpolation i.e.

$$IRR(r) = r_L + \left[\frac{PV_{CFAT} - PV_C}{DPV} \right] \times Dr$$

or

$$= r_H - \left[\frac{PV_C - PV_{CFAT}}{DPV} \right] \times Dr$$

r_L = The lower rate of discount.

PV_{CFAT} = Calculated present value of cash inflow.

PV_C = Present value of cash outlay.

DPV = Difference in calculated present value.

Dr = Difference in rate of interest.

r_H = The higher rate of discount.

Decision Rule:

If Internal Rate of Return i.e.

r > k (cut off rate) Accept the investment proposal

r < k Reject the investment proposal

r = k Indifferent

In case of several investment proposals the projects may be ranked according to their Internal Rate of Return, the project with highest Internal Rate of Return, is ranked first and so on. Acceptance of more than one project may follow in order of priority

Let us illustrate the method in two different situations:

   (i) Uniform cash inflows

   (ii) Non-uniform cash inflows.

Example

Let us consider a project where initial investment is ₹ 18,000. The annual cash flow will be ₹ 5,600 for a period of 5 years. The internal rate of return can be computed by computing the factor as under

F = I/C

where,

F = Factor to be located

I = Initial investment

C = Average cash inflow

$$= \frac{18,000}{5600} = 3.214$$

After the factor is calculated as above, it is located in the different Annuity table on the line representing the number of years corresponding to the economic life of the project.

In above example, according to annuity table, factor closest to 3.21 for five years are 3.2 (16% discount rate) and 3.199 (17% discount rate). Net Present Value for both the rates are as follows:

Rate of Discount	*16%*	*17%*
Total Present Value	₹ 5,600 x 3.274 = ₹ 18,334.40	₹ 5,600 x 3.199 = ₹ 17,914.40
Less: initial outlay	₹ 18,000.00	₹ 18,000.00
NPV	+ ₹ 334.40	(–) ₹ 85.60

Since Net Present Value is greater than zero i.e. ₹ 334.40 at 16% rate of discount, we need a higher rate of discount to equalise Net Present Value with total outlay. On other hand, Net Present Value is less than zero i.e. (–) ₹ 85.60 at 17% rate of discount we need lower rate. So the above exercise shows that internal Rate of Return lies between 16% and 17%. To find out the exact figure, the interpolation can be used i.e.

$$IRR = r_L + \frac{PV_{CFAT} - PV_C}{\Delta PV} \times \Delta r$$

r_L = 16

$PV_{CFAT} = + ₹\ 18,334.40$

$PV_C = ₹\ 18,000$

$\Delta PV = ₹\ 420$

$\Delta r = 1$

$IRR = 16 + \dfrac{₹334}{₹420} \times 1 = 16 + .8$

$= 16.8\%$

Alternatively it can be worked out by using higher rate of return also.

Under uneven cash inflow, the calculation of internal rate of return is a tedious job. The process of Internal Rate of Return can be understood with the help of following illustration i.e. Company A is proposed to instal a new machine costing ₹ 16,200 having an economic life of 3 years. The annual Cash inflow shall be ₹ 8,000, 7,000 and 6,000 in the respective 3 years. Calculate Internal Rate of Return.

To compute internal rate of return, the trial and error method has been followed.

Average cash inflow $= \dfrac{Rs.\ 8,000 + 7,000 + 6,000}{3} = ₹\ 7,000$

$F = \dfrac{I}{C} = \dfrac{₹16,200}{₹7,000} = 2.314$

According to annuity table factor closest to 2.314 for 3 years are 2.322 (14%) and 2.246 (16%). Broad results are given in the following table:

Year	Cash in flow (₹)	Rate of Discount (14%)	PV (₹)	Rate of Discount (16%)	PV (₹)	Rate of Discount	PV (₹) (15%)
1.	8,000	0.877	7,016	.862	6,896	.870	6,960
2.	7,000	0.769	5,383	.743	5,201	.756	5,292
3.	6,000	0.675	4,050	.641	3,846	.658	3,948
			16,449		15,943		16,200
Less: Cash outlay			16,200		16,200		16,200
NPV			+249		-257		0

From the above table, it is quite clear that net present value is zero with 15% rate of discount, so it is the true internal rate of return.

Advantages of IRR Method:

(i) The discounted cash flow (IRR) takes into account the time value of money.

(ii) It considers cash benefits, i.e. profitability of the project for the whole of its economic life.

(iii) The rate of discount at which the present value of cash flows is equated to capital outlay on a project is shown as a percentage figure. Evidently, this method provides for uniform ranking and quick comparison of relative efficiency of different projects.

(iv) This method is considered to be a sophisticated and more reliable technique of evaluating capital investment proposals.

(v) The objective of maximising of owner's wealth is met.

Disadvantages of IRR Method:

(i) The discounted cash flow is the most difficult of all the methods of project evaluation discussed above.

(ii) An important assumption implied in this method is that incomes are reinvested (compounding) over the project's economic life at the rate earned by the investment. This assumption is correct and justified only when the internal rate of return is very close to the average rate of return earned by the company on its total investments. To the extent internal rate of return departs from the typical rate of earnings of the company, results of this method, will be misleading. Thus, when the internal rate of return on a project is computed to be 30% while company's average rate of return is 15%, the assumption of earning income on income at the rate of 30% is highly unrealistic. From this point of view the assumption of the net present value method that incomes are reinvested at the rate of discount (cost of capital) seems to be more reasonable.

(iii) The rate may be negative or one or may be multiple rate as per calculations. When a project has a sequence of changes in sign of cash flow, there may be more than one internal rate of return.

C. Profitability Index (PI) Method

Profitability Index is defined as the rate of present value of the future cash benefits at the required rate of return to the initial cash outflow of the investment. symbolically, Profitability Index is expressed as :

$$\text{Profitability index} = \frac{\text{PV of Future cash flows}}{\text{Initial cash investment}}$$

$$PI = \frac{\sum_{t=1}^{n} \dfrac{A_t}{(1+k)^t}}{C}$$

A_t = Present value of cash inflows.

k = rate of return

C = initial cash outlay

t = time period.

The above ratio is an indicator of the profitability of the project. If the ratio is equal to or greater than one, it shows that project has an expected yield equal to or greater than the discount rate. If the index is less than one, it indicates that project has an expected yield less than the discount rate.

Decision Rule:

If PI > 1 Accept the Project, PI = 1 indifferent, PI < 1 Reject the project.

In the event of more than one alternatives, projects may be ranked according to their ratio – the project with the highest ratio should be ranked first and *vice versa*.

Advantages of PI Method:

(1) Profitability Index method gives due consideration to the time value of money.

(2) Profitability Index method satisfies almost all the requirements of a sound investment criterion.

(3) This method can be successfully employed to rank projects of varying cash and benefits in order of their profitability.

(4) This method is consistent with the principle of shareholders wealth maximisation.

Disadvantages of PI Method:

(1) This method is more difficult to understand and compute.

(2) This method does not take into account the size of investment.

(3) When cash outflows occur beyond the cement period Profitability Index Ratio criterion is unsuitable as a selection criterion.

COMPARISON OF NET PRESENT VALUE AND INTERNAL RATE OF RETURN METHODS

The net present value and internal rate of return, two widely used methods are the species of the same genus i.e. Discount cash flow method, yet they are different from each other on various points.

The broad points of difference between the two are as follows:

Points of Differences

1. Interest Rate: Under the net present value method rate of interest is assumed as the known factor whereas it is unknown in case of internal rate of return method.

2. Reinvestment Axiom: Under both the methods, it is assumed that cash inflows can be re-invested at the discount rate in the new projects. However, reinvestment of funds, at cut-off rate is more possible than internal rate of return. So the net present value method is more reliable than internal rate of return method for ranking two or more projects.

3. Objective: The net present value method took to ascertain the amount which can be invested in a project so that its expected yields will exactly match to repay this amount with interest at the market rate. On the other hand, internal rate of return method attempts to find out the rate of interest which is maximum to repay the invested fund out of the cash inflows.

Points of Similarities

IRR will give the same results as NPV in terms of acceptance or rejection of investment proposals in the following circumstances:

1. Projects having conventional cash flows i.e. a situation where initial investment (outlay or cash outflow) is followed by series of cash inflows.

2. Independent Investment Proposals: Such proposal, the acceptance of which does not exclude the acceptance of others.

The reasons for the consistent results under net present value and internal rate of return method in above two cases are simple and logical. According to the net present value method the rule is that an investment proposal will be accepted if it has positive net present value (NPV > 0) which is possible only when actual rate of return is more than cut off rate. It is supported by internal rate of return method. In those case internal rate of return is more than required rate of return (R > r). When the net present value is = 0 or internal rate of return R = r the project may be accepted or rejected. So the proposal which have positive net present value will also have a higher than required rate of return.

The following diagram depict NPV as $\gtrless 0$ corresponding to IRR (R) $\gtrless$ r
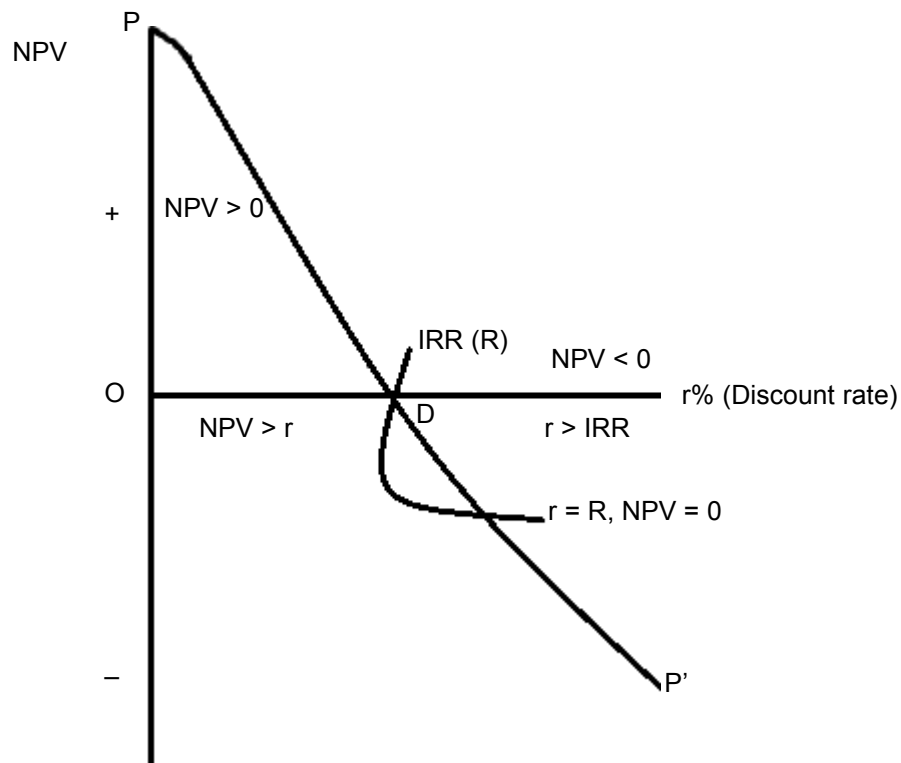
The above figure helps us to understand the close relationship between the Net Present Value (NPV) and internal rate of return methods along with reasons for their identical decisions. In the figure, vertical line upward and downward indicates NPV > 0, = 0 and less than 0. Where as base horizontal line indicates rate of return from 0 to > 0. In the figure, OP is the highest NPV at the zero rate of discount or cost of capital. At 0 discount rate R>r, NVP > 0 because at this point NPV is the difference between total cash inflow and total cash outflow and is both case inflows and case outflows are greater than zero. As the rate of discount increases from 0 towards IRR(R), the NPV decrease. At a point D, where rate of discount i.e. r = R, the NPV is zero. Further, if rate of discount increases beyond IRR(R) then NPV turn out to be negative. Thus, we may say, that when the required rate of return of a project is some what less than R (Internal Rate of Return), then we would accept the project under both the method because NPV>0 and IRR is higher than cut-of rate. On the other hand, if required rate (cut of rate) is greater then IRR, than we would reject the project under both the methods. Hence, we see that IRR & NPV methods give us identical answers with respect to the acceptance or rejection of an investment project.

Points of conflict between net present value and internal rate of return cannot be avoid under certain situations where the results given by both the methods are in conflict to each other. This is so in the case of mutually exclusive investment proposals which result in non-acceptance of others. There are two types of mutually exclusive proposals:

1. *Technical:* It refers to proposals having different profitabilities and their selection is most profitable.

2. *Financial:* It is the exclusiveness due to limited fund. A firm will select only those proposal which is most profitable rather than accepting all proposals yielding more than minimum acceptable level. The conflict of results under two methods may be due to following reasons:

   1. Size-disparity problem
   2. Time-disparity problem

3. Unequal expected lives.

Comparative Study of results under alternative Discounted Cash Flow Method

We can summarise the relationship among net present value, internal rate of return and profitability index methods regarding decision rules as follows:

Proposal	Net Present Value	Internal rate of return (R)	Profitable Index(PI)
Accept	(1) Positive	> r	> 1
Indifferent	(2) Zero	= r	= 1
Reject	(3) Negative	< r	< 1

Given the above relationship, any discounted cash flow criterion may be employed where investment proposals are independent and there is no capital budget constraints. In such a situation, the set of projects selected by all the criterion would be the same though there may be differences in internal ranking. In the real world, however, firms are faced with mutually exclusive proposals and limited availability of funds. On account of the imperfections, all the projects with (NPV) > 0, (IRR) > r, and (PI > 1) can be accepted.

CHOICE OF METHODS

The business enterprise is confronted with large number of investment criteria for selection of investment proposals. It should like to choose the best among all. Specially, it is the choice between Net Present Value and Internal Rate of Return Method because these are the two methods which are widely used by the firms. If a choice must be made, the Net Present Value Method generally is considered to be superior theoretically because:

   (i) It is simple to operate as compared to internal rate of return method;

  (ii) It does not suffer from the limitations of multiple rates;

 (iii) The reinvestment assumption of the Net Present Value Method is more realistic than internal rate of return method.

On the other hand, some scholars have advocated for internal rate of return method on the following grounds:

1. It is easier to visualise and to interpret as compared to Net Present Value Method.

2. It suggests the maximum rate of return and even in the absence of cost of capital, it gives fairly good idea of the projects profitability. On the other hand, Net Present Value Method may yield incorrect results if the firm's cost of capital is not calculated with accuracy.

3. The internal rate of return method is preferable over Net Present Value Method in the evaluation of risky projects.

Limits on Investment

The evaluation techniques discussed above help management to appraise and rank different capital investment proposals in terms of their economic benefits. But does it mean that management will accept all projects promising some economic benefit? The most probable answer seems to be in negative. For one thing, no firm enjoys infinite capital supply at a point of time when investment decisions have to be made. Ability to generate funds internally and to raise them externally is not without limits. Next, there are also occasions when quantitative factors of economic evaluation need to be supplemented with a number of qualitative considerations like employee relations, competitive position, environmental and social responsibility and public relations. Moreover, there are some valid reasons for establishing some minimum acceptable rate of return below which management will not accept any investment proposal even if resources would remain unutilised for sometime. The rate of return below which no investment should ordinarily be accepted

is known as the cut off rate or the hurdle rate. Establishing the levels of hurdle rate enables the organisation to make investment decisions and maintain consistency in the actions of different people in the organisation. Further, by indicating the hurdle rate management communicates throughout the organisation its expectation as to the minimum rate of return.

The cut off rate may be established by any of the following methods:

1. By the method of intuition;

2. By the historical rate of return;

3. By the weighted average cost of capital;

4. By the cost of funds to be used to finance a given project.

The method used to establish a hurdle rate should be carefully selected keeping in view the overall objectives of the enterprise, its environment and opportunity cost of funds required to be invested in a given project.

CAPITAL RATIONING

The firm may put a limit to the maximum amount that can be invested during a given period of time, such as a year. Such a firm is then said to be resorting to capital rationing. A firm with capital rationing constraint attempts to select the combination of investment projects that will be within the specified limits of investments to be made during a given period of time and at the same time provide greatest profitability.

Capital rationing may be effected through budget ceiling. A firm may resort to capital rationing when it follows the policy of financing investment proposals only by ploughing back its retained earnings. In that case, capital expenditure in a given period cannot exceed the amount of retained earnings available for reinvestment. Management may also introduce capital rationing when a department is authorised to make investments upto a limit beyond which investment decisions will be made by higher level management.

Capital rationing may result in accepting several small investment proposals then accepting a few large investment proposals so that there may be full utilisation of budget ceiling. This may result in accepting relatively less profitable investment proposals if full utilization of budget is a primary consideration. Similarly, capital rationing also means that the firm foregoes the next most profitable investment falling after the budget ceiling even though it is estimated to yield a rate of return much higher than the required rate of return. Thus, capital rationing does not lead optimum results.

Introduction

Uncertainty refers to the outcomes of a given event which are too unsure to be assigned probabilities, while Risk refers to a set of unique outcomes for a given event which can be assigned probabilities. In investment decisions, cash outflows and cash inflows over the life of the project are estimated and on the basis of such estimates, decisions are taken following some appraisal criteria (NPV, IRR, etc.). Risk and uncertainties are involved in the estimation of such future cash flows as it is very difficult to predict with certainty what exactly will happen in future. Therefore, the risk with reference to capital budgeting is referred to as the variability in actual returns of a project over its working life in relation to the estimated return as forecast at the time of the initial capital budgeting decision. The difference between the risk and uncertainty, therefore, lies in the fact that variability is less in risk than in uncertainty. So, the risk exists when the decision maker is in a position to assign probabilities to various outcomes. This happens when the decision maker has some historical data on the basis of which he assigns probabilities to other projects of the same type.

Risk Evaluation and Sensitivity analysis

Risk analysis gives management better information about the possible outcomes that may occur so that

management can use their judgement and experience to accept or reject an investment. Since risk analysis is costly, it should be used relatively in costly and important projects.

Risk and uncertainty are quite inherent in capital budgeting decisions. This is so because investment decisions and capital budgeting are actions of today which bear fruits in future which is unforeseen. Future is uncertain and involve risk. The projection of probability of cash inflows made today are not certain to be achieved in the course of future. Seasonal fluctuations and business cycles both deliver heavy impact upon the cash inflows and outflows projected for different project proposals. The cost of capital which offers cut-off rates may also be inflated or deflated under business cycle conditions. Inflation and deflation are bound to effect the investment decision in future period rendering the degree of uncertainty more severe and enhancing the scope of risk. Technological developments are other factors that enhance the degree of risk and uncertainty by rendering the plants or equipments obsolete and the product out of date. Tie up in the procurement in quantity and/or the marketing of products may at times fail and frustrate a business unless possible alternative strategies are kept in view.

Standard Deviation and Coefficient of Variation

Standard Deviation is considered as the best measures of dispersion or variability. Higher value of standard deviation indicates higher variability and vice versa. Higher variability means higher risk. As future cash flows cannot be estimated with certainty, it involves risk. Therefore, risk in investment analysis can be measured by using standard deviation. Investment proposal with lower standard deviation will indicate lower variability in cash flow estimates, hence such investment proposal may be preferred to the proposal having higher standard deviation. For comparing different alternative investment proposals, coefficient of variation is preferred to standard deviation because coefficient of variation is a relative measure (which is derived through dividing standard deviation by expected NPV while standard deviation is an absolute measure.

$$\text{Standard Deviation} \sqrt{\frac{\Sigma f(x - \bar{x})^2}{\Sigma f}}$$

$$\text{Co-efficient of Variation} = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100$$

Both standard deviation and co-efficient of variation require to be adjusted with the discount rate with which the project investments are evaluated. According to the degree of standard deviation or co-efficient of variation, the investment proposals shall be termed as highly risky or less risky investments. Less risky projects shall be afforded highest priority in investment or capital budgeting decisions.

Risk Adjusted Discount Rate (RADR) Method

Risk adjusted discount rates method is used in investment and budgeting decisions to cover time value of money and the risk. The use of risk adjusted discount rate is based on the concept that investors demands higher returns from the risky projects. The required return of return on any investment should include compensation for delaying consumption equal to risk free rate of return, plus compensation for any kind of risk taken on.

The case, risk associated with any investment project is higher than risk involved in a similar kind of project, discount rate is adjusted upward in order to compensate this additional risk borne.

After determining the appropriate required rate of return (Discount rate) for a project with a given level of risk cash flows are discounted at this rate in usual manner.

Adjusting discount rate to reflect project risk- If risk of project is greater than, equal to, less than risk of existing investments of firm, discount rate used is higher than, equal to or less than average cost of capital as the, case may be. Risk Adjusted Discount Rate for Project 'k' is given by:

$$NPV = \sum_{t=0}^{n} \frac{NCF_t}{(1+k)^t}$$

Where, NCF_t is the forecats not cash flow in time period t, k is a risk-adjusted discount rate (RADR). That is:

RADR = Risk free rate + Risk premium

$$k = k_f + k_r$$

Certainty Equivalent Approach (CE Approach)

This is another method of dealing with risk in capital budgeting in order to reduce the forecasts of cash flows to some conservative levels. The certainty equivalent approach may be expressed as:

$$NPV = \sum_{t=0}^{n} \frac{\alpha_t \, NCF_t}{(1+k_f)^t}$$

where NCF_t = the forecasts of net cash flow without risk adjustment

α_t = the risk adjustment factor or the certainty equivalent coefficient

k_f = risk- free rate of return assumed to be constant for all periods

The certainty equivalent coefficient α_t assumes value between 0 and 1, and varies inversely with risk. A lower α_t will be used if greater risk is perceived and a higher α_t will be used if lower risk is anticipated. The decision maker subjectively or objectively establishes the coefficients. These coefficients reflect the decision maker's confidence in obtaining a particular cash flow in period t. Thus, to obtain certain cash flows, we multiply estimated cash flows by the certainty-equivalent coefficients.

The certainty-equivalent coefficient can be determined as a relationship between the certain cash flows and the risky cash flows, i.e.

$$\alpha_t = \frac{NCF_{*t}}{NCF_t} = \frac{\text{Certain net cash flow}}{\text{Risky net cash flow}}$$

Decision Tree Analysis

Decision tree technique is another method which many corporate units use to evaluate risky proposals. A decision tree shows the sequential outcome of a risky decision. A capital budgeting decision tree shows the cash flows and net present value of the project under differing possible circumstances.

For example, a company 'X' has an opportunity to invest in equivalent schemes that will last for two years and will cost ₹ 1,00,000 initially. Cost of capital is 15%. It has the following estimated possible cash flow after tax (CFAT)

Year

One: 30% chance that (CFAT) will be ₹ 40,000/-

40% chance that (CFAT) will be ₹ 60,000/-

30% chance that (CFAT) will be ₹ 80,000

Two: CFAT are conditional to those of year one.

The estimated conditional CFAT's and probabilities are as under:

If 1st year CFAT = ₹ 40,000		If 1st year CFAT = ₹ 60,000		If 1st year CFAT = ₹ 80,000	
2nd year CFAT	Probability	2nd year CFAT	Probability	2nd year CFAT	Probability
20,000	0.2	70,000	0.3	80,000	0.1
50,000	0.6	80,000	0.4	1,00,000	0.8
80,000	0.2	90,000	0.3	1,20,000	0.1

From the above data we may plan the decision as under:

| | Prob-ability | CFAT Year 1 (₹) | Probability | CFAT Year 2 (₹) | PV of CFAT at 15% (PV of CFAT at yr1 + PV of CFAT at yr2) | Decision Tree | | Expected NPV a x b (₹) |
						(a) NPV at 15% ₹	(b) Joint Probability	
			0.2	20,000	49,920	- 50,080	0.06	- 3,005
	.3	40,000	0.6	50,000	72,600	- 27,400	0.18	- 4,932
			0.2	80,000	95,280	- 4,720	0.06	- 283
Cash outlay 1,00,000			0.3	70,000	1,05,120	5,120	0.12	614
	.4	60,000	0.4	80,000	1,12,680	12,680	0.16	2,029
			0.3	90,000	1,20,240	20,240	0.12	2,428
			0.1	80,000	1,30,080	30,080	0.03	902
	.3	80,000	0.8	1,00,000	1,45,200	45,200	0.24	10,848
			0.1	1,20,000	1,60,320	60,320	0.03	1,810
							1.00	10,411

Note: Present value of cash inflows are worked out on the basis of three decimal points.

The above decision tree shows possible CFAT outcomes in each year and the probabilities associated with these outcomes. The decision tree shows nine distinct paths, or combinations of outcomes that the project would take if accepted. One possibility is that one year's CFAT is ₹ 40,000 and the second year's CFAT is ₹ 20,000. This is worst combination of outcomes that could occur. The company X would have paid ₹ 1,00,000 for a CFAT stream of ₹ 40,000 and ₹ 20,000 in years one and two respectively. If the company X determined that an appropriate discount rate for this project is 15%, the NPV of the worst path is –₹ 50,080. By looking at the decision tree figure, the best path for the firm is $CFAT_1 = ₹ 80,000$ and $CFAT_2 = ₹ 1,20,000$. The NPV at 15% of that path is ₹ 60,320. The decision tree shows NPV of each of the nine possible CFAT paths in the tree at discount rate of 15%. The expected net present value $\overline{(NPV)}$ of the problem depicted by the decision tree is the weighted average of net present values of all the paths:

$$\overline{NPV} = \sum_{J=0}^{N} (Prob_j)(NPV_j)$$

Where NPV_j = net present value of the jth path

   $Prob_j$ = the probability of the jth path occurring

   N = number of possible paths

The probability of a path occurring is called its joint probability. It is equal to the product of the probabilities along with the path.

In the decision tree calculations the last column shows the calculation of expected $\overline{NPV}$ which is the weighted average of individual path NPVs where the weights are the path probabilities. $\overline{NPV}$ for example is ₹ 10,411 and project should be accepted.

For short period projects the above technique is good but for long period projects it becomes more complicated

with the multiplication of paths, for the number of possibilities. In the above case, there had been 9 paths for 2 years, but for the 3 years these could be $(3 \times 3 \times 3) = 27$ paths and like wise the increase of path complicates the diagram and calculations.

Sensitivity Analysis in Capital Budgeting

Sensitivity analysis is used in Capital budgeting for more precisely measuring the risk. It helps in assessing information as to how sensitive are the estimated parameters of the project such as cash flows, discount rate, and the project life to the estimation errors. Future being always uncertain and estimations are always subject to error, sensitivity analysis takes care of estimation errors by using a number of possible outcomes in evaluating a project. The methodology adopted in sensitivity analysis is to evaluate a project by using a number of estimated cash flows so as to provide to the decision maker an insight into the variability of outcome. Thus, it is a technique of risk analysis which studies the responsiveness of a criterion of merit like NPV or IRR to variation in underlying factors like selling price, quantity sold, returns from an investment etc. Sensitivity analysis answers questions like,

 (i) What happens to the present value (or some other criterion of merit) if flows are, say Rs. 50,000 than the expected Rs. 80,000?

 (ii) What will happen to NPV if the economic life of the project is only 3 years rather than expected 5 years?

Therefore, wherever there is an uncertainty, of whatever type, the sensitivity analysis plays a crucial role. However, it should not be viewed as the method to remove the risk or uncertainty, it is only a tool to analyse and measure the risk and uncertainty. In terms of capital budgeting the possible cash flows are based on three assumptions:

 (a) Cash flows may be worst (pessimistic)

 (b) Cash flows may be most likely.

 (c) Cash flows may be most optimistic.

Sensitivity analysis has been evolved to treat risk and uncertainty in capital budgeting decisions. The analysis is compromised of the following steps:

 (1) Identification of variables;

 (2) Evaluation of possibilities for these variables;

 (3) Selection and combination of variables to calculate NPV or rate of return of the project;

 (4) Substituting different values for each variables in turn while holding all other constant to discover the effect on the rate of return;

 (5) Comparison of original rate of return with this adjusted rate to indicate the degree of sensitivity of the rate to change in variables;

 (6) Subjective evaluation of the risk involved in the project.

The purpose of sensitivity analysis is to determine how varying assumptions will affect the measures of investment worth. Ordinarily, the assumptions are varied one at a time i.e. cash flows may be held constant with rate of discount used to vary; or discount rate is assumed constant and cash flow may vary with assumed outlay; or the level of initial outlay may change with discount rate and annual proceeds remaining the same. In the context of NPV, sensitivity analysis provides information regarding the sensitivity of the calculated NPV to possible estimation errors in expected cash flows, the required rate of return and project life.

SIMULATION FOR RISK EVALUATION

Simulation is known as simulated sampling or more fully Monte-Carlo simulation is as much an art as a technique.

It has been described as "what to do when all else fails". Some investment projects may depend on so many stochastic variables that analytical results are unobtainable. In simulation a mathematical model is constructed and artificial data is fed. The desired parameters of the system are then determined from the output of the mode. Simulation like sensitivity analysis is not an optimising technique. It merely provides a convenient representation of reality in some more advanced work than can be used to improve NPV by adjusting certain variables under the decision makers control (like advertising expenditure). There are two important things in simulation viz. the construction of the model and the judgement of changes to be made to controllable variables. This method involves use of computers to determine the distribution of the internal rate of return or net present value. Suppose the company has estimated project probability distribution for initial investment, annual sales and operating costs, life and salvage value, the simulation proceeds as follows:

1. Randomly select a value of each variable from its distribution;

2. Take these values and other given information (tax rates, type of depreciation used and so on) and calculate the projects IRR or NPV;

3. Repeat steps one and two many times; and

4. Prepare the IRR or NPV distribution.

This is the result of the simulation. From the information used to prepare the distribution the analyst can determine the standard deviation of the projects IRR which is used in determining the project risk.

Simulation is an expensive device and suits only to those projects involving heavy capital expenditure. Simulation is advantageous to corporate project proposal selections for the reason that it shows all possible outcomes associated with the project including identification of possible extremely bad outcomes which might happen if the project is accepted.

Capital budgeting Techniques under uncertainty:

Risk can be defined as the chance that the actual outcome will differ from the expected outcome. Uncertainty relates to the situation where a range of differing outcome is possible, but it is not possible to assign probabilities to this range of outcomes. The two terms are generally used interchangeably in finance literature. In investment appraisal, managers are concerned with evaluating the riskiness of a project's future cash flows. Here, they evaluate the chance that the cash flows will differ from expected cash flows, NPV will be negative or the IRR will be less than the cost of capital. In the context of risk assessment, the decision-maker does not know exactly what the outcome will be but it is possible to assign probability weightage to the various potential outcomes. The most common measures of risk are standard deviation and coefficient of variations. There are three different types of project risk to be considered:

1. *Stand-alone risk:* This is the risk of the project itself as measured in isolation from any effect it may have on the firm's overall corporate risk.

2. *Corporate or within-firm risk:* This is the total or overall risk of the firm when it is viewed as a collection or portfolio of investment projects.

3. *Market or systematic risk:* This defines the view taken from a well-diversified shareholders and investors. Market risk is essentially the stock market's assessment of a firm's risk, its beta, and this will affect its share price.

Due to practical difficulties of measuring corporate and market risk, the stand-alone risk has been accepted as a suitable substitute for corporate and market risk. There are following techniques one can use to deal with risk in investment appraisal.

Statistical Techniques for Risk Analysis:

(a) Probability Assignment

(b) Expected Net Present Value

(c) Standard Deviation

(d) Coefficient of Variation

(e) Probability Distribution Approach

 (f) Normal Probability Distribution

(a) Probability Assignment:

The concept of probability is fundamental to the use of the risk analysis techniques. It may be defined as the likelihood of occurrence of an event. If an event is certain to occur, the probability of its occurrence is one but if an event is certain not to occur, the probability of its occurrence is zero. Thus, probability of all events to occur lies between zero and one.

The classical view of probability holds that one can talk about probability in a very large number of times under independent identical conditions. Thus, the probability estimate, which is based on a large number of observations, is known as an objective probability. But this is of little use in analyzing investment decisions because these decisions are non-repetitive in nature and hardly made under independent identical conditions over time. The another view of probability holds that it makes a great deal of sense to talk about the probability of a single event without reference to the repeatability long run frequency concept. Therefore, it is perfectly valid to talk about the probability of sales growth will reach to 4%, the probability of rain tomorrow or fifteen days hence. Such probability assignments that reflect the state of belief of a person rather than the objective evidence of a large number of trials are called personal or subjective probabilities.

(b) Expected Net Present Value:

Once the probability assignments have been made to the future cash flows, the next step is to find out the expected net present value. It can be found out by multiplying the monetary values of the possible events by their probabilities. The following equation describes the expected net present value.

$$ENPV = \sum_{i=0}^{n} \frac{ENCF_t}{(1+k)^t}$$

Where ENPV is the expected net present value, ENCFt expected net cash flows in period t and k is the discount rate. The expected net cash flow can be calculated as follows:

$$ENCF_t = NCF_{jt} \times P_{jt}$$

Where NCFjt is net cash flow for jth event in period t and Pjt probability of net cash flow for jth event in period t.

For example, A company is considering an investment proposal costing ₹ 7,000 and has an estimated life of three years. The possible cash flows are given below:

Expected net present value

All amount in ₹

Cash flow In Year 1	Prob.	Expected Value	Cash flow in Year 2	Prob.	Expected Value	Cash flow in Year 3	Prob.	Expected Value
2000	0.2	400	3000	0.4	1200	4000	0.3	1200
3000	0.5	1500	4000	0.3	1200	5000	0.5	2500
4000	0.3	1200	5000	0.3	1500	6000	0.2	1200
		3100			**3900**			**4900**

If we assume a risk free discount rate of 10%, the expected NPV for the project will be as follows:

Year	ENCF in ₹	PV@10%	PV in ₹
1	3100	0.909	2817.9
2	3900	0.826	3221.4
3	4900	0.751	3679.9
		ΣPV	9719.2
		Less : NCO	7000
		ENPV	2719.2

(c) Standard Deviation:

The assignment of probabilities and the calculation of the expected net present value include risk into the investment decision, but a better insight into the risk analysis of capital budgeting decision is possible by calculating standard deviation and coefficient of variation.

Standard deviation(s) is an absolute measure of risk analysis and it can be used when projects under consideration are having same cash outlay. Statically, standard deviation is the square root of variance and variance measures the deviation about expected cash flow of each of the possible cash flows. The formula for calculating standard deviation will be as follows:

$$\sigma = \sqrt{\sum_{i=1}^{n}\left(CF_t \ x \ \overline{CF}\right)^2 \ x \ P_i}$$

Thus, it is the square root of the mean of the squared deviation, where deviation is the difference between an outcome and the expected mean value of all outcomes and the weights to the square of each deviation is provided by its probability of occurrence. For example, the standard deviation of following project X and Y is as follows :

<div align="center">

Table 2.8

PROJECT-X (Standard deviation)

</div>

All Amount in in ₹

CF	$\overline{CF}$	$\left(CF_t - \overline{CF}\right)$	$\left(CF_t - \overline{CF}\right)^2$	Pi	$\left(CF_t - \overline{CF}\right)^2 Pi$	σ
4000	6000	-2000	4000000	0.1	400000	
5000	6000	-1000	1000000	0.2	200000	
6000	6000	0	0	0.4	0	
7000	6000	1000	1000000	0.2	200000	
8000	6000	2000	4000000	0.1	400000	
					1200000	1095

PROJECT Y (Standard deviation)

All Amount in ₹

CF	$\overline{CF}$	$\left(CF_t-\overline{CF}\right)$	$\left(CF_t-\overline{CF}\right)^2$	Pi	$\left(CF_t-\overline{CF}\right)^2 Pi$	σ
12000	8000	4000	16000000	0.1	1600000	
10000	8000	2000	4000000	0.15	600000	
8000	8000	0	0	0.5	0	
6000	8000	-2000	4000000	0.15	600000	
4000	8000	-4000	16000000	0.1	1600000	
					4400000	2098

In the above example, Project Y is riskier as standard deviation of project Y is higher than the standard deviation of project X. However, the project Y has higher expected value also so the decision-maker is in a dilemma for selecting project X or project Y.

(d) Coefficient of Variation:

If the projects to be compared involve different outlays/different expected value, the coefficient of variation is the correct choice, being a relative measure. It can be calculated using following formula:

CV = Standard deviation or σ
　　　 Expected Value CF

For example, the coefficient of variation for the above project X and project Y can be calculated as follows:

CV (X) = 1095 = 0.1825
　　　　　 6000

CV (Y) = 2098 = 0.2623
　　　　　 8000

The higher the coefficient of variation, the riskier is the project. Project Y is having higher coefficient so it is riskier than the project X. It is a better measure of the uncertainty of cash flow returns than the standard deviation because it adjusts for the size of the cash flow.

(e) Probability Distribution Approach:

The researcher has discussed the concept of probability for incorporating risk in capital budgeting proposals. The probability distribution of cash flows over time provides valuable information about the expected value of return and the dispersion of the probability distribution of possible returns which helps in taking accept-reject decision of the investment decision.

The application of this theory in analyzing risk in capital budgeting depends upon the behaviour of the cash flows, being (i) independent, or (ii) dependent. The assumption that cash flows are independent over time signifies that future cash flows are not affected by the cash flows in the preceding or following years. When the cash flows in one period depend upon the cash flows in previous periods, they are referred to as dependent cash flows.

   (i) Independent Cash Flows over Time: The mathematical formulation to determine the expected values of the probability distribution of NPV for any project is as follows:

$$PV = \sum_{t=1}^{n} \frac{\overline{CF}_t}{(1+i)^t} - Co$$

where CF_t is the expected value of net CFAT in period t and i is the risk free rate of interest.

The standard deviation of the probability distribution of net present values is equal to ;

$$\sigma(NPV) = \sqrt{\sum_{t=1}^{n} \frac{\sigma t^2}{(1+i)^{2t}}}$$

where σ t is the standard deviation of the probability distribution of expected cash flows for period t, σ t would be calculated as follows:

$$\sigma t = \sqrt{\sum_{j=1}^{n} \left(CF_{jt} - \overline{CF_t}\right)^2 P_{jt}}$$

Thus, the above calculation of the standard deviation and the NPV will produce significant volume of information for evaluating the risk of the investment proposal. For example, The standard deviation of the probability distribution of net present values under the assumption of the independence of cash flows over time for the above mentioned example of expected net present values can be calculated as follows:

Probability distribution approach

Year 1

CF in ₹	$\overline{CF}$ in ₹	$(CF_t - \overline{CF})^2$ in ₹	$(CF_t - \overline{CF})^2$ in ₹	Pi	$(CF_1 - \overline{CF})^2$ Pi in ₹	σ
2000	3100	-1100	1210000	0.2	242000	
3000	3100	-100	10000	0.5	5000	
4000	3100	900	810000	0.3	243000	
					490000	700
			Year 2			
3000	3900	-900	810000	0.4	324000	
4000	3900	100	10000	0.3	3000	
5000	3900	1100	1210000	0.3	363000	
					690000	831
			Year 3			
4000	4900	-900	810000	0.3	243000	
5000	4900	100	10000	0.5	5000	
6000	4900	1100	1210000	0.2	242000	
					490000	700

$$\sigma = \sqrt{\sum_{t=1}^{n} \frac{\sigma t^2}{(1+i)^{2t}}} = \sqrt{\frac{(700)^2}{(1.10)^2} + \frac{(831)^2}{(1.10)^4} + \frac{(700)^2}{(1.10)^6}}$$

= ₹ 1073.7

where σ is the standard deviation of the probability distribution of possible net cash flows and σt^2 is the variance of each period.

(ii) Dependent Cash Flows: If cash flows are perfectly correlated, the behavior of cash flows in all periods is alike. This means that if the actual cash flow in one year is a standard deviations to the left of its expected value, cash flows in other years will also be a standard deviations to the left of their respective expected values. In other words, cash flows of all years are linearly related to one another. The expected value and the standard deviation of the net present value, when cash flows are perfectly correlated, are as follows:

$$\overline{NPV} = \sum_{t=1}^{n} \frac{\overline{CF_t}}{(1+t)^t} - CO \qquad\qquad \sigma(NPV) = \sum_{t=1}^{n} \frac{\sigma t}{(1+i)^t}$$

Where,

NPV = Expected Net Present Value

CF_t = Expected Cash Flow for year"t"

i = Risk-free interest rate

σ NPV = Standard deviation of Net Present Value

σt = Standard deviation of the cash flow for year "t"

For example, if we calculate NPV and σ NPV for an investment project requiring a current outlay of Rs 10,000, assuming a risk free interest rate of 6 per cent. The mean and standard deviation of cash flows, which are perfectly correlated, are as follows:

Year	CFt (₹)	σt
1	5,000	1,500
2	4,000	1,000
3	5,000	2,000
4	3,000	1,200

$$\overline{NPV} = \frac{5000}{(1.06)^1} + \frac{4000}{(1.06)^2} + \frac{5000}{(1.06)^3} + \frac{3000}{(1.06)^4} - 10,000 = ₹4,851$$

$$\sigma(\overline{NPV}) = \frac{1,500}{(1.06)^1} + \frac{1,000}{(1.06)^2} + \frac{2,000}{(1.06)^3} + \frac{1,200}{(1.06)^4} = ₹4,934$$

(f) Normal Probability Distribution:

The normal probability distribution can be used to further analyze the risk in investment decision. It enable the decision maker to have an idea of the probability of different expected values of NPV, that is, the probability of NPV having the value of zero or less, greater than zero and within the range of two values for example, within the range of ₹ 2,000 and ₹ 3,000 etc. If the probability of having NPV is low or zero or less, eg. .01, it means that the risk in the project is negligible. Thus, the normal probability distribution is an important statistical technique in the hands of decision makers for evaluating the riskiness of a project.

The area under the normal curve, representing the normal probability distribution, is equal to 1 (0.5 on either side of the mean). The curve has its maximum height at its expected value i.e. its mean. The distribution theoretically runs from minus infinity to plus infinity. The probability of occurrence beyond 3 s is very near to zero (0.26 per cent).

For any normal distribution, the probability of an outcome falling within plus or minus.

    1 σ from the mean is 0.6826 or 68.26 per cent,

    2 σ from the mean is 95.46 per cent,

    3. σ from the mean is 99.74 per cent.
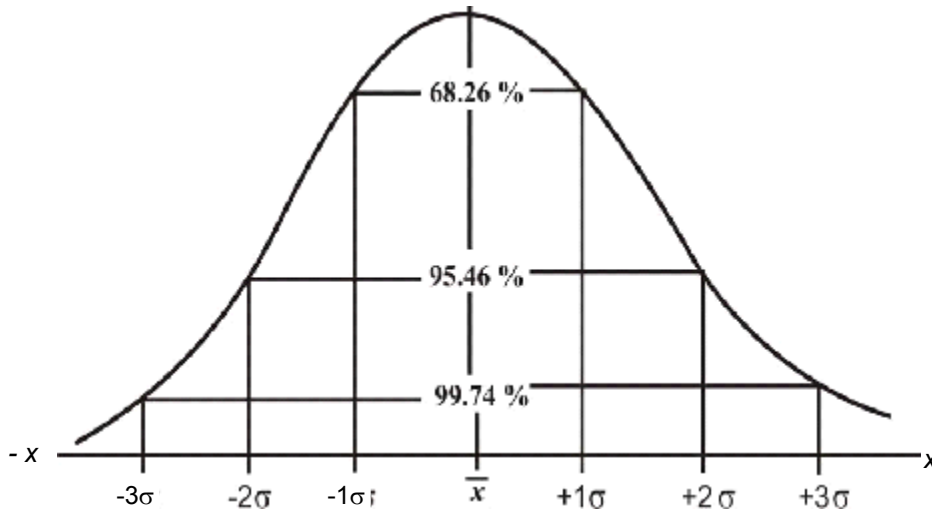
Figure 2.4

For example, If one needs to calculate for the above mentioned example the probability of the NPV being zero or less, the probability of the NPV being greater than zero and the probability of NPV between the range of ₹ 1500 and ₹ 3000, it can be calculated as follows using normal distribution.

Probability of the NPV being zero or less:

$$Z = \frac{X - \overline{X}}{\sigma} = \frac{0 - 2719.2}{1073.7} = -2.533$$

According to Table Z, the probability of the NPV being zero is = 0.4943, therefore, the probability of the NPV being zero or less would be 0.5-0.4943=0.0057 i.e. 0.57 per cent.

Probability of the NPV being greater than zero:

As the probability of the NPV being less than zero is 0.57 per cent, the probability of the NPV being greater than zero would be 1-0.0057=0.9943 or 99.43 per cent.

Probability of NPV between the range of ₹ 1,500 and ₹ 3,000:

$$Z_1 = \frac{1,500 - 2,719.2}{1,073.7} = -1.13$$

$$Z_2 = \frac{3000 - 2719.2}{1073.7} = -0.26$$

The area as per Table Z for the respective values of -1.13 and 0.26 is 0.3708 and

0.4803 respectively. Summing up, we have 0.8511 i.e., there is 85.11 per cent probability of NPV being within the range of ₹ 1500 and ₹ 3000.

SOME CASE STUDIES

Question No. 1 : *An Entrepreneur has approached you with an opportunity to lend ₹ 25,000 for his newly established home healthcare business. Funds would be used to lease a delivery vehicle, purchase supplies, and provide working capital. Terms of the proposal are that you would receive ₹ 5,000 at the end of each year in interest with the full ₹ 25,000 to be repaid at the end of a ten-year period.*

   A. *Assuming a 10% required rate of return, calculate the present value of cash flows and the net present value of the proposed investment.*

   B. Based on this same interest rate assumption, calculate the cumulative cash flow of the proposed investment for each period in both nominal and present-value terms.

   C. What is the payback period in both nominal and present-value terms?

   D. What is the difference between the nominal and present-value payback period? Can the present-value payback period ever be shorter than the nominal payback period??

Solution

A : The present value of cash flows and the net present value of the proposed investment can be calculated as given below:

Year	Cash Flow in ₹	Present Value Interest Factor (10%)	Present Value Cash Flow ₹
0	(25,000)	1.0000	(25,000)
1	5,000	0.9091	4,545
2	5,000	0.8264	4,132
3	5,000	0.7513	3,757
4	5,000	0.6830	3,415
5	5,000	0.6209	3,105
6	5,000	0.5645	2,822
7	5,000	0.5132	2,566
8	5,000	0.4665	2,333
9	5,000	0.4241	2,120
10	5,000	0.3855	1,928
Cost of Capital	10.0%		
Present Value of Benefits	₹ 30,723		
Present Value of Cost	₹ 25,000		
Net Present Value	₹ 5,723		

B. The cumulative cash flow of the proposed investment for each period in both nominal and present-value terms is:

Year Flow	Cash Interest Factor	Present Value Factor @ (10%)	Present Value Cash Flow	Cumulative PV Cash Flow	Cumulative
0	(₹ 25,000)	1.0000	(₹25,000)	(₹25,000)	(₹25,000)
1	5,000	0.9091	4,545	(20,000)	(20,455)
2	5,000	0.8264	4,132	(15,000)	(16,322)
3	5,000	0.7513	3,757	(10,000)	(12,566)
4	5,000	0.6830	3,415	(5,000)	(9,151)
5	5,000	0.6209	3,105	0	(6,046)
6	5,000	0.5645	2,822	5,000	(3,224)
7	5,000	0.5132	2,566	10,000	(658)
8	5,000	0.4665	2,333	15,000	1,675
9	5,000	0.4241	2,120	20,000	3,795
10	5,000	0.3855	1,928	25,000	5,723
Payback Period			5 years		
Present Value Payback Period			8.28 years (= 8 + ₹ 658/₹2,333).		

C. Based on the information provided in part B, it is clear that the cumulative cash flow in nominal rupees reached ₹0 at the end of Year 5. This means that the nominal payback period is 5 years. The cumulative cash flow in present-value rupees exceeds ₹0 when the Year 8 interest payment is received. This means that the present-value payback period is roughly 8 years. If cash flows were received on a continuous basis, the present-value payback period would be 8.28 years (= ₹ 658/₹ 2,333).

D. Assuming a positive rate of interest, the present-value payback period is always longer than the nominal payback period. This stems from the fact that present-value dollars are always less than nominal dollars, and it therefore takes longer to receive a fixed dollar amount back in terms of present-value dollars rather than in nominal terms.

Question No. 2: Decision Rule Conflict : Balwinder has been retained as a management consultant by Square Pants, Inc., a local specialty retailer, to analyze two proposed capital investment projects, projects X and Y. Project X is a sophisticated working capital and inventory control system based upon a powerful personal computer, called a system server, and PC software specifically designed for inventory processing and control in the retailing business. Project Y is a similarly sophisticated working capital and inventory control system based upon a powerful personal computer and general- purpose PC software. Each project has a cost of ₹ 10,000, and the cost of capital for both projects is 12%. The projects = expected net cash flows are as follows

Solution:

Years	Expected Net Cash Flows in ₹	
	Project X	**Project Y**
0	(10,000)	(10,000)
1	6,500	3,500
2	3,000	3,500
3	3,000	3,500
4	1,000	3,500

A. Calculate each project = s nominal payback period, net present value (NPV), internal rate of return (IRR), and profitability index (PI).

B. Should both projects be accepted if they are interdependent?

C. Which project should be accepted if they are mutually exclusive?

D. *How might a change in the cost of capital produce a conflict between the NPV and IRR rankings of these two projects? At what values of k would this conflict exist?*

E. *Why does a conflict exist between NPV and IRR rankings?*

Solution

A. *Payback*:

To determine the nominal payback period, construct the cumulative cash flows for each project:

Cumulative Cash Flow in ₹		
Year	Project X	Project Y
0	(10,000)	(10,000)
1	(3,500)	(6,500)
2	(500)	(3,000)
3	2,500	500
4	3,500	4,000

$$\text{Payback period project X} = 2 + \frac{\text{Rs.500}}{\text{Rs.3,000}} = 2.17 \text{ years}$$

$$\text{Payback period project Y} = 2 + \frac{\text{Rs.3,000}}{\text{Rs.3,500}} = 2.86 \text{ years}$$

Net Present Value

All amount in INR

Years	Expected Net Cash Flows in ₹		Present Value Factor @ 12%	Cash Flow in ₹	
	Project X	Project Y		Project X	Project Y
0	(10,000)	(10,000)	1.0000	(10,000)	(10,000)
1	6,500	3,500	0.8929	5,803.57	3,125.00
2	3,000	3,500	0.7972	2,391.58	2,790.18
3	3,000	3,500	0.7118	2,135.34	2,491.23
4	1,000	3,500	0.6355	635.52	2,224.31
Net Cash Flow				966.01	630.72

Internal Rate of Return (IRR):

To solve for each project's IRR, find the discount rates that set *NPV* to zero:

IRR_X = 18.0%.

IRR_Y = 15.0%.

Profitability Index (PI):

$$Profitability\ Index = \frac{Present\ Value}{Initial\ Investment}$$

$$Profitability\ Index\ (X) = \frac{Rs.\ 10,966.01}{Rs.\ 10,000} = 1.10$$

$$Profitability\ Index\ (Y) = \frac{Rs.\ 10,630.72}{Rs.\ 10,000} = 1.06$$

B. Using all methods, project X is preferred over project Y. Because both projects are acceptable under the *NPV*, *IRR*, and *PI* criteria, both projects should be accepted if they are interdependent.

C. Choose the project with the higher *NPV* at *k* = 12%, or project X.

D. To determine the effects of changing the cost of capital, plot the *NPV* profiles of each project. The crossover rate occurs at about 6% to 7%. To find this rate exactly, create a project , which is the difference in cash flows between projects X and Y:

Years	Differential Cash flow between Project X and Y (in ₹)
0	0
1	3,000
2	(500)
3	(500)
4	(2,500)

Then find the *IRR* of Project   :

IRR = Crossover Rate = 6.2%.

Thus, if the firms cost of capital is less than 6.2%, a conflict exists, because

NPV_Y > NPV_X but IRR_X > IRR_Y.

E. The basic cause of conflict is the differing reinvestment rate assumptions between *PV* and *IRR*. The conflict occurs in this situation because the projects differ in their cash flow timing.

Qns No 3: Decision Rule Criteria*. The net present value (NPV), profitability index (PI), and internal rate of return (IRR) methods are often employed in project valuation. Identify each of the following statements as true or false, and explain your answers.*

    A. The IRR method can tend to understate the relative attractiveness of superior investment projects when the opportunity cost of cash flows is below the IRR.

    B. A PI = 1 describes a project with an NPV = 0.

    C. Selection solely according to the NPV criterion will tend to favor larger rather than smaller investment projects.

    D. When NPV = 0, the IRR exceeds the cost of capital.

    E. Use of the PI criterion is especially appropriate for larger firms with easy access to capital markets.

Solution

A. False. The *IRR* method implicitly assumes reinvestment of net cash flows during the life of the project at the *IRR* and will overstate the relative attractiveness of superior investment projects when the opportunity cost of cash flows is below the *IRR*. If, for example, a project has a projected *IRR* = 22%, but cash flows thrown off during the life of the project can only be reinvested at, say, 15%, then the true *IRR* for the project will be less than 22% and its relative attractiveness will be overstated using the *IRR* method.

B. True. The *PI* = PV Cash Flows/Cost, and *NPV* = PV Cash Flows -Cost. Therefore, when PV Cash Flows = Cost, *PI* = 1 and *NPV* = 0.

C. True. Selection according to the *NPV* criterion will tend to favour larger as opposed to smaller investment projects.

D. False. The *IRR* is the interest rate that equates the PV cash flows with the investment cost of a project. *NPV* = PV Cash Flows - Cost, when cash flows are discounted at an appropriate risk-adjusted cost of capital, *k*. Therefore, when *IRR* = *k*, *NPV* = 0.

E. False. Larger firms with easy access to capital markets maximize the value of the firm through the process by selecting projects according to the *NPV* criterion. Smaller firms, which face capital budget constraints forcing rejection of some *NPV* > 0 projects, can best employ scarce capital through use of the *PI* criterion.

Question No 4:

Mr. Jagdish owns a Drug Store, **located** in Maliwara Ghaziabad. The drug store sells pharmaceuticals, cosmetics, toiletries, magazines, and various novelties. The most recent annual net income statement of drug store is as follows:

	Amount in ₹
Sales revenue	1,800,000
Costs	
Cost of goods sold	1,260,000
Wages and salaries	200,000
Rent	120,000
Depreciation	60,000
Utilities	40,000
Miscellaneous	30,000
Total costs	1,710,000
Net profit before tax	90,000

Drug Store's sales and expenses have remained relatively constant over the past few years and are expected to continue unchanged in the near future. To increase sales, Drug Store is considering using some floor space for a small soda fountain. Drug Store would operate the soda fountain for an initial three-year period and then would reevaluate its profitability. The soda fountain would require an incremental investment of ₹20,000 to lease furniture, equipment, utensils, and so on. This is the only capital investment required during the three-year period. At the end of that time, additional capital would be required to continue operating the soda fountain, and no capital would be recovered if it were shut down. The soda fountain is expected to have annual sales of ₹100,000 and food and materials expenses of ₹20,000 per year. The soda fountain is also expected to increase wage and

salary expenses by 8% and utility expenses by 5%. Because the soda fountain will reduce the floor space available for display of other merchandise, sales of non-soda fountain items are expected to decline by 10%.

A. Calculate net incremental cash flows for the soda fountain.

B. Assume that Drug Store has the capital necessary to install the soda fountain and that he places a 12% opportunity cost on those funds. Should the soda fountain be installed? Why or why not?

Solution

A. The relevant annual cash flows from the proposed soda fountain are:

	Amount in ₹
Incremental revenue (A)	100,000
Increment Cost	
Food and materials	20,000
Wages and salaries (₹200,000 x 0.08)	16,000
Utilities (₹40,000 x 0.05)	2,000
Opportunity Cost: Profit contribution lost on regular sales	
= 0.1(₹ 18,00,000 - ₹12,60,000)	54,000
Total incremental cost (B)	92,000
Net incremental annual cash flow (A – B)	8,000
Incremental investment	20,000

B. No, the NPV for the proposed soda fountain should be calculated to determine the economic viability of the project.

NPV = (Incremental annual cash flow)(PVIFA, N = 3, i = 12%) - ₹20,000

= ₹8,000(2.4018) - ₹20,000

= -₹785.60 (A loss)

Because NPV < 0, Drug Store should not undertake the soda fountain investment project.

Question No 5: Cash Flow Analysis. The Future India Press is analyzing the potential profitability of three printing jobs put up for bid by the Department of Revenue:

	Job A	Job B	Job C
Projected winning bid (per unit)	₹ 5.00	₹ 8.00	₹ 7.50
Direct cost per unit	₹ 2.00	₹ 4.30	₹ 3.00
Annual unit sales volume	₹ 8,00,000	₹ 6,50,000	₹ 4,50,000
Annual distribution costs	₹ 90,000	₹ 75,000	₹ 55,000
Investment required to produce annual volume	₹ 50,00,000	₹ 52,00,000	₹ 40,00,000

Assume that

(1) The company's marginal city-plus-state-plus-Corporate tax rate is 50%;

(2) Each job is expected to have a six-year life; (3) the firm uses straight-line depreciation; (4) the average cost of capital is 14%; (5) the jobs have the same risk as the firm's other business; and (6) the company

has already spent ₹60,000 on developing the preceding data. This ₹60,000 has been capitalized and will be amortized over the life of the project.

A. What is the expected net cash flow each year? (Hint: Cash flow equals net profit after taxes plus depreciation and amortization charges.)

B. What is the net present value of each project? On which project, if any, should Future India Press (FIP) bid?

C. Suppose that FIP's primary business is quite cyclical, improving and declining with the economy, but that job A is expected to be countercyclical. Might this have any bearing on your decision?

Solution

A. The ₹60,000 spent on job cost development is a sunk cost. This cost must, however, be accounted for in the tax calculation as a ₹10,000 per year non-cash expense. The annual net cash flow calculations are:

Amount in ₹

	Job A	Job B	Job C
Projected winning bid (per unit)	5.00	8.00	7.50
Deduct direct cost per unit	2.00	4.30	3.00
Profit contribution per unit	3.00	3.70	4.50
Annual unit sales volume	8,00,000	6,50,000	4,50,000
Profit contribution per year	24,00,000	24,05,000	20,25,000
Deduct annual distribution costs	90,000	75,000	55,000
Cash flow before amortization, depreciation and taxes	23,10,000	23,30,000	19,70,000
Deduct amortization charges	10,000	10,000	10,000
Cash flow before depreciation and taxes	23,00,000	23,20,000	19,60,000
Deduct depreciation	8,33,333	8,66,667	6,66,667
Cash flow before taxes	14,66,667	14,53,333	12,93,333
Deduct taxes	7,33,334	7,26,666	6,46,666
Cash flow	7,33,333	7,26,667	6,46,667
Add back depreciation plus amortization	8,43,333	8,76,667	6,76,667
Net annual cash flow	15,76,667	16,03,333	13,23,333
Investment required to produce annual volume	50,00,000	52,00,000	40,00,000
Job cost development	60,000		
Job life (years)	6		
Tax rate	50%		

B.   The NPV calculations are:

Amount in ₹

	Job A	Job B	Job C
Net annual cash flow	15,76,667	16,03,333	13,23,333
Times PVIFA	3.8887	3.8887	3.8887
Present value of annual net cash flows	61,31,185	62,34,881	51,46,045
Deduct initial investment cost	50,00,000	52,00,000	40,00,000
Net present value (NPV)	11,31,185	10,34,881	11,46,045
Relevant discount rate		14%	
Job life (years)		6	

Job C is the most profitable, and therefore is the most attractive because NPVC

> NPVA > NPVB. However, NPV > 0 for each job and each project is attractive.

C. Risk for the firm is reduced through diversification. If job A is counter-cylical, then it is least risky, other things being equal, and could be attractive on the basis of both its risk and return characteristics.

Question No. 6

Following data in respect of two machines namely 'A' and 'B' are detailed below Depreciation has been charged on straight line basis and estimated life of both machines is five years.

(In ₹)

Item	Machine 'A'	Machine 'B'
Cost	56,125	56,125
Net income after depreciation and taxes:		
1st Year	3,375	11,375
2nd Year	5,375	9,375
3rd Year	7,375	7,375
4th Year	9,375	5,375
5th Year	11,375	3,375
	36,875	36,875

Find out –

   (a) Average rate of return on 'A' and 'B' machines

   (b) Which machine is better from the point of view of pay-back period and why?

   (c) Calculate average rate of return when salvage value of machine 'A' turns out to be Rs. 3,000 and when 'B' machine has zero salvage value.

Answer

   (a) Average Rate of Return (ARR)

        ARR   =   Average net income after taxes
                              Average investment

Average income of machine 'A' = $\frac{36,875}{5}$ = 7,375

Average income of machine 'B' = $\frac{36,875}{5}$ = 7,375

Average investment = $\frac{1 \times 56,125}{2}$

= Rs.28,062.50

(Average investment of Machine A and Machine B is the same as the cost is same)

ARR for Machine A = $\frac{7,375 \times 100}{28\ 062.50}$

= 26.28%

ARR for Machine B = $\frac{7,375 \times 100}{28\ 062.50}$

= 26.28%

(b) From the Point of View of Pay-back Period

From this point of view, Machine B is better as the initial inflow is much higher compared to Machine A and hence Machine B provides large liquidity of funds.

(c) Average Rate of Return when Salvage Value of Machine A is Rs. 3,000

Average Investment = ₹ 3,000 + 1/2 (₹ 56,125 – ₹ 3,000)

= ₹ 3,000 + ₹ 26,563 (approximately)

= ₹ 29,563 (approximately)

ARR = $\frac{\text{Average income}}{\text{Average investment}}$

= $\frac{7\ 375 \times 100}{29\ 563}$

= 24.95%

ARR of Machine A = 24.95%

As Machine B does not have any salvage value, the ARR for Machine B will remain the same, i.e. 26.28% (as calculated in (a) above).

Question No. 7

Nimex Ltd. has just installed Machine-R at a cost of Rs. 2,00,000. The machine has a five year life with no residual value. The annual volume of production is estimated at 1,50,000 units, which can be sold at Rs. 6 per unit. Annual operating costs are estimated at Rs. 2,00,000 (excluding depreciation) at this output level. Fixed costs are estimated at Rs. 3 per unit for the same level of production.

Nimex Ltd. has just come across another model called Machine-S capable of giving the same output at an annual operating cost of Rs. 1,80,000 (exclusive of depreciation).There will be no change in fixed costs. Capital cost of this machine is Rs. 2,50,000 and the estimated life is for five years with nil residual value.

The company has an offer for sale of Machine-R at Rs. 1,00,000. But the cost of dismantling and removal will amount to Rs. 30,000. As the company has not yet commenced operations, it wants to sell Machine –R and

purchase Machine-S.

Nimex Ltd. will be a zero-tax company for seven years in view of several incentives and allowances available.

The cost of capital may be assumed at 14%. P.V. factors for five years are as follows:

Year	P.V. Factors
1	0.877
2	0.769
3	0.675
4	0.592
5	0.519

(i) Advise whether the company should opt for the replacement.

(ii) Will there be any change in your view if Machine-R has not been installed but the company is in the process of selecting one or the other machine?

Support your view with necessary workings.

Answer

(i) **Replacement of Machine –R**

Incremental cash out flow

Cash out flow on Machine –S	₹ 2,50,000
Less: Sale Value of Machine –R	
Less : Cost of dismantling and removal (Rs. 1,00,000-Rs. 30,000)	₹ 70,000
Net outflow	₹ 1,80,000
Incremental cash flow from Machine-S	
Annual cash flow from Machine –S	₹ 2,70,000
Annual cash flow from Machine –R	₹ 2,50,000
Net incremental Cash in flow	₹ 20,000

Present value of incremental cash in flows

$$= ₹ 20,000 \times (0.877 + 0.769 + 0.675 + 0.592 + 0.519)$$

$$= 20,000 \times 3.432 = ₹ 68,640$$

NPV of Machine -S $= ₹ 68,640 – ₹ 1,80,000$

$$= (-) ₹ 1,11,360$$

Rs. 2,00,000 spent on Machine –R is a sunk cost and hence it is not relevant for deciding the replacement.

Decision: Since Net present value of Machine –S is in the negative, replacement is not advised.

If the company is in the process of selecting one of the two machines, the decision is to be made on the basis of independent evaluation of two machines by comparing their Net-present values.

(ii) Independent evaluation of Machine –R and Machine –S:

	Machine –R	Machine –S
Units produced	1,50,000	1,50,000
Selling price per unit (₹)	6	6
Sale value (₹)	9,00,000	9,00,000
Less: Operating Cost (₹) (exclusive of depreciation)	2,00,000	1,80,000
Contribution (₹)	7,00,000	7,20,000
Less: Fixed Cost (₹)	4,50,000	4,50,000
Annual cash flow (₹)	2,50,000	2,70,000
Present value of cash flows for five years (₹)	8,58,000	9,26,640
Cash Outflow (₹)	2,00,000	2,50,000
Net Present Value (₹)	6,58,000	6,76,640

As the NPV of cash inflow of Machine –S is higher than that of Machine –R, the choice should fall on machine – S.

Note: As the company is a zero tax company for seven years (Machine life in both cases is only for five years), depreciation and the tax effect on the same are not relevant for consideration.

Question No. 8

A large profit making company is considering the installation of a machine to process the waste produced by one of its existing manufacturing process to be converted into a marketable product. At present, the waste is removed by a contractor for disposal on payment by the company of ₹ 50 lacs per annum for the next four years. The contract can be terminated upon installation of the aforesaid machine on payment of a compensation of ₹ 30 lacs before the processing operation starts. This compensation is not allowed as deduction for tax purposes.

The machine required for carrying out the processing will cost ₹ 200 lacs to be financed by a loan repayable in 4 equal installments commencing from the end of year 1. The interest rate is 16% per annum. At the end of the 4th year, the machine can be sold for ₹ 20 lacs and the cost of dismantling and removal will be ₹ 15 lacs.

Sales and direct costs of the product emerging from waste processing for 4 years are estimated as under:

(₹ In lacs)

Year	1	2	3	4
Sales	322	322	418	418
Material consumption	30	40	85	85
Wages	75	75	85	100
Other expenses	40	45	54	70
Factory overheads	55	60	110	145
Depreciation (as per income tax rules)	50	38	28	21

Initial stock of materials required before commencement of the processing operations is ₹ 20 lacs at the start of year 1. The stock levels of materials to be maintained at the end of year 1, 2 and 3 will be ₹ 55 lacs and the stocks at the end of year 4 will be nil. The storage of materials will utilise space which would otherwise have been rented out for ₹ 10 lacs per annum. Labour costs include wages of 40 workers, whose transfer to this

process will reduce idle time payments of ₹ 15 lacs in the year 1 and ₹ 10 lacs in the year 2. Factory overheads include apportionment of general factory overheads except to the extent of insurance charges of ₹ 30 lacs per annum payable on this venture. The company's tax rate is 50%.

Present value factors for four years are as under:

Year	1	2	3	4
Present value factors	0.870	0.756	0.658	0.572

Advise the management on the desirability of installing the machine for processing the waste. All calculations should form part of the answer.

Answer

Statement of Incremental Profit (₹ in lacs)

Years	1	2	3	4
Sales :(A)	322	322	418	418
Material consumption	30	40	85	85
Wages	60	65	85	100
Other expenses	40	45	54	70
Factory overheads (insurance)	30	30	30	30
Loss of rent	10	10	10	10
Interest	32	24	16	8
Depreciation (as per income tax rules)	50	38	28	21
Total cost: (B)	252	252	308	324
Incremental profit (C)=(A)-(B)	70	70	110	94
Tax (50% of (C))	35	35	55	47

Statement of Incremental Cash Flows (₹ in lacs)

Years	0	1	2	3	4
Material stocks	(20)	(35)	-	-	-
Compensation for contract	(30)	-	-	-	-
Contract payment saved	-	50	50	50	50
Tax on contract payment	-	(25)	(25)	(25)	(25)
Incremental profit	-	70	70	110	94
Depreciation added back	-	50	38	28	21
Tax on profits	-	(35)	(35)	(55)	(47)
Loan repayment	-	(50)	(50)	(50)	(50)
Profit on sale of machinery (net)	-	-	-	-	5
Total incremental cash flows	(50)	25	48	58	48
Present value factor	1.00	0.870	0.756	0.658	0.572

Net present value of cash flows	(50)	21.75	36.288	38.164	27.456

Net present value   = ₹ 123.658 – ₹ 50

                               = ₹ 73.658 lacs.

Advice: *Since the net present value of cash flows is ₹ 73.658 lacs which is positive the management should install the machine for processing the waste.*

Notes:

1. Increase in material stock is taken in cash flows.

2. Idle time wages have also been considered

3. Apportioned factory overheads are not relevant, only insurance charges of this project are relevant.

4. Interest calculated at 16% based on 4 equal instalments of loan repayment.

5. Sale of machinery- Net income after deducting removal expenses taken. Tax on Capital gains ignored.

6. Saving in contract payment and income tax there on considered in the cash flows.

Question No. 9

A company is considering two mutually exclusive projects X and Y. Project X costs ₹ 3,00,000 and Project Y ₹ 3,60,000. You have been given below the net present value, probability distribution for each project:

Project X		Project Y	
NPV Estimate	Probability	NPV Estimate	Probability
(₹)		(₹)	
30,000	0.1	30,000	0.2
60,000	0.4	60,000	0.3
1,20,000	0.4	1,20,000	0.3
1,50,000	0.1	1,50,000	0.2

(i) Compute the expected net present value of Projects X and Y.

(ii) Compute the risk attached to each project i.e., Standard Deviation of each probability distribution.

(iii) Which project do you consider more risky and why?

Answer

Project-X   *(Amount in ₹)*

NPV Estimates	Probability	Expected NPV	Deviation 90,000- (1)	Square of Deviation	Square of Deviation x Probability
(1)	(2)	(3) =(1) x (2)	(4)	(5) =(4)^2	(6)=(5) x (2)
30,000	0.1	3,000	-60,000	36,00,000,000	36,00,00,000
60,000	0.4	24,000	-30,000	9,00,000,000	9,00,00,000
1,20,000	0.4	48,000	30,000	9,00,000,000	9,00,00,000

1,50,000	0.1	15,000	60,000	36,00,000,000	36,00,00,000
Expected NPV	90,000			14,40,000,000	

Project-Y *(Amount in ₹)*

NPV Estimates	Probability	Expected NPV	Deviation 90,000- (1)	Square of Deviation	Square of Deviation x Probability
(1)	(2)	(3) =(1) x (2)	(4)	(5) =(4)²	(6)=(5) x (2)
30,000	0.2	6,000	-60,000	36,00,000,000	72,00,00,000
60,000	0.3	18,000	-30,000	9,00,000,000	27,00,00,000
1,20,000	0.3	36,000	30,000	9,00,000,000	27,00,00,000
1,50,000	0.2	30,000	60,000	36,00,000,000	72,00,00,000
Expected NPV	90,000			19,80,000,000	

(i) The expected net present value of Projects X and Y is ₹ 90,000 each.

(ii) Standard Deviation = $\sum \sqrt{\text{Square of the deviation x probability}}$

In case of Project X: Standard Deviation $= \sqrt{14,40,000,000}$
= 37,947

In case of Project Y: Standard Deviation $= \sqrt{19,80,000,00}$
= 44,497

(iii) Coefficient of variation = $\dfrac{\text{standard deviation}}{\text{Expected net present value}}$

In case of Project X : Coefficient of variation = $\dfrac{37,947}{90,000}$

= 0.42

In case of Project Y : Coefficient of variation = $\dfrac{44,497}{90,000}$

= 0.4944 or 0.50

Project Y is riskier since it has a higher coefficient of variation.

Question No. 9

The Textile Manufacturing Company Ltd., is considering one of two mutually exclusive proposals, Projects M and N, which require cash outlays of ₹ 8,50,000 and ₹ 8,25,000 respectively. The certainty-equivalent (C.E) approach is used in incorporating risk in capital budgeting decisions. The current yield on government bonds is 6% and this is used as the risk free rate. The expected net cash flows and their certainty equivalents are as follows:

	Project M		**Project N**	
Year-end	Cash Flow (₹)	C.E.	Cash Flow (₹)	C.E.
1	4,50,000	0.8	4,50,000	0.9
2	5,00,000	0.7	4,50,000	0.8
3	5,00,000	0.5	5,00,000	0.7

Present value factors of ₹ 1 discounted at 6% at the end of year 1, 2 and 3 are 0.943, 0.890 and 0.840 respectively. Which one of the project should be accepted?

Answer

(i) Statement Showing the Net Present Value of Project M

Year	Cash Flow(a) (₹)	C. E.(b)	Adjusted Cashflow (₹)(c) = (a) × (b)	Present Value Factor at 6%(d)	Total Present Value (₹) (c) x (d)
1	4,50,000	0.8	3,60,000	0.943	3,39,480
2	5,00,000	0.7	3,50,000	0.890	3,11,500
3	5,00,000	0.5	2,50,000	0.840	2,10,000
Total					8,60,980
Less: Initial Investment					8,50,000
Net Present Value					10,980

Statement Showing the Net Present Value of Project N

Year	Cash Flow(a) (₹)	C. E.(b)	Adjusted Cashflow (₹)(c) = (a) × (b)	Present Value Factor at 6%(d)	Total Present Value (₹) (c) x (d)
1	4,50,000	0.9	4,05,000	0.943	3,81,915
2	4,50,000	0.8	3,60,000	0.890	3,20,400
3	5,00,000	0.7	3,50,000	0.840	2,94,000
Total					9,96,315
Less: Initial Investment					8,25,000
Net Present Value					1,71,315

Decision : Since the net present value of Project N is higher, so the project N should be accepted.

Question No. 10

From the following details relating to a project, analyse the sensitivity of the project to changes in initial project cost, annual cash inflow and cost of capital:

Initial Project Cost (₹)	1,20,000
Annual Cash Inflow (₹)	45,000
Project Life (Years)	4
Cost of Capital	10%

To which of the three factors, the project is most sensitive? (Use annuity factors: for 10% 3.169 and 11% ... 3.109).

Answer

CALCULATION OF NPV

	₹
PV of cash inflows (₹ 45,000 x 3.169)	1,42,605
Initial Project Cost	1,20,000
NPV	22,605

If initial project cost is varied adversely by 10%

NPV (Revised) (₹ 1,42,605 - 1,32,000)   ₹ 10,605

Change in NPV $\left(\dfrac{₹22,605 - ₹10,605}{22605} \right)$ ₹ 22,605

= 53.08 %

If annual cash inflow is varied adversely by 10%*

Revised annual inflow (₹ 45,000 - 10% of ₹ 45,000) = ₹ 40,500

NPV (Revised) (₹ 40,500 x 3.169) – (1,20,000) = (+) ₹ 8,345

Change in NPV (₹ 22,605 – ₹ 8,345) / ₹ 22,605

=63.08 %

If cost of capital is varied adversely by 11%*

NPV (Revised) (₹ 45,000 x 3.109) – ₹ 1,20,000 = (+) ₹ 19,905

Change in NPV (₹ 22,605 – ₹ 19,905) / ₹ 22,605

=11.94 %

Conclusion: Project is most sensitive to 'annual cash inflow'.

*Note: Students may please note that they may assume any other percentage rate other than 10% say 15%, 20%, 25% etc.

LESSON ROUND-UP

– Capital Budgeting refers to long-term planning for proposed capital outlays and their financing. Capital Budgeting may also be defined as "the firms' decision to invest its current fund more efficiently in long-term activities in anticipation of an expected flow of future benefit over a series of years.

– Capital Rationing helps the firm to select the combination of investment projects that will be within the specified limits of investments to be made during a given period of time and at the same time provide greatest profitability.

– Pay Back technique estimates the time required by the project to recover, through cash inflows, the firms initial outlay.

$$\text{Pay back period } = \frac{\text{Initial Investment}}{\text{Annual cash inflows}}$$

– Average Rate of Return method is designated to consider the relative profitability of different capital investment proposals as the basis for ranking them – the fact neglected by the payout period technique.

– Average Rate of Return

$$= \left(\frac{\text{Net earnings after Depreciation and Taxes}}{\text{No. of years project will last } \quad \text{Investment}} \right) \div \quad \text{Original Investment or Average Investment}$$

– Net Present Value: The cash outflows and inflows associated with each project are ascertained first and both are reduced to the present values at the rate of return acceptable to the management. The rate of return is either cost of capital of the firm or the opportunity cost of capital to be invested in the project.

$$\text{NPV} = \sum_{t=1}^{N} \frac{R_t}{(1+k)^t} + \frac{S_n + W_n}{(1+k)^n} - \sum_{t=1}^{N} \frac{C_t}{(1+k)^t} - C_0$$

– Internal Rate of Return: The internal rate of return refers to the rate which equates the present value of cash inflows and present value of cash outflows.

$$\sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} + \frac{S_n + W_n}{(1+r)} = \sum_{t=1}^{n} \frac{C_1}{(1+k)^1}$$

– Profitability Index (PI): Profitability Index is defined as the ratio of present value of the future cash benefits at the required rate of return to the initial cash outflow of the investment.

$$\text{PI} = \frac{\sum_{t=1}^{n} \frac{A_t}{(1+k)^t}}{C}$$

– Sensitivity Analysis treats risk and uncertainty in capital budgeting decisions.

– Cost of equity capital is the minimum return that the investors would like to get on their investments in Company's Shares.

– Composite cost of Capital is calculated as combined weighted average of the cost of all different sources of capital

SELF-TEST QUESTIONS

(*These are meant for re-capitulation only. Answers to these questions are not to be submitted for evaluation*)

1. Define capital budgeting and examine the need for capital budgeting.

2. Explain different methods of appraising project profitability. Which method is considered to be the best?

3. Distinguish between Internal Rate of Return and Net Present Value techniques. Which method would you recommend for evaluating investment? Explain.

4. (a) Capital Budgeting models are used to evaluate a wide variety of capital expenditure decisions. Comment on this statement and enunciate some of the important expenditure decisions to which capital budgeting technique can be applied.

   (b) The Susan Co. is contemplating either of two mutually exclusive projects. The data with respect to each are given below. The initial investment for both is equal to their depreciable value. Both will be depreciated straight line over a five-year life.

	Project A (₹)	Project B (₹)
Initial Investment	1,00,000	1,40,000
Year	Profits after taxes	
1	10,000	25,000
2	15,000	25,000
3	20,000	25,000
4	25,000	25,000
5	35,000	25,000

(i) Calculate the 'net present value' and 'benefit-cost ratio' for each project.

(ii) Evaluate the acceptability of each project on the basis of above mentioned two techniques.

(iii) Select the best project, using NPV and benefit-cost ratios and comment on the resulting rankings.

(iv) Assume that the Susan Co. has an 11% cost of capital.

(v) The following data relates to discounting factor:

Year	Discounting factor at 11%
1	.901
2	.812
3	.731
4	.659
5	.593

and discounting factor for present value of an annuity discounted at 11% for five years is 3.696.

5. Define the concept of cost of capital. State how you would determine the weighted average cost of capital of firm.

6. Write short notes on:

  (1) Profitability Index

  (2) Sensitivity Analysis

  (3) Decision tree analysis

  (4) Capital Rationing.

7. Explain the various steps of capital budgeting process.

Lesson 3
Capital Structure

LEARNING OBJECTIVES

Capital Structure of a company is very important for company's survival. If the capital structure of a company is not optimized, then it becomes difficult for a company to sustain i.e. sometimes it has to face shortage of capital, sometimes it has to bear high interest. So in view of above, it becomes very important for a finance manager to ensure that the firm's capital structure is as per the market and organisation condition. The object of the lesson is to enable the students to understand:

– Nature, scope and significance of capital structure

– Factors affecting Capital Structure

– Capital structure vis a vis Financial structure

– Planning and designing of capital structure

– Optimal Capital Structure

– Capital Structure & Valuation

– Theories of Capital Structure

– Leverage – Operating leverage, financial leverage, combined leverage

– EBIT-EPS Analysis

– Effect of leverages on return on equity

The optimal capital structure indicates the best debt-to-equity ratio for a firm that maximizes its value. Putting it simple, the optimal capital structure for a company is the one which offers a balance between the ideal debt-to-equity ranges thus minimizing the firm's cost of capital

INTRODUCTION, DEFINITION AND SIGNIFICANCE OF CAPITAL STRUCTURE

Introduction

Given the Capital Budgeting decision of a firm, it has to decide the way in which the capital projects will be financed. Every time the firm makes an Investment decision, it has to undertake a financing decision also. For example, a decision to purchase a new machinery or plant implies specific ways of financing that project. Should the firm employ equity or debt or both? What may be its implications/ What is the appropriate mix of debt and equity? These are some questions that a firm needs to answer before taking up any Financing decision.

Capital structure means the structure or constitution or break-up of the capital employed by a firm. The capital employed consists of both the owners' capital and the debt capital provided by the lenders. Debt capital is understood here to mean the long term debt which has been deployed to build long term assets. Apart from the elements of equity and debt in the capital structure, a firm could have quasi equity in the form of convertible debt.

The Financing or Capital Structure decision is a significant managerial decision as it influences the shareholder's return and risk. Consequently the market value of the share may be affected by the capital structure decision.

Definition of Capital Structure

The following definitions clearly initiate, the meaning and objective of the capital structure.

According to the definitions of **Gerstenberg**, "Capital Structure of a company refers to the composition or make up of its capitalization and it includes all long-term capital resources".

According to the definition of **James C. Van Horne**, Captial Structure is "The mix of a firm's permanent long-term financing represented by debt, preferred stock and common stock equity".

Type of Capital Structure

Capital Structure of a firm is a reflection of the overall investment and financing strategy of the firm. It shows how much reliance is being placed by the firm on external sources of finance and how much internal accruals are being used to finance expansions etc. Capital structure can be of various kinds as described below:

1. Horizontal Capital Structure

In a Horizontal capital structure, the firm has zero debt components in the structure mix. The structure is quite stable. Expansion of the firm takes in a lateral manner, i.e. through equity or retained earning only. The absence of debt results in the lack of financial leverage. Probability of disturbance of the structure is remote.

2. Vertical Capital Structure

In a vertical capital structure, the base of the structure is formed by a small amount of equity share capital. This base serves as the foundation on which the super structure of preference share capital and debt is built. The incremental addition in the capital structure is almost entirely in the form of debt. Quantum of retained earnings is low and the dividend pay-out ratio is quite high. In such a structure, the cost of equity capital is usually higher than the cost of debt. The high component of debt in the capital structure increases the financial risk of the firm and renders the structure unstable. The firm, because of the relatively lesser component of equity capital, is vulnerable to hostile takeovers.

3. Pyramid shaped Capital structure

A pyramid shaped capital structure has a large proportion consisting of equity capital and retained earnings which have been ploughed back into the firm over a considerably large period of time. The cost of share capital and the retained earnings of the firm is usually lower than the cost of debt. This structure is indicative of risk averse conservative firms.

4. Inverted Pyramid shaped Capital Structure

Such a capital structure has a small component of equity capital, reasonable level of retained earnings but an ever increasing component of debt. All the increases in the capital structure in the recent past have been made through debt only. Chances are that the retained earnings of the firm are shrinking due to accumulating losses. Such a capital structure is highly vulnerable to collapse.

Significance of Capital Structure

Capital structure is significant for a firm because the long term profitability and solvency of the firm is sustained by an optimal capital structure consisting of an appropriate mix of debt and equity. The capital structure also is significant for the overall ranking of the firm in the industry group. The significance of the capital structure is discussed below:

1. It reflects the firm's strategy

The capital structure reflects the overall strategy of the firm. The strategy includes the pace of growth of the firm. In case the firm wants to grow at a faster pace, it would be required to incorporate debt in its capital structure to a greater extent. Further, in case of growth through acquisitions or the inorganic mode of growth as it is called, the firm would find that financial leverage is an important tool in funding the acquisitions.

2. It is an indicator of the risk profile of the firm

One can get a reasonably accurate broad idea about the risk profile of the firm from its capital structure. If the debt component in the capital structure is predominant, the fixed interest cost of the firm increases thereby increasing its risk. If the firm has no long term debt in its capital structure, it means that either it is risk averse or it has cost of equity capital or cost of retained earnings less than the cost of debt.

3. It acts as a tax management tool

The capital structure acts as a tax management tool also. Since the interest on borrowings is tax deductible, a firm having healthy growth in operating profits would find it worthwhile to incorporate debt in the capital structure in a greater measure.

4. It helps to brighten the image of the firm

A firm can build on the retained earnings component of the capital structure by issuing equity capital at a premium to a spread out base of small investors. Such an act has two benefits. On the one hand, it helps the firm to improve its image in the eyes of the investors. At the same time, it reduces chances of hostile take-over of the firm.

CAPITAL STRUCTURE VIS-A-VIS FINANCIAL STRUCTURE

In engineering, structure refers to different parts of a building and thus in financial terms, financial structure refers to all the components of finance in an organization. In simple terms, financial structure consists of all assets, all liabilities and the capital. The manner in which an organization's assets are financed is referred to as its financial structure. There are some similarities between capital structure and financial structure. However, there are many differences also.

If you take a look at the balance sheet of a company, the entire left hand side which includes liabilities plus equity is called the financial structure of the company. It contains all the long term and short term sources of capital. On the other hand, capital structure is the sum total of all long term sources of capital and thus is a part of the financial structure. It includes debentures, long term debt, preference share capital, equity share capital and retained earnings. In the simplest of terms, capital structure of a company is that part of financial structure that reflects long term sources of capital.

Consider the balance sheet of a company :

(Amt. in ₹)

	Particulars	Note No.	Amount as at 31st March, 2016	Amount as at 31st March, 2017
	1	**2**	**3**	**4**
I	**EQUITY AND LIABILITIES**			
(1)	**Shareholders' funds**			
(a)	Share Capital		2,00,000	
(b)	Reserve and Surplus	1	72,000	
(2)	**Current liabilities**			
(a)	Trade payable		1,28,000	
(b)	Provision for income Tax		60,000	
	TOTAL		4,60,000	
II.	**ASSETS**			
(1)	**Non current-assets**			
(a)	Fixed Assets		2,64,000	
(b)	Preliminary expenses	2	8,000	
(2)	**Current Assets**			
(a)	inventories		48,000	
(b)	Trade receivable		88,000	
(c)	Cash at bank		52,000	
	TOTAL		4,60,000	

In the above illustration, the total liabilities size of ₹ 4,60,000 is the financial structure of the firm while the long term block of ₹ 2,72,000 is the capital structure. We can also say that that the total financial structure minus the current liabilities structure gives us the capital structure.

We can enunciate the following differences between financial structure and capital structure:

– Capital structure relates to long term capital deployment for creation of long term assets. Financial structure involves creation of both long term and short term assets.

– Capital structure is the core element of the financial structure. Capital structure can exist without the current liabilities and in such cases. Capital structure shall be equal to the financial structure. But we cannot have a situation where the firm has only current liabilities and no long term capital.

– The financial structure of a firm is considered to be a balanced one if the amount of current liabilities is less than the capital structure net of outside debt because in such cases the long term capital is considered sufficient to pay current liabilities in case of sudden loss of current assets.

– Components of the capital structure may be used to build up the level of current assets but the current liabilities should not be used to finance acquisition of fixed assets. This would result in an asset liability mismatch.

PLANNING AND DESIGNING OF CAPITAL STRUCTURE

Just as planning and design of a physical structure is important, the same holds true for capital structure as well. A well thought out plan for the capital structure supplemented by a careful design ensures that prime goal of the firm, i.e. maximisation of the shareholder wealth is easily achieved.

Planning of the capital structure is a preliminary activity and it might commence as early at the time of incorporation of the firm. Once the firm is established, the next logical step is to move in the direction of implementation of the project. For meeting the cost of the project, the means of finance are to be arranged. Hence the need for timely and early planning of the capital structure.

The management of a company should seek answers to the following questions while making the decision regarding capital structure of the company:

> ➢ How should the investment project be financed?
>
> ➢ Does the way in which the investment projects are financed matter?
>
> ➢ How does financing affect the shareholders' risk, return and value?
>
> ➢ Does there exist an optimum financing mix in terms of the maximum value to the firm's shareholders?
>
> ➢ Can the optimum financing mix be determined in practice for a company?
>
> ➢ What factors in practice should a company consider in designing its financing policy?

Attributes of a Well Planned Capital Structure

A sound or appropriate capital structure should have the following features:

Return: The capital structure of the company should be most advantageous. Subject to other considerations, it should generate maximum returns to the shareholders without adding additional cost to them.

Risk: The use of excessive debt threatens the solvency of the company. To the point debt does not add significant risk. It should be sued, otherwise its use should be avoided.

Flexibility: The capital structure should be flexible. It should be possible for a company to adapt its capital structure with a minimum cost and delay if warranted by a changed situation. It should also be possible for the company to provide funds whenever needed to finance its profitable activities.

Capacity: The capital structure should be determined within the debt capacity of the company and this capacity should not be exceeded. The debt capacity of a company depends on its ability to generate future cash flows. It should have enough cash to pay creditors' fixed charges and principal sum.

Control: The capital structure should involve minimum risk of loss of control of the company. The owners of closely-held companies are particularly concerned about dilution of control.

Designing a Capital Structure

After planning the capital structure, we are faced with the issue of its design. Design takes off from where the plan ends. Planning establishes the broad parameters of the structure. It is left for the design to fill in the minor details. While designing a capital structure, following points need to be kept in view:

1. ***Design should be functional:*** The design should create synergy with the long term strategy of the firm and should not be dysfunctional. It should facilitate the day to day working of the firm rather than create systematic bottlenecks.

2. ***Design should be flexible:*** The capital structure should be designed to incorporate a reasonable amount of flexibility in order to allow for temporary expansion or contraction of the share of each component.

3. ***Design should be conforming statutory guidelines:*** The design should conform to the statutory guidelines, if any, regarding the proportion and amount of each component. The limits imposed by lenders regarding the minimum level of owners' equity required in the firm should be complied with.

OPTIMAL CAPITAL STRUCTURE

Is there an optimal capital structure for a firm? By the term optimal capital structure we mean a particular arrangement of various components of the structure which is just in tune with the both the long term and short term objectives of the firm. An optimal capital structure is the best debt to equity ratio for a firm that maximises its value. The optimal capital structure for a company is one that offers a balance between the ideal debt to equity range and minimises the firm's cost of capital. A combination less or more than the optimal combination would be less than satisfying. Hence, a sub-optimal combination would affect the achievement of the goal of maximisation of the shareholders' wealth.

But can we plan and design an optimal capital structure? For designing such a structure, one would need the following information:

– The requirement of capital of the firm

– Availability of different components

– Cost of these components

– Rate of return from investment

It has to be further kept in mind that the above information should be exact information. In reality it is not possible to have the exact information on all the above four parameters. Secondly whatever information is available is for a particular period. Thus, we have to design the structure in a static set-up which makes the design devoid of all flexibility.

The real world of business, however, is a dynamic world with ever changing demand and supply of various components of the capital structure. Hence, we can not formulate the optimal capital structure in a static framework. The process has to be carried out in a dynamic framework of interdependent investment and financing decisions that yield optimal values within the constraints at the time and place when the decisions were made. We can, therefore, say that the optimal capital structure is an ideal situation which can function as the benchmark of performance for a firm. But this benchmark is invincible and the firm can expect to achieve moderated or toned down versions of this benchmark depending upon dynamics of each project.

FACTORS INFLUENCING CAPITAL STRUCTURE

Under the capital structure, decision regarding the proportion of long-term sources of capital is determined. Most favourable proportion determines the optimum capital structure. That happens to be the need of the company because EPS happens to be the maximum on it. Some of the chief factors affecting the choice of the capital structure are the following:

(1) Cash Flow Position

While making a choice of the capital structure the future cash flow position should be kept in mind. Debt capital should be used only if the cash flow position is really good because a lot of cash is needed in order to make payment of interest and refund of capital.

(2) Interest Coverage Ratio-ICR

With the help of this ratio an effort is made to find out how many times the EBIT is available to the payment of interest. The capacity of the company to use debt capital will be in direct proportion to this ratio.

It is possible that inspite of better ICR the cash flow position of the company may be weak. Therefore, this ratio is not a proper or appropriate measure of the capacity of the company to pay interest. It is equally important to take into consideration the cash flow position.

(3) Debt Service Coverage Ratio-DSCR

This ratio removes the weakness of ICR. This shows the cash flow position of the company.

This ratio tells us about the cash payments to be made (e.g., preference dividend, interest and debt capital repayment) and the amount of cash available. Better ratio means the better capacity of the company for debt payment. Consequently, more debt can be utilised in the capital structure.

(4) Return on Investment-ROI

The greater return on investment of a company increases its capacity to utilise more debt capital.

(5) Cost of Debt

The capacity of a company to take debt depends on the cost of debt. In case the rate of interest on the debt capital is less, more debt capital can be utilised and vice versa.

(6) Tax Rate

The rate of tax affects the cost of debt. If the rate of tax is high, the cost of debt decreases. The reason is the deduction of interest on the debt capital from the profits considering it a part of expenses and a saving in taxes.

For example, suppose a company takes a loan of 0ppp 100 and the rate of interest on this debt is 10% and the rate of tax is 30%. By deducting 10/- from the EBIT a saving of in tax will take place (If 10% on account of interest are not deducted, a tax of @ 30% shall have to be paid).

(7) Cost of Equity Capital

Cost of equity capital (it means the expectations of the equity shareholders from the company) is affected by the use of debt capital. If the debt capital is utilised more, it will increase the cost of the equity capital. The simple reason for this is that the greater use of debt capital increases the risk of the equity shareholders.

Therefore, the use of the debt capital can be made only to a limited level. If even after this level the debt capital is used further, the cost of equity capital starts increasing rapidly. It adversely affects the market value of the shares. This is not a good situation. Efforts should be made to avoid it.

(8) Floatation Costs

Floatation costs are those expenses which are incurred while issuing securities (e.g., equity shares, preference shares, debentures, etc.). These include commission of underwriters, brokerage, stationery expenses, etc. Generally, the cost of issuing debt capital is less than the share capital. This attracts the company towards debt capital.

(9) Risk Consideration: There are two types of risks in business –

 (i) Operating Risk or Business Risk

   This refers to the risk of inability to discharge permanent operating costs (e.g., rent of the building, payment of salary, insurance installment, etc.).

 (ii) Financial Risk

   This refers to the risk of inability to pay fixed financial payments (e.g., payment of interest, preference dividend, return of the debt capital, etc.) as promised by the company.

The total risk of business depends on both these types of risks. If the operating risk in business is less, the financial risk can be faced which means that more debt capital can be utilised. On the contrary, if the operating risk is high, the financial risk likely occurring after the greater use of debt capital should be avoided.

(10) Flexibility

According to this principle, capital structure should be fairly flexible. Flexibility means that, if need be, amount of capital in the business could be increased or decreased easily. Reducing the amount of capital in business is possible only in case of debt capital or preference share capital.

If at any given time company has more capital than as necessary then both the above-mentioned capitals can be repaid. On the other hand, repayment of equity share capital is not possible by the company during its lifetime. Thus, from the viewpoint of flexibility to issue debt capital and preference share capital is the best.

(11) Control

According to this factor, at the time of preparing capital structure, it should be ensured that the control of the existing shareholders (owners) over the affairs of the company is not adversely affected.

If funds are raised by issuing equity shares, then the number of company's shareholders will increase and it directly affects the control of existing shareholders. In other words, now the number of owners (shareholders) controlling the company increases.

This situation will not be acceptable to the existing shareholders. On the contrary, when funds are raised through debt capital, there is no effect on the control of the company because the debenture holders have no control over the affairs of the company. Thus, for those who support this principle debt capital is the best.

(12) Regulatory Framework

Capital structure is also influenced by government regulations. For instance, banking companies can raise funds by issuing share capital alone, not any other kind of security. Similarly, it is compulsory for other companies to maintain a given debt-equity ratio while raising funds.

Different ideal debt-equity ratios such as 2:1; 4:1; 6:1 have been determined for different industries. The public issue of shares and debentures has to be made under SEBI guidelines.

(13) Stock Market Conditions

Stock market conditions refer to upward or downward trends in capital market. Both these conditions have their influence on the selection of sources of finance. When the market is dull, investors are mostly afraid of investing in the share capital due to high risk.

On the contrary, when conditions in the capital market are cheerful, they treat investment in the share capital as the best choice to reap profits. Companies should, therefore, make selection of capital sources keeping in view the conditions prevailing in the capital market.

(14) Capital Structure of Other Companies

Capital structure is influenced by the industry to which a company is related. All companies related to a given industry produce almost similar products, their costs of production are similar, they depend on identical technology, they have similar profitability, and hence the pattern of their capital structure is almost similar.

Because of this fact, there are different debt- equity ratios prevalent in different industries. Hence, at the time of raising funds a company must take into consideration debt-equity ratio prevalent in the related industry.

CAPITAL STRUCTURE AND VALUATION

There is a theme that the capital structure should be conducive to increase in valuation of the firm. By valuation, we mean that the market value or the realisable value of the owners' equity should increase. This can happen in case value of both components of the shareholders' equity, i.e. share capital and retained earnings increases.

Value of the share capital is reflected in the market value of the firm in case the shares are traded on the stock exchange. This market value, under ideal conditions, is indicative of the inherent value and is different from both the face value and the book value. The capital structure should be such as maximises the inherent value of the firm.

Retained earnings also have a book value, i.e. the value at which these earnings are carried in the books of the firm. The inherent value of the retained earnings depends upon the future returns which these earnings can generate for the owners. As earnings of the firm increase, its valuation also increases. Earnings can increase either directly through increased level of operations of the firm or indirectly through decrease in cost of capital of the firm. The direct increase in earnings is dependent upon the investment decisions and the changes in capital structure have no explicit bearing upon these earnings. Capital structure plays an important part in increase in earnings brought about by change in cost of different components of the structure.

CAPITAL STRUCTURE THEORIES

There are basically four approaches to capital structure decision:

1. Net Income Approach

2. Net Operating Income Approach

3. Traditional Approach

4. Modigliani Miller (MM) Approach

1. Net Income Approach

According to this approach there is a relationship between capital structure and the value of the firm and therefore, the firm can affect its value by increasing or decreasing the debt proportion in the overall financial mix. The Net Income Approach makes the following assumptions:

1. The total capital requirement of the firm is given and remains constant.

2. Cost of debt (K_d) is less than cost of equity (K_e).

3. Both K_d and K_e remain constant and increase in financial leverage i.e., use of more and more debt financing in the capital structure does not affect the risk perception of the investors.

Under this approach, the cost of debt capital, K_d and the cost of equity capital K_e remains unchanged when D/S, the degree of leverage, varies. Here S stands for total capital employed (= D + E). The constancy of K_d and K_e with respect to the degree of leverage means that K the average cost of capital, measured by the following formula declines as the degree of leverage increases.

$$K = K_d \times \frac{D}{(D+E)} + K_e \times \frac{E}{(D+E)}$$

This happens because when the degree of leverage increases, K_d which is lower than K_e receives a higher weight in the calculation of K. This can also be illustrated by a graph as shown below:
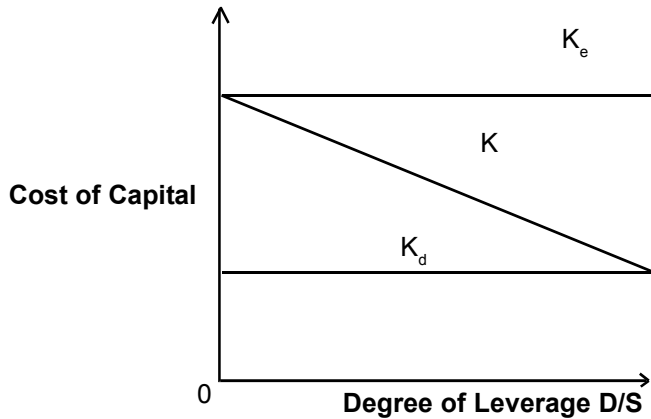
As our assumption is that the cost of debt and equity capital would not change with the change in the level of leverage, K is seen to go down with the increasing proportion of debt in the capital.

Let us take a company that has an investment of ₹ 2,00,000 and a net operating income of ₹ 50,000. It is considering two scenarios: (1) no debt and (2) equal levels of debt and equity of ₹ 1,00,000 each. Let us say that the company finds out that the cost of equity is 12% and the cost of debt is 8%.

Calculations show that equity earnings would be ₹ 50,000 and ₹ 42,000 respectively in the two scenarios and shown below. As the return expected on equity is 12%, we can say that this profit is 12% and therefore the market value of equity would be such that this return becomes 12% on the same. This means that the market value of equity would be ₹ 4,16,667 and ₹ 4,50,000 respectively in the two scenarios. Adding the market value of debt and the market value of equity gives us the total value of the firm in the market.

Equity	Scenario 'A'	Scenario 'B'
Equity	2,00,000	1,00,000
Debt	0	1,00,000
Cost of Equity	12%	12%
Cost of Debt	8%	8%
Net operating income	50,000	50,000
Interest on Debt	0	8,000
Equity earnings	50,000	42,000
Market value of equity	4,16,667	3,50,000
Market value of debt	0	1,00,000
Total Value of firm	4,16,667	4,50,000

Average cost of capital Scenario A: 8% x (0/2,00,000) + 12% x (2,00,000/2,00,000) = 12%

Scenario B: 8% x (1,00,000/4,50,000) + 12% x (3,50,000/4,50,000) = 11.10%

There are two points to be noted here

1. As the cost of capital decreases the value of the firm would go up as it is dependent upon the return expected and the cost of capital. Inverse relationship exists between the value of the firm and cost of capital for any given level of return.

2. This means that as we increase the level of debt in the company, the value of the firm would go up even further. This would mean that the companies would like to employ as much debt as possible.

2. Net Operating Income Approach

Net operating income approach is opposite to the Net income approach. According to NOI Approach, the market value of the firm depends upon the net operating profit or EBIT and the overall cost of capital. The financing mix or the capital structure is irrelevant and does not affect the value of the firm. The NOI Approach makes the following assumptions:

1. The investors see the firm as a whole and thus capitalize the total earnings of the firm to find the value of the firm as a whole.

2. The overall cost of capital K_O, of the firm is constant and depends upon the business risk which also is assumed to be unchanged.

3. The cost of debt, K_d, is also taken as constant.

4. The use of more and more debt in the capital structure increases the risk of the shareholders and thus results in the increase in the cost of equity capital i.e, K_e. The increase in K_e is such as to completely offset the benefits of employing cheaper debt, and

5. There is no taxes.

Under NOI Approach the relationship between the leverage and cost of capital has been represented in the Figure below:
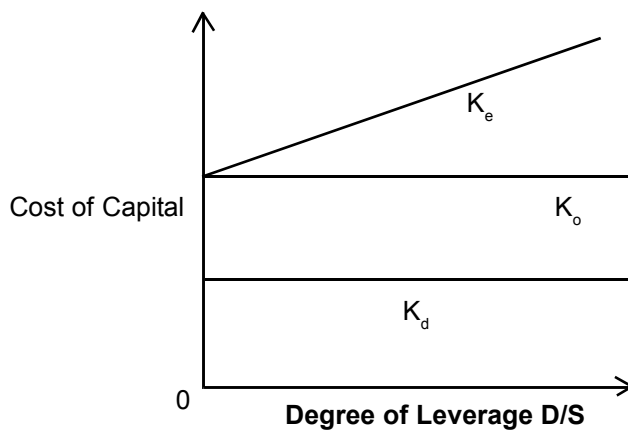
Let us repeat the example we discussed earlier in net income approach. Let us take a company that has an investment of ₹ 2,00,000 and net operating income of ₹ 50,000. It is considering two scenarios: 1) no debt and 2) equal levels of debt and equity of ₹ 100,000 each. Let us assume that the company finds out that the overall cost of capital is 10% and the cost of debt is 8%.

As the return expected on total capital is 10 per cent, therefore the market value of total capital would be such that this return becomes 10 per cent on the same. This means that the market value of capital would be ₹ 5,00,000 in both the scenarios as our assumption in this case is that the total market value remains constant. Also the value of debt would also remain constant as the cost of debt remains constant. This means that the equity capitalization can be calculated by subtracting the market value of debt from the total market value of the firm. Then the return on equity divided by the market capitalization of equity would give us the cost of equity.

Equity	Scenario 'A'	Scenario 'B'
Equity	2,00,000	1,00,000
Debt	0	1,00,000
Cost of Debt	8%	8%
Net operating income	50,000	50,000
Overall Capitalization rate	10%	10%
Total market value	5,00,000	5,00,000
Interest on debt	0	8,000
Debt capitalization rate	0.08	0.08
Market value of debt	0	1,00,000
Market value of equity	5,00,000	4,00,000

There are two points to be noted here:

– As the cost of total capital and debt is constant, the cost of equity would go up or down with increasing or decreasing leverage, i.e., the amount of debt in the capital structure.

– This means that as we increase the level of debt in the company, the value of the firm doesn't change and the company does not benefit by taking on debt. This would mean that the companies would like to employ as much equity as possible so as to reduce the risk of the company.

3. Traditional Approach

The NI Approach and NOI Approach hold extreme views on the relationship between the leverage, cost of capital and the value of the firm. In practical situations, both these approaches seem to be unrealistic. The traditional view takes a compromising view between the two and incorporates the basic philosophy of both. The traditional approach to capital structure suggests that there exist an optimal debt to equity ratio where the overall cost of capital is the minimum and market value of the firm is the maximum. On either side of this point, changes in the financing mix can bring positive change to the value of the firm. Before this point, the marginal cost of debt is less than a cost of equity and after this point vice-versa.

The traditional approach to capital structure advocates that there is a right combination of equity and debt in the capital structure, at which the market value of a firm is maximum. As per this approach, debt should exist in the capital structure only up to a specific point, beyond which, any increase in leverage would result in the reduction in value of the firm.

It means that there exists an optimum value of debt to equity ratio at which the Weighted Average Cost of Capital (WACC) is the lowest and the market value of the firm is the highest. Once the firm crosses that optimum value of debt to equity ratio, the cost of equity rises to give a detrimental effect to the WACC. Above the threshold, the WACC increases and market value of the firm starts a downward movement.

Assumptions under traditional approach:

1. The rate of interest on debt remains constant for a certain period and thereafter with an increase in leverage, it increases.

2. The expected rate by equity shareholders remains constant or increase gradually. After that, the equity shareholders starts perceiving a financial risk and then from the optimal point and the expected rate increases speedily.

3. As a result of the activity of rate of interest and expected rate of return, the WACC first decreases and then increases. The lowest point on the curve is optimal capital structure.

Traditional viewpoint on the relationship between leverage, cost of capital and the value of the firm is displayed in the figure below:
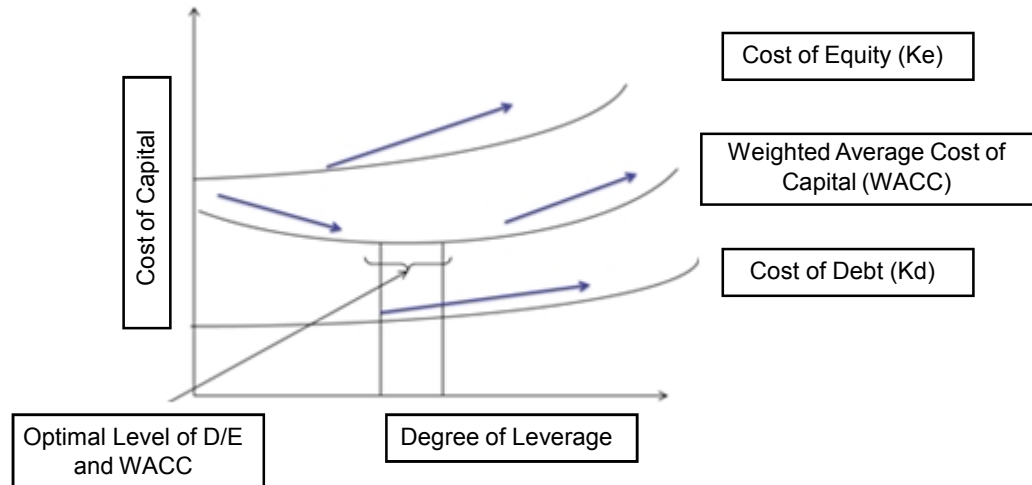
4. Modigliani - Miller Theory

In 1958, Franco Modigliani and Merton Miller (MM) published a theory of modern financial management – they concluded that the value of a firm depends solely on its future earnings stream, and hence its value is unaffected by its debt/equity mix. In short, they concluded that a firm's value stems from its assets, regardless of how those assets are financed.

In their paper, MM began with a very restrictive set of assumptions, including perfect capital markets (which implies zero taxes). And then they used an arbitrage proof to demonstrate that capital structure is irrelevant. Under their assumptions, if debt financing resulted in a higher value for the firm than equity financing, then investors who owned shares in a leveraged (debt-financed) firm could increase their income by selling those shares and using the proceeds, plus borrowed funds, to buy shares in an unleveraged (all equity-financed) firm. The simultaneous selling of shares in the leveraged firm and buying of shares in the unleveraged firm would drive the prices of the stocks to the point where the values of the two firms would be identical. Thus, according to MM Hypothesis, a firm's stock price is not related to its mix of debt and equity financing.

Modigliani and Miller have restated and amplified the net operating income position in terms of three basic propositions. These are as follows:

Proposition – I

The total value of a firm is equal to its expected operating income (PBIT when tax = 0) divided by the discount rate appropriate to its risk class. It is independent of the degree of leverage.

$$V_l = V_u = \frac{EBIT}{K_{ol}} = \frac{EBIT}{K_{ou}}$$

Here the subscript l is used to denote leveraged firm and subscript u is used to denote unleveraged firm.

Since the V (Value of the firm) as established by the above equation is a constant, then under the MM model, when there are no taxes, the value of the firm is independent of its leverage. This implies that the weighted average cost of capital to any firm is completely independent of its capital structure and the WACC for any firm, regardless of the amount of debt it uses, is equal to the cost of equity of unleveraged firm employing no debt.

Proposition – II

The expected yield on equity, K_e is equal to K_o plus a premium. This premium is equal to the debt – equity ratio times the difference between K_o and the yield on debt, K_d. This means that as the firm's use of debt increases its cost of equity also rises, and in a mathematically precise manner.

Proposition – III

The cut-off rate for investment decision making for a firm in a given risk class is not affected by the manner in which the investment is financed. It emphasizes the point that investment and financing decisions are independent because the average cost of capital is not affected by the financing decision.

Example

Let us take the case of two firms X and Y, similar in all respects except in their capital structure. Firm X is financed by equity only; firm Y is financed by a mixture of equity and debt. The financial parameters of the two firms are as follows:

Financial Particulars of Firms X and Y

(Amount in ₹)

Particulars	Firm X	Firm Y
Total Capital Employed	10,00,000	10,00,000
Equity Capital	10,00,000	6,00,000
Debt	Nil	4,00,000
Net operating Income	1,00,000	1,00,000
Debt Interest	0	20,000
Market value of debt	0	4,00,000
Equity earnings	1,00,000	80,000
Equity capitalization rate	10%	12%
Market value of equity	10,00,000	6,66,667
Total market value of the firm	10,00,000	10,66,667
Average cost of capital	10%	9.37%
Debt-Equity ratio	0	0.6

From the above particulars, it can be seen that the value of leverged firm Y is higher than that of the unleveraged firm. According to Modigliani Miller approach, such a situation cannot persist because equity investors would do well to sell their equity investment in firm Y and invest in the equity of firm X with personal leverage. For example, an equity investor who owns 1% equity in firm Y would do well to:

- Sell his equity in Firm Y for ₹ 6,667

- Borrow ₹ 4,000 at 5% interest on personal account and

– Buy 1.0667% of the equity of firm X with the amount of ₹ 10,667 that he has.

Such an action will result in the following income:

Particular	*(₹)*
Income on investment in firm X	1066.70
Less: Interest (4000 x 0.5%)	200.00
Net Income	866.70

This net income of ₹ 866.7 is higher than a net income of ₹ 800 foregone by selling 1 percent equity of firm Y and the leverage ratio is the same in both the cases.

When investors sell their equity in firm Y and buy the equity in firm X with personal leverage, the market value of equity of firm Y tends to decline and the market value of equity of firm X tends to rise. This process continues until the net market values of both the firms become equal because only then the possibility of earning a higher income for a given level of investment and leverage by arbitraging is eliminated. As a result of this the cost of capital for both the firms is the same.

The above example explains that due to the arbitrage mechanism the value of a leveraged firm cannot be higher than that of an unleveraged firm, other things being equal. It can also be proved that the value of an unleveraged firm cannot be higher than that of leveraged firm, other things being equal.

Let us assume the valuation of the two firms X and Y is the other way around and is as follows:

(Amount in ₹)

Particulars	Firm X	Firm Y
Debt Interest	0	20,000
Market Value of debt (Debt capitalisation rate is 5%)	0	4,00,000
Equity earnings	1,00,000	80,000
Equity Capitalisation rate	8%	12%
Market value of equity	12,50,000	6,66,667
Total Market value	12,50,000	10,66,667

If a situation like this arises, equity investors in firm X would do well to sell the equity in firm X and use the proceeds partly for investment in the equity of firm Y and partly for investment in the debt of firm Y. For example, an equity investor who owns 1 percent equity in firm X would do well to:

– Sell his 1% equity in firm X for ₹ 12,500

– Buy 1.01% of the equity and debt in firm Y involving an outlay of ₹ 10,773

Such an action will result in an increase of income by ₹ 1727 without changing the risk shouldered by the investor. When investors resort to such a change, the market value of the equity of firm X tends to decline and the market value of the equity of firm Y tends to rise. This process continues until the total market value of both the firms becomes equal.

CRITICISM OF MM HYPOTHESIS

If the MM theory was correct, managers would not need to concern themselves with capital structure decisions, because such decisions would have no impact on stock prices. However, like most theories, MM's results would hold true only under a particular set of assumptions. Still, by showing the conditions under which capital

structure is irrelevant, MM provided important insights into when and how debt financing can affect the value of a firm.

MM Hypothesis with Corporate Taxes

In 1963, MM added corporate taxes to their model. With corporate taxes considered, a firm's stock price was shown to be directly related to its use to debt financing – higher the percentage of debt financing, the higher the stock price. Under the MM with tax theory, firms should use virtually 100% debt financing. The reason for this result is the corporate tax structure – returns to stockholders come from after-tax earnings, but returns to creditors are paid before tax. The effect of this tax treatment is that more of a company's operating income is left for investors when more debt financing is used.

Empirical evidence Against MM Hypothesis

In spite of the MM arguments, firms do not usually use anywhere close to 100% debt financing. In an attempt to modify MM's model to make it more consistent with actual behaviour, many of their assumptions were relaxed in papers by other authors. In particular, the possibility of financial distress drastically changed the MM results. In the modified model, tax savings cause the value of a firm to rise as more and more debt is used, but at some point (the optimal structure), the value of the firm begins to fall with additional debt because the tax benefits are more than offset by the increasing costs of potential financial distress.

The MM model as modified to include financial distress suggests to managers .

  – that a certain amount of debt is good

  – that too much debt is bad, and

  – that there is an optimal amount of debt for every firm.

Thus, the modified MM theory, which is called the trade-off theory of capital structure, provides useful insights into the factors that affect a firm's optimal capital structure. Here the marginal costs and benefits of debt financing are balanced against one another, and the result is an optimal capital structure that falls somewhere between zero and 100% debt.

EBIT - EPS Analysis

One widely used means of examining the effect of leverage is to analyse the relationship between earnings before interest and taxes (EBIT) and earnings per share (EPS). The use of EBIT – EPS analysis indicates to management the projected EPS for different financial plans. Generally, management wants to maximise EPS if doing so also satisfies the primary goal of financial management - maximisation of the owner's wealth as represented by the value of business, i.e. the value of firm's equity. If the firm attempts to use excessive amounts of debt, shareholders (who are risk - averters) may sell their shares, and thus its price will fall. While the use of large amount of debt may result in higher EPS, it may also result in a reduction in the price of the firm's equity. The optimum financial structure for a firm (that is, the use of debt in relationship of equity and retained earnings as sources of financing) should be the one which maximises the price of the equity.

Given the importance of earnings per share (EPS) as a measure of a firm's performance, analysis of the impact of financing alternatives on EPS is an important first step. Essentially, the method involves the comparison of alternative methods of financing under various assumptions as to EBIT.

Let us assume that a firm has a capital structure of ₹ 1,00,000. The equity capital is of ₹ 100 each and debt carries rate of interest of 10% p.a. We further assume that the firm has the following combination of components of this structure:

Case No.	Equity (%)	Debt (%)
1.	100	0
2.	75	25
3.	50	50
4.	25	75

For calculating the impact on EPS of various levels of EBIT, we take five values of ₹ 5000, ₹ 7,500, ₹ 12,500 and ₹ 15,000. The tax rate is assumed to be 40 %.

(a) If EBIT is ₹ 5,000

Debt Level (%)	0%	25%	50%	75%
EBIT	5,000	5,000	5,000	5,000
Less: Interest	0	(2,500)	(5,000)	(7,500)
PBT	5,000	2,500	0	2,500
Less: Tax @ 40%	2,000	1,000	0	0
PAT	(3,000)	(1,500)	0	(2,500)
Equity Shares	1,000	750	500	250
EPS	3.0	2.0	0	(1.0)

We find that with increasing level of debt in the capital structure, the EPS decreases.

(b) If EBIT is ₹ 7,500

Debt Level (%)	0%	25%	50%	75%
EBIT	7,500	7,500	7,500	7,500
Less: Interest	0	(2,500)	(5,000)	(7,500)
PBT	7,500	5,000	2,500	0
Less: Tax @ 40%	(3,000)	(2,000)	(1,000)	0
PAT	4,500	3,000	1,500	0
Equity Shares	1,000	750	500	250
EPS	4.5	4.0	3.0	0

In this case also, the EPS decreases with increasing level of debt.

(c) If EBIT is ₹ 10,000

Debt Level (%)	0%	25%	50%	75%
EBIT	10,000	10,000	10,000	10,000
Less: Interest	0	(2,500)	(5,000)	(7,500)
PBT	10,000	7,500	5,000	2,500

Less: Tax @ 40%	(4,000)	(3,000)	(2,000)	(1,000)
PAT	6,000	4,500	3,000	1,500
Equity Shares	1,000	750	500	250
EPS	6.0	6.0	6.0	6.0

At this level of EBIT, the EPS remains unchanged irrespective of any change in the capital structure.

(d) If EBIT is ₹ 12,500

Debt Level (%)	0%	25%	50%	75%
EBIT	12,500	12,500	12,500	12,500
Less: Interest	0	(2,500)	(5,000	(7,500)
PBT	12,500	10,000	7,500	5,000
Less: Tax @ 40%	(5,000)	(4,000)	(3,000)	(2,000)
PAT	7,500	6,000	4,500	3,000
Equity Shares	1,000	750	500	250
EPS	7.5	8.0	9.0	12.0

Now we see that EPS increases with increasing level of debt.

(e) If EBIT is ₹ 15,000

Debt Level (%)	0%	25%	50%	75%
EBIT	15,000	15,000	15,000	15,000
Less: Interest	0	(2,500)	(5,000)	(7,500)
PBT	15,000	12,500	10,000	7,500
Less: Tax @ 40%	(6,000)	(5,000)	(4,000)	(3,000)
PAT	9,000	7,500	6,000	4,500
Equity Shares	1,000	750	500	250
EPS	9.0	10.0	12.0	18.0

If we increase the EBIT further, the impact on EPS is better still.

We can conclude from the above illustration that the firm should resort to financing its operations through debt only beyond a threshold or indifference level in order to benefit from tax breaks provided by interest on borrowings. In other words, debt is suitable if the EBIT is expanding rapidly. If the operations are shrinking, it should change its capital structure immediately in favour of equity capital.

The EBIT-EPS analysis of the above illustration can be summarised in the form of following table :

	Debt Levels (%)			
	0%	25%	50%	75%
EBIT	EPS at above levels			
₹ 5,000	3.0	2.0	0	(1.0)
₹ 7,500	4.5	4.0	3.0	0
₹ 10,000	6.0	6.0	6.0	6.0
₹ 12,500	7.5	8.0	9.0	12.0
₹ 15,000	9.0	10.0	12.0	18.0

The indifference point of a firm (EBIT of ₹ 10000 in this case) varies from firm to firm but normally it approximates the breakeven point.

EBITDA ANALYSIS (EARNINGS BEFORE INTEREST, TAX, DEPRECIATION AND AMORTIZATION),

EBITDA, an acronym for "earnings before interest, taxes, depreciation and amortization," is an often-used measure of the value of a business. EBITDA is calculated by taking net income and adding interest, taxes, depreciation and amortization expenses back to it. EBITDA is used to analyze a company's operating profitability before non-operating expenses (such as interest and "other" non-core expenses) and non-cash charges (depreciation and amortization).

Analysis with EBITDA

EBIDTA enables analysts to exclude the impacts of non-operating activities and focus on the outcome of operating decisions. Non-operating activities include interest expenses, tax rates, and large non-cash items such as depreciation and amortization.

By removing the non-operating effects, EBITDA gives investors the ability to focus on the profitability of their operations. This type of analysis is particularly important when comparing similar companies across a single industry.

Limitations of EBITDA

Factoring out interest, taxes, depreciation and amortization can make even completely unprofitable firms appear to be fiscally healthy. The use of EBITDA as measure of financial health made these firms look attractive. EBITDA numbers are easy to manipulate. If fraudulent accounting techniques are used to inflate revenues and interest, taxes, depreciation and amortization are factored out of the equation, almost any company may appears to be profitable and great.

Operating cash flow is a better measure of how much cash a company is generating because it adds non-cash charges (depreciation and amortization) back to net income and includes the changes in working capital that also use or provide cash (such as changes in receivables, payables and inventories). These working capital factors are the key to determining how much cash a company is generating. If investors do not include changes in working capital in their analysis and rely solely on EBITDA, they will miss clues that indicate whether a company is losing money because it isn't making any sales.

Despite various shortcomings, there are some good reasons for using EBITDA.

1. The first factor to consider is that EBITDA can be used as a shortcut to estimate the cash flow available to pay debt on long-term assets, such as equipment and other items with a lifespan measured in decades rather than years. Dividing EBITDA by the amount of required debt payments yields a debt coverage ratio. Factoring out the "ITDA" of EBITDA was designed to account for the cost of the long-term assets

and provide a look at the profits that would be left after the cost of these tools was taken into consideration

2. Another factor is that EBITDA estimate to be reasonably accurate, the company under evaluation must have legitimate profitability. Using EBITDA to evaluate old-line industrial firms is likely to produce useful results. This idea was lost during the 1980s, when leveraged buyouts were fashionable, and EBITDA began to be used as a proxy for cash flow. This evolved into the more recent practice of using EBITDA to evaluate unprofitable dotcoms as well as firms such as telecoms, where technology upgrades are a constant expense.

3. EBITDA can also be used to compare companies against each other and against industry averages. In addition, EBITDA is a good measure of core profit trends because it eliminates some of the extraneous factors and allows a more "apples-to-apples" comparison.

Ultimately, EBITDA should not replace the measure of cash flow, which includes the significant factor of changes in working capital. Remember "cash is king" because it shows "true" profitability and a company's ability to continue operations.

MEASURES OF OPERATING AND FINANCIAL LEVERAGE

The term leverage refers to an increased means of accomplishing some purpose. Leverage is used to lifting heavy objects, which may not be otherwise possible. In the financial point of view, leverage refers to furnish the ability to use fixed cost assets or funds to increase the return to its shareholders.

Definition of Leverage

James Horne has defined leverage as, "the employment of an asset or fund for which the firm pays a fixed cost or fixed return.

Types of Leverage

Leverage can be classified into three major headings according to the nature of the finance mix of the company.

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                        Leverages
                       /         \
                      /           \
           Operating Leverages   Financial Leverage
                      \           /
                       \         /
                     Combined Leverage
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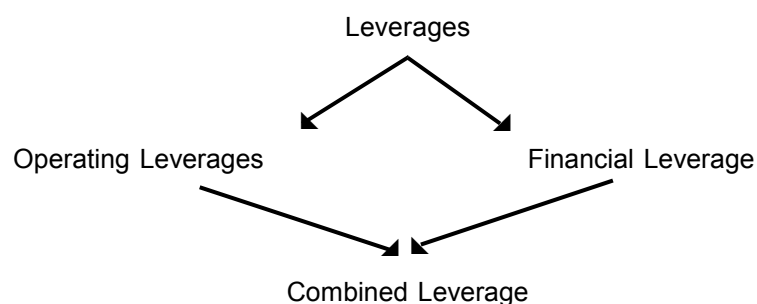
The company may use financial or leverage or operating leverage, to increase the EBIT and EPS.

OPERATING LEVERAGE

The leverage associated with investment activities is called as operating leverage. It is caused due to fixed operating expenses in the company. Operating leverage may be defined as the company's ability to use fixed operating costs to magnify the effects of changes in sales on its earnings before interest and taxes. Operating leverage consists of two important costs viz., fixed cost and variable cost. When the company is said to have a high degree of operating leverage if it employs a great amount of fixed cost and smaller amount of variable cost. Thus, the degree of operating leverage depends upon the amount of various cost structure. Operating leverage can be determined with the help of a break even analysis.

Operating leverage can be calculated with the help of the following formula:

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{Operating Profit (EBIT)}}$$

Degree of Operating Leverage

The degree of operating leverage may be defined as percentage change in the operating income (EBIT) resulting from a percentage change in the sales. It can be calculated with the help of the following formula:

$$\text{DOL} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sale}}$$

Exercise:

From the following selected operating data, determine the degree of operating leverage. Which company has the greater amount of business risk? Why?

Amount in ₹

	Company A (₹)	Company B (₹)
Sales	25,00,000	30,00,000
Fixed costs	7,50,000	15,00,000

Variable expenses as a percentage of sales are 50% for company A and 25% for company B.

Solution

Statement of Profit

Amount in ₹

	Company A	Company B
Sales	25,00,000	30,00,000
Variable cost	12,50,000	7,50,000
Contribution	12,50,000	22,50,000
Fixed cost	7,50,000	15,00,000
Operating Profit	5,00,000	7,50,000

$$Operating\ Leverage = \frac{Contribution}{Operating\ Profit}$$

$$Company\ 'A'\ Operating\ Leverage = \frac{12,50,000}{5,00,000}$$

= 2.5

Similarly for Company B Operating Leverage would be $= \dfrac{22,50,000}{7,50,000} = 3$

Comments

Operating leverage for Company B is higher than that of Company A ; Company B has a higher degree of operating risk. The tendency of operating profit may vary proportionately with sales, is higher for Company B as compared to Company A.

Uses of Operating Leverage

Operating leverage is one of the techniques to measure the impact of changes in sales which lead for change in the profits of the company. If any change in the sales, it will lead to corresponding changes in profit. Operating leverage helps to identify the position of fixed cost and variable cost.

Operating leverage measures the relationship between the sales and revenue of the company during a particular period. Operating leverage helps to understand the level of fixed cost which is invested in the operating expenses of business activities. It describes the overall position of the fixed operating cost.

FINANCIAL LEVERAGE

A leverage activity with financing activities is called financial leverage. Financial leverage represents the relationship between the company's earnings before interest and taxes (EBIT) or operating profit and the earning available to equity shareholders.

Financial leverage is defined as "the ability of a firm to use fixed financial charges to magnify the effects of changes in EBIT on the earnings per share". It involves the use of funds obtained at a fixed cost in the hope of increasing the return to the shareholders. "The use of long-term fixed interest bearing debt and preference share capital along with share capital is called financial leverage or trading on equity".

Financial leverage may be favourable or unfavourable depends upon the use of fixed cost funds.

Favourable financial leverage occurs when the company earns more on the assets purchased with the funds, then the fixed cost of their use. Hence, it is also called as positive financial leverage.

Unfavourable financial leverage occurs when the company does not earn as much as the funds cost. Hence, it is also called as negative financial leverage.

Financial leverage can be calculated with the help of the following formula:

$$\text{Financial Leverage} = \frac{\text{Operating Profit (EBIT)}}{\text{Profit Before Tax}}$$

Degree of Financial Leverage

Degree of financial leverage may be defined as the percentage change in taxable profit as a result of percentage change in earnings before interest and tax (EBIT). This can be calculated by the following formula :-

$$\text{DFL} = \frac{\text{Percentage change in taxable Income}}{\text{Percentage change in operating income}}$$

Alternative Definition of Financial Leverage

According to **Gitmar**, "financial leverage is the ability of a firm to use fixed financial changes to magnify the effects of change in EBIT and EPS".

$$\text{DFL} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}}$$

Example

A Company has the following capital structure :

Particulars	₹
Equity share capital	1,00,000
10% Preference share capital	1,00,000
8% Debentures	1,25,000

The present EBIT is ₹ 50,000. Calculate the financial leverage assuming that the company is in 50% tax bracket.

Solution

Statement of Profit	₹
Earnings before Interest and Tax (EBIT) or operating profit	50,000
Less: Interest on Debenture (1,25,000 × $\frac{8}{100}$)	(10,000)
Earnings before Tax (EBT)	40,000
Income Tax	(20,000)
Profit	20,000

Financial leverage = $\frac{\text{Operating Profit (OP)}}{\text{Profit before Tax (PBT)}}$

$= \frac{50,000}{40,000}$

$= 1.25$

Uses of Financial Leverage

Financial leverage helps to examine the relationship between EBIT and EPS.

Financial leverage measures the percentage of change in taxable income to the percentage change in EBIT. Financial leverage locates the correct profitable financial decision regarding capital structure of the company. Financial leverage is one of the important devices which is used to measure the fixed cost proportion with the total capital of the company. If the firm acquires fixed cost funds at a higher cost, then the earnings from those assets, the earning per share and return on equity capital will decrease. The impact of financial leverage can be understood with the help of the following exercise.

Example

XYZ Ltd. decides to use two financial plans and they need ₹ 50,000 for total investment.

Particulars	Plan A	Plan B
Debenture (interest at 10%)	₹ 40,000	₹10,000
Equity share (₹ 10 each)	₹ 10,000	₹40,000
Total investment needed	₹ 50,000	₹ 50,000
Number of equity shares	50,000	1,000

The earnings before interest and tax are assumed at ₹ 5,000, and 12,500. The tax rate is 50%. Calculate the EPS.

Solution

When EBIT is ₹ 5,000

Particulars	Plan A	Plan B
Earnings before interest and tax (EBIT)	₹ 5,000	₹ 5,000
Less : Interest on debt (10%)	₹ 4,000	₹ 1,000
Earnings before tax (EBT)	₹ 1,000	₹ 4,000
Less : Tax at 50%	₹ 500	₹ 2,000
Earnings available to equity shareholders.	₹ 500	₹ 2,000
No. of equity shares	1,000	4,000
Earnings per share (EPS) Earnings/No. of equity shares	₹ 0.5	₹ 0.5

When EBIT is ₹ 12,500

Particulars	Plan A	Plan B
Earnings before interest and tax (EBIT)	₹ 12,500	₹ 12,500
Less : Interest on debt (10%)	₹ 4,000	₹ 1,000
Earnings before tax (EBT)	₹ 8,500	₹ 11,500
Less : Tax at 50%	₹ 4,250	₹ 5,750
Earnings available to equity shareholders.	₹ 4,250	₹ 5,750
No. of equity shares	1,000	4,000
Earnings per share (EPS) Earnings/No. of equity shares	₹ 4.25	₹ 1.44

DIFFERENCE BETWEEN OPERATING LEVERAGE AND FINANCIAL LEVERAGE

Sl. No	Operating Leverage	Financial Leverage
1	Operating leverage is associated with investment activities of the company.	Financial leverage is associated with financing activities of the company.
2	Operating leverage consists of fixed operating expenses of the company.	Financial leverage consists of operating profit of the company.
3	It represents the ability to use fixed operating cost.	It represents the relationship between EBIT and EPS
4	Operating leverage can be calculated by	Financial leverage can be calculated by
5	A percentage change in the profits resulting from a percentage change in the sales is called as degree of operating leverage.	A percentage change in taxable profit is the result of percentage change in EBIT.
6	Trading on equity is not possible while the company is operating leverage.	Trading on equity is possible only when the company uses financial leverage.

7	Operating leverage depends upon fixed cost and variable cost.	Financial leverage depends upon the operating profits.
8	Tax rate and interest rate will not affect the operating leverage.	Financial leverage will change due to tax rate and interest rate.

Financial BEP

It is the level of EBIT which covers all fixed financing costs of the company. It is the level of EBIT at which EPS is zero.

Indifference Point

It is the point at which different sets of debt ratios (percentage of debt to total capital employed in the company) gives the same EPS.

COMBINED LEVERAGE

When the company uses both financial and operating leverage to magnification of any change in sales into a larger relative changes in earning per share. Combined leverage is also called as composite leverage or total leverage.

Combined leverage expresses the relationship between the revenue in the account of sales and the taxable income.

Combined leverage can be calculated with the help of the following formulas:

$$DCL = DOL \times DFL = \frac{Contribution}{EBIT} \times \frac{EBIT}{PBT} = \frac{Contribution}{PBT}$$

Degree of Combined Leverage

The percentage change in a firm's earning per share (EPS) results from one percent change in sales. This is also equal to the firm's degree of operating leverage (DOL) times its degree of financial leverage (DFL) at a particular level of sales.

Degree of combined leverage = $\dfrac{\text{Percentage change in EPS}}{\text{Percentage change in sales}}$

Example

Kumar Company has sales of ₹ 25,00,000. Variable cost of ₹ 15,00,000 and fixed cost of ₹ 5,00,000 and debt of ₹ 12,50,000 at 8% rate of interest. Calculate combined leverage.

Solution

Statement of Profit

Amount in ₹

Sales		25,00,000
Less:	Variable cost	(15,00,000)
	Contribution	10,00,000
Less:	Fixed cost	(5,00,000)
	Operating Profit	5,00,000

Combined leverage =Operating leverage x Financial leverage

Calculation of operating leverage

$$\frac{\text{Contribution}}{\text{Operating Profit}} = \frac{10,00,000}{5,00,000} = 2$$

Calculation of financial leverage

Earning before Interest and Tax (EBIT)	₹ 5,00,000
Less: Interest on Debenture (8% of 12,50,000)	(₹ 1,00,000)
Earnings before Tax	₹ 4,00,000

$$Financial\ Leverage = \frac{EBIT}{EBT}$$

$$Financial\ Leverage = \frac{5,00,000}{4,00,000}$$

$$= 1.25$$

Combined leverage = 2 × 1.25 = 2.5

WORKING CAPITAL LEVERAGE

One of the new models of leverage is working capital leverage which is used to locate the investment in working capital or current assets in the company.

Working capital leverage measures the sensitivity of return in investment of charges in the level of current assets.

$$\text{Working Capital Leverage} = \frac{\text{Percentage Change in ROI}}{\text{Percentage Change in Working Capital}}$$

If the earnings are not affected by the changes in current assets, the working capital leverage can be calculated with the help of the following formula.

$$Working\ Capital\ Leverage = \frac{CA}{TA + DCA}$$

where,

CA = Current Assets

TA = Total Assets

DCA = Changes in the level of Current Assets

Example

The following information is available for two companies.

You are required to compare the sensitivity earnings of the two companies for 30% change in the level of their current assets.

Solution

$$Working\ Capital\ Leverage = \frac{CA}{TA + DCA}$$

	X Ltd.	Y Ltd.
Fixed Assets	₹ 4,00,000	₹ 1,00,000
Current Assets	₹ 10,00,000	₹ 4,00,000
Total Assets	₹ 14,00,000	₹ 14,00,000
Earnings before interest and taxes	₹ 1,50,000	₹ 1,50,000

$$Working\ Capital\ Leverage\ for\ Company\ X\ =\ \frac{10,00,000}{14,00,000 - 3,00,000}$$

$$=\ \frac{10,00,000}{11,00,000}$$

$$=\ 0.90$$

$$Working\ Capital\ Leverage\ for\ Company\ Y\ =\ \frac{4,00,000}{14,00,000 - 1,20,000}$$

$$=\ \frac{4,00,000}{12,80,000}$$

$$=\ 0.3125$$

EFFECTS OF LEVERAGE ON SHAREHOLDERS' RETURNS

Financial plan is one of the vital decisions of a firm because a financial plan affects the market value, cost of capital and shareholders return of a firm. The Proportion of Debt to Equity in the financial plan of a firm is called leverage. Since optimal debt ratio influences a firm's market value and shareholder's return, different firms use different debt ratio at different levels to maximize market value and shareholders return. Leverage has statistically significant effect on the shareholders' return and proper management of leverage can maximize the value of EPS.

1. Operating Leverage Effect : % Change in EBIT is more than % Change in Sale

If % change of earning before interest and tax is more than % change in sale, this operating leverage will effect ROE positively because at this level, per unit fixed cost will decrease and small increase in sale will boost EBIT.

If EBIT will increase, ROE will also increase. Operating Leverage indicates, how will EBIT change if sales changes. 2:1 ratio of operating leverage means 100% increase in sales will increase EBIT by 200%. As interest is fixed cost, so ROE will increase.

A. Situation: **High Operating Leverage:**

Too high operating leverage is not good, it may be highly risky.

B. Situation: Low Operating Leverage:

Low operating leverage may be useful when sale market is fluctuating.

2. Operating Leverage Effect : % Change in EBIT is less than % Change in Sale

Now we see the second face when % changes of EBIT is less than % changes in sales, it means 200% increase in sales will increase EBIT by only 100% if operating leverage is 1:2. This situation is less effective for enhancing ROE.

3. Effect of Financial Leverage on ROE

If we have to check real effect of leverage on ROE, we have to study financial leverage. Financial leverage refers to the use of debt to acquire additional assets. Financial leverage may decrease or increase return on equity in different conditions.

A. Situation: High Financial Leverage:

Financial over-leveraging means incurring a huge debt by borrowing funds at a lower rate of interest and utilizing the excess funds in high risk investments in order to maximize returns.

B. Situation: Low Financial Leverage:

Financial low-leveraging means incurring a low debt by borrowing funds. It may affect positively, if decrease the value of bought asset with this low debt.

4. Effect of High Operating leverage and High Financial Leverage

It will increase ROE but it is highly risky also.

5. Effect of Low Operating leverage and High Financial Leverage

It is optimum combination for bringing optimum return on equity.

RISK AND LEVERAGE

Risk is the probability that the future revenue streams of a firm shall show a variation from the expected figures. The variation is normally on the negative or the lower side because a positive variation reduces the investment risk and a reduction of risk is always welcome.

For linkage with leverage, we can divide risk into two broad categories, i.e. business risk and financial risk. Business risk pertains to risks associated with day to day operations of the firm. For example, decisions made regarding purchase of raw materials, manufacturing expenses and administrative expenses, etc. change the business risk profile of the firm. These decisions have an impact upon the operational profitability of the firm, i.e. the profits before interest and taxes. Financial risk, on the other hand, is associated with introduction of fixed interest bearing debt obligations in the capital structure of the firm. These obligations create a prior charge on EBIT before distribution of post tax profits among the owners.

The distinction between business risk and financial risk can be clarified through the following illustration:

ABC Company Limited

Profit and Loss Statement for the year ended 31.03.2012

(Amount in ₹ Lacs)

(a) Net Sales	8,500	
(b) Cost of goods Sold	5,000	(1)
(c) Gross Profit	3,500	
(d) Selling Expenses	1,500	(2)
(e) EBIT	2,000	(3)

Business risk is associated with the impact of item no. (3) above of changes in item nos. (1) and (2). The "Cost of goods sold" item consists of cost of raw materials, labour cost, factory rent and other manufacturing expenses. Out of these elements, labour cost and factory rent are fixed costs while the rest are variable depending upon the level of sales. Now if the fixed costs are increased the expectation would be that the sales would rise in anticipated proportion. However if the sales do not rise as anticipated, business risk of the firm increases.

Uptill now we have assumed that the firm has no debt and as such, no interest cost. Let us assume that the firm raises debt with yearly interest payment of ₹ 500 lacs. The Profit & loss account would now be extended as shown below:

Sr. No.	Particulars	Amount (₹ in lakh)	
(a)	EBIT	2,000	
(b)	Interest	500	(4)
(c)	Profit before tax	1,500	
(d)	Tax @ 40%	600	
(e)	Profit after Tax	900	(5)

Now item no. (5) i.e. profit after tax is dependent on interest payments which are fixed. If EBIT decreases as a result of changes in items (1) and (2) and item no. (4) remains the same, the venture would become riskier as an additional element of financial risk has been built in. The change in risk profile of the firm has been caused by change in its leverage. The changes in fixed labour costs and factory rent are referred to as changes in operating leverage while the changes in fixed interest costs are described as changes in financial leverage.

A firm has operating leverage when it can expand output and sales without a proportionate increase in fixed costs. Let us assume that in our earlier illustration, cost of sales has the following break-up:

Cost of raw materials	₹ 2,500
Labour Cost	₹ 500
Factory rent	₹ 500
Other manufacturing costs	₹ 1,500

Labour cost and factory rent are fixed costs for running the factory for manufacturing, say, 1,00,000 units of the product. The firm now plans to expand the capacity to 2,00,000 units in the same factory by increasing the number of factory labour and installation of new machinery. The profit and loss account under the two levels of capacity would now read as under:

Amount in ₹

Sr. No.	Particulars	Capacity (100000 units)	Capacity (200000 units)
1.	Net Sales	8,500	17,000
2.	Cost of raw material	2,500	5,000
3.	Labour cost	500	1,000
4.	Factory rent	500	500
5.	Other mfg. Costs	1,500	2,500
6.	Gross profit	3,500	8,000
7.	Selling Expenses	1,500	2,500
8.	EBIT	2,000	5,500
9.	Tax @ 40%	800	2,200
10.	Profit after tax	1,200	3,300

We see that while net sales have increased by 100%, the EBIT has increased by 175%, thanks to the operating leverage provided by the fixed factory rent and the fixed component of manufacturing expenses and selling expenses, which we assume to be ₹ 500 lacs each.

Now, if due to recessionary conditions, capacity utilisation of the factory is reduced to 50% and 40% in two subsequent years respectively, profitability of the firm would change as under:

Amount in ₹

Sr. No	Particulars	Capacity 50%	Capacity 40%
1.	Net Sales	8,500	6,800
2.	Cost of raw material	2,500	2,000
3.	Labour cost	1,000	1,000
4.	Factory rent	500	500
5.	Other mfg. Costs	1,500	1,300
6.	Gross profit	3,000	2,000
7.	Selling Expenses	1,500	1,300
8.	EBIT	1,500	700
9.	Tax @ 40%	600	280
10.	Profit after tax	900	420

We see that the fall in EBIT is much sharper than the decline in sales. This has happened due to operating leverage.

Let us assume that the firm decides to move from rented factory premises to own premises. This is achieved by borrowing a sum of ₹ 15 crores from the bank carrying fixed interest of 12% p.a. The capacity is also simultaneously doubled. The comparative profit & loss figures shall now read as under:

Amount in ₹

Sr. No.	Particulars	Original Capacity	Double Capacity
1.	Net Sales	8,500	17,000
2.	Cost of raw material	2,500	5,000
3.	Labour cost	500	1,000
4.	Other mfg. Costs	1,500	2,500
5.	Gross profit	4,000	8,500
6.	Selling Expenses	1,500	2,500
7.	EBIT	2,500	6,000
8.	Interest	180	180
9.	Profit before tax	2,320	5,820
10.	Tax @ 40%	928	2,328
11.	Profit after tax	1,392	3,492

By creating financial leverage, the firm has not only ensured rise in EBIT but in PAT as well. But at the same time, it has increased its financial risk, i.e. the risk of default on repayment of loan amount and the interest on loan.

Now let us see how financial leverage impacts the performance of the firm in recessionary conditions:

Amount in ₹

Sr. No.	Particulars	Original Capacity	Double Capacity
1.	Net Sales	8,500	6,800
2.	Cost of raw material	2,500	2,000
3.	Labour cost	1,000	1,000
4.	Other mfg. Costs	1,500	1,300
5.	Gross profit	3,500	2,500
6.	Selling Expenses	1,500	1,300
7.	EBIT	2,000	1,200
8.	Interest	180	180
9.	Profit before tax	1,820	1,020
10.	Tax @ 40%	728	408
11.	Profit after tax	1,112	612

We can see that in case of financial leverage, the impact on PAT upon reduction in capacity utilisation is much severe. The degree of financial leverage can be calculated by the rate of change of PAT for a one percent change in sales.

Relationship between Financial Risk and Financial Leverage

As the financial leverage increases, the breakeven point of the company increases and the company now has to sell more of its product (or service) in order to break even. High financial leverage increases the risk to banks and other lenders because of the higher probability of bankruptcy and the risk to stockholders because greater losses may be incurred if the company goes bankrupt. Increase in financial leverage, increases the risk to stockholders because the higher leverage will cause greater volatility in earnings and greater volatility in the stock price.

SOME CASE STUDIES

Example No. 1: Calculate the operating, financial and combined leverage under situations 1 and 2 and the financial plans for X and Y respectively from the following information relating to the operating and capital structure of a company, and also find out which gives the highest and the least value ? Installed capacity is 5000 units. Annual Production and sales at 60% of installed capacity.

Selling price per unit ₹ 25

Variable cost per unit ₹ 15

Fixed cost:

Situation 1   : ₹ 10,000

Situation 2   : ₹ 12,000

Capital structure:

	Financial Plan	
	X(₹)	Y (₹)
Equity	25,000	50,000
Debt (10%)	50,000	25,000
	75,000	75,000

Solution

Annual production and sales 60% of 5,000 = 3000 Unit

	₹
Contribution per Unit	25
Selling Price	15 Per Unit
Per Unit Variable Price	10 Per Unit

Total contribution is 3000 Units × ₹ 10 = ₹ 30,000

Computation of leverage.   Amount in ₹

	PLAN- X		PLAN- Y	
	Situation 1	Situation 2	Situation 1	Situation 2
Contribution	30,000	30,000	30,000	30,000
Fixed cost	10,000	12,000	10,000	12,000
operating Profit or EBIT	20,000	18,000	20,000	18,000
Interest on Debts				
10% of 50,000	5,000	5,000		
10% of 25,000			2,500	2,500
Earnings before Tax	15,000	13,000	17,500	15,500
Operating Leverage (Contribution/EBIT)	1.50	1.67	1.5	1.67
Financial Leverage (EBIT/EBT)	1.33	1.38	1.14	1.16
(iii) Combined leverage (OL X FL)	2.00	2.31	1.71	1.94

Highest and least value of combined leverage. Highest Value = 2.31 under situation 2 plan X. Least Value = 1.71 under situation 1 plan Y.

Example No. 2. XYZ' company has a choice of the following three financial plans. You are required to calculate the financial leverage in each case

	Plan I	**Plan II**	**Plan III**
Equity capital	₹ 2,000	₹ 1,000	₹ 3,000
Debt	₹ 2,000	₹ 3,000	₹ 1,000
EBIT	₹ 400	₹ 400	₹ 400

Interest @10% per annum on debts in all cases.

Solution *Amount in ₹*

	Plan I	**Plan II**	**Plan III**
EBIT	400	400	400
Less Interest-(I)	200	300	100
EBT	200	100	300
FL (EBIT/EBT)	2	4	1.33

Example No. 3. Calculate operating leverage and financial leverage under situations A, B and C and financial plans 1, 2 and 3 respectively from the following information relating to the operating and financial leverage which give the highest value and the least value.

Installed capacity (units)	1,200
Actual production and sales (units)	800
Selling price per unit (₹)	15
Variable cost per unit (₹)	10
Fixed costs (₹) Situation A	1,000
Situation B	2,000
Situation C	3,000

	Financial Plan		
Sources of Fund	1	2	3
Equity	₹ 5,000	₹ 7,500	₹ 2,500
Debt	₹ 5,000	₹ 2,500	₹ 7,500
Cost of debt	12 per cent per annum		

Solution *Amount in ₹*

	A	B	C
S – VC	4,000	4,000	4,000
EBIT	3,000	2,000	1,000
Degree of Operative Leverage = (S – VC)/EBIT	1.33	2	4

FINANCIAL LEVERAGE

Situation A	1	2	3
EBIT	3,000	3,000	3,000
Less : Interest	600	300	900
EBT	2,400	2,700	2,100
Financial Leverage	1.25	1.11	1.43

Situation B

EBIT	2,000	2,000	2,000
Less : Interest	600	300	900
EBT	1,400	1,700	1,100
Financial Leverage	1.43	1.18	1.82

Situation C

EBIT	1,000	1,000	1,000
Less : Interest	600	300	900
EBT	400	700	100
Financial Leverage	2.5	1.43	10

LESSON ROUND-UP

– Capital Structure of a firm is a reflection of the overall investment and financing strategy of the firm. It shows how much reliance is being placed by the firm on external sources of finance and how much internal accruals are being used to finance expansions.

– Optimal capital structure means arrangement of various components of the structure in tune with both the long-term and short term objectives of the firm.

– The four Capital Structure Theories are—Net Income Approach, Net Operating Income Approach, Traditional Approach and Modigliani Miller Approach.

– Net income approach provides that the cost of debt capital, K_d and the cost of equity capital K_e remains unchanged when the degree of leverage, varies.

– Net Operating Income approach states that cost of the capital for the whole firm remains constant, irrespective of the leverage employed in the firm.

– Traditional Approach to capital structure advocates that there is a right combination of equity and debt in capital structure, at which market value of the firms is maximum.

– Modigliani and Miller have restated the net operating income position in terms of three basic propositions:

Proposition I – The total value of a firm is equal to its expected operating income divided by the discount rate appropriate to its risk class.

Proposition II – The expected yield on equity, Ke is equal to Ko plus a premium.

Proposition III – The cut off rate for investment decision making for a firm in a given risk class is not affected by the manner in which the investment is financed.

– Leverage refers to relationship between two variables as reflected in a unit change in one variable consequent upon a unit change in another variable.

– Two major types of Leverages are: Financial leverage and operating leverage.

– Financial leverage measures the extent to which the cost of project has been funded by borrowed money as compared to owner's equity.

– EBIT –EPS Analysis indicates the projected EPS for different financial plans.

SELF-TEST QUESTIONS

(These are meant for re-capitulation only. Answers to these questions are not to be submitted for evaluation)

1. What is the significance of capital structure? Describe its various kinds.

2. What points need to be kept in mind while deciding the capital structure of a firm?

3. Describe the process of planning and designing of capital structure.

4. Briefly discuss the theories of capital structure.

5. Illustrate the difference between operating leverage and financial leverage.

6. What factors determine the cost of capital?

7. Explain the various types and leverages and their significance in financial decision making.

Lesson 4
Sources of Raising Long Term Finance and Cost of Capital

LESSON OUTLINE

– Meaning and Purpose of Long Term Finance

– Sources of Long Term Finance

– Meaning of Cost of Capital

– Factors Affecting Cost of Capital

– Measurement of Cost of Capital

    (a) Cost of redeemable debt

    (b) Cost of irredeemable debt

    (c) Cost of irredeemable preference shares

    (d) Cost of redeemable Preference Share

    (e) Cost of Equity

– Weighted Average Cost of Capital

– Marginal Cost of Capital

– LESSON ROUND UP

– SELF TEST QUESTIONS

LEARNING OBJECTIVES

Cost of capital is very important aspect of corporate finance which decides the fate of various investment decisions. Cost of capital is an integral part of investment decision as it is used to measure the worth of investment proposal provided by the business concern. It is used as a discount rate in determining the present value of future cash flows associated with capital projects. Cost of capital is also called as cut-off rate, target rate, hurdle rate and required rate of return. When the firms are using different sources of finance, the finance manager must take careful decision with regard to the cost of capital; because it is closely associated with the value of the firm and the earning capacity of the firm.

The objective of this lesson is to enable the students to learn about

    – Sources of Long Term Finance

    – The factors affecting the cost of capital of accompany

    – Calculation of cost of capital of for different sources of finance

    – Calculation of Weighted Cost of Capital

    – Calculation of Marginal cost of Capital

Cost of a capital of a company is not only important financing decision but it very important in deciding the capital structure of a company and various important financial decisions.

INTRODUCTION

Finance is the life blood of business. It is of vital significance for modern business which requires huge capital. Funds required for a business may be classified as long term and short term. In this chapter we will discuss about long term sources of finance. Finance for a long period is required for purchasing fixed assets like land and building, machinery etc. Even a portion of working capital, which is required to meet day to day expenses, is of a permanent nature. To finance it we require long term capital. The amount of long term capital depends upon the scale of business and nature of business.

Features of Long-term finance

- It involves financing for fixed capital required for investment in fixed assets
- it is obtained from Capital Market
- Long term sources of finance have a long term impact on the business
- Generally used for financing big projects, expansion plans, increasing production, funding operations.

LONG TERM FINANCE – ITS MEANING AND PURPOSE

A business requires funds to purchase fixed assets like land and building, plant and machinery, furniture etc. These assets may be regarded as the foundation of a business. The capital required for these assets is called fixed capital. A part of the working capital is also of a permanent nature. Funds required for this part of the working capital and for fixed capital is called long term finance.

Purpose of long term finance:

Long term finance is required for the following purposes:

1. **To Finance fixed assets :**

   Business requires fixed assets like machines, building, furniture etc. Finance required to buy these assets is for a long period, because such assets can be used for a long period and are not for resale.

2. **To finance the permanent part of working capital:**

   Business is a continuing activity. It must have a certain amount of working capital which would be needed again and again. This part of working capital is of a fixed or permanent nature. This requirement is also met from long term funds.

3. **To finance growth and expansion of business:**

   Expansion of business requires investment of a huge amount of capital permanently or for a long period.

FACTORS DETERMINING LONG-TERM FINANCIAL REQUIREMENTS

The amount required to meet the long term capital needs of a company depend upon many factors. These are:

(a) **Nature of Business:** The nature and character of a business determines the amount of fixed capital. A manufacturing company requires land, building, machines etc. So it has to invest a large amount of capital for a long period. But a trading concern dealing in, say, washing machines will require a smaller amount of long term fund because it does not have to buy building or machines.

(b) **Nature of goods produced**: If a business is engaged in manufacturing small and simple articles it will require a smaller amount of fixed capital as compared to one manufacturing heavy machines or heavy consumer items like cars, refrigerators etc. which will require more fixed capital.

(c) **Technology used**: In heavy industries like steel the fixed capital investment is larger than in the case of a business producing plastic jars using simple technology or producing goods using labour intensive technique.

SOURCES OF LONG TERM FINANCE

The two main sources of long term finance are as follows:

(A) Ownership Capital
- Equity share capital
- Preference share capital
- Retained earnings

(B) Borrowed capital
- Debentures
- Term loans
- Others
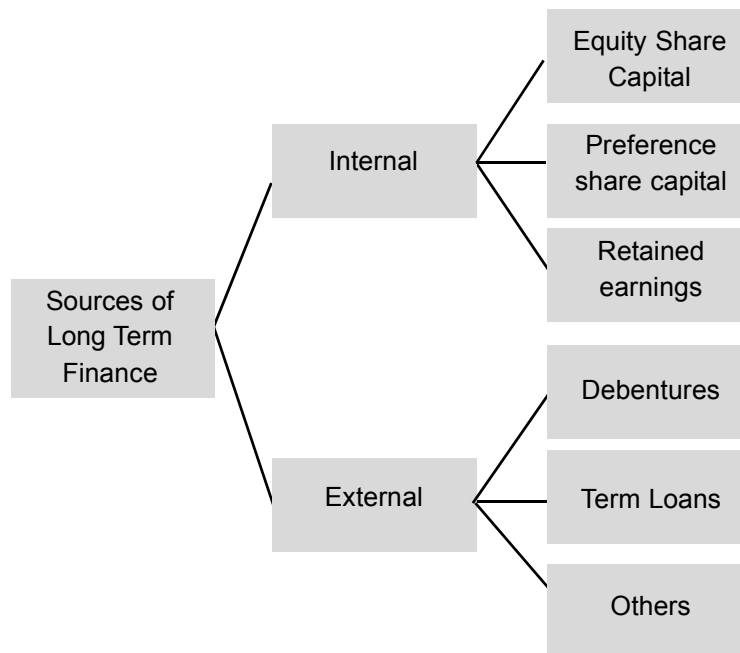
Owner's capital

1. Equity share capital

It represents the investment made by the owners of the business. They enjoy the rewards and bear the risks of the ownership. They are paid dividend only after paying dividend to preference shareholders and after meeting the future investment needs of the organisation.

2. Preference share capital

It represents the investment made by preference shareholders. Preference share holders as the name suggests enjoy preference over payment of dividend. The dividend paid on these shares is generally at a fixed rate.

3. Retained earnings

It represents the earnings not distributed to shareholders. A firm may retain a portion or whole of its profits and utilize it for financing its projects.

Borrowed Capital

1. Debentures

Debenture capital is a financial instrument for raising long term debt capital. A debenture holder is a

creditor of the company. A fixed rate of interest is paid on debentures. It may be convertible or Non-convertible.

Non-convertible debentures - these are straight debt instrument carrying a fixed rate and have a maturity period of 5-9 years. If interest is accumulated it has to be paid by the company by liquidation of its assets. It is an economical method of raising funds. Debenture holders do not have any voting rights and there is no dilution of ownership. They cannot be converted into equity shares.

Convertible debentures - convertible debentures are debentures which are convertible wholly or partly into equity shares after a fixed period of time.

2. **Term loans from banks:** Many industrial development banks, cooperative banks and commercial banks grant medium term loans for a period of three to five years. Commercial banks usually provide short-term finance to business firms in the form of loans and advances, cash credit, overdraft etc. But now-a-days, most of the commercial banks have also started term lending (long and medium term) and providing need based finance of different time periods to firms of all sizes.

3. **Loan from financial institutions:** There are many specialised financial institutions established by the Central and State governments which give long term loans at reasonable rate of interest. Some of these institutions are: Industrial Finance Corporation of India (IFCI), Industrial Development Bank of India (IDBI), Industrial Investment Bank of India (IIBI), Infrastructure Development Finance Company Ltd. (IDFC), Small Industries Development Bank of India (SIDBI), State Industrial Development Corporations (SIDCs), Industrial Credit and Investment Corporation of India (ICICI), Unit Trust of India (UTI), State Finance Corporations (SFCs) etc. The main functions of these institutions are:

   (i) to grant loans for a longer period to industrial establishment;

   (ii) to help the establishment of business units that require large amount of funds and have long gestation period;

   (iii) to provide support for the speedy development of the economy in general and backward regions in particular;

   (iv) to offer specialized services operating in the areas of promotion, project assistance, technical assistance services and training and development of entrepreneurs;

   (v) to provide technical and professional management services and help in identification, evaluation and execution of new projects.

4. **Foreign Sources**: Foreign Sources also play an important part in meeting the long-term financial needs of the business in India. These usually take the form of (1) external borrowings; (2) foreign investments and; (3) deposits from NRIs.

COST OF CAPITAL

The cost of capital is the required rate of return that a firm must achieve in order to cover the cost of generating funds in the marketplace. It is used to evaluate new projects of a company as it is the minimum return that investors expect for providing capital to the company, thus setting a benchmark that a new project has to meet.

Meaning of Cost of Capital

Cost of capital is the rate of return that a firm must earn on its project investments to maintain its market value and attract funds.

Cost of capital is the required rate of return on its investments which belongs to equity, debt and retained earnings. If a firm fails to earn return at the expected rate, the market value of the shares will fall and it will result in the reduction of overall wealth of the shareholders.

Definitions of the Term Cost of Capital

The following important definitions are commonly used to understand the meaning and concept of the cost of capital.

According to the definition of **John J. Hampton** "Cost of capital is the rate of return the firm required from investment in order to increase the value of the firm in the market place"

According to the definition of **Solomon Ezra**, "Cost of capital is the minimum required rate of earnings or the cut-off rate of capital expenditure".

According to the definition of **James C. Van Horne**, Cost of capital is "A cut-off rate for the allocation of capital to investment of projects. It is the rate of return on a project that will leave unchanged the market price of the stock".

According to the definition of **William and Donaldson**, "Cost of capital may be defined as the rate that must be earned on the net proceeds to provide the cost elements of the burden at the time they are due".

Assumption of Cost of Capital

Cost of capital is based on certain assumptions which are closely associated while calculating and measuring the cost of capital. It is to be considered that there are three basic concepts:

A. It is not a cost as such. It is merely a hurdle rate.

B. It is the minimum rate of return.

C. It consists of three important risks such as zero risk level, business risk and financial risk. Cost of capital can be measured with the help of the following equation.

$$K = r_j + b + f.$$

Where,

K = Cost of capital.

r_j = The riskless cost of the particular type of finance, b = The business risk premium.

f = The financial risk premium.

IMPORTANCE OF COST OF CAPITAL

Computation of cost of capital is a very important part of the financial management to decide the capital structure of the business concern.

1. *Importance to Capital Budgeting Decision*; Capital budgeting decision largely depends on the cost of capital of each source. According to net present value method, present value of cash inflow must be more than the present value of cash outflow. Hence, cost of capital is used to make capital budgeting decision.

2. *Importance to Capital Structure Decision:* Capital structure is the mix or proportion of the different kinds of long term securities. A firm uses particular type of sources if the cost of capital is suitable. Hence, cost of capital helps to take decision regarding structure.

3. *Importance to Evolution of Financial Performance:* Cost of capital is one of the important factor in determining claim which affects the capital budgeting, capital structure and value of the firm. Hence, it helps to evaluate the financial performance of the firm.

4. *Importance to Other Financial Decisions:* Apart from the above points, cost of capital is also used in some other areas such as, market value of share, earning capacity of securities etc. hence; it plays a major part in the financial management.

FACTORS DETERMINING THE FIRM'S COST OF CAPITAL

Cost of capital, like all other costs, is a variable term, subject to changes in a number of factors. The various factors that play a part in determination of cost of capital are described below. There are four main factors which mainly determine the cost of Capital of a firm.

General economic conditions, the marketability of the firm's securities (market conditions), operating and financing conditions within the company, and the amount of financing needed for new investments. Now we will discuss each one of them.

1. General Economic Conditions

General economic conditions determine the demand for and supply of capital within the economy, as well as the level of expected inflation. This economic variable is reflected in the risk less rate of return. This rate represents the rate of return on risk- free investments, such as the interest rate on short-term government securities. In principle, as the demand for money in the economy changes relative to the supply, investors alter their required rate of return. For example, if the demand for money increases without an equivalent increase in the supply, lenders will raise their required interest rate. At the same time, if inflation is expected to deteriorate the purchasing power of money, investors require a higher rate of return to compensate for this anticipated loss.

2. Market Conditions

When an investor purchases a security with significant risk, an opportunity for additional returns is necessary to make the investment attractive. Essentially, as risk increases, the investor requires a higher rate of return. This increase is called a risk premium. When investors increase their required rate of return, the cost of capital rises simultaneously. If the security is not readily marketable when the investor wants to sell, or even if a continuous demand for the security exists but the price varies significantly, an investor will require a relatively high rate of return. Conversely, if a security is readily marketable and its price is reasonably stable, the investor will require a lower rate of return and the company's cost of capital will be lower.

3. Operating and Financing Decisions

Risk, or the variability of returns, also results from decisions made within the company. Risk resulting from these decisions is generally divided into two types: business risk and financial risk. 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 common stockholders as a result of financing with debt or preferred stock. As business risk and financial risk increase or decrease, the investor's required rate of return (and the cost of capital) will move in the same direction.

4. Amount of Financing

The last factor determining the corporation's cost of funds is the level of financing that the firm requires. As the financing requirements of the firm become larger, the weighted cost of capital increases for several reasons. For instance, as more securities are issued, additional flotation costs, or the cost incurred by the firm from issuing securities, will affect the percentage cost of the funds to the firm. Also, 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 sums without evidence of management's capability to absorb this capital into the business. This is typically "too much too soon". Also, as the size of the issue increases, there is greater difficulty in placing it in the market without reducing the price of the security, which also increases the firm's cost of capital.

Controllable Factors Affecting Cost of Capital

These are the factors affecting cost of capital that the company has control over

(1) Capital Structure Policy

A firm has control over its capital structure, and it targets an optimal capital structure. As more debt is issued, the cost of debt increases, and as more equity is issued, the cost of equity increases.

(2) Dividend Policy

Given that the firm has control over its payout ratio, the breakpoint of the marginal cost of capital schedule can be changed. For example, as the payout ratio of the company increases, the breakpoint between lower-cost internally generated equity and newly issued equity is lowered.

(3) Investment Policy

It is assumed that, when making investment decisions, the company is making investments with similar degrees of risk. If a company changes its investment policy relative to its risk, both the cost of debt and cost of equity change.

Uncontrollable Factors Affecting the Cost of Capital

These are the factors affecting cost of capital that the company has no control over:

(1) Level of Interest Rates

The level of interest rates will affect the cost of debt and, potentially, the cost of equity. For example, when interest rates increase the cost of debt increases, which increases the cost of capital.

(2) Tax Rates

Tax rates affect the after-tax cost of debt. As tax rates increase, the cost of debt decreases, decreasing the cost of capital.

MEASUREMENT OF COST OF CAPITAL

Cost of Debt (Kd)

Cost of Debt refers to the cost of long term debentures/bond. Short term debts are ignored in calculating the cost of debt assuming that either short term debt plays insignificant part in determining the cost of debt or that the interest on short term debt is balanced by interest on short term receivables

Cost of Debt is calculated after tax because interest payments are tax deductible for the firm. Cost of capital is denoted by the term Kd

Kd after taxes = Kd (1 – tax rate)

Example 1

If the cost of debt for Cowboy Energy Services is 10% (effective rate) and its tax rate is 40% then:

Kd after taxes =Kd (1 – tax rate)

= 10 (1 – 0.4) = 6.0 %

Example 2

Jain & Co sells a new issue of 6% irredeemable debentures to raise ₹ 100,000 and realizes the full face value of ₹ 100. The company falls in 40% tax bracket. Debts are issued at par. Find Cost of Capital

Solution

Before tax cost of debt = Interest / Sale value or Interest /Principal being issued at par

(6,000 / 1,00,000) * 100 = 6%

Cost of debt after tax = (1 - T) * before tax cost of debt

= (1 - 0.40) * 6%

= 0.036 or 3.6%

Cost of debt which are issued at premium

Example 3

Jain & Co sells a new issue of 6%, 1000 irredeemable debentures of ₹ 100 each @ 10 % premium. The company falls in 40% tax bracket. Find Cost of Capital

Solution

Sale value or net proceeds from sale of Debentures (SV) = ₹ (1,000*100+ 1,000*100*10%)

= ₹ 1, 10,000

Kd = I (1 - T) / SV

Where:

Kd = cost of debt after tax

SV = Sale value of debentures

T = Tax rate

I = Annual interest payment

Cost of debt = 6,000 * (1 - 0.40) / 1,10,000= 3.27%

Cost of debt which are issued at Discount

Example 4

Jain & Co sells a new issue of 6%, 1000 irredeemable debentures of ₹ 100 each @ 10% discount. The company falls in 40% tax bracket. Find Cost of Capital

Solution

Sale value or net proceeds from sale of Debentures (SV)　= ₹ (1,000*100- 1,000*100*10%)

= ₹ 90,000

Kd = I (1 - T) / SV

Cost of debt = 6,000 * (1 - 0.40) / 90,000= 4%

Cost of Bond/Debentures redeemable after certain period

Cost of Redeemable debt:

In case of debentures redeemable after a certain period of time, cost of debt is calculated taking the average of sale value and redemption value. It is calculated by using under given formula :-

Kd (before tax) = (I + [RV - SV] / n) / (RV + SV) / 2

Where:

I = Annual fixed interest

RV = Redeemable Value of debenture net of commission and floatation costs, if any.

SV= Sale Value of debentures net of discount or premium.

n = Term of debt till maturity

After tax cost of Redeemable debt :-

Kd (after tax) = Kd (before tax) * (1 - T)

Example 5

A firm issues debentures worth ₹ 1,00,000 and realizes ₹ 98,000 after allowing 2% commission to brokers. They carry an interest rate of 10% and are due for maturity at the end of 10th year. The company has 40% tax bracket.

Solution

Redeemable value = ₹1,00,000; Sale value = ₹ 98,000. Annual interest (I) = ₹ 10,000

Cost of debt = ((10,000 + [1,00,000 - 98,000] / 10) / [(1,00,000 + 98,000) / 2)]

Cost of debt (before tax) = 10.30%

Cost of debt (after tax) = 10.30% x (1-0.40) = 6.18%

Example 6

X Limited issues its Bond at par @ ₹1,000 per bond. These bonds will mature after 20 years at par and bears coupon rate of 10%. Coupons are annual. The bond will sell for par but flotation costs amount to ₹ 50 per bond.

What is the pre-tax and after-tax cost of debt for X Limited?

Solution

Present realization from sale of 1 Bond = ₹ 950

Annual Interest   = ₹ 100

Maturity value after 20 Years   = Rs 1000

Let Pre tax cost of debt is Kd

Present Value of realization from Bond= P. V. of interest for 20 Years @ kd + P.V of Redemption Value @ Kd

$950 = 100 \, (PVIFA)_{(20,Kd)} + 1000 \, (PVIF)_{(20,Kd)}$

Using a financial calculator:

Kd = 10.61%

After-tax cost of debt:

Kd = Kd (1 - T)

Kd = .1061 (1 - .34)

Kd = .07 = 7%

B. COST OF PREFERENCE SHARE CAPITAL

Preference shares represent a special type of ownership interest in the firm. They are entitled to a fixed dividend, but subject to availability of profit for distribution. The preference share holders have to be paid their fixed dividends before any distribution of dividends to the equity shareholders. Their dividends are not allowed as an expense for the purpose of taxation. In fact, the preference dividend is a distribution of profits of the business. Dividends are paid out of profits after taxes so the cost of preference shareholder is after tax only.

Preference shares can be divided into:

  1. Irredeemable preference shares

  2. Redeemable preference shares

(1) Cost of Irredeemable preference shares

Irredeemable preference shares are those shares issuing by which the company has no obligation to pay back the principal amount of the shares during its lifetime. The only liability of the company is to pay the annual dividends. The cost of irredeemable preference shares is:

Kp (cost of pref. share) = $\underline{\text{Annual dividend of preference shares}}$
Market price of the preference stock

Example 7

Calculate the cost of 10% preference capital of 10,000 preference shares whose face value is ₹100. The market price of the share is currently ₹ 115.

Solution

Annual dividend = 10% of ₹ 100 = ₹10 per share

Kp = ₹ 10/₹ 115 = 8.7%

Cumulative preference shares:

Cumulative preference shares are those shares whose dividends will get accumulated if they are not paid periodically. All the arrears of cumulative preference shares must be paid before paying anything to the equity share holders. In case of cumulative preference shares, the market price of the preference stock will be increased by such amount of dividend in arrears.

Non-cumulative preference shares:

These are preference shares whose dividends do not get carried forward to the next year if they are not paid during a year.

If the company issues new preference shares,

The cost of preference capital would be:

Kp = Annual dividend / Net proceeds after floatation costs, if any.

Example 8: A limited company issues 8% preference shares which are irredeemable. The face value of share is ₹100 but they are issued at ₹105. The floatation cost is ₹3 per share, calculate case of capital.

Solution

Net proceed = ₹(105-3)= ₹ 102

Kp = (8/102) *100= 7.84%

(2) Cost of Redeemable preference shares

Redeemable preference shares are those shares which have a fixed maturity date at which they would be redeemed.

Cost of Redeemable preference shares = $Kp = \dfrac{D + (RV - SV) / N}{(RV + SV) / 2}$

Where Kp= Cost of preference Shares

RV- Redemption value

SV= Sale value

N= No of years to Maturity

D= Annual Dividend

Example 9: A company issues 10,000, 8% preference shares of ₹100 each redeemable after 20 years at face value. The floatation costs are ₹3 per share find case of capital.

Solution

Redeemable value = ₹100;

Sale value = ₹100-₹3 = ₹97

Annual dividend = ₹8 per share.

$$Kp = \frac{8 + (100 - 97) / 20}{(100 + 97) / 2} = 8.27\%$$

COST OF EQUITY CAPITAL

The measurement of cost of capital of equity share capital is the most typical and conceptually a difficult exercise. The reason being there is no coupon rate in case of equity shares. Further, there is no commitment to pay equity dividends and it is the sole discretion of the Board of directors to pay or not to pay dividends or to decide at what rate the dividend be paid to the equity share holders. Moreover equity shareholders are the last claimant on the profits of the company. Therefore, it is often said that equity shares have no cost of capital as such. But the same is not true.

The equity share capital, like any other source, also has a cost. Just as in the case of debt and preference shares, the investor will invest the funds in the form of equity share capital of a firm only if they expect a return from the firm, which will compensate them for surrendering the funds as the risk undertaken. The return which equity share holders get is of two kinds:

– Periodic Payments in the form of dividends. This is an explicit return.

– The capital appreciation which they might get by selling the shares at the increase in the market value of the shares. This return is an implicit return. The market value is an indicative measure of the return to the investors when they wish to redeem their investment

The cost of equity capital is the minimum rate of return that a company must earn on the equity financed portion of its investments in order to maintain the market price of the equity share at the current level. The cost of equity capital is rather difficult to estimate because there is no definite commitment on the part of the company to pay dividends. However, there are various approaches for computing the cost of equity capital. They are:

1. CAPM model

This is a popular approach to estimate the cost of equity. According to the CAPM, the cost of equity capital is:

$$Ke = R_f + (R_m - R_f) \ss$$

Where:

Ke = Cost of equity

R_f = Risk-free rate

R_m = Equity market required return (expected return on the market portfolio)

ß = beta is Systematic Risk Coefficient.

Example 10:

Calculate the cost of equity capital for a company whose Risk-free rate =10%, equity market required return =18% with a beta of 0.5.

Solution

Ke = 0.10 + 0.5(0.18 - 0.10)

= 0.14 or 14%.

2. Bond Yield Plus Risk Premium Approach

This approach is a subjective procedure to estimate the cost of equity. In this approach, a judgmental risk premium to the observed yield on the long-term bonds of the firm is added to get the cost of equity.

Cost of equity = Yield on long-term bonds + Risk Premium.

Example 11

Given, the yield on debt is 10% and the risk premium as 5%, calculate the cost of equity.

Solution

Cost of equity = 0.10 + 0.05 = 0.15 or 15%.

Firms that have risky and consequently high cost of debt will also have risky and consequently high cost equity. Thus, it makes sense to base the cost of equity on a readily observable cost of debt. The disadvantage or a challenge to this approach is the determination of the risk premium. There is no objective way to determine it and hence many financial analysts look at the operating and financial risks of the business and arrive at a subjectively determined risk premium that ranges between 2 percent and 6 percent.

3. Dividend Growth Model Approach

The price of an equity stock depends ultimately on the dividends expected from it. It can be represented as follows:

$P_0 = D_1/ (1+r)^1 + D_2/ (1+r)^2 +D_3/ (1+r)^3 +$----------------------------------

Where:

P_0 = Current price of the stock

D_1 = Expected dividend at the end of year 1

D_2 = Expected dividend at the end of year 2 and so on..

t = Year t

r = Equity shareholders' required rate of return

If the dividends are expected to grow at a constant rate of g% per year, then the equation becomes:

$P_0 = D_1(1+g) / (1+r)^1 + D_2(1+g) / (1+r)^2 +D_3(1+g) / (1+r)^3 +$-----------

Simplifying this equation, we get: $P_0 =D_1/(r-g)$

and solving for r, we get $r = D_1/P_0+ g$

Example 12

A company has issued 5,000 equity shares of ₹ 100 each. Its current market price is ₹ 95 per share and the current dividend is ₹ 4.5 per share. The dividends are expected to grow at the rate of 6%. Compute the cost of equity capital.

Solution

Here, D1 = ₹4.5 + growth rate 6% = ₹ 4.77 per share

P_0 = ₹95

Ke = $\dfrac{₹4.77}{₹95}$ + 6% = 0.11 or 11%

4. Earnings-Price Ratio approach

According to this approach, the cost of equity capital is:

$$Ke = \frac{E_1}{P_0}$$

Where:

E_1 = Expected earnings per share for the next year

P_0 = Current market price per share

E_1 = (Current EPS) * (1 + growth rate of EPS)

Example 13

A company has currently 10,000 equity shares of ₹100 each and its' earnings are ₹ 150,000. Its' current market price is ₹112 and the growth rate of EPS is expected to be 5%. Calculate the cost of equity.

Solution

Current EPS = $\dfrac{\text{Earnings available for equity shareholders}}{\text{Number of equity shares}}$

= ₹150,000 / 10,000 shares = ₹15 per share.

E_1 = ₹15 + 5% of ₹ 15 = ₹15.75 per share

Ke = ₹15.75 / ₹112 = 0.14 or 14%.

Cost of Retained Earnings

Earnings generated by a firm are distributed among the equity shareholders. However, if the entire earnings are not distributed and a part of it is retained by the firm, then these retained earnings are available for reinvestment within the firm. The firm is not required to pay dividends on retained earnings, so it may be argued that the retained earnings have no cost as such. But this is not true. The cost of retained earnings must be considered as the opportunity cost of the foregone dividends. from the point of view of equity shareholder, any earnings could have been profitably invested by them, had these been distributed to them. Thus, there is an opportunity cost involved in the firms retaining the earnings and an estimation of this cost may be taken up as a measure of cost of capital of retained earnings.

The cost of retained earnings are often taken as equal to the cost of equity. Therefore we can say, $k_e = k_r$. It may be noted that the cost of retained earnings is not to be adjusted for tax, for floatation cost and for the under pricing. While retaining the earnings, the firm does not in any way incur any such cost and the earnings to be retained are already after tax.

Weighted Average Cost of Capital

The weighted average cost of capital (WACC), as the name implies, is the weighted average of the costs of different components of the capital structure of a firm. WACC is calculated after assigning different weights to the components according to the proportion of that component in the capital structure.

Example No 14

$K_o = K_1 W_1 + K_2 W_2 + K_3 W_3 + \dots$ where $K_1, K_2 \dots$ are components of cost and W_1, W_2 are weights of various kind of capital employed by the company.

Kritika Limited is currently financed with ₹1, 000,000 of 7% bonds, and ₹2, 000,000 of common stock. The stock has a beta of 1.5, and the risk free rate is 4%, and the market risk premium is 3.5%. The marginal tax rate for a corporation of AKL's size is 35%. What is Kritika Limited WACC?

Solution

Ratio of Debt to Total Capital = 10,00,000/ (10,00,000+ 20,00,000)

= 1/3

Ratio of Common stock to total capital = 20,00,000/ (10,00,000+ 20,00,000)

= 2/3

Cost of Equity:

$E(R_i) = R_f + ß_{im} [(E(R_m) – R_f)] = 4\% + 1.5 \times 3.5 = 9.25\%$

Cost of debt = 0.07(1-0.35) = 0.455 or 4.55%

WACC = (4.55%*1/3) + (9.25%*2/3)

= 0.076833 or 7.68%

Example No 15

A firm is considering a new project which would be similar in terms of risk to its existing projects. The firm needs a discount rate for evaluation purposes. The firm has enough cash on hand to provide the necessary equity financing for the project.

Also, the firm has 10,00,000 common shares outstanding with current price ₹ 11.25 per share. Next year's dividend expected to be ₹1 per share, firm estimates that dividend will grow at 5% per year.

It has 1,50,000 preference shares outstanding. The current price of preference share is ₹9.50 per share and dividend is ₹0.95 per share. if new preference shares are issued, they must be sold at 5% less than the current market price (to ensure they sell) and involve direct flotation costs of ₹0.25 per share

It has a total of ₹100,00,000 (par value) in debt outstanding. The debt is in the form of bonds with 10 years left to maturity. They pay annual coupons at a coupon rate of 11.3%. Currently, the bonds sell at 106% of par value. Flotation costs for new bonds would equal 6% of par value.

The firm's tax rate is 40%. What is the appropriate discount rate for the new project?

Solution:

Market value of common = 11.25(1000000)	=	₹ 1,12,50,000
Market value of preferred = 9.50(150000)	=	₹ 14,25,000
Market value of debt = 10000000(106%)	=	₹ 1,06,00,000
Total value of firm	=	₹ 2,32,75,000

Cost of Equity:

$$Ke = \frac{D_1}{P_0} + g$$

$$= \frac{1}{11.25} + 0.05$$

$$Ke = 0.1389$$

Cost of Preference Share Capital

$$\text{Kp} = \frac{\text{Div}}{\text{netP}}$$

$$= \frac{0.95}{9.50(1 - 0.05) - 0.25}$$

$$= 0.1083$$

Cost of debt:

Net price = 106% - 6% = 100% of par value

Net price = par

Therefore, cost of debt = coupon rate

Kd = 11.3% ; cost of debt after tax = 11.3% (1-0.4) = 6.78%

Therefore:

$$\text{WACC} = \left(\frac{11250000}{23275000}\right)(0.1389) + \left(\frac{1425000}{23275000}\right)(0.1083) + \left(\frac{10600000}{23275000}\right)(0.113)(1 - 0.4)$$

$$= 0.1046$$

$$= 10.46\%$$

Book Value vs. Market Value weights

The weights to be used for calculation of WACC can either be based on the book value or the market value of the funds raised from different sources.

(a) Book value weights

The weights are said to be book value weights if the proportion of different sources are ascertained on the basis of the face values. The book value can be easily calculated by taking the relevant information from the capital structure as given in the balance sheet of the firm.

(b) Market value weights

The weights may also be calculated on the basis of the market value of different sources i.e., the proportion of each source at its market value. In order to calculate the market value weights, the firm has to find out the current market price of the securities in each category.

Generally, there will be a difference between the book value and market value weights, and therefore, WACC will be different. WACC, calculated using the book value weights, will be understated if the market value of the share is higher than the book value and vice versa.

Marginal Cost of Capital (MCC)

MCC can be defined as the cost of additional capital introduced in the capital structure since we have assumed that the capital structure can vary according to changing requirements of the firm.

The following illustration shows how marginal cost of capital can be calculated:

Let us assume that the capital structure of the firm has been expanded by addition to various components. The

addition has been ₹ 2,000 lacs for debt, ₹ 1,000 lacs for preference capital, ₹ 2,000 lacs for equity capital and ₹ 6,000 lacs for retained earnings. The cost of each component of the capital structure after addition would be the weighted average of the old and new values of the component:

(₹ in lakhs)

Component	*Existing Value*	*Cost (%)*	*Additional Value*	*Cost (%)*	*Weighted Average Cost (%)*
Debt	4,000	14	2,000	16	14.6
Pref. Capital	1,000	9	1,000	12	10.5
Equity Capital	1,000	15	2,000	20	18.34
Ret. Earnings	4,000	18	6,000	18	18.00

Having calculated the weighted cost of each component, we calculate the weighted average cost of the entire capital structure now:

Component	*Weight (%)*	*Cost (%)*	*Weighted Cost*
Debt	28.57	14.6	14.6 x 0.29 = 4.23
Preference capital	9.52	10.5	10.5 x 0.0952 = 1.00
Equity capital	14.28	18.34	18.34 x 0.1428 = 2.62
Retained earnings	47.62	18	18 x 0.4762 = 8.57
Total	WACC = 4.23 + 1.00 + 2.62 + 8.57 = 16.42 %		

Marginal cost of addition is 16.42 – 15.2 = 1.22%. The return on investment has to be more than the revised weighted average cost of capital in order to ensure that the investors stay invested.

COST OF CAPITAL AND ITS IMPLICATIONS IN BUDGETING DECISIONS

Investment decisions are directly related to financial decisions influenced by cost of capital. Management of a company is always anxious to maximise return on investments with a view to ensure that cost of capital is covered although management may alternatively decide to minimise investment which may yield highest returns for reasons of high risk involved or it may decide to maximise investments for obtaining highest growth through expansion of the productive processes. Management is guided by such considerations as:

(1) Opportunities created by technological change requiring replacements, necessitating expansion or taking up new activities.

(2) Competition strategies to avail of economic opportunities, investment being planned by them and the threat which may arise to the existing or proposed market shares of the firm;

(3) Short-term and long-term market forecasts with reference to sales, revenue proceeds, net profits etc.;

(4) Incentives offered by the state to promote investment in particular areas of production required for meeting urgent local needs of the nation or for exporting to earn foreign exchange etc. Nevertheless, the management of a corporate enterprise while preparing capital outlays prepares the particulars of the expected receipts (cash inflows) generated from the activity through such investment. Both are compared over-time and for optimum decision, receipts should cover cost of financing the capital outlays. As such investment or capital budgeting decisions are directly linked with the cost of capital.

Before dealing with the application of cost of capital budgeting decisions, it is considered necessary to apprise

the readers of the sources of capital and the cost of capital and its significance in investment decisions in the following paragraphs:

IMPLICATIONS IN BUDGETING DECISIONS

Despite the above objections, cost of capital is used as the basis to evaluate investments whose cash flows are perfectly correlated with the cash flows from the company's present assets. With perfect co-relation between the two sets of cash flows risk is the same. But if the timing of the cash flows is not also the same, the same discount rate cannot be used for both investments. But weighted average cost of capital represents an averaging of all risks of the company and can be used to evaluate investments in much the same manner that the pay-back method. It gives some insight and guidance and to that extent it is good to be used. Present value of an investment can be computed using a weighted average cost of capital and this can be compared with present values calculated using the other discount rates. It may be that an investment with a positive present value should be rejected because of its risk characteristics or that an investment with a negative present value using the weighted average cost of capital should be accepted. All this will differ from situation to situation and case to case. Nevertheless, evaluation of capital investment projects requires some basis which could serve as the minimum rate of return which a project should generate. In such cases, weighted cost of capital could serve as an accepted discounting rate for evaluating investment decisions as no project will be acceptable which does not generate funds equal or greater to the cut-off rate represented by weighted cost.

Some Case Study

Exercise 1: Identify each of the following statements as true or false, and explain your answers.

A. Information costs both increase the marginal cost of capital and reduce the internal rate of return on investment projects.

B. Depreciation expenses involve no direct cash outlay and can be safely ignored in investment-project evaluation.

C. The marginal cost of capital will be less elastic for larger firms than for smaller firms.

D. In practice, the component costs of debt and equity are jointly rather than independently determined.

E. Investments necessary to replace worn-out or damaged equipment tend to have low levels of risk.

SOLUTION

A. **True:** The need to gather information concerning the creditworthiness of borrowers increases the interest rates charged by creditors. Similarly, the task of information gathering in the investment project evaluation process reduces the IRR from those projects.

B. **False:** Even though depreciation expenses involve no direct cash outlay, they must be explicitly considered in investment project evaluation because they affect corporate cash outlays for income tax payments.

C. **False:** The marginal cost of capital will tend to be more elastic for larger as opposed to smaller firms. Large firms tend to have easy access to capital markets given their relatively long operating history, and substantial resources. On the other hand, the marginal cost of capital can increase rapidly (be quite inelastic) for smaller firms which, for example, face capital constraints due to scarce managerial talent.

D. **True:** The component costs of debt and equity tend to be jointly as opposed to independently determined. Higher levels of debt, for example, will usually increase the perceived level of risk for debt holders and equity holders alike, and, therefore, raise the interest rate charged by creditors and the rate of return requirement of stockholders.

E. **True:** Investments necessary to replace worn out or damaged equipment have highly predictable returns and low levels of risk.

Exercise 2

ABC Ltd. has the following capital structure.

	₹
Equity (expected dividend 12%)	10,00,000
10% preference	5,00,000
8% loan	15,00,000

You are required to calculate the weighted average cost of capital, assuming 50% as the rate of income-tax, before and after tax.

Solution

Sources of Funds	Amount in ₹	After Tax Cost of Capital	Weights	Cost (₹)
Equity	10,00,000	12%	33.33%	3.99
Preference	5,00,000	10%	16.67	1.67
8% Loan	15,00,000	4%	50.00	2.00
				7.66%

Weighted average cost of capital = 7.66%

Exercise 3

A company has on its books the following amounts and specific costs of each type of capital.

Type of Capital	Book Value	Market Value	Specific Costs (%)
	₹	₹	
Debt	4,00,000	3,80,000	5
Preference	1,00,000	1,10,000	8
Equity	6,00,000	9,00,000	15
Retained Earnings	2,00,000	3,00,000	13
	13,00,000	16,90,000	

Determine the weighted average cost of capital using:

(a) Book value weights, and

(b) Market value weights.

How are they different? Can you think of a situation where the weighted average cost of capital would be the same using either of the weights?

Solution

A. Computation of Weighted Average Cost of Capital using book value

Source of Funds	Amount (₹)	Cost % (X)	Weighted Cost (W) (₹)
Debt	4,00,000	5	20,000
Preference Shares	1,00,000	8	8,000
Equity Shares	6,00,000	15	90,000
Retained Earnings	2,00,000	13	26,000
	ΣW = 13,00,000		ΣXW = 1,44,000

$$K_w = \frac{\Sigma XW}{\Sigma W}$$

$$K_w = \frac{1,44,000 \times 100}{13,00,000}$$

= 11.1%

B. Computation Weighted Average Cost of Capital using Market Value

Source of Funds	Amount (₹)	Cost % (X)	Weighted Cost (W) (₹)
Debt	3,80,000	5	19,000
Preference Shares	1,10,000	8	8,800
Equity Shares	9,00,000	15	13,500
Retained Earnings	3,00,000	13	39,000
	ΣW = 16,90,000		ΣXW = 2,01,800

$$K_w = \frac{\Sigma XW}{\Sigma W}$$

$$K_w = \frac{2,01,800}{16,90,000} \times 100 \qquad = 11.9\%$$

Exercise 4

KPL Manufacturing is in the process of analyzing its investment decision-making procedures. The two projects evaluated by the firm during the past month were projects 123 and 124. The basic variables surrounding each project analysis and the resulting decision actions are summarized in the following table.

Basic variables	Project 123	Project 124
Cost	Rs 60,000	Rs 52,000
Life	10 years	10 years
Expected return	8%	15%
Cost of financing		
Source	Debt	Equity
Cost (after-tax)	7%	16%

Decision

Action	Invest	Don't invest
Reason	8% > 7% cost	15% < 16% cost

a) Evaluate the firm's decision-making procedures, and explain why the acceptance of project 123 and rejection of project 124 may not be in the owners' best interest.

b) If the firm maintains a capital structure containing 40% debt and 60% equity, find its weighted average cost using the data in the table.

c) If the firm had used the weighted average cost calculated in part (b), what actions would have been indicated relative to projects 123 and 124?

d) Compare and contrast the firm's actions with your findings in part (c). Which decision method seems more appropriate? Explain why.

Answer

a) The firm is basing its decision on the cost to finance a particular project rather than the firm's combined cost of capital. This decision-making method may lead to erroneous accept/reject decisions.

b) Weighted average cost of capital, $Ka = wd* Kd + we* Ke$

   $= 0.40\,(7\%) + 0.60\,(16\%)$

   $= 2.8\% + 9.6\%$

   $= 12.4\%$

c) Reject project 123. Accept project 124.

d) Opposite conclusions were drawn using the two decision criteria. The overall cost of capital as a criterion provides better decisions because it takes into consideration the long-run interrelationship of financing decisions.

Exercise 5

ABC Ltd. has expected earnings at Rs 30 per share which is growing at 8% annually. Company follows fixed payout ratio of 50%. The market price of its share is Rs 300. Find the following:

a) Current cost of equity

b) Cost of new equity if the firm issues fresh shares at current market price but with floatation cost of 5%.

Answer

a) Cost of equity can be calculated by using constant growth valuation model. The formula is as under:

$$Ke = \frac{D1}{Po} + g$$

Here, the EPS is given as Rs 30. Since the payout is 50%, therefore, the dividend per share (DPS) = 30*0.5 = Rs 15.

So, $\quad Ke = \dfrac{15}{300} + 0.08$

   $= 0.13 = 13\%$

b) Cost of new equity with 5% floatation cost: $\text{Kex} = \dfrac{\text{Ke}}{(1-\text{f})}$

Where;

f- Floatation cost

Ke- Cost of internal equity

So,

$\text{Kex} = \dfrac{0.13}{(1-0.05)}$

$= 0.1368 = 13.68\%$

Exercise 6

Oxford Company has compiled the information shown in the following table.

Source of capital	Book Value	Market value	After tax cost
Equity	1080000	3000000	17
Preference stock	50000	60000	13
Long term debt	4500000	3840000	6
Total	*5630000*	*6900000*	

a. Calculate the weighted average cost of capital using book value weights.

b. Calculate the weighted average cost of capital using market value weights.

c. Compare the answers obtained in parts a and b. Explain the differences.

Answer

a) Weighted average cost of capital (WACC) using book value weights can be calculated as follows:

Source of capital	*Book Value (Rs. Crore)*	*Weight*	*Cost (%)*	*WACC = Ke* We + Kp* Wp+ Kd * Wd*
Equity	1080000	0.19	17	3.26
Preference stock	50000	0.01	13	0.12
Long term debt	4500000	0.80	6	4.80
Total	5630000	1		8.18

So, the weighted average cost of capital is 8.17%

b) Weighted average cost of capital (WACC) using market value weights can be calculated as follows:

Source of capital	*Market Value (Rs. Crore)*	*Weight*	*Cost (%)*	*WACC = Ke* We + Kp* Wp+ Kd * Wd*
Equity	3000000	0.43	17	7.39
Preference stock	60000	0.01	13	0.11
Long term debt	3840000	0.56	6	3.34
Total	6900000	1		10.84

So, the weighted average cost of capital is 10.84%

c) The difference lies in the two different value bases. The market value approach yields the better value because the costs of the components of the capital structure are calculated using the prevailing market prices. Since the common stock is selling at a higher value than its book value, the cost of capital is much higher when using the market value weights. Notice that the book value weights give the firm a much greater leverage position than when the market value weights are used.

LESSON ROUND-UP

– Funds required for a business may be classified as long term and short term.

– Long term finance is required to Finance fixed assets, finance the permanent part of working capital, finance growth and expansion of business.

– The two main sources of long term finance are Ownership Capital and Borrowed capital.

– The cost of capital is a term used in the field of financial investment to refer to the cost of a company's funds (both debt and equity), or, from an investor's point of view "the shareholder's required return on a portfolio company's existing securities"

– Cost of capital is used to evaluate new projects of a company and it is the minimum return that investors expect for providing capital to the company.

– For an investment to be worthwhile, the expected return on capital must be greater than the cost of capital. The cost of capital is the rate of return that capital could be expected to earn in an alternative investment of equivalent risk.

– There are four main factors which mainly determine the cost of Capital of a firm. General economic conditions, the marketability of the firm's securities (market conditions), operating and financing conditions within the company, and the amount of financing needed for new investments.

– There are factors affecting cost of capital that the company has control over and includes Capital Structure Policy, Dividend Policy, Investment Policy etc.

– There are some factors affecting cost of capital that the company has not control over and these factors includes Level of Interest Rates, Tax Rates.

– Cost of Debt is calculated after tax because interest payments are tax deductible for the firm. Cost of capital is denoted by the term Kd.

Kd after taxes = Kd (1 – tax rate)

– Irredeemable preference shares are those shares issuing by which the company has no obligation to pay back the principal amount of the shares during its lifetime. The only liability of the company is to pay the annual dividends. The cost of irredeemable preference shares is:

$$Kp \text{ (cost of pref. share)} = \frac{\text{Annual dividend of preference shares}}{\text{Market price of the preference stock}}$$

– Redeemable preference shares are those shares which have a fixed maturity date at which they would be redeemed. The cost of redeemable preference shares is calculated by under given formulae.

$$\text{Cost of Redeemable preference shares} = Kp \frac{= D + (RV - SV) / N}{(RV + SV) / 2}$$

Where Kp= Cost of preference Shares

RV- Redemption value

SV= Sale value

N= No of years to Maturity

D= Annual Dividend

– The cost of equity capital is the minimum rate of return that a company must earn on the equity financed portion of its investments in order to maintain the market price of the equity share at the current level. The cost of equity capital is rather difficult to estimate because there is no definite commitment on the part of the company to pay dividends. However, there are various approaches for computing the cost of equity capital. They are:

– CAPM model : This is a popular approach to estimate the cost of equity. According to the SML, the cost of equity capital is:

Ke = R_f + ß (R_m - R_f)

Where:

Ke = Cost of equity

R_f = Risk-free rate

R_m = Equity market required return (expected return on the market portfolio)

ß = beta- Systematic Risk Coefficient.

– Bond Yield Plus Risk Premium Approach

This approach is a subjective procedure to estimate the cost of equity. In this approach, a judgmental risk premium to the observed yield on the long-term bonds of the firm is added to get the cost of equity.

Cost of equity   =   Yield on long-term bonds + Risk Premium.

– Dividend Growth Model Approach

The price of an equity stock depends ultimately on the dividends expected from it. According to this approach $P_0 = D_1/(r-g)$ and $r = D_1/P_0 + g$. here

P_0 = Current price of the stock

D_1 = Expected dividend at the end of year 1

r = Equity shareholders' required rate of return

g = Growth rate

– Earnings-Price Ratio approach

According to this approach, the cost of equity capital is:

$$Ke = \frac{E_1}{P_0}$$

Where:

E_1 = Expected earnings per share for the next year

P_0 = Current market price per share

E_1 = (Current EPS) * (1 + growth rate of EPS)

– The weighted average cost of capital (WACC), as the name implies, is the weighted average of the costs of different components of the capital structure of a firm. WACC is calculated after assigning different weights to the components according to the proportion of that component in the capital structure.

– Marginal Cost of Capital (MCC) can be defined as the cost of additional capital introduced in the capital structure since we have assumed that the capital structure can vary according to changing requirements of the firm.

SELF-TEST QUESTIONS

(These are meant for re-capitulation only. Answers to these questions are not to be submitted for evaluation)

1. What is cost of capital? Define cost of capital.

2. Cost of capital computation is based on certain assumptions. Discuss. Explain the classification of cost.

3. Mention the importance of cost of capital. Explain the computation of specific sources of cost of capital.

4. How overall cost of capital is calculated? Explain various approaches for calculation of cost of equity.

5. Rama Company issued 1,20,000 10% debentures of ₹ 10 each at a premium of 10%. The costs of floatation are 4%. The rate of tax applicable to the company is 55%. Complete the cost of debt capital. (*Ans. 4.26%*)

6. Siva Ltd., issued 8,000 8% debentures for ₹ 100 each at a discount of 5%. The commission payable to underwriters and brokers is ₹ 40,000. The debentures are redeemable after 5 years. Compute the after tax cost of debt assuming a tax rate of 60%. (*Ans. 3.69%*)

7. Suraiya Limited issued 4,000 12% preference shares of ₹ 100 each at a discount of 5%. Costs of raising capital are ₹ 8,000. Compute the cost of preference capital. (*Ans. 12.90%*)

Lesson 5
Project Finance

LESSON OUTLINE

- Project Finance
- Project Planning
- Preparation of Project Report,
- Project Appraisal under Normal, Inflationary and Deflationary Conditions,
- Project Appraisal by Financial Institutions
- Lending Policies and Appraisal, Norms by Financial Institutions and Banks;
- Loan Documentation,
- Project Review and Control;
- Social Cost and Benefit Analysis of Project.
- Term Loans from Financial Institutions and Banks;
- Lease and Hire Purchase Finance;
- Venture Capital Funds;
- Private Equity;
- International Finance and Syndication of Loans,
- Deferred Payment Arrangements;
- Corporate Taxation and its Impact on Corporate Financing,
- Financing Cost Escalation
- LESSON ROUND UP
- SELF TEST QUESTIONS

LEARNING OBJECTIVES

Project Finance is very important aspect of Financial management. To be successful in his endeavour, a finance manager should be well versed about various aspects of project financing, project appraisal techniques, essential of loan documents, project management and control techniques.

The object of the study is to enable the student to understand:

- The meaning of Project Planning
- Project Appraisal by various Financial Institutions
- Project Evaluation Technique
- Loan Documentation
- Loan Syndication – Bridge Loans against Sanctioned Loan
- Monitoring the progress of units assisted by the Financial Institutions
- Social Cost – Benefit Analysis
- Project Review and Control
- Follow-up Reports and Procedures

"Planning without action is futile, action without planning is fatal."

Cornelius Fitchner

INTRODUCTION

What is Project Finance?

Project finance is the financing of long-term infrastructure, industrial projects and public services based upon a non-recourse or limited recourse financial structure, in which project debt and equity used to finance the project are paid back from the cash flow generated by the project, without any claims (with some very specific exceptions) on the companies that develop these projects. Project financing is a loan structure that relies primarily on the project's cash flow for repayment, with the project's assets, rights and interests held as secondary security or collateral. Project finance is especially attractive to the private sector because companies can fund major projects off balance sheet.

Project finance, comes from a combination of both equity and debt. The split between equity (investor funding) and debt (lender funding) depends on the individual project and, most importantly, on the risk profile of each project. The higher the risk, the greater the share of equity will be required by the lending banks. The risk of an individual project is also decisive for the level of debt which a project can take on.

The principle used in Project Finance is simple: a bank finances a specific asset, and gets repaid only from the revenues generated by that asset, without recourse to the investors that own the project. It works well for project with well identified assets with high initial investment costs, and strong cash flows after that, like big infrastructure items (toll bridges, pipelines) and energy assets (oil fields, power plants).

PROJECT PLANNING

What is Project Planning?

Project planning defines the project activities and end products that will be performed and describes how the activities will be accomplished. The purpose of project planning is to define each major task, estimate the time and resources required, and provide a framework for management review and control. The project planning activities and goals include defining:

1. The specific work to be performed and goals that define and bind the project.

2. Estimates to be documented for planning, tracking, and controlling the project.

3. Commitments that are planned, documented, and agreed to by affected groups.

4. Project alternatives, assumptions, and constraints.

The planning process includes steps to estimate the size of the project, estimate the technical scope of the effort, estimate the resources required to complete the project, produce a schedule, identify and assess risks, and negotiate commitments.

Repetition of these steps is necessary to establish the project plan. Typically, several iterations of the planning process are performed before a plan is actually completed.

Importance of the Project Plan

A project plan is a formal, approved document that is used to manage and control a project.

The project plan forms the basis for all management efforts associated with the project. It is a document that is also expected to change over time. The project plan documents the pertinent information associated with the project; the information associated with the plan evolves as the project moves through its various stages and is to be updated as new information unfolds about the project.

Steps in the Project Planning Process

The planning process consists of the following basic tasks:

    (a) Define the technical approach used to solve the problem.

    (b) Define and sequence the tasks to be performed and identify all deliverables associated with the project.

    (c) Define the dependency relations between tasks.

    (d) Estimate the resources required to perform each task.

    (e) Schedule all tasks to be performed.

    (f) Define a budget for performing the tasks.

    (g) Define the organization used to execute the project.

    (h) Identify the known risks in executing the project.

    (i) Define the process used for ensuring quality.

    (j) Define the process used for specifying and controlling requirements.

The Evolving Plan of a Project

Strategic Planning	Concept Definition	Planning Risk ID
Business Needs	Concept Paper	Statement of Work
Budgeting Estimates	Project Categorization	Oversight Risk Assail
IT Strategy	Pre-project Team Org	Pre-Project Team Org
Resources	Cost Constraints	Project Budget Estimates
	Schedule Requirements	Project Timeframe
	Project Sponsor ID	Key Schedule Milestones
	Technology Assessment	Identified Project Tasks
	Cost Benefit Analysis	Resource Identification
	Make Buy Decision	Deliverable Requirements
	Critical Success Factors	Technical Approach Req
	Project Methodology Tailoring	Quality Activities
		Draft Project Plan

Project Start-up	Project Performance	Project Close-Out
Detailed Specifications	Requirement Changes	Lessons Learned
Identified Project Risks	Risk & Mitigation List	Team Awards
Project Organization	Current Project Organization	Final Cost
Estimate to Complete	Current Estimate to Complete	Values Admin
Detailed Project Schedule	Planned vs Actual Schedule	Closure Contract Closure
Detailed WBS	Current WBS	
Staffing & Resource Plan	Planned vs Actual Staffing	
Deliverable Assignments	Current Deliverable Assignments	
Technical Approach	Updated Technical Approach	
Quality Plan	Project Action Items	
Baselined Project Plan	Quality Audits	
	Updated Project Plan	

The plan defines the objectives of the project, the approach to be taken, and the commitment being assumed.

The project plan evolves through the early stages and, by the time the project is ready to begin project execution, contains the detail required to successfully complete the project. Then, when implementation begins, the plan is updated as required.

(1) Planning in the Concept Phase

In the projects concept phase, a need that would result in a product is identified. While only very general information may be known about the project at this time, it is important to capture this information for the planning phase. In this stage, the focus of planning is on the project definition and on getting the project underway. A strategy for deriving a solution to the stated goals is important at this point. The problem being addressed by the project is clearly stated; the project goals and objectives are identified; and success criteria for the project are documented. Also, the assumptions, constraints, and risks that apply to the project are defined. Without a description of this concept information, the completed project plan is difficult to thoroughly understand. Results of the technology assessment also are documented as a precursor to the technical approach that is later defined.

(2) Planning in the Planning Stage

The project plan is completed in the Project Planning and Risk Identification stage of a project. For large projects, this stage may be run as a mini-project, with a team of people dedicated to performing the effort. For very small projects, the plan may be developed by a group of people as a part-time job. Since various skill sets are required to complete a successful project plan, it is a difficult task for one person to develop the entire plan. During this project stage, details of the plan are determined and an approach is defined. The full project plan is then developed. The plan may include the following elements: a brief project summary, a work breakdown structure, a project organization chart, a schedule, an approach, a list of identified risks, an estimated budget and cost, a list of deliverables, a description of planned quality activities, a description of the configuration management process to be used, and a summary of project requirements.

Even during the planning stage, the development of the project plan is an iterative process. Each element of the plan is regularly revisited for changes and refinements, based upon further analysis and decisions made in developing other plan elements. This refinement also develops .buy-in. from the project team and stakeholders.

It is critical to get buy off on the project plan from the involved parties prior to actually starting the project. Approval of the plan commits the resources needed to perform the work.

(3) Planning in the Project Start-up Stage

To transition a project from the initial conceptualization and planning to execution requires some type of start-up activities. The project start-up stage is typically a short period that transitions a project from the planning to the execution stage. In the start-up stage, the team is assembled and a kickoff meeting is held to familiarize the team with the elements of the plan and the requirements of the system. Specific work packages detail and specify the activities being performed by the teams, as well as the cost and schedule associated with those activities.

Sometimes, particularly in systems that include procurement, there may be a need to update the project plan during this stage to reflect negotiations or refinements in scope that occurred prior to the actual start of the project. In these cases, the plan is reviewed and updated prior to presentation to the team. Also, in some projects, auxiliary plans (such as the configuration management or quality assurance plans) are detailed in the start-up phase. These plans are developed from strategies defined in the project planning stage.

(4) Planning in the Project Execution Stage

Planning in the project execution stage consists of re-planning when it is determined that the project is not on track with the current plan. This might occur for a variety of reasons. It is very important to know that project plans will change and that re-planning is a natural part of the planning process. Re-planning does not necessarily mean that a project is in trouble. Frequent and extensive re-planning may, however, indicate that there are some serious issues with the project plan. It is better to re-plan than to simply throw away the original plan and operate without a plan.

(5) Planning in the Project Close-Out Stage

A close-out process is performed once the project objectives have been met. Closing a project should be fairly routine. The first step is acceptance of the system by the users. It is important that the user decides when the project is completed. The determination is based upon the success criteria defined in the very early concept and planning stages of the project. This acceptance may be very informal or it may be very formal and depends upon the criteria defined in the plan.

PREPARATION OF PROJECT REPORT

The project report is an extremely important aspect of the project. It should be properly structured and also necessary and appropriate information regarding the project.

Preparation of project report is a pre-investment study of investment proposal but encompasses a thorough investigating process covering economic, technical, social managerial and commercial aspects. Project report is a working plan for implementation of project proposal after investment decision by a company has been taken.

Importance of preparation of project report has been felt in the wake of sophisticated technology being adopted and the heavy financial state of public funds through financial institutions, banks and investment organisation being contemplated. High technology involvement, higher cost in the project implementation and as such economy cannot afford to tolerate failure of the project. Therefore, to ensure before taking in hand a project whether or not the proposed project is viable, preparation of project report has become essential exercise for all corporate units particularly in the light of the following background:

(1) Planning in advance, the accomplishment of the following objectives:

(a) Performance Objectives

(b) Marketing Objectives

(c) Operations Objectives

(d) Technical Objectives

(e) Financial Objectives

(f) Personnel Objectives

(g) Organisation Objectives

(h) The end product Objectives

(i) The customer benefit Objectives, and

(j) The societal Objectives

(2) To evaluate above objectives in the right perspective it is essential to consider the input data, analyse the data, predict outcome, choose best alternatives, take action and measure results with predictions. Stress is laid that the objectives become measurable, tangible, verifiable, attainable and the risk of failures is avoided to the maximum desired extents.

(3) To evaluate constraints on resources viz. manpower, equipment, financial and technological.

(4) To avail of the financial facilities who require a systematic project report to evaluate desirability of financing the project. Besides, the financial intermediaries today check up and verify the project proposals for accepting the responsibility for a company to procure funds from the capital market. Merchant banks who have entered in the capital market as financial intermediaries are quite careful about the project viability before taking up a contract for making financial services available to corporate units.

(5) Successful implementation of a project depends upon the course of action suggested in the project report. Besides, comparison of results will depend upon the projected profitability and cash flows, production schedule and targets as planned in the project report.

The above background necessitating the preparation of a project report leaves the impression that the task of preparation of project report involves skills, expertise and experience of field work covering different aspects by financial, technical, commercial, socio-economic, government rules and regulations and the legal requirements under different laws and can only be handled by a team of experts in different areas. Project idea can be formulated by an entrepreneur but project report cannot be prepared single-handedly as it requires a multi-disciplinary approach to incorporate the following set of analysis in the project report:

Market Analysis ——————
- Potential Market
- Market Share

Technical Analysis ——————
- Technical Viability
- Sensible Choices

Financial Analysis ——————
- Risk
- Return

Ecological Analysis ——————
- Benefits and Costs in Shadow Prices
- Restoration Measures
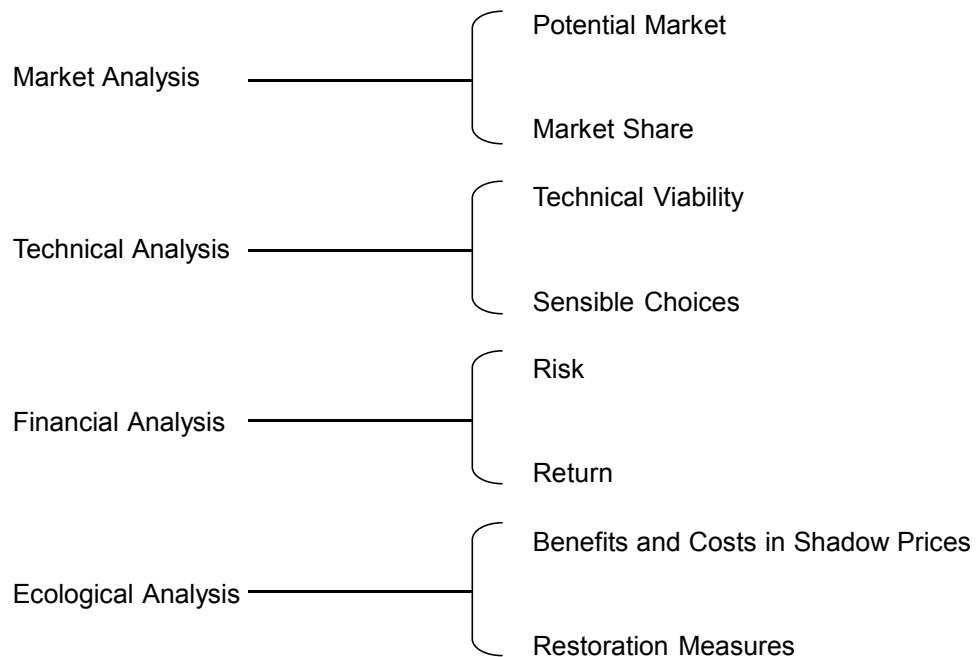
(1) Marketing research to forecast demand for goods/services which may be produced on implementation of the project, capture market and elicit cooperation of the consumers etc.

(2) Technical analysis comprising systems analysis using technique of operation research to sort out complex problems like allocation problems, replacement problems, inventory problems, scheduling and queuing of operations with use of PERT/CPM, Linear programming. Integral programming, Goal Programming and simulation etc.

(3) Financial analysis, to project future cash flows, profitability, evaluate net worth, to do cost-benefit analysis, profit plannings, budgeting and resource allocation, etc.

(4) Techno-economic Analysis suggesting to adopt optimal technology for project size/objectives, to explore economic conditions to absorb projects products, etc.

(5) Project Design and network analysis i.e. detailed work plan to the project and its time profile.

(6) Input output analysis etc.

Format of Project Report

There is no prescribed format for the preparation of a project report - but a project report should contain mainly the following set of information in general:

(1) Information about industry and its status in the economy, present production and demand, indicating

Licensed, installed capacity, Government policies and export potential. Generally speaking, broad guidelines in this respect may be had from the plan documents of the Government.

(2) Broad market trend of the product within and outside the states for 5 years.

(3) Raw material survey, giving specifications and quality of raw materials required and their availability.

(4) Process - broad description of different processes and their relative economics.

(5) Availability of technical know-how.

(6) Location of Plant, its advantages.

(7) Water - requirement of water for process, boiler feed, cooling etc., sources of water available and making it useable for the factory and to townships.

(8) Power - total power requirement for the factory specification of power and choice between purchased power and generated power. If power to be generated - total cost of investment, choice of fuel and the cost for fuel available to factory.

(9) Fuel - its requirement for steam raising or processing source and price at which it will be available for factory including taxes and surcharge.

(10) Effluents - type and quality of effluents, their treatment and disposal, investment in the effluent treatment and disposal. Government of India has since decided that any project proposal has to have a clearance of Environmental Authority set up by the government.

(11) Implementation programme: implementation and construction programme in form of CPM/PERT.

(12) Cost of Project - (Specify foreign exchange cost if any):

    (a) Land, inclusive of development expenditure incurred on the land;

    (b) Buildings to be erected for housing the plant and machinery, the administrative office, stores, services, etc. requirements estimates to be included in the project cost;

    (c) Plant and machinery; including other equipments and their estimated cost;

    (d) Offsite facilities: utilities and auxiliary facilities;

    (e) Preliminary expenses (share issue, stamp duty, cost of raising equity etc.);

    (f) Contingencies;

    (g) Cost of spare, repairs and maintenance during trial run and commissioning period;

    (h) Pre-commissioning and commissioning expenses;

    (i) Working capital margin-details of estimation be given.

(13) Margin of financing-broad pattern to be indicated.

(14) Cost of production - project broad pattern five years vis-a-vis design capacity. Breakeven point of production cost should be given, effect of variation of cost of raw materials, utilities, selling price etc. be indicated and elaborated. Price trend of raw material and finished goods be discussed.

(15) Profitability for five years after commission of the project should be worked out in the prescribed format.

(16) Cash flow statement and pay period should be worked out for the project.

(17) Technical feasibility be discussed in detail with financial viability.

(18) Organisation and management – description of corporate management, promoters experience and background organisational chart, key personnels and delegation of power and responsibility structure be fully described.

PROJECT APPRAISAL UNDER NORMAL CONDITIONS

Appraisal means to critically examine with a focus of attention on specific aspects, areas of operations, and target goals to ensure the conformity of the performance to the proposed goals. Basic task before the appraiser is to study progress in terms of cost productivity ratio, time schedule relationship, inter-action between different agencies, and performance of personnel in terms of their responsibilities and objectives of the company.

Important ingredients of appraisal are the following:

(1) Objectives as defined in the proposal to be kept in view for satisfactory assessment of operational courses;

(2) Accuracy of methods and measurements planned to be adopted is well adhered to;

(3) Objectivity of the proposal is highlighted so as to keep off from the bias and personnel prejudices;

(4) Ensure the reliability of the data and projected statements;

(5) Predictors made to conform to reality and should be objective.

In project appraisal above points should be kept in view by the members of appraisal team irrespective of the fact whether the appraisal is being done for an industrial project being implemented by a corporate unit or the project devoted to the national economy sponsored by the state agency.

Form the angle of a company unit the project appraisal of the project may be done at three stages as under:

(1) Projects appraisal by the corporate unit itself i.e. the promoters of the company are interested in ensuring that on successful implementation of the project whether or not it would generate the required rate of return on the total investment. The promoters make selection of the projects following investment criteria of obtaining the required rate of return. In this appraisal , all aspects with reference to project idea are identified and evaluated. As a matter of fact, it is a feasibility study done to identify the project, identify internal constraints and external difficulties, environmental constraints including government placed restrictions and regulations. Once the promoters are satisfied on this aspect, they have the formal feasibility report prepared and consider it for investment purposes.

(2) Second stage of project appraisal arises when a project report duly accepted by the promoters is submitted by the corporate unit of financial institution for considering for grant of financial facilities to finance the cost of implementation of the project.

(3) Project appraisal is done by Government agencies for according approvals required to clear a particular project under the different statues or state regulations. The main criterion followed by Government agencies is the cost benefit analysis and social gains.

PROJECT APPRAISAL UNDER INFLATIONARY CONDITIONS

Timing for project appraisal is most important consideration for all types of appraisers. A project under normal circumstances is appraised from different angles viz. technical feasibility, managerial aspects, commercial aspects, financial viability and economic and social aspects.

Under the normal conditions when prices are generally stable, demand pattern as projected in the project report is unchangeable, the project cost described in the project report remains unchanged at current prices and as such there is not much danger of any sudden escalation in project cost or over run in the projected resources.

There is practically no risk involved of either business or financial nature and evaluation of the project could be done from different angles without providing for any change in project cost and planning for additional financial resources to meet the over run or escalations.

Nevertheless, project appraisal can't be devoid of inflationary pressures as normal conditions for a project do

not exist. Because the project is to be implemented over a period of time ranging upon the size and magnitude of the project, i.e. it could be six months or beyond to run or two or more years. During such a period, it can't be predicted as and when the trade cycles set in and the up-turn in economy is generated.

In a developing economy like India, inflation grow at a planned steady rate because of the economic development activities and as such provision for a probable escalation in the project cost is generally provided as a cushion to inflationary pressures.

However, during inflationary conditions the project cost is affected in magnitude of parameters. Cost of project on all heads viz. labour wage, raw material, fixed assets, equipments, plant and machinery, building material, remuneration of technicians and managerial personnels undergo a shift change. Besides, inflationary conditions place constraints on the resources of the consumers of the product and affect the demand pattern. Thus, cost at production are affected besides the projected statements of profitability and cash flow by the change in the demand pattern and market forecasting figures. The inflationary pressures alone do not stop here. The financial institution and banks revise their rate of lending and their financing cost further escalate during inflationary conditions. Under such conditions, the appraisal of the project generally be done keeping in view the following guidelines which are usually followed by the Government agencies, banks and financial institutions:

(1) Make provisions for delay in project implementation, escalation in project cost as per the forecasted rate of inflation in the economy particularly on all heads of cost.

(2) Sources of finance should be carefully scrutinized with reference to revision in the rate of interest to be made by lender and the revision which could be followed in the interest bearing securities. All these factors will push up the cost of financial resources for the corporate unit.

(3) Profitability and cash flow projections as made in the project report require revision and adjustment should be made to take care of the inflationary pressures affecting adversely future projections.

(4) Explain fully the criteria followed in adjusting the inflationary pressures viz. there are two criteria followed given as under:-

  (a) take inflationary rate at average rate and escalate the total cost at that rate;

  (b) adjust each cost item against inflationary rate. This would make adjustment for inflationary pressures in the cost elements responsible outflows and the revenue elements in the cash. Both cash inflows and outflows will accordingly adjust to inflationary changes at the appropriate rate applicable to each of them respectively.

(5) Examine the financial viability of the project at the revised rates and assess the same with reference to economic justification of the project. The appropriate measure for this aspect is the economic rate of return for the project which will equate the present value of capital expenditure to net cash flows over the life of the project. The rate of return should be acceptable which accommodates the rate of inflation per annum.

(6) In inflationary times, early pay back projects should be prepared. Because projects with long pay back are more subjected to inflationary pressures and the cash flow generated by the project will bear high risk.

PROJECT APPRAISAL UNDER DEFLATIONARY CONDITIONS

A different situation may arise in deflationary or recessionary situation. The economy is in down swing, prices are falling, lack of effective demand is discernible, production capacities are already affected narrowing the cash inflows affecting liquidity of the project adversely because wages and salaries and other overhead costs do not fall which keeps the outflow at static rate with declining inflows. The main consideration in project appraisal during this period is the cash inflow, sales, the demand for the projects and sales forecasting outliving the predictions. As a matter of fact new project are delayed as the appraisal never remains so realistic and the sources of supply of money become tight; investors have no enthusiasm in investing this money or savings in the corporate securities for the uncertain working results and higher risk investment. Nevertheless, the appraisal of the project should be done keeping in view the above factors.

From the above discussion, it is concluded that the difference in project appraisal during normal inflationary and deflationary condition is only of degree if due care is taken to adjust the economic, commercial or financial aspects of the project affecting the cost and cash inflows, the profitability and liquidity of the project.

PROJECT APPRAISAL BY FINANCIAL INSTITUTIONS

Project Report submitted by a corporate unit to a financial institution for grant of financial facilities is properly appraised by a team of experts drawn from different disciplines.

The project appraisal is done as a "business risk" and, therefore, efforts are made to corroborate the data submitted by a company with authentic sources. Each project is appraised on its own merits and flexibility is observed while applying the norms of ratio analysis, funds flow analysis, financial indicators, technical norms etc. The basic objective during appraisal remains the project and its future in the form of successful implementation and efficient operation so as to contribute to national economy. If a project remains successful, the money lend by financial institutions is returned safely. The growth of the project is the best security for the financial institutions than the physical and legal security. No doubt this security form an important part in the entire transaction for lending and borrowing for the project.

Viewing from the above angle, project appraisal, in general, by the financial institutions seek to consider *inter alia* the following aspects:

(1) The project profile, its reliable and formulation and project report;

(2) The promoter's capacity and competence;

(3) Viability Tests:

    (A) Technical Aspects

    (B) Financial Aspects

    (C) Economic Aspects

    (D) Societal/Distributive Aspects

    (E) Environment, Energy Management and Economical Aspects

    (F) Organisation and Management Aspects

    (G) Commercial Inclduing Marketing Aspects

Now, we would be analyzing each aspect in detail

1. The Project

The first and foremost consideration for appraisal of project report by a financial institution is the examination of the project itself. It may be recalled that the term lending financial institutions have been established by the Government with the sole objective to promote development and growth of the industries which are given planned priorities for the economic development of the country. Therefore, the project should be such which meet this standard and falls within the category of approved projects.

Another important consideration in this area is that the project report prepared by the corporate unit should confirm to the prescribed standard of the financial institutions. To be on the safe side, it is desirable if the project report is prepared by the reputed consultants approved by the financial institutions or the Technical Consultancies organisation established in different parts of the country by the financial institution.

There is no standard performa for preparation of project report but to facilitate its easy appraisal it should be self contained study with all necessary feasibility reports, market surveys, projected financial statements, managerial personnel and organisational charts, status of the company in the ownership and title to the property and the legal relationship with the promoters be clearly specified to avoid discrepancies and confusions. In reality, the

prescribed application form for financing by the financial institutions contains clauses to bring out most of the salient features in accepting a project proposal.

2. The Promoters: Capacity and competence

The promoter's capacity and competence should be examined with reference to their management background, traits as entrepreneurs, business or industrial experience, and past performance in other concerns, their integrity and reputation, market standing and legal competence.

Different considerations have got to be applied for the established entrepreneurs, or promoters and the new entrepreneurs. The basic requirement is that their profile should inspire confidence of their abilities and capacities to run the project successfully and continue the interest therein till the repayment of the financial facilities disbursed by the institutions to the unit promoted by them. In the cases of technocrats who are coming up and taking up the industrial project, these aspects are paid more attention than their experience with entrepreneurism ability or skills.

3. Viability Tests

After analyzing the Project and Promoters capacity, a bank/financial institution carries out the different validity tests.

A. Technical Aspects of Project Appraisal

This involves studying the feasibility of selected technical processes and its suitability under Indian conditions, Location of the project, Plant layout, appropriateness of the chosen equipment, machinery and technology, availability of raw material, power and other inputs, appropriateness of technology chosen from social point of view, availability of infrastructure for the project, the techno economic assumptions and parameters used for analyzing costs and benefits and viability provision for treatment of effluents, training of manpower, legal requirement on documentation, license and registration.

The technical feasibility is generally examined by technical specialists in the organizations. In case of highly specialized projects, the banks seek opinions or get the projects appraised through experts like consultants, or organizations like Technical Consultancy Organizations (TCOs).

B. The Financial Aspects of Project Appraisal

Financial Appraisal of a project is most important for a banker. The primary aim of financial analysis is to determine whether the project satisfies the investment criteria of generating acceptable level of profitability. The project should be able to service the debt and ensure expected returns to the investor. The important aspects which are examined while conducting financial appraisal are investment outlay, means of financing, projected financial statements, viability and profitability, break-even point analysis, sensitivity analysis and risk analysis.

Cash flow statement is the basis for financial analysis. In the initial period there is a negative cash flow because of investment in capital assets, but after the project takes off, the cash flow becomes positive due to the increased income.

Investment is generally required in the initial years, which is a cash outflow for the project. In the operational phase, there is inflow from the business, which results in positive cash flow till the project is wound up. In the last year, the inflow is higher due to the residual value adding to the cash inflow.

The period from start of the project till its winding up is known as project life and will vary from project to project. Generally, projects with more than 20 years life are analyzed for financial cost and benefits for 20 years only, as the benefits accruing after that have a negligible present value.

(a) Measures of Financial Viability – NPV, BCR and IRR

Financial viability is measured by net present value, benefit cost ratio, internal rate of return and debt service coverage ratios.

Net Present Value (NPV) representing wealth creation by the Project, is calculated by taking the discounted sum of the stream of cash flows during the project life. In symbolic terms, we can express NPV of a project as under:

$$\text{NPV} = \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^3} + ... + \frac{C_n}{(1+r)^n} - \text{Invst.}$$

Where C = Cash Flows for different periods, r = Discount Rate and Invest. = Initial Investment

In other words, NPV represents the difference between the present value of the cost and benefit streams.

A project is considered viable if the NPV is positive at a given discount rate and vice-versa. When two or more mutually exclusive projects are being appraised, the project with the highest NPV should be selected. Among the discounted techniques, NPV is considered the most important parameter for assessing viability.

    (i) Benefit Cost Ratio (BCR): BCR is the ratio of discounted value of benefit and discount value of cost. It can be expressed as under:-

$$\text{BCR} = \frac{\text{Summation of discounted value of Benefits}}{\text{Summation of discounted value of Costs}}$$

    The project is viable when BCR is one or more than one and is unviable when it is less than one.

    (ii) Internal Rate of Return (IRR): IRR represents the returns internally generated by the project. This is also the rate which makes the net present value equal to 0. The calculation of IRR is a process of trial and error. Normally, the process starts with the minimum discount rate and as the discount rate is increased the NPV will come down and becomes 0 or negative. If NPV is positive at one rate and negative at the immediate next rate (for example if NPV is positive at 20% discount rate and is negative at 25%), 'Interpolation Method' could be used for finding out the exact IRR by the following formula.

$$\text{Exact IRR by interpolation method} = \frac{L + (H - L) \times (\text{NPV at L})}{\{(\text{NPV at L}) - (\text{NPV at H})\}}$$

    Where, IRR = Internal Rate of Return; L = Lower discount rate where NPV was positive; H = Higher discount rate at which NPV was negative.

    The project is considered viable if the IRR is more than the acceptable rate for the entrepreneur which could be the opportunity cost for his funds. In case of agricultural and rural development projects generally the prescribed IRR for viability is 15% in India and other developing countries.

(b) Sensitivity Analysis

Projects are sensitive to fluctuation in values of critical variables like costs of inputs and prices of outputs. It is important to examine how sensitive is the project to fluctuations in the values of these variables because the basic assumptions taken for projections of balance sheet, cash flow statements for future years have an element of uncertainty. Different projects may, however, get affected differently from changes in the assumption of cost and return items. Sensitivity analysis helps us in finding out that how sensitive is the project to these fluctuations. Sensitivity analysis involves identification of crucial variable relating to costs and returns, specification of alternative values of the crucial variables and re-computation of the NPV and IRR by using the alternative values. A project, which is highly sensitive to even small fluctuations in cost and price, is a risky project for financing.

(c) Scenario Analysis

Sensitivity analysis takes care of only one or two variable which is at times inadequate. This limitation is partially overcome by what is known as scenario analysis, where scenario of certain prices, cost and other variables are created and the financial parameters are computed.

(d) Risk Analysis

Even though through sensitivity analysis and scenario analysis techniques, some of the uncertainties in the project are taken care, both these types of analysis have limitation that they have deterministic values for the variables. In a significant improvement over these methods, under risk analysis, probabilistic analysis is done by identification of key risk variables, finding out values of each risk variable, assigning probabilities for each value to each of the risk variables, using these values for risk analysis and finding out the probability of negative outcome of the project, i.e. what is the probability that the NPV of the project will be negative.

The risk analysis adds valuable information to the project analysis and it is an important tool in this respect but to take up investment or not depends on the risk taking capacity of the entrepreneur which will vary from person to person. Therefore, it is judgmental in nature.

C. Economic Appraisal

The objective of economic appraisal is to examine the project from the entire economy's point of view to determine whether the project will improve the economic welfare of the country. Economic appraisal is traditionally not conducted in banks or financial institutions. It is generally conducted by agencies like the World Bank and the development agencies of the Government for the projects having huge investment and profound implication for the economy. Examples of the projects where economic analysis is conducted are big dams, forestry projects and big industrial projects.

D. Social/distributive Appraisal

For an analysis of a project to be complete, it should include not only the financial and economic but also social appraisal. The social analysis consists of two parts: measurement of the distribution of the income due to the project and identification of the impact on the basic needs objectives of the society.

The steps involved in social appraisal are: conducting financial analysis, economic analysis and appraisal of distributional effect of the net benefits (externalities) of the project. Here, the affected parties like farmers, dealers of the goods, existing operators and Government are to be identified. One party (like farmers whose lands will be irrigated in the case of a dam) is a gainer but the other (like those who are displaced due to the dam) is a loser.

After social and distributive analysis it may emerge that a project is financially unviable but socially and economically is viable. In such situations the decisions to undertake the project would depend upon the goals of the Government. If the Government believes that the positive externalities are worth the negative financial cash flow, it may decide to implement the project.

E. Environmental Aspects

Developing countries including India are now becoming increasingly aware of the urgency to integrate environmental concerns into their project formulations and appraisal. This has led to the increased importance being attached to the environmental aspects in the projects and now most of the banks and financial institutions insist on what is known as Environmental Impact Assessment (EIA). The essence of EIA is a prediction of the consequences to the natural environment from development projects.

The emphasis in EIA is on those consequences of the projects which are relatively well known and whose magnitudes can be easily estimated. Conditional, uncertain or probabilistic aspects of the impacts are not considered. Another elaborate analysis called Environmental risk Assessment (ERA) is used to differentiate a new and additional analysis in which the probabilistic element is explicitly addressed.

In India, the consciousness has already come at the policy level. A separate ministry has been formed and Environment (Protection) Act, 1986 was passed by the Government of India. Further, Central Pollution Control Board (CPCB) has been formed for ensuring proper implementation of the provisions of the Act. Most of the

industries are covered by the Act and therefore such industries have to seek clearance not only before setting up of industries but also on a regular basis from the state level PCBs. State level PCBs implement the standards set by CPCB. Reserve Bank of India has also directed the banks not to extend certain credit facilities to industries which have deleterious effects on the environment. Thus, environmental aspects of the projects are becoming very important in project appraisal.

F. Organizational and Managerial Aspects

The organizational and managerial aspects evaluate the managerial capacity of the organization or the entrepreneur, responsible for implementing the project. Even if very good technology is chosen for the project, it may fail due to lack of or inadequate managerial capability. In small agricultural and other projects the entrepreneur is responsible for taking care of all these aspects. It is important for the banker to judge the borrower's managerial capability and also his financial capability (worth). In case of cost escalation he should be in a position to meet the additional financial requirement for the project.

G. Commercial Aspects Including Marketing

Commercial aspects of a project include arrangement for supply of inputs for the initiation and operation of the project and marketing of outputs. Some experts prefer to have a separate marketing module and would treat it as the most important aspect of appraisal.

LENDING POLICIES AND APPRAISAL NORMS BY FINANCIAL INSTITUTIONS AND BANKS

Lending policy and appraisal norms by banks are decided by the Reserve Bank of India. Banks determine their lending policies on the basis of RBI circulars/instructions and government policies.

To lend, banks depend largely on deposits from the public. Banks act as custodian of public deposits. Since the depositors require safety and security of their deposits, want to withdraw deposits whenever they need and also adequate return, bank lending must necessarily be based on principles that reflect these concerns of the depositors.

These principles include: safety, liquidity, profitability, and risk diversion.

(1) Safety

Banks need to ensure that advances are safe and money lent out by them will come back. Since the repayment of loans depends on the borrowers' capacity to pay, the banker must be satisfied before lending that the business for which money is sought is a sound one. In addition, bankers many times insist on security against the loan, which they fall back on if things go wrong for the business. The security must be adequate, readily marketable and free of encumbrances.

(2) Liquidity

To maintain liquidity, banks have to ensure that money lent out by them is not locked up for long time by designing the loan maturity period appropriately. Further, money must comeback as per the repayment schedule. If loans become excessively illiquid, it may not be possible for bankers to meet their obligations vis-à-vis depositors.

(3) Profitability

To remain viable, a bank must earn adequate profit on its investment. This calls for adequate margin between deposit rates and lending rates. In this respect, appropriate fixing of interest rates on both advances and deposits is critical. Unless interest rates are competitively fixed and margins are adequate, banks may lose customers to their competitors and become unprofitable.

(4) Risk diversification

To mitigate risk, banks should lend to a diversified customer base. Diversification should be in terms of geographic location, nature of business etc. If, for example, all the borrowers of a bank are concentrated in one region and that region gets affected by a natural disaster, the bank's profitability can be seriously affected.

LOAN POLICY

Based on the general principles of lending stated above, the Lending Policy Committee (LPC) of individual banks prepares the basic Lending policy of the Bank, which has to be approved by the Bank's Board of Directors. The loan policy outlines lending guidelines and establishes operating procedures in all aspects of Lending management including standards for presentation of Lending proposals, financial covenants, rating standards and benchmarks, delegation of Lending approving powers, prudential limits on large Lending exposures, asset concentrations, portfolio management, loan review mechanism, risk monitoring and evaluation, pricing of loans, provisioning for bad debts, regulatory/ legal compliance etc. The lending guidelines reflect the specific bank's lending strategy (both at the macro level and individual borrower level) and have to be in conformity with RBI guidelines. The loan policy typically lays down lending guidelines in the following areas:

– Level of Lending-deposit ratio

– Targeted portfolio mix

– Hurdle ratings

– Loan pricing

– Collateral security

1. Credit Deposit (CD) Ratio

A bank can lend out only a certain proportion of its deposits, since some part of deposits have to be statutorily maintained as Cash Reserve Ratio (CRR) deposits, and an additional part has to be used for making investment in prescribed securities (Statutory Liquidity Ratio or SLR requirement). It may be noted that these are minimum requirements. Banks have the option of having more cash reserves than CRR requirement and invest more in SLR securities than they are required to. Further, banks also have the option to invest in non-SLR securities. Therefore, the Credit Policy Committee (CPC) has to lay down the quantum of Lending that can be granted by the bank as a percentage of deposits available. Currently, the average CD ratio of the entire banking industry is around 70 percent, though it differs across banks. It is rarely observed that banks lend out of their borrowings.

2. Targeted Portfolio Mix

The LPC aims at a targeted portfolio mix keeping in view both risk and return. Toward this end, it lays down guidelines on choosing the preferred areas of lending (such as sunrise sectors and profitable sectors) as well as the sectors to avoid. Banks typically monitor all major sectors of the economy. They target a portfolio mix in the light of forecasts for growth and profitability for each sector. If a bank perceives economic weakness in a sector, it would restrict new exposures to that segment and similarly, growing and profitable sectors of the economy prompt banks to increase new exposures to those sectors. This entails active portfolio management. Further, the bank also has to decide which sectors to avoid. For example, the LPC of a bank may be of the view that the bank is already overextended in a particular industry and no more loans should be provided in that sector. It may also like to avoid certain kinds of loans keeping in mind general Lending discipline, say loans for speculative purposes, unsecured loans, etc.

3. Hurdle ratings

There are a number of diverse risk factors associated with borrowers. Banks should have a comprehensive risk

rating system that serves as a single point indicator of diverse risk factors of a borrower. This helps taking Lending decisions in a consistent manner. To facilitate this, a substantial degree of standardisation is required in ratings across borrowers. The risk rating system should be so designed as to reveal the overall risk of lending. For new borrowers, a bank usually lays down guidelines regarding minimum rating to be achieved by the borrower to become eligible for the loan. This is also known as the 'hurdle rating' criterion to be achieved by a new borrower.

4. Pricing of loans

Risk-return trade-off is a fundamental aspect of risk management. Borrowers with weak financial position, hence, placed in higher risk category and are provided Lending facilities at a higher price (that is, at higher interest). The higher the Lending risk of a borrower, the higher would be his cost of borrowing. To price Lending risks, banks devise appropriate systems, which usually allow flexibility for revising the price (risk premium) due to changes in rating. In other words, if the risk rating of a borrower deteriorates, his cost of borrowing should rise and vice versa. At the macro level, loan pricing for a bank is dependent upon a number of its cost factors such as cost of raising resources, cost of administration and overheads, cost of reserve assets like CRR and SLR, cost of maintaining capital, percentage of bad debt, etc. Loan pricing is also dependent upon competition.

5. Collateral security

As part of a prudent lending policy, banks usually advance loans against some security. The loan policy provides guidelines for this. In the case of term loans and working capital assets, banks take as 'primary security' the property or goods against which loans are granted. In addition to this, banks often ask for additional security or 'collateral security' in the form of both physical and financial assets to further bind the borrower. This reduces the risk for the bank. Sometimes, loans are extended as 'clean loans' for which only personal guarantee of the borrower is taken.

6. Compliance with RBI guidelines

The Lending policy of a bank should be conformant with RBI guidelines; some of the important guidelines of the RBI relating to bank Lending are discussed below.

7. Directed Lending stipulations

The RBI lays down guidelines regarding minimum advances to be made for priority sector advances, export Lending finance, etc. These guidelines need to be kept in mind while formulating Lending policies for the Bank.

CAPITAL ADEQUACY

If a bank creates assets-loans or investment-they are required to be backed up by bank capital; the amount of capital they have to be backed up by depends on the risk of individual assets that the bank acquires. The riskier the asset, the larger would be the capital it has to be backed up by. This is so, because bank capital provides a cushion against unexpected losses of banks and riskier assets would require larger amounts of capital to act as cushion. The Basel Committee for Bank Supervision (BCBS) has prescribed a set of norms for the capital requirement for the banks for all countries to follow. These norms ensure that capital should be adequate to absorb unexpected losses. In addition, all countries, including India, establish their own guidelines for risk based capital framework known as Capital Adequacy Norms. These norms have to be at least as stringent as the norms set by the Basel committee. A key norm of the Basel committee is the Capital Adequacy Ratio (CAR), also known as Capital Risk Weighted Assets Ratio, is a simple measure of the soundness of a bank. The ratio is the capital with the bank as a percentage of its risk-weighted assets. Given the level of capital available with an individual bank, this ratio determines the maximum extent to which the bank can lend. The Basel committee specifies a CAR of at least 8% for banks. This means that the capital funds of a bank must be at least 8 percent of the bank's risk weighted assets. In India, the RBI has specified a minimum of 9%, which is more stringent than the international norm.

The RBI also provides guidelines about how much risk weights banks should assign to different classes of assets (such as loans). The riskier the asset class, the higher would be the risk weight. Thus, the real estate assets, for example, are given very high risk weights. This regulatory requirement that each individual bank has to maintain a minimum level of capital, which is commensurate with the risk profile of the bank's assets, plays a critical role in the safety and soundness of individual banks and the banking system.

LENDING EXPOSURE LIMITS

As a prudential measure aimed at better risk management and avoidance of concentration of Lending risks, the Reserve Bank has fixed limits on bank exposure to the capital market as well as to individual and group borrowers with reference to a bank's capital. Limits on inter-bank exposures have also been placed. Banks are further encouraged to place internal caps on their sectoral exposures, their exposure to commercial real estate and to unsecured exposures. These exposures are closely monitored by the Reserve Bank. Prudential norms on banks' exposures to NBFCs and to related entities are also in place.

Exposure norms for Commercial banks in India

Exposure to	Limit
1. Single Borrower	15 per cent of capital fund (Additional 5 percent on infrastructure exposure)
2. Group Borrower	40 percent of capital fund (Additional 10 percent on infrastructure exposure)
3. NBFC	10 percent of capital fund
4. NBFC - AFC	15 percent of capital fund
5. Indian Joint Venture/Wholly owned	20 percent of capital fund subsidiaries abroad/ Overseas step down subsidiaries of Indian corporates
6. Capital Market Exposure	
(a) Banks' holding of shares in any	The lesser of 30 percent of paid-up share company capital of the company or 30 percent of the paid-up capital of banks
(b) Banks' aggregate exposure to	40 percent of its net worth capital market (solo basis)
(c) Banks' aggregate exposure to	40 percent of its consolidated net worth capital market (group basis)
(d) Banks' direct exposure to capital	20 percent of net worth market (solo basis)
(e) Banks' direct exposure to capital	20 percent of consolidated net worth market (group basis)
7. Gross Holding of capital	10 per cent of capital fund banks / financial institutions

Some of the categories of the above table are discussed below:

1. ***Individual Borrowers:*** A bank's Lending exposure to individual borrowers must not exceed 15 % of the Bank's capital funds. Lending exposure to individual borrowers may exceed the exposure norm of 15 % of capital funds by an additional 5 % (i.e. up to 20 %) provided the additional Lending exposure is on account of infrastructure financing.

2. ***Group Borrowers:*** A bank's exposure to a group of companies under the same management control must not exceed 40% of the Bank's capital funds unless the exposure is in respect of an infrastructure

project. In that case, the exposure to a group of companies under the same management control may be up to 50% of the Bank's capital funds.

3. ***Aggregate exposure to capital market:*** A bank's aggregate exposure to the capital market, including both fund based and non-fund based exposure to capital market, in all forms should not exceed 40 percent of its net worth as on March 31 of the previous year.

In addition to ensuring compliance with the above guidelines laid down by RBI, a Bank may fix its own Lending exposure limits for mitigating Lending risk. The bank may, for example, set upper caps on exposures to sensitive sectors like commodity sector, real estate sector and capital markets. Banks also may lay down guidelines regarding exposure limits to unsecured loans.

Lending Rates

The Reserve Bank of India has brought a new methodology of setting lending rate by commercial banks under the name Marginal Cost of Funds based Lending Rate (MCLR**).** It has modified the existing base rate system from April 2016 onwards. As per the new guidelines by the RBI, banks have to prepare Marginal Cost of Funds based Lending Rate (MCLR) which will be the internal benchmark lending rates. Based upon this MCLR, interest rate for different types of customers should be fixed in accordance with their riskiness. The base rate will be now determined on the basis of the MCLR calculation.

The MCLR should be revised monthly by considering some new factors including the repo rate and other borrowing rates. Specifically the repo rate and other borrowing rates that were not explicitly considered under the base rate system. As per the new guidelines, banks have to set five benchmark rates for different tenure or time periods ranging from overnight (one day) rates to one year. The new methodology uses the marginal cost or latest cost conditions reflected in the interest rate given by the banks for obtaining funds (from deposits and while borrowing from RBI) while setting their lending rate. This means that the interest rate given by a bank for deposits and the repo rate (for obtaining funds from the RBI) are the decisive factors in the calculation of MCLR.

LOAN DOCUMENTATION

Term lending by the Financial Institutions is a high risk business and is therefore important for them to satisfy themselves that no legal lacuna or formality is omitted as might expose the Financial Institutions to the danger of losing the money lent. The relationship between the Lender and the Borrower is a legal relationship which results in mutual rights, duties and liabilities and commercial prudence demands that these should be well expressed and be fool proof as far as possible. Loan documentation is one of the most important aspects of banking and banks are very cautious in documentation for a project financing

Procedure for execution of documents has been standardized in most of the cases. Sometimes delay takes place in providing certain documents required in connection with the execution of the loan documents. The Company Secretary of the Borrower should therefore in consultation with Legal Department of the financial institution and the Company's advocate arrange to have:

(a) Inspection and investigation of the Title Deeds of the Borrower in respect of its properties by the Lenders and/or by the advocates chosen by the Borrower from the panel maintained by the Lenders to establish a clear and marketable title in favour of the Borrower to its properties.

(b) Approval of the shareholders of the company for mortgaging/charging company's properties in favour of the Financial Institutions as required under Section 180(1)(a) of the Companies Act, 2013;

(c) Shareholders' Authority to the Board of directors of the company to borrow in excess of the limits of its paid-up capital and free reserves as required under Section 180(1)(a) of Companies Act, 2013;

(d) Resolution of the Board of directors of the Company accepting the terms and conditions of the Sanction Letter or Letter of Intent issued by the Financial institution sanctioning the term loan and execution of Loan Agreement and Deed of Hypothecation.

(e) Normally the Lending Institution obtains several undertakings from the borrower on stamp papers. These are:

  (i) Undertakings from the Promoters Group regarding non-disposal of their shares in the Company without prior approval of the Lender;

  (ii) Undertaking by the Promoters to meet the over-run in the cost of the project without having recourse to the Institutions and agreeing not to withdraw the unsecured loans and deposits brought in by the Promoters/their Group for financing the project;

  (iii) Undertaking to complete the pending formalities given in the Sanction Letter within a stipulated period and also to create the Mortgage (if not completed) within a stipulated period.

(f) The Institution in the case of bridge loan gets a Demand Promissory Note signed by the authorized Director, along with Board's is resolution for authorizing the director.

(g) The Institution also obtains a 'No-lien' letter from the Company's Bank to which the sanctioned loan amount is to be credited. Format of this 'No-lien' letter is provided by the Lending institution.

(h) Permission of the Income-tax authorities under Section 281 of ITA.

(i) Letter of Confirmation under Section 9A of IDBI Act that none of its Directors are interested in the project being financed.

(j) Permission/exemption under Urban Land Ceiling Act, wherever required.

As such before signing the Loan Documents with the Financial Institutions, the Company secretary should, besides keeping the aforementioned documents/paper, constantly liaise with the lenders to ascertain if any further compliance is required to enable disbursement of the loan amount as soon as the documentation gets completed.

The importance of the Loan Agreement and its main terms and conditions are discussed hereunder.

Loan Agreement of Financial Institutions

The Loan agreement is an agreement expressed in writing and entered into between the borrower and the lender bank, institution or other creditors. It envisages a relationship taking into account the commitment made at that time and the conduct of the parties carrying legal sanctions.

A company, as a borrower, delivers power to borrow under the Memorandum of Association and Articles of Association read with the provision of the Companies Act. The agreement as such is required to be on behalf of the company under its express or implied authority and may in the same manner be varied or discharged.

Loan agreement for borrowing money from financial institutions can be executed under the authority of the Board authorization and authorizing affixation of the common seal of the company on the documents at the time of its execution. An agreement, thus executed, binds the company and is valid in the eyes of law.

Usual conditions in Loan Agreement

(1) Loan Agreement Terms

The loan agreement begins with the 'date of execution and 'description of the parties to the agreement'. The main terms used in the loan agreement are defined and a 'brief description of project and financing plan' is given.

The Terms of Loan

(a) Under the terms of the loan, the exact amount of the loan the company agreed to borrow is specified.

(b) After mention of the loan agreement amount, another important clause in the loan agreement is 'interest

ordinary course of the business. Where there are more than one mending institution involved, the mortgage and charge are to be created on *pari-passu* basis in favour of such institutions.

The provision of personal guarantee of Promoter/Directors made in the security clause is discretionary. The institutions in some cases obtain pledge of unencumbered shares held by the promoter as security for the loan. In these cases, it is to be ensured that the shares are not subject to lock-in-period or the intention to create the pledge is discussed in the prospectus.

(3) Borrowers Warranties

Under this clause the borrower ensures the lenders of the accurate description of the project in the Loan Application, on the basis of which the borrower has been granted the loan followed by execution of the agreement. The borrower also undertakes to furnish correct information relating to the project to the lender in future also. Besides, this clause requires the borrower to disclose any material affecting the project in future also. Such changes may cover scope of the projects, the location of its factory, the processes to be used for the manufacture of its products, the line of activity, the specifications of machinery and equipment required for the project, buying and selling arrangements, the management set-up, the arrangements entered into with collaborators, machinery suppliers and technical consultants etc. except as approved by the lenders from time to time.

Warranties clause also cover assurance by the borrower for a good title to its properties. The assurance specifies that there has been no changes or encumbrances on the property or the assets of the borrower; that the properties are not involved in any litigation of title or ownership; that there is no defect in the property affecting its title, of ownership; that there is no infringement of public law, or no default in payment of demands of Municipalities or other statutory authorities etc. Further, warranty also covers that the properties are not affected by any public schemes like widening of public roads etc.

In addition to the above, the warranties clause covers briefly about the selling and purchasing arrangements; management agreements; financial position; auditors certificates, permissions under FEMA; various consents/ licence from Government of India or State Agencies; Agreement with technical consultants/collaborators; agreements with machinery suppliers; construction schedules; cash budgets; supply of power, water, raw material, arrangements for working capital and arrangements for meeting short fall in the resources for completion of the project. Compliance of provisions of the Companies Act, 2013 in relation to borrowing like passing of requisite resolutions under Sections 180(1)(a) and 180(1)(c); adequacy of technical, financial and executive staff; resolving conflict in Memorandum of Association and Articles of Association exist in loan agreement. This list of warranties is not complete or exhaustive but only illustrative. Additional conditions befitting the circumstances are appended whenever the Institution deems them fit.

(4) Condition Precedent to Disbursement of the Loan

To safeguard the interest of the financial institutions, the borrower is required to comply with the following matters incorporated under this clause in the Loan Agreement:

(a) The borrower shall have share capital paid-up to the required extent as stipulated in the loan agreement;

(b) The borrowers shall have created security in favour of lenders having proved to the satisfaction of the lenders about the borrowers clear and marketable title over its properties;

(c) The borrower shall have complied with the provisions of the Companies Act, 2013, viz. under Section 180(1)(a) as applicable;

(d) The borrower shall have entered into arrangements with other financial institutions and banks where so required for the balance portion of the funds required for completion of the project;

(e) The borrower has furnished tax clearance certificate under Section 230A of the Income-tax Act, 1961; (whenever applicable)

(f) That there are no legal proceedings pending against the borrower company involving any claim on its properties;

(g) There has been no default discharge of its obligations to the financial institutions;

(h) The borrower shall satisfy the lender of the utilisation of earlier disbursed amount of the loan.

Here, also additional conditions precedent to disbursement could be added depending upon the circumstances of each case as the Institution may deem fit. Similarly, some of the above conditions could even be deleted where the circumstances so warrant when compliance of such conditions in a particular case is not required.

(5) Concurrent Covenants

The affirmative covenants and terms as given in the Loan Agreement which apply during the currency of the Loan Agreement cover the following subject matter:

(a) Project implementation;

(b) Utilisation of loan;

(c) Adequate loan amount to be kept in separate Bank Account i.e. Escrow account in case of project finance;

(d) Adequate Insurance of the mortgaged assets and insurance policies to be furnished to the lenders endorsing the Lenders as Mortgages;

(e) To report to the lender any changes in project;

(f) To report to the lender any adverse changes in the production and profitability projections;

(g) To report to the lender the changes in different contractors/agreements as covered in the loan agreement specially those made with machinery suppliers/collaborators/technicians or technical consultants and suppliers of raw materials;

(h) Borrower to ensure proper maintenance of the property;

(i) Borrower to inform the lender of the notices received by it about the winding up proceedings and other legal process instituted against the company;

(j) Borrower to inform the lenders of the causes of delay in completion of the project;

(k) Borrower to inform any loss-damages the borrower suffers due to any unforeseen circumstances;

(l) On happening of certain events proportionate repayment of the loan is required to be made by the borrower. These, events may include payment being made to other lenders covered under the loan syndication arrangements without making proportionate payments to all i.e. preference being made in payment of dues by paying one over the other;

(m) The borrower to reimburse and pay costs/charges and expenses to lenders e.g. travelling expenses of lender's inspection team etc.

(n) Furnish to lenders the documents executed in favour of banks and other institutions;

(o) Make alterations in memorandum of association and articles of association as desired by the lenders;

(p) Pass necessary resolutions to entitle lenders to rights shares/bonus shares where a right of conversion of loan into equity has been exercised by the lenders;

(q) Furnish details of additional property, movable or immovable acquired by the company subsequent to the creation of mortgage;

(r) Borrower shall facilitate the appointment of the lender's nominee directors;

(s) Borrower to agree to the lenders' right to depute observers at meetings of the Board of directors or General Meeting of the Borrower Company.

(t) Borrower to place before its Board of Directors for consideration of all important matters and also those matters which the lenders may desire;

(u) Borrower to uphold lenders' rights to appoint Technical/Management consultants and chartered accountants as and when the lender may so decide.

Negative Covenants

In addition to the above positive covenants, there are certain 'negative covenants in the agreement which is required to be performed by the borrower. These negative covenants restrict the company (1) to pay commission to promoters, directors, managers or other persons for furnishing guarantee or indemnity or for undertaking any other liability in connection with any financial assistance obtained and/or to be obtained by the borrower for the purpose of the project; (2) to pay dividend to the equity share holders if default has been committed in payment of interest or repayment of installments of principal to the lenders; (3) to create charge or lien on its assets; (4) to enter into any partnership, profit-sharing or royalty agreements or enter into any similar arrangements whereby the business or operations of the company are affected; (5) to create any subsidiary or become subsidiary to any other existing concern; (6) to recognize or register any transfer of shares in the borrowers' share capital by the promoter directors, their relatives and associates who are required to furnish "Undertaking for non-disposal of shares" to the Financial Institutions; (7) to permit withdrawal of unsecured loans and deposits brought in or to be brought in by the Promoter Directors Group or Associates to finance capital cost of the project and to meet the working capital needs unless such withdrawal or payment of interest on such unsecured loan and deposit is permitted by the lenders.

The various other aspects covered under the 'negative covenants include not to carry out (1) the amendment of the memorandum of association and articles of association or alteration in the capital structure of the Company i.e. borrower (2) transfer of undertaking, trading activity other than the activities permitted by the Lenders (3) payment of directors remuneration, in addition to what has been approved by the Central Government and the Institution. Negative covenants also relate to (1) Mergers/consolidation etc. utilisation of funds, donations, new project, change of registered office and location of factory, not to raise loans or debentures or invest funds in other concerns etc. without the prior approval of the Lenders.

(6) Reporting System and Inspections

The borrower company is required to submit to the lender the quarterly/half-yearly progress reports during the period when project implementation is in progress. Once the project is completed and production is commenced the borrower company is required to submit quarterly progress reports of production, sales, gross profits and other important details having a bearing on the operational performance of the company. Besides, the audited annual accounts of the company are also required to be submitted by the company to the lenders.

In addition to above and obtaining the information through periodical reports, the loan agreement contains provision for having the inspection of the borrower concern carried out periodically by the lenders to verify project expenditure, Books of Accounts and records; technical-cum-financial-cum-legal inspections through the Institutional Inspection team of experts in different areas. This practice continues till the entire amount of the loan is repaid. The cost of such inspection is borne and paid by the company on demand and until payment; the same shall carry interest at the same rate as on defaulted sums under the loan agreement.

(7) Remedies for the Breach

The main remedy of the lender against the borrower is to call back the loan amount with interest and other dues. The clause for remedies specifies those circumstances in which the lender can take recourse to such remedies. These circumstances, *inter alia*, are default in payment of principal sum of the loan; interest and arrears of interest, non-performance of covenants and conditions; supply of misleading information to the tenders relating

to the projects, its promoters or relating to its operations; refusal to disburse loan by other Financial Institutions; sales, disposal or removal of Assets of the Company without lenders approval etc. etc.

(8) Cancellation, Suspension and Termination of Loan

The lender may cancel any part of the loan by giving notice to the borrower if such loan amount remains unavailed of by the borrower company. Any portion of the loan may be suspended or terminated for non-compliance of the terms and conditions of the loan agreement by the borrower or on emergence of any extraordinary situation. Such suspension shall continue till the default is remedied.

PROJECT REVIEW AND CONTROL

Project review is a very important aspect of entire project life.

Even projects that are well designed, comprehensively planned, fully resourced and meticulously executed will face challenges. These challenges can take place at any point in the life of the project and the project team must work to continually revisit the design, planning and implementation of the project to confirm they are valid and to determine whether corrective actions need to be taken when the project's performance deviates significantly from its design and its plan. This is the purpose of the Project Monitoring, Evaluation and Control Phase.

Not surprisingly, the three principle categories of activities taking place during the Monitoring, Evaluation and Control Phase are:

– Project Monitoring

– Project Evaluation

– Project Control

These activities are intended to occur continuously and continually, taking place through the entire life of the project. For example, the earliest iterations of the project indicators are already being developed during the Project Identification and Design Phase; the Monitoring Plan is developed during the Planning Phase; monitoring visits are conducted during the implementation phase, and many evaluation activities are undertaken during the End of Project Transition Phase.

Differentiating Monitoring, Evaluation and Control

Before examining each of the three categories of activities in the Project Monitoring, Evaluation and Control Phase in detail, it is first important to differentiate between them.

Progress Monitoring tracks the operational work of the project. It answers questions like "Have activities been completed as planned?" "Have outputs been produced as anticipated?" "Is the work of the project progressing as projected?" At a fundamental level it is a **passive process,** it changes nothing. Instead, it tells the project manager where the project performance is in terms of money, time, risk, quality, and other areas of project progress. At its core, the goal objectives, timing and activities of project progress monitoring are perhaps best identified via the following table:

The What, Why, When and How of Monitoring

What	A continuous review of project progress at the activity and outputs levels Identify necessary corrective action
Why	Analyze current situation, identify issues and find solutions, discover trends and patterns, keep project activities on schedule, measure progress against outputs, make decisions about human, financial and material resources

When   Continuous

How   Field Visits Records Reports

Examples of Monitoring Indicators

	Agriculture Example	Microfinance Example	Water Example
Outputs – 'The tangible products or services'	Number of farmer groups created - competence of trainees	Number of clients receiving and correctly using credit Number of new water systems installed and functioning properly	Number of clients participating in savings programs
Activities – 'Tasks or actions taken to implement project interventions'	Number of staff visits to farming communities Number of training sessions organized	Number of staff visits to villages Number of bank training sessions - competence of trainees	Number of communities organized for water system installation

Project Evaluation tends to focus on tracking progress at the higher levels of the logical framework – i.e. project outcomes. Evaluations tend to explore questions like, "Is the project successful at achieving its outcomes?" "Is the project contributing to its ultimate goal?" Evaluation data is collected and analyzed less frequently and often requires a more formal intervention (often by technical advisors or external evaluators) to show project results.

Examples of Evaluation Indicators

	Agriculture Example	Microfinance Example	Water Example
Goals – 'Are the project outcomes contributing to a larger impact within the target communities?'	% of families who produce enough food to cover lean periodsDecreased % of malnourished children	Increase in net household income Positive change in household consumption patterns	Reduced morbidity and mortality from water related diseases
Outcomes – 'Are the project outputs resulting in the desired project outcomes?'	% of families adopting improved techniques % of hectares covered with improved techniques	% of households with increased working capital	% of households using safe water supply increase in per capita consumption of water

Note – While projects are expected to contribute to the achievement of the goal level indicators, it is NOT the responsibility of the project to achieve (or to monitor) the goals.

Project Control involves establishing the systems and decision-making process to manage variances between the project plans (in terms of scope, cost, schedule, etc.) and the realities of project implementation. It also involves establishing how project variances and changes are managed, documented and communicated with stakeholders.

The Project Monitoring and Evaluation Plan

Connecting the Logical Framework and the Monitoring and Evaluation Plan	
Project Management is Iterative!	As discussed, the Monitoring, Evaluation and Control Phase extends through the entire life of the project. The project logical framework is the first step in developing the full monitoring and evaluation plan for the project. The indicators and means of verification that are included for the logical framework will ultimately become the building blocks for the full monitoring and evaluation plan of the project.

A crucial element of a comprehensive implementation plan is a monitoring and evaluation plan which identifies the system for tracking and measuring project progress, performance and impact. The appropriate time to develop the formal Monitoring and Evaluation plan is after the project is approved for funding but before the start-up of project activities. However, the preparatory work that contributes to that plan will start long before this point.

Strong project design makes it easier to create and align comprehensive monitoring and evaluation systems. The Monitoring and Evaluation Plan expands on the initial progress indicators provided in the logical framework and the project proposal; and provides additional details for each of the levels of the project logical framework. While the format of project monitoring and evaluation plans varies, the plan usually includes the following information:

- What indicators are being monitored and evaluated?
- What information is needed to track the indicator?
- What are the sources of the information?
- What data collection methods are appropriate?
- Who will collect the information?
- How often will it be collected?
- Who will receive and use the results?

While there are many considerations (budget, resources, donor requirements, etc.) to keep in mind when identifying what data to collect in the Project Monitoring and Evaluation Plan, the most important consideration should be the usefulness of the data. When identifying indicators, the project team should always ask "What will this information tell us?" and "What are the expected improvements in decision-making resulting from this data?"

Monitoring Project Progress and Project Risk	
Project Management is Comprehensive!	While the attention of the monitoring and evaluation plan is focused on tracking the project's progress against the indicators at each of the levels of the project logframe, the project team must also track the project risk throughout the life of the project. Risk monitoring, in comparison to progress monitoring, involves continuously surveying the project horizon and anticipating the possibility that something may go wrong, or not turn out as planned. The project manager needs to continually and comprehensively survey the risks which have the potential to threaten project success and actively manage these threats throughout the life of the project.

SOCIAL COST AND BENEFIT ANALYSIS (SCBA) OF PROJECT

Social cost-benefit analysis is a systematic and cohesive method to survey all the impacts caused by a project. It comprises not just the financial effects (investment costs, direct benefits like tax and fees, etc), but all the social effects, like: pollution, safety, indirect (labour) market, legal aspects, etc. The main aim of a social cost-benefit analysis is to attach a price to as many effects as possible in order to uniformly weigh the above-mentioned heterogeneous effects. As a result, these prices reflect the value a society attaches to the caused effects, enabling the decision maker to form a statement about the net social welfare effects of a project.

Major advantages of a social cost-benefit analysis are that it enables investors to systematically and cohesively compare different project alternatives. Hence, these alternatives will not just be compared intrinsically, but will also be set against the "null alter-native hypothesis". This hypothesis describes "the most likely" scenario development in case a project will not be executed. Put differently, investments on a smaller scale will be included in the null alternative hypothesis in order to make a realistic comparison in a situation without "huge" investments.

The social cost-benefit analysis calculates the direct (primary), indirect (secondary) and external effects:

(a) Direct effects are the costs and benefits that can be directly linked to the owners/users of the project properties (e.g., the users and the owner of a building or highway).

(b) Indirect effects are the costs and benefits that are passed on to the producers and consumers outside the market with which the project is involved (e.g., the owner of a bakery nearby the new building, or a business company located near the newly planned highway).

(c) External effects are the costs and benefits that cannot be passed on to any existing markets because they relate to issues like the environment (noise, emission of CO_2, etc.), safety (traffic, external security) and nature (biodiversity, dehydration, etc.).

The results of a social cost-benefit analysis are:

1. ***An integrated way of comparing the different effects:*** All relevant costs and benefits of the different project implementations (alternatives) are identified and monetized as far as possible. Effects that cannot be monetized are described and quantified as much as possible.

2. ***Attention for the distribution of costs and benefits:*** The benefits of a project do not always get to the groups bearing the costs. A social cost-benefit analysis gives insight in who bears the costs and who derives the benefits.

3. ***Comparison of the project alternatives:*** A social cost-benefit analysis is a good method to show the differences between project alternatives and provides information to make a well informed decision.

4. ***Presentation of the uncertainties and risks****: A social cost-benefit analysis has several methods to take economic risks and uncertainties into account. The policy decision should be based on calculated risk.

Two approaches for SCBA

– **UNIDO Approach**: - This approach is mainly based on publication of UNIDO (United Nation Industrial Development Organisations) named Guide to Practical Project Appraisal in 1978.

– **L-M Approach :-** IMD Little and J.A. Mireless approach for analysis of Social Cost Benefit in Manual of Industrial Project " Analysis in Developing countries and project Appraisal and planning for Developing Countries.

UNIDO Approach of Social Cost benefit Analysis

The UNIDO guidelines provide a comprehensive framework for appraisal of projects and examine their desirability and merit by using different yardsticks in a step-wise manner. The desirability is examined from various angles, such as the impact on:-

    (a) Financial profitability of utilization of domestic resources,

    (b) Savings and consumption pattern,

    (c) Income distribution, and

    (d) Production of merit and demerit goods.

These different aspects are examined in five stages, each stage leading towards a social benefit-cost of the project.

Stage one: measures financial profitability from detailed integrated standard analytical tables enumerating various costs and benefits at the market price and examines profit viability from investors' point of view.

Stage two: adjusts the financial costs and benefits to various distortions introduced by market imperfections by valuing costs and benefits or net benefits in terms of economic efficiency or shadow prices. For shadow prices, it categorizes project inputs and outputs into "traded", "tradable" and "non-traded". For traded and tradable, the guidelines use the border prices (f.o.b/c.i.f)as the relevant shadow prices, whereas non-traded inputs and outputs are broken down into their components and each tradable subcomponent is valued at border prices, and so on. The residual non-traded components of commodities are valued at domestic willingness to pay criterion and the labour is valued at shadow wage rate.

Stage three: This stage designed to examine the impact of projects on savings and consumption which are of vital consideration in the choice of alternative investments in labour-intensive and capital-intensive projects. If saving is assigned great importance, as should be the case in capital-scarce countries, this stage recommends the rate for adjustment for savings by which the social value of a rupee/dollar investment exceeds its consumption value.

Stage four: This is important for those countries that regard income redistribution in favor of weaker sections and backward regions as desirable objectives. The guidelines suggest weighting net benefits to various income groups or regions that reflect the judgment of politicians or the planners.

 Stage five: Finally, in stage five, the UNIDO analysis suggests a methodology for necessary adjustment of the deviations in economic and social values and difference between the efficiency and social value of project output, say, between good and bad or merit and demerit goods. It has been claimed that the analysis of merit and demerit goods is not designed for "purists in economics who think that economics should be devoid of political or subjective judgements"

Little – Mireless (L-M) Approach

The seminal work of Little and Mireless on benefit-cost analysis systematically develops a theoretical basis for the analysis and its underlying assumptions and lays down step-wise procedure for undertaking benefit-cost studies of public projects. The mathematical formulation is identical to the UNIDO method except for differences in assigning value to discount rates and accounting for imperfections and other market failures and social considerations.

Like UNIDO guidelines, the Little-Mireless method also suggests valuation of project investment at opportunity cost (shadow prices) of resources to correct distortions due to market imperfections. Both methods make use of border prices to correct distortions but with a major difference.

While Little and Mireless express the numeraire in terms of border prices in foreign currencies, the guidelines recommend that foreign exchange values be calculated in terms of domestic currency.

Little and Mireless have also suggested an elaborate methodology for calculating shadow prices of non-tradables. Use of detailed input-output tables is suggested with a view to tracing down the chain of all non-traded and traded inputs that go into their production. However, in the case of non-availability of detailed input/output tables, a conversion factor based on the ratio of domestic costs of representative items to world prices of these items could be used for approximation of shadow prices of non-traded resources. Little and Mireless believe that in all less developed countries, one of the major criteria for the choice of a project should be its ability to generate savings and, hence, the Little-Mireless method suggests the use of "accounting rate of interests" to calculate present worth of future annuities of savings and consumption. Guidelines, on the other hand, do not make any adjustment for consumption and saving impact of project investment. Unlike the five stages of UNIDO, the Little and Mireless procedure is relatively more practical, although, unlike guidelines, it does not provide sufficient insights by examining project investment from different angles.

Difference between UNIDO and L-M Approach

UNIDO Appraoch	L-M Appraoch
Domestic currency is used as Numeraire	International price is used as Numeraire
Consumption is the measurement base	Uncommitted social income is the measurement base
SCBA objectives are met through stage by stage	At one place all SCBA objectives are fulfilled.

DIFFERENT SOURCES OF FINANCE

Term Loans from Financial Institutions and Banks

Term loan is a long term secured debt extended by banks or financial institutions to the corporate sector for carrying out their long term projects maturing between 5 to 10 Years which is normally repaid in monthly or quarterly equal instalment. They are external source of finance paid in instalments governed by loan agreement and covenants.

All the capital requirements cannot be fulfilled by the promoters or equity share issues and that is where the term loans come into picture. Term loan or project finance is a long term source of finance for a company normally extended by financial institutions or banks for a period of more than 5 years to a maximum of around 10 years. One common feature which helps management in relatively substituting equity by term loans is the longer term of the loan.

Term loan is a type of funding which is most suitable for projects involving very heavy investment which is not possible by an individual or promoters. Big projects cannot be concluded in a year or two. To yield return from them, long term perspective is required. Such big ventures are normally financed by big banks and financial institutions. If the investment is too large, several banks come together and finance it. Such type of term loan funding is also called as consortium loan

Term loan is acquired for new projects, diversification of business, expansion projects, or for modernization or technology upgradation. Here also, the underlying fact is that the investment in these projects is normally very huge. Lack of option of funding from other sources such as equity etc for any reason also directs a company to go for term loan.

Financial Leverage and Term Loan

At times, important reason for selecting term loan is financial leverage. By opting for debt finance like term loan, a company tries to magnify the returns to their equity shareholders. This help management of a company achieve the core objective of wealth maximization for its shareholders and also preserve the control and share of existing shareholders.

Features of a Term Loan:

1. Loan in any Currency: These loans are provided both in home or foreign currency. Home currency loans are offered normally for purchase of fixed assets such as land, building, plant and machineries, preliminary and preoperative expenses, technical know-how, working capital etc. On the other hand, foreign currency loans are offered for import of certain plant or machinery, payment of foreign consulting fee etc.

2. Secured Loan: Term loans come under secured category of loans. Two kinds of securities are there – primary and collateral. Primary security is the asset which is purchased using the loan amount and collateral security is the charge on other assets of the borrower.

3. Loan Instalments: Repayment of loan is done in instalments. These instalments cover both principal and interest. Normally, loan instalments are decided by banks based the borrower's cash flow capacity. There may be instalments paid monthly, quarterly, biannually, or even annually. Instalments are normally equal but they may be structured based on the borrower's business. Moratorium or grace period is also given by banks in which no instalment or very low instalment is asked from the borrower. Sometimes, small instalments are kept in the initial year or two and then the remaining loan is split into the remaining maturity period making the later instalments higher than the initial ones.

4. Maturity: Normally a term loan is ranging between 5 to 10 years. Forecasting for more than 10 years in the current changing business environment is very difficult.

5. Loan Agreement: An agreement is drafted between the borrower and the bank regarding the terms and conditions of the loans which is signed by the borrower and is preserved with bank.

6. Loan Covenant: Covenants are a part of loan agreement. They are certain statements in the agreement which states certain do's and dont's for the company. They are normally related to use of assets, creation of liabilities, cash flow, and control of the management. They are positive / affirmative or negative in nature.

Leasing and hire purchase are currently a supplementary form of debt finance.

LEASE FINANCE

A lease represents a contractual arrangement whereby the lessor grants the lessee the right to use an asset in return for periodic lease rental payments. While leasing of land, buildings, and animals has been known from times immemorial, the leasing of industrial equipments is a relatively recent phenomenon, particularly on the Indian scene.

There are two broad types of lease: finance lease and operating lease.

Finance Lease

A finance lease or capital lease is essentially a form of borrowing. Its salient features are:

1. It is an intermediate term to a long-term non-cancellable arrangement. During the initial lease period, referred to as the 'primary lease period'. Which is usually three years or five years or eight years, the lease cannot be cancelled.

2. The lease is more or less fully amortised during the primary lease period. This means that during this period, the lessor recovers, through the lease rentals, his investment in the equipment along with an acceptable rate of return. Thus, a finance lease transfers substantially all the risks and rewards incident to ownership to the lessee.

3. The lessee is responsible for maintenance, insurance, and taxes.

4. The lessee usually enjoys the option for renewing the lease for further periods at substantially reduced lease rentals.

Operating Lease

An operating lease can be defined as any lease other than a finance lease. The salient features of an operating lease are:

1. The lease term is significantly less than the economic life of the equipment.

2. The lessee enjoys the right to terminate the lease at a short notice without any significant penalty.

3. The lessor usually provides the operating know-how and the related services and undertakes the responsibility of insuring and maintaining the equipment. Such an operating lease is called a 'wet lease'. An operating lease where the lessee bears the costs of insuring and maintaining the leased equipment is called a 'dry lease'.

From the above features of an operating lease it is evident that this form of a lease does not result in a substantial transfer of the risks and rewards of ownership from the lessor to the lessee. The lessor structuring an operating lease transaction has to depend upon multiple leases or on the realisation of a substantial resale value (on expiry of the first lease) to recover the investment cost plus a reasonable rate of return thereon. Therefore, specialising in operating lease calls for an in-depth knowledge of the equipments and the secondary (resale) market for such equipments. Of course, the prerequisite is the existence of a resale market. Given the fact that the resale market for most of the used capital equipments in our country lacks breadth, operating leases are not in popular use. In recent years there have been attempts to structure car lease and computer lease transactions in the operating lease format.

The key features of lease finance in India:

– Most leases in India are finance leases not operating leases

– Lease finance is available for identifiable performing assets

– Lease finance is available in small volume

– There is a great deal of flexibility in structuring lease finance

– Lease of immovable assets is not possible by banks

– Lease tenors up to eight years is available

HIRE-PURCHASE

Hire Purchase is a loan or contract that involves an initial deposit, linked to a specific purchase, which is a way of obtaining the use of an asset before payment is completed. The payments of the HP are in monthly instalments, plus interest within which at the end of the agreement. Finance companies usually offer the facility of leasing as well as hire-purchase to its clients.

The main features of a hire-purchase arrangement are as follows:

– The hiree (the counterpart of lessor) purchases the asset and gives it on hire to the hirer (the counterpart of lessee).

– The hirer pays regular hire-purchase instalments over a specified period of time. These instalments cover interest as well as principal repayment. When the hirer pays the last instalment, the title of the asset is transferred from the hiree to the hirer.

– The hiree charges interest on a flat basis. This means that a certain rate of interest, usually around 8 percent, is charged on the initial investment (made by the hiree) and not on the diminishing balance.

– The total interest collected by the hiree is allocated over various years. For this purpose, the 'sum of the years digits' method is commonly employed.

The following differences between leasing and hire-purchase, from the point of view of the lessee (hirer), may be noted.

Leasing	*Hire-Purchase*
– The lessee cannot claim depreciation.	– The hirer is entitled to claim depreciation.
– The entire lease rental is a tax-deductible expense for the lessee.	– Only the interest component of the hire-purchase instalment is a tax-deductible expense for the hirer.
– The lessee, not being the owner of the asset, does not enjoy the salvage value of the asset.	– The hirer, being the owner of the asset, enjoys the salvage value of the asset.

VENTURE CAPITAL

Venture capital is a source of financing for new businesses. Venture capital funds pool investors' cash and loan it to startup firms and small businesses with perceived, long-term growth potential. This is a very important source of funding startups that do not have access to other capital and it typically entails high risk (and potentially high returns) for the investor.

Venture capital provides long-term, committed share capital, to help unquoted companies grow and succeed. If an entrepreneur is looking to start-up, expand, buy-into a business, buy-out a business in which he works, turnaround or revitalise a company, venture capital could help do this. Obtaining venture capital is substantially different from raising debt or a loan from a lender. Lenders have a legal right to interest on a loan and repayment of the capital, irrespective of the success or failure of a business. Venture capital is invested in exchange for an equity stake in the business. As a shareholder, the venture capitalists return is dependent on the growth and profitability of the business. This return is generally earned when the venture capitalist "exits" by selling its shareholding when the business is sold to another owner.

Venture capitalist prefers to invest in "entrepreneurial businesses". This does not necessarily mean small or new businesses. Rather, it is more about the investment's aspirations and potential for growth, rather than by current size. Such businesses are aiming to grow rapidly to a significant size. As a rule of thumb, unless a business can offer the prospect of significant turnover growth within five years, it is unlikely to be of interest to a venture capital firm. Venture capital investors are only interested in companies with high growth prospects, which are managed by experienced and ambitious teams who are capable of turning their business plan into reality.

Venture capital firms usually look to retain their investment for between three and seven years or more. The term of the investment is often linked to the growth profile of the business. Investments in more mature businesses, where the business performance can be improved quicker and easier, are often sold sooner than investments in early-stage or technology companies where it takes time to develop the business model.

Just as management teams compete for finance, so do venture capital firms. They raise their funds from several sources. To obtain their funds, venture capital firms have to demonstrate a good track record and the prospect of producing returns greater than can be achieved through fixed interest or quoted equity investments. Most UK venture capital firms raise their funds for investment from external sources, mainly institutional investors, such as pension funds and insurance companies.

PRIVATE EQUITY

Private equity is essentially a way to invest in some assets that isn't publicly traded, or to invest in a publicly traded asset with the intention of taking it private. Unlike stocks, mutual funds, and bonds, private equity funds

usually invest in more illiquid assets, i.e. companies. By purchasing companies, the firms gain access to those assets and revenue sources of the company, which can lead to very high returns on investments. Another feature of private equity transactions is their extensive use of debt in the form of high-yield bonds. By using debt to finance acquisitions, private equity firms can substantially increase their financial returns.

Private equity consists of investors and funds that make investments directly into private companies or conduct buyouts of public companies that result in a delisting of public equity. Capital for private equity is raised from retail and institutional investors, and can be used to fund new technologies, expand working capital within an owned company, make acquisitions, or to strengthen a balance sheet. Generally, the private equity fund raise money from investors like Angel investors, Institutions with diversified investment portfolio like –pension funds, insurance companies, banks, funds of funds etc.

Types of Private Equity

Private equity investments can be divided into the following categories:

Leveraged Buyout (LBO): This refers to a strategy of making equity investments as part of a transaction in which a company, business unit or business assets is acquired from the current shareholders typically with the use of financial leverage. The companies involved in these transactions are typically more mature and generate operating cash flows.

Venture Capital: It is a broad sub-category of private equity that refers to equity investments made, typically in less mature companies, for the launch, early development, or expansion of a business.

Growth Capital: This refers to equity investments, most often minority investments, in companies that are looking for capital to expand or restructure operations, enter new markets or finance a major acquisition without a change of control of the business.

Structure of Private Equity

Huss (2005) describes that investing in private equity can be done in two ways: a direct investment or an investment through a fund. A direct investor participates in privately placed offerings and is responsible for the investment process. Such an investment is not only very time consuming and costly, but it requires a certain know-how and experience in the private equity market. When investing through a fund, one can be faced with problems due to asymmetric information between investors and entrepreneurs. These entrepreneurs have a better knowledge about the real conditions of the firm, the market and potential risk factors.

Characteristics of Private Equity

The structure of private equity funds is a fixed limited partnership; therefore early withdrawals are not possible. Moreover, there is often a sales restriction that underlies private equity investments. Private equity investments generally are liquid, because when there is a possibility of a secondary sale of fund shares, investors can expect a substantial discount on the net asset value if selling in the secondary market.

When participating in a limited partnership, the investor needs a minimum amount of capital commitment. This minimum differs from fund to fund, but it is a small fraction of the wealth of an investor. So, the potential for diversification is highly restricted. The private equity market is not transparent. One of the key characteristics in this market is that there is little publicly available information. The lacking of transparency is seen as a necessity for achieving the results, because substantial part of the returns, private equity experiences, is due to the ability to exploit inside information.

DEFERRED PAYMENT ARRANGEMENTS

A deferred payments arrangement is one of the sources of finance to industry. Machinery suppliers in India or overseas where machinery is proposed to be imported may agree to accept payment in a scheduled manner in

instalments in the period ahead of delivery. This is known as deferred payment arrangement with the machinery suppliers. The machinery suppliers in India or abroad may agree to above arrangement on security which is procured in the form of guarantee from financial institutions and banks of repute relied upon by the machinery suppliers.

Guarantee for deferred payments are offered by All India Institution viz, IFCI, IDBI, ICICI to foreign machinery supplier and also to indigenous machinery supplier against the request of the company for financing project cost of the company. The application made by the borrower for facility of guarantee is processed in the same manner as applicable for loan. However, the borrower company to be able to avail the facility should be in possession of requisite import licence where the guarantee is required for import of machinery from abroad or should have tied up the foreign currency loan from the foreign institution with the approval of the Government of India where the guarantee for such loans is required to be given to such foreign lending institution.

INTERNATIONAL FINANCE AND SYNDICATION OF LOANS

International finance plays a very important role in financing the cost of capital of projects of the corporate sector.

In international financial market the borrower from one country may seek lenders in other countries in specific currency which need not be of the participant country. In international financial market, the availability of foreign currency is assured under four main systems:

(a) Euro currency market; (b) Export credit facilities; (c) Bond issues; and (d) Financial institutions.

  (a) Euro currency market—Here funds are made available as loans through syndicated Euro credits/ instruments known as Floating Rate Notes FRNs. Interest rates vary every 3 to 6 months based on London—Interbank offered—Rate. Syndicated Euro Currency bank loan has developed into one of the most important instruments for international lending. Syndicated Euro credit is available through instruments viz. Term loan and Revolving Line facility.

  (b) Export Credit Facilities are made available by several countries through an institutional frame work in which EXIM Banks play a prominent role. EXIM Bank of India is playing a significant role in financing exports and other off shore deals.

  (c) International Bond Market provides facilities to raise long term funds by using different types of instruments. The bond market is generally known as Euro bond market.

  (d) UN Agency financial institutions viz. IMF of World Bank and its allied agencies, IFC (W), ADB, etc. provide finance in foreign currency.

New International Instruments

Swap is the international finance market instrument for managing funds. The basic concept involved in swaps is matching of difference between spot exchange rate for a currency and the forward rate. The swap rate is the cost of exchanging one currency into another for a specified period of time. The swap will represent an increase in the value of the forward exchange rate (premium of a decrease discount). There are three main types of swaps (a) interest swap; (b) currency swap; (c) combination of both.

Syndicated Euro Currency Loans

The Eurocurrency market refers to the availability of a particular currency in the international financial market outside the 'home country' of that currency. For example, the Eurodollar market refers to the financial market for US dollars in England, France, West Germany, Hong Kong and other financial centres outside the US. The Eurodollar borrowing may be evidenced by issue of commercial paper in the form of promissory notes, or by subscription to bond/debentures or it may be syndicated loans type.

Main Objectives of Syndication (Borrowers' point of view)

(a) Large sums are arranged without delay and at least cost.

(b) Gets better introduction to enter into international loan market without much difficulty.

(c) Funds are made available easily for meeting balance of payment deficit and for financing large industrial projects.

(d) The borrower is allowed to select the length of the roll over period and in choosing different currencies to repay or cancel agreements after a short notice period without penalty.

Lenders' point of view

(1) It helps the bank to share large credits with other banks, to finance many borrowers.

(2) Different size banks can participate.

(3) It provides more profitability to banks as costs are relatively low.

(4) Syndicated loan is under-written by a small group banks which resell portions of the commitments to other banks.

CORPORATE TAXATION AND THE IMPACT ON CORPORATE FINANCING

Corporate Finance is the field of finance dealing with financial decision that business enterprises make and the tool and analysis used to make the decisions. There are three methods used in corporate financing, these are borrowings, Issue of shares and retained earnings. Corporate taxations play a vital role in taking decision of corporate financing. The provisions of tax laws have wider impact on Capital investment decisions that deal with which project to invest in, whether it is feasible to fund the investment with debt or equity, as well as the time when dividend should be paid to the shareholders.

The deductibility of interest paid on debt reduces the tax liability of the company therefore the companies preferred to fund the new project out of borrowed capital. However, the Companies with low expected marginal tax rates on their interest deductions are less likely to finance new investment with debt. Availability of deductions under the tax laws will reduce the taxable income which will lower the average tax rate and ultimately minimize the tax benefit on interest paid on borrowings. The companies have to pay tax first on the earned profits and secondly when it declares dividend. The companies have to pay Corporate Dividend Tax on the declared dividend.

In tax laws, there are certain types of deductions, tax incentives available to the corporates which need to be considered while taking financial decisions.

The deductions & incentives available to the industry are summed up as below:

1. The deduction of 100 percent of business profits of infrastructure sector is permitted for a period of 10 years for the development, operation, or maintenance of ports, airports, roads, highways, bridges, rail systems, inland water ways, inland or outland ports or navigational channels, water supply projects, water treatment systems, irrigation projects, sanitation and sewage projects, and solid waste management systems.

2. The deduction of 100 percent of business profits is permitted for the refining of mineral oil for a period of 10 years

3. The deduction of 100 percent of profits from businesses operating and maintaining a hospital for a period of 5 years

4. The deduction of 100 percent of profits from the business of hotels and convention centers for a period of 5 years

5. The deduction of 100 percent of business profits for a period of 10 years for Undertakings in India's Northeastern States

6. Deductions of 100 percent profits for the development, operation, and maintenance of an industrial park or Special Economic Zone (SEZ). For full details of India's SEZs.

7. Deductions of 100 percent profits for the export of articles or software by undertakings in FTZs, electronic and hardware technology parks, and software technology parks.

8. Deductions of 100 percent profits for the export of articles or software by 100 percent export oriented units.

9. Deductions of 100 percent profits for Undertakings engaged in the integrated business of handling, storing, and transporting food grains.

10. Deductions of 100 percent profits for Undertakings engaged in the commercial production or refining of mineral oil.

11. Deductions of 100 percent profits for Undertakings from the export of wood based handicrafts.

12. A weighted deduction of expenditure in respect of expenditure incurred on scientific research in an in-house R&D facility approved by the prescribed authority for companies engaged in specified businesses and in research associations, universities, etc., respectively.

FINANCING COST ESCALATION

Cost escalation results in the increase in project cost for many reasons viz. delay in implementation of project and inflationary pressure on corporate purchasing.

Financing cost escalation will depend upon the corporate arrangements as to how the project cost has originally been financed. There may be two different aspects to treat the financing of cost escalation as discussed below:

1. Firstly, financing cost escalation in the case when he project is new and financed by owner fund only. In such cases, the raising of equity is costly but issue of right shares to existing shareholder could be planned and this cost be met out.

   There may be another situation when the company is existing company and project cost is being financed by its internal funds. In this case the company can capitalise its reserves and surplus and use the amount in financing cost escalation.

2. In the second situation where the company has been using borrowed sums in addition to equity capital for financing the project cost, it can always make request of additional funds to the lending institutions to meet the cost escalations or over runs in the project cost. In case the cost escalation is of greater magnitude then the company will have to go to raise funds from equity holders besides raising loans from the institutions so as to maintain the debt equity ratio tin the existing balanced and planned proportions.

LESSON ROUND UP

– Project decisions are taken by the management with basic objective to maximize returns on the investment being made in a project.

– Project report is a working plan for implementation of project proposal after investment decision by a company has been taken.

– Project appraisal should be analyzed for determining the project objects, accuracy of method and measurement, objective of the proposal, reliability of data and project statements.

– A careful balance has to be stuck between debt and equity. A debt equity ratio of 1:1 is considered ideal but it is relaxed up to 1.5:1 in suitable cases.

– Economic Rate of Return is a rate of discount which equates the real economic cost of project outlay to its economic benefits during the life of the project.

– Domestic Resource Cost measures the resource cost of manufacturing a product as against the cost of importing/exporting it. The output from any project adds to domestic availability implying a notional reduction in imports to the extent of output of the project or an addition to exports if the product is being exported.

– Effective Rate of Protection attempts to measure the net protection provided to a particular stage of manufacturing

– The Loan agreement is an agreement expressed in writing and entered into between the borrower and the lender bank, institution or other creditors. It envisages a relationship taking into account the commitment made at that time and the conduct of the parties carrying legal sanctions.

– Loan syndication involves obtaining commitment for term loans from the financial institutions and banks to finance the project. Basically it refers to the services rendered by merchant bankers in arranging and procuring credit from financial institutions, banks and other lending and investment organization or financing the client project cost or working capital requirements

– In Social Cost-Benefit Analysis, a project is analyzed from the point of view of the benefit it will generate for the society as a whole.

SELF TEST QUESTIONS

1. What is Project report? Why is it necessary to prepare project report? Sketch a formal for project report to be submitted to a financial institution.

2. Discuss the important covenant incorporated in a long term loan agreement. Also state its relevance.

3. How the financial institutions monitor the projects financed by them.

4. Narrate the steps taken by financial institutions while appraising a project.

5. Write short notes:

   (i) Promoters contribution

   (ii) Social Cost benefit analysis

   (iii) Viability tests

   (iv) Economic aspects of project appraisal

   (v) Borrowers warranties in loan agreement

   (vi) Social Cost Benefit Analysis.

6. Discuss various techniques of economic appraisal followed by the lending institutions.

Lesson 6
Dividend Policy

LESSON OUTLINE

– Meaning of Cost of Capital

– Introduction

– Types of Dividend Policies

– Determinants and Constraints of Dividend Policy

– Type/ Forms of Dividend

– Different Dividend Theories –

  (a) Walter's Model

  (b) Gordon's Model

  (c) Modigliani-Miller Hypothesis of Dividend Irrelevance Policy

– Practical and Legal Constraints

– Case Studies

– LESSON ROUND UP

– SELF TEST QUESTIONS

LEARNING OBJECTIVES

Dividend is the part of EAT (Earning left after paying tax) which is paid to the shareholders. There is no stipulation in the legislations about dividend policy of an organisation. Dividend policy of an organisation depends on multiple factors. A finance manager should be aware about the different aspects affecting the dividend policy of an organisation.The object of the lesson is to enable the student to understand:

– Dividend Policy

– Types of the Dividend Policies

– Determinants of Dividend Policy

– Dividend Relevance – Walter's Model Gordon's Model

– Dividend Growth Model

– Dividend Irrelevance – Modigliani – Miller Hypothesis

– Marginal Analysis and Residual Theory

Dividend decision is one of the crucial parts of the financial manager, as it determines the amount available for financing the organisation long term growth and it plays very important part in the financial management

INTRODUCTION

Dividend policy determines what portion of earnings will be paid out to stock holders and what portion will be retained in the business to finance long-term growth. Dividend constitutes the cash flow that accrues to equity holders whereas retained earnings are one of the most significant sources of funds for financing the corporate growth. Both dividend and growth are desirable but are conflicting goals to each other. Higher dividend means less retained earnings and vice versa. This position is quite challenging for the finance manager and necessitate the need to establish a dividend policy in the firm which will evolve a pattern of dividend payments having no adverse effects on future actions of the firm.

The formulation of the dividend policy poses many problems. On the one hand theory would seem to dictate that the firm should retain all funds which can be employed at a higher rate than the capitalization rate; on the other hand, stock-holders preference must be considered.

Two important considerations evolve from the above, firstly, whether owners' needs are more important than the needs of the firm. It is not easy to ascertain the extent to which shareholders best interest or desires affect dividend policy because of the following difficulties: (1) in determining the dividend 'needs of the stock-holders, as related to tax position, capital gains, current incomes; it is also difficult to locate exactly what more affects the interest of the shareholders current income requirements or alternative use of funds, or tax considerations. (2) Existing conflict of interest amongst shareholders dividend policy may be advantageous to one and not to other. Nevertheless, investor's expectations of dividend are mainly based on three factors viz., (a) reduction of uncertainty due to current earnings by way of dividend. (b) Indication of company's strength and sound position that reposes confidence in investors. (c) To meet the need of current income.

Secondly, need of the firm are easier to determine which the centre of attention is for the policy makers. Firm-oriented matters relating to dividend policy can be grouped under the following six categories, affecting directly or indirectly the determination and the appropriateness of the policy:

(1) Firms' contractual obligations, restrictions in loan agreement and/or legal limitations/considerations; and insufficiency of cash to pay dividends.

(2) Liquidity, credit standing and working capital requirement and considerations. Ability to borrow, nature of stockholders, degree of control, timing of investment opportunities, inflation and need to repay debt.

(3) Need for expansion-availability of external finance, financial position of promoters, relative cost of external funds, the ratio of debt to equity.

(4) Business cycle considerations.

(5) Factors relating to future financing.

(6) Past dividend policies and stockholders relationship.

The above factors affect the different firms or industry in different manner in different situations.

Types of Dividend Policies

There are basically four types of dividend policy. Let us discuss them on by one:

(1) Regular dividend policy: in this type of dividend policy the investors get dividend at usual rate. Here, the investors are usually persons who want to get regulary incomes. This type of dividend payment can be maintained only if the company has regular earning.

Merits of Regular Dividend Policy:

– It helps in creating confidence among the shareholders.

– It stabilizes the market value of shares.

– It helps in marinating the goodwill of the company.

– It helps in giving regular income to the shareholders.

(2) Stable dividend policy: Here the payment of certain sum of money is regularly made to the shareholders. It is of three types:

   (**a**) **Constant dividend per share:** In this case, reserve fund is created to pay fixed amount of dividend in the year when the earning of the company is not enough. It is suitable for the firms having stable earning.

   (**b**) **Constant payout ratio:** Under this type the payment of fixed percentage of earning is paid as dividend every year.

   (**c**) **Stable rupee dividend + extra dividend:** Under this type, there is payment of low dividend per share constantly + extra dividend in the year when the company earns high profit. The extra dividend may be considered as a "bonus" paid to the shareholders as a result of usually good year for the firm. This additional amount of dividend may be paid in the form of cash or bonus shares, subject to the firm's liquidity position.

Merits of stable dividend policy:

   – It helps in creating confidence among the shareholders.

   – It stabilizes the market value of shares.

   – It helps in marinating the goodwill of the company.

   – It helps in giving regular income to the shareholders.

(3) Irregular dividend: as the name suggests here the company does not pay regular dividend to the shareholders. The company uses this practice due to following reasons:

   – Due to uncertain earning of the company.

   – Due to lack of liquid resources.

   – The company is sometime afraid of giving regular dividend.

   – Due to uncertainty of business.

(4) No dividend: the company may use this type of dividend policy due to requirement of funds for the growth of the company or for the working capital requirement.

DETERMINANTS/CONSTRAINTS OF DIVIDEND POLICY

In the company/organisation, dividend policy is determined by the Board of directors having taken into consideration a number of factors which include legal restrictions imposed by the Government to safeguard the interests of various parties or the constituents of the company.

The main considerations are as follows:

   (1) Legal: As regards cash dividend policy several legal constraints bear upon it – a firm may not pay a dividend which will impair capital. Dividend must be paid out of firm's earnings/current earnings. Contract/ Agreements for bonds/loans may restrict dividend payments. The purpose of legal restriction is to ensure that the payment of dividend may not cause insolvency.

   (2) Financial: There are financial constraints to dividend policy. A firm can pay dividend only to the extent that it has sufficient cash to disburse; a firm can't pay dividend when its earnings are in accounts receivables or firm does not have adequate liquidity.

(3) Economic Constraints: Besides, there are economic constraints also. The question arise, does the value of dividend affects the value of the firm. If the answer to it is yes then there must be some optimum level of dividend, which maximises the market price of the firm's stock.

(4) Nature of Business Conducted by a Company: A company having a business of the nature which gives regular earnings may like to have a stable and consistent dividend policy. Industries manufacturing consumer/consumer durable items have a stable dividend policy.

(5) Existence of the Company: The length of existence of the company affects dividend policy. With their long standing experience, the company may have a better dividend policy than the new companies.

(6) Type of Company Organisation: The type of company organisation whether a private limited company or a public limited company affects dividend decisions. In a closely held company, a view may be taken for acquiescence and conservative dividend policy may be followed but for a public limited company with wide spread of shareholder, a more progressive and promising dividend policy will be the better decision.

(7) Financial Needs of the Company: Needs of the Company for additional capital affects the dividend policy. The extent to which the profits are required to be invested in the company for business growth is the main consideration in dividend decisions. Working capital position of a company is an important condition that affects the dividend policy as no company would declare a dividend to undermine its financial strength and threaten its solvency and existence.

(8) Market Conditions: Business cycles, boom and depression, affects dividend decisions. In a depressed market, higher dividend declaration are used to market securities for creating a better image of the company. During the boom, the company may like to save more, create reserves for growth and expansion or meeting its working capital requirements.

(9) Financial Arrangement: In case of financial arrangements being entered into or being planned like merger or amalgamation with another company, liberal policy of dividend distribution is followed to make the share stock more attractive.

(10) Change in Government Policies: Changes in Government Policies particularly those affecting earnings of the company are also taken into consideration in settling dividend decisions. For example, higher rate of taxation will definitely affect company earnings and carry impact on dividend decisions. Besides, fiscal, industrial, labour, industrial policies do affect in different magnitude the dividend decisions of individual corporate enterprises.

TYPES OF DIVIDEND/FORM OF DIVIDEND

Dividend may be distributed among the shareholders in the form of cash or stock. Hence, Dividends are classified into:
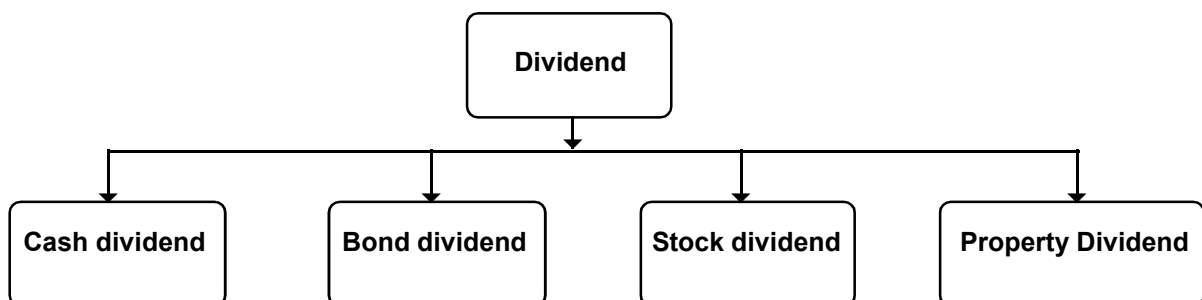
(1) Cash Dividend

If the dividend is paid in the form of cash to the shareholders, it is called cash dividend. It is paid periodically out

the business concern's EAIT (Earnings after interest and tax). Cash dividends are common and popular type followed by majority of the business concerns.

(2) Stock Dividend

Stock dividend is paid in the form of the company stock due to raising of more finance. Under this type, cash is retained by the business concern. Stock dividend may be bonus issue. This issue is given only to the existing shareholders of the business concern.

(3) Bond Dividend

Bond dividend is also known as script dividend. If the company does not have sufficient funds to pay cash dividend, the company promises to pay the shareholder at a future specific date with the help of issue of bond or notes.

(4) Property Dividend

An alternative to cash or stock dividend, a property dividend can either include shares of a subsidiary company or physical assets such as inventories that the company holds. The dividend is recorded at the market value of the asset provided. It will be distributed under exceptional circumstances. This type of dividend is not prevalent in India.

THEORIES OF DIVIDEND

Dividend decision of the business concern is one of the crucial parts of the financial manager, because it determines the amount of profit to be distributed among shareholders and amount of profit to be treated as retained earnings for financing its long term growth. Hence, dividend decision plays very important part in the financial management. Dividend decision consists of two important concepts which are based on the relationship between dividend decision and value of the firm.
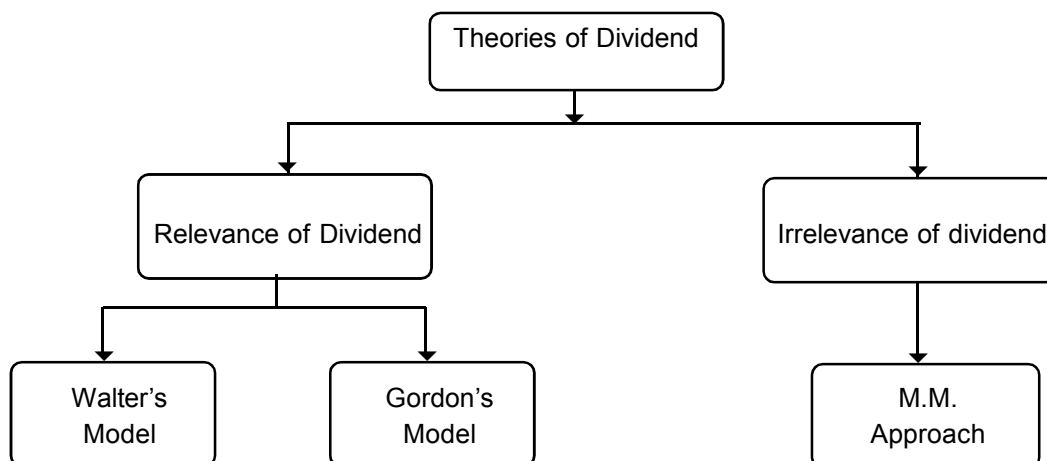
RELEVANCE OF DIVIDEND

If the choice of the dividend policy affects the value of a firm, it is considered as relevant. In that case a change in the dividend payout ratio will be followed by a change in the market value of the firm. If the dividend is relevant, there must be an optimum payout ratio. Optimum payout ratio is the ratio which gives highest market value per share.

1. Walter's Model

Professor James E. Walter has developed a theoretical model which shows the relationship between dividend

policies and common stock prices. The basic premise underlying the formulation is that prices reflect the present value of expected dividend in the long run. The model operates on the objective of maximising common stockholders wealth. In general, if a firm is able to earn a higher return on earnings retained than the stockholder is able to earn on a like investment then it would appear beneficial to retain these earnings, all other things being equal.

Walter's model is based on the following assumptions:

1. The firm finances all investment through retained earnings; that is debt or new equity is not issued;

2. The firm's internal rate of return (r), and its cost of capital (k) are constant;

3. All earnings are either distributed as dividend or reinvested internally immediately.

4. Beginning earnings and dividends never change. The values of the earnings per share (E), and the divided per share (D) may be changed in the model to determine results, but any given values of E and D are assumed to remain constant forever in determining a given value.

5. The firm has a very long or infinite life.

$$P = \frac{D + \frac{r}{k}(E - D)}{k}$$

Where:

P : market price per share of common stock

D : dividend per share

E : earnings per share

r : return on investment

k : market capitalization rate.

The above equation clearly reveals that the market price per share is the sum of the present value of two sources of income:

(i) The present value of an infinite stream of constant dividends, (D/k) and

(ii) The present value of the infinite stream of stream gains, [r (E-D)/k/k]

According to the theory, the optimum dividend policy depends on the relationship between the firm's internal rate of return and cost of capital. If r > k, the firm should retain the entire earnings, whereas it should distribute the earnings to the shareholders in case the r < k. The rationale of r > k is that the firm is able to produce more return than the shareholders from the retained earnings.

Walter's view on optimum dividend payout ratio can be summarised as below:

(a) **Growth Firms (r > k):-** The firms having r > k may be referred to as growth firms. The growth firms are assumed to have ample profitable investment opportunities. These firms naturally can earn a return which is more than what shareholders could earn on their own. So optimum payout ratio for growth firm is 0%.

(b) **Normal Firms (r = k):-** If r is equal to k, the firm is known as normal firm. These firms earn a rate of return which is equal to that of shareholders. In this case, dividend policy will not have any influence on the price per share. So there is nothing like optimum payout ratio for a normal firm. All the payout ratios are optimum.

(**c**) **Declining Firm (r < k)**:- If the company earns a return which is less than what shareholders can earn on their investments, it is known as declining firm. Here it will not make any sense to retain the earnings. So entire earnings should be distributed to the shareholders to maximise price per share. Optimum payout ratio for a declining firm is 100%.

So according to Walter, the optimum payout ratio is either 0% (when r > k) or 100% (when r < k).

Criticism of Walter's Model

Walter's model is quite useful to show the effects of dividend policy on an all equity firm under different assumptions about the rate of return. However, the simplified nature of the model can lead to conclusions which are not true in general, though true for Walter's model.

The criticisms on the model are as follows:

1. Walter's model of share valuation mixes dividend policy with investment policy of the firm. The model assumes that the investment opportunities of the firm are financed by retained earnings only and no external financing debt or equity is used for the purpose when such a situation exists either the firm's investment or its dividend policy or both will be sub-optimum. The wealth of the owners will maximise only when this optimum investment in made.

2. Walter's model is based on the unrealstic assumption that r is constant, but it does not hold good. This reflects the assumption that the most profitable investments are made first and then the poorer investments are made.

   The firm should stop at a point where r = k. This is clearly an erroneous policy and fail to optimise the wealth of the owners.

3. A firm's cost of capital or discount rate, k, does not remain constant; it changes directly with the firm's risk. Thus, the present value of the firm's income moves inversely with the cost of capital. By assuming that the discount rate, k is constant, Walter's model abstracts from the effect of risk on the value of the firm.

Example:

r = return on investment is given as 0.12

k = market capitalization rate is as 0.10

E = earnings per share is ₹ 4/-

D = dividend per share is ₹ 2/-

Then, the market price per share as per Walter's Model would be:

$$P = \frac{2 + (0.12 \div 0.10)(4 - 2)}{0.10}$$

= ₹ 44/-

The optimal payout ratio is determined by varying D until we obtain the maximum market price per share. According to Walter the dividend payout ratio should be zero if r is greater than k. This will maximise the market price of the share. In the instant case, we have P = ₹ 48 as calculated under:

$$P = \frac{0 + (0.12 \div 0.10)(4 - 0)}{0.10}$$

= ₹ 48/-

So, with payout ratio 0, the market price is maximised and comes to ₹ 48/-. Similarly, if r is less than k the optimal

payout ratio should be 100%. This point can be exemplified if r = 0.8 instead of 0.12 and other figures remain unchanged as in the above example, then we have market price of share as under:

$$P = \frac{2 + (0.8 \div 0.10)(4 - 2)}{0.10}$$

= ₹ 36/-

However, with Dividend payout ratio at 100%, we have:

$$P = \frac{4 + (0.8 \div 0.10)(4 - 4)}{0.10}$$

= ₹. 40/-

Thus, market price per share can be maximised with complete distribution of earnings. If r is equal k, then market price per share is insensitive to payout ratio. To sum up Walter's conclusions, the firm should distribute all the earnings in dividends if it has no profitable opportunities to invest.

2. Gordon's Model

Another theory, which contends that dividends are relevant, is the Gordon's model. This model which opines that dividend policy of a firm affects its value of the share and firm is based on the following assumptions:

    (a) The firm is an all equity firm (no debt).

    (b) There is no outside financing and all investments are financed exclusively by retained earnings.

    (c) Internal rate of return (r) of the firm remains constant.

    (d) Cost of capital (*k*) of the firm also remains same regardless of the change in the risk complexion of the firm.

    (e) The firm derives its earnings in perpetuity.

    (f) The retention ratio (b) once decided upon is constant. Thus the growth rate of frim (g) is also constant (g=br).

    (g) $k_e > g$.

    (h) A corporate tax does not exist.

Gordon used the following formula to find out price per share:

$$P = \frac{E(1-b)}{k_e - br}$$

Where, P = Market price of a share

E = Earning per share

b = Retention ratio or percentage of earnings retained or (1 – Payout ratio)

(1 - b) = dividend payout ratio, i.e., percentage of earnings distributed as dividend

k_e = Capitalisation rate/cost of capital

br = growth rate in r, i.e., rate of return on investment of an all equity firm.

The model is also referred to as the dividend capitalization model. Grahm and Dodd Myron Gordon and others worked on the model which considers capitalization of dividends and earnings. The model is also referred to as the dividend growth model. The model considers the growth rate of the firm to be the product of its retention ratio and its rate of return.

The capitalization model projects that the dividend division has a bearing on the market price of the shares.

According to Gordon, when r>k$_e$ the price per share increases as the dividend payout ratio decreases. When r<k the price per share increases as the dividend payout ratio increases.

When r=k$_e$ the price per share remains unchanged in response to the change in the payout ratio.

Thus Gordon's view on the optimum dividend payout ratio can be summarised as below:

(1) The optimum payout ratio for a growth firm (r>k$_e$) is zero.

(2) There no optimum ratio for a normal firm (r=k$_e$).

(3) Optimum payout ratio for a declining firm r<k$_e$ is 100%.

Thus the Gordon's Model's is conclusions about dividend policy are similar to that of Walter. This similarity is due to the similarities of assumptions of both the models.

Example

Determine the market price of a share of LMN Ltd., given

ke = 11%

E = ₹ 20

r = (i) 12%; (ii) 11%; and (iii) 10%

The market price be determined if –   (a) b = 90%

(b) b = 60% and

(c) b = 30%

Solution

$$P = \frac{E(1-b)}{k_e - br}$$

(i) *r = 12%*

(a) *b = 90%*

br = 0.9 x .12 = 0.108

$$P = \frac{₹\,20(1-0.9)}{.11-.108} = ₹\,1,000$$

(b) *b = 60%*

br = 0.6 x .12 = 0.072

$$P = \frac{₹\,20(1-0.6)}{.11-.072} = ₹\,210.52$$

(c) *b = 30%*

br = 0.3 x 0.12 = 0.036

$$P = \frac{₹\,20(1-0.3)}{.11-.036} = ₹\,189.19$$

(ii) *r = 11%*

(a) *b = 90%*

br = 0.9 x .11 = 0.099

$$P = \frac{₹\,20(1-0.9)}{.11-.099} = ₹\,181.82$$

(b) *b = 60%*

br = 0.6 x .11 = 0.066

$$P = \frac{₹\,20(1-0.6)}{.11-.066} = ₹\,181.82$$

(c) *b = 30%*

br = 0.3 x .11 = 0.033

$$P = \frac{₹\,20(1-0.3)}{.11-.033} = ₹\,181.82$$

(i) *r = 10%*

(a) *b = 90%*

br = 0.9 x .10 = 0.090

$$P = \frac{₹\,20(1-0.9)}{.11-.090} = ₹\,100$$

(b) *b = 60%*

br = .6 x .10 = 0.060

$$P = \frac{₹\,20(1-0.6)}{.11-.060} = ₹\,160$$

(c) *b = 30%*

br = 0.3 x .10 = 0.030

$$P = \frac{₹\,20(1-0.3)}{.11-.030} = ₹\,175$$

The impact of dividend growth model can thus be analysed in three situations:

(1) When normal capitalization rate is less than the actual capitalization rate: $CD_{norm} < CR_{act}$

In such a situation, the shareholder gains more earnings by investing in the company than he expects as a norm. The shareholder would want the firm to retain more than to pay as dividend. If dividend payout is enhanced it will lower the intrinsic value as it lowers the growth rate of a highly profitable company.

(2) Another situation could be where normal capitalization rate equals the actual capitalization rate: $CD_{norm} = CR_{act}$

This situation represents that the company is doing well and shareholders are indifferent as to the level of dividend. If dividend is declared, it would be reinvested in the companies. Thus, the dividend payout ratio does not effect the intrinsic value of the company.

(3) Where normal capitalization rate is more than actual capitalization rate i.e., $CD_{norm} > CR_{act}$:

This situation represents the opposite side of (1) above. Here, the company is not doing well as expected, the shareholders would like to invest elsewhere in more profitable avenues, so dividend payout has to be higher and intrinsic value of shares accordingly gets enhanced.

The dividend growth model, thus an additional measure of the intrinsic value of shares that may be used to supplement other valuation methods.

DIVIDEND AND UNCERTAINTY: THE BIRD-IN-HAND ARGUMENT

Gordon revised this basic model later to consider risk and uncertainty. Gordon's model, like Walter's model, contends that dividend policy is relevant. According to Walter, dividend policy will not affect the price of the share when r = k. But Gordon goes one step ahead and argues that dividend policy affects the value of shares even when r = k. The crux of Gordon's argument is based on the following two assumptions :

1. Investors are risk averse and

2. They put a premium on a certain return and discount (penalise) uncertain return.

The investors are rational. Accordingly they want to avoid risk. The term risk refers to the possibility of not getting the return on investment. The payment of dividends now completely removes any chance of risk. But if the firm retains the earnings the investors can expect to get a dividend in the future. But the future dividend is uncertain both with respect to the amount as well as the timing. The rational investors, therefore prefer current or near dividend to future dividend. Retained earnings are considered as risky by the investors. In case earnings are retained, therefore the price per share would be adversely affected. This behaviour of investor is described as "Bird in Hand Argument". A bird in hand is worth two in bush. What is available today is more important than what may be available in the future. So the rational investors are willing to pay a higher price for shares on which more current dividends are paid, all other things held constant. Therefore the discount rate (K) increases with retention rate. Thus, distant dividends would be discounted at a higher rate than the near dividends.

DIVIDEND IRRELEVANCE: MODIGLIANI - MILLER MODEL

Professor Modigliani and Miller in their article, "Dividend Policy, Growth and the Valuation of Shares" advanced most comprehensive arguments to hold that investors are indifferent to dividends and capital gains and so dividends have no effect on the wealth of shareholders. They argue that the value of the firm is determined by the earning power of firm's assets or its investment policy. The manner in which earnings are divided into dividends and retained earnings does not affect this value. These conclusions of MM model are based on certain assumptions which sidelined the importance of the dividend policy and its effect thereof on the share price of the firm. According to the theory the value of a firm depends solely on its earnings power resulting from the investment policy and not influenced by the manner in which its earnings are split between dividends and retained earnings.

Following are the assumptions under M-M hypothesis:

1. Capital markets are perfect- Investors are rational, information is freely available, transaction cost are nil, securities are divisible and no investor can influence the market price of the share.

2. There are no taxes- No difference between tax rates on dividends and capital gains.

3. The firm has a fixed investment policy which will not change. So if the retained earnings are reinvested, there will not be any change in the risk of the firm. So k remains same.

4. Floatation cost does not exist.

With these assumptions, the market price of a share at the beginning of the period is defined as equal to the present value of dividend paid at the end of the period plus the market price at the end of the period. Thus,

$P_0 = \frac{1}{1+r} (D_1 + P_1)$

Where

P_0 = market price per share at 0 time

r = Capitalisation rate for firm in that risk class (assumed constant throughout)

D_1 = Dividend per share at time 1

P_1 = Expected market price per share at time 1.

Suppose a share is expected to sell at ₹ 100/- one year from now, and is to pay a dividend of ₹ 5/- one year from now, the current value of stock is ₹ 105/- discounted by the appropriate rate r. A firm committed to equity financing may retain earnings and forego selling additional shares or it may pay dividend and sell shares. According to MM, the discounted value per share before and after a dividend payment (with an accompanying sale of shares) will be the same as if earnings had been retained (with no accompanying sale of shares). Let 'n' share be outstanding at period t_0 and let Δn be number of new shares sold at t_1 at a price of P_1, the new equation will be written as:

$$nP_0 = \frac{1}{1+r} \ [nD_1 + (n + \Delta n) \ P_1 - \Delta n P_1]$$

The total value of new shares to be sold (DnP1) will depend on the volume of new Investment I, the net income earned Y during the period and the dividend paid on outstanding shares (nD1) will be:

ΔnP1 = I - (Y - nD1) or I – Y + nD_1

Substituting the above into main equation above we have:

$$nP_0 = \frac{1}{1+r} \ [(n + \Delta n) \ P_1 - I + Y]$$

Since D_1 does not appear in the above equation MM concludes that P0 is not a function of D_1, the other variable n, Δn, P_1, I, Y are assumed to be independent of D_1.

The substance of MM arguments may be stated as below:

If the company retains the earnings instead of giving it out as dividends, the shareholders enjoy capital appreciation, which is equal to the earnings, retained.

If the company distributes the earnings by the way of dividends instead of retention, the shareholders enjoy the dividend, which is equal to the amount by which his capital would have been appreciated had the company chosen to retain the earnings.

Hence, the division of earnings between dividends and retained earnings is irrelevant from the point of view of shareholders.

Question

In the light of above, consider the following data:

r = .12

P_0 = 10

D_1 = .40

Shares outstanding 5,00,000

Solution
Dividend is paid to shareholders

$$P_0 = \frac{1}{1+r} \ (D_1 + P_1)$$

$P_0 \ (1+ r) - D_1 = P_1$

10 (1.12) – 0.40 = 10 or P_1 = ₹ 10.80

If no dividend is paid, then the share price is 10(1.12) – 0 = ₹11.20.

If the company earns ₹1/- per share next year, new investment of ₹10,00,000 are expected and company pays dividend then new shares to be issued are as under :

ΔnP1 = I - (Y - nD1)

Δn(10.80) = 10,00,000 - (5,00,000 - 2,00,000)

Δn =   7,00,000
       10.80

=   64,815 shares

If no dividend is paid by the company, the new share to be issued are:

Δn(11.20) = 10,00,000 - 5,00,000

Δn = 5,00,000
       11.20

=   44,643 shares

The discounted value per share before and after a dividend payment will be the same as if earnings had been retained. Further, the total value of new shares to be sold will depend on the volume of new investment I, the net income earned during the period Y and the dividend paid on outstanding shares nD_1 which established that P_0 is not function of D_1 and all the variables in the equation are independent of D_1.

However, the unrealistic assumptions of MM hypothesis render the hypothesis unrealistic and insignificant.

Exercise No. 1

1. X Company Ltd., has 1,00,000 shares outstanding the current market price of the shares ₹ 15 each. The company expects the net profit of ₹ 2,00,000 during the year and it belongs to a rich class for which the appropriate capitalisation rate has been estimated to be 20%. The company is considering dividend of ₹ 2.50 per share for the current year. What will be the price of the share at the end of the year (i) if the dividend is paid and (ii) if the dividend is not paid?

Solution

$$P_0 = \frac{D_1 + P_1}{1 + k_e}$$

P_0 = market price per share at 0 time

ke = capitalisation rate for firm in that risk class (assumed constant throughout)

D_1 = dividend per share at time 1

P_1 = market price per share at time 1.

(i) If the dividend is paid

P_0 = ₹15

k_e = 20%

D_1 = 2.50

P_1 = ?

$$15 = \frac{(2.50 + P_1)}{1 + 0.20}$$

2.50 + P_1 = 15 × 1.2

$P_1 = 18 - 2.50$

$P_1 = ₹\ 15.50$

(ii) If the dividend is not paid

$P_o = 15$

$k_e = 20\%$

$D_1 = 0$

$P_1 = ?$

$$15 = \frac{(0 + P_1)}{1 + 0.20}$$

$0 + P_1 = 15 \times 1.20$

$P_1 = ₹\ 18.$

Exercise No. 2

Ram Company belongs to a risk class for which the appropriate capitalization rate is 12%. It currently has outstanding 30000 shares selling at ₹ 100 each. The firm is contemplating the declaration of dividend of ₹ 6 per share at the end of the current financial year. The company expects to have a net income of ₹ 3,00,000 and a proposal for making new investments of ₹ 6,00,000. Show that under the MM assumptions, the payment of dividend does not affect the value of the firm. How many new shares issued and what is the market value at the end of the year?

Solution

$$P_o = \frac{(D_1 + P_1)}{1 + ke}$$

P_0 = market price per share at 0 time

k_e = capitalisation rate for firm in that risk class (assumed constant throughout)

D_1 = dividend per share at time 1

P_1 = market price per share at time 1.

In the given problem

$P_o = 100$

$D_1 = ₹\ 6$

$P_1 = ?$

$k_e = 12\%$

$$P_o = \frac{(D_1 + P_1)}{(1 + ke)}$$

$$100 = \frac{(6 + P_1)}{(1 + .12)}$$

$$= 100(1.12) = 6 + P_1$$

OR

6 + P$_1$ = 112

P$_1$ = 112 – 6

P$_1$ = ₹ 106

If Dividend is not declared

K$_e$ = 12%, P$_o$ = 100, D$_1$ = 0, P$_1$ =?

$$100 = \frac{(0 + P_1)}{1 + 0.12}$$

112 = P$_1$

The following ilustration shows the calculation of number of new shares to be issued/ Market Value of Firm when dividend is paid/not paid

	Dividends is Paid	Dividends is not Paid
Net Income (₹)	3,00,000	3,00,000
Total Dividend (₹)	1,80,000	Nil
Retained earning (₹)	1,20,000	3,00,000
Investment required (₹)	6,00,000	6,00,000
Amount to be raised from new shares (A) (₹)	4,80,000	3,00,000
Relevant Market Price (B) (₹)	106	112
No. of shares to be issued (A/B) (₹)	4,528	2,679
Total number of shares at the end of the year	30,000	30,000
Total Number of shares	34,528	32,679
Market Price per share (₹)	106	112
Market Value for shares (₹)	36,60,000	36,60,000

There is no change in the total market value of shares whether dividends are distributed or not distributed.

Exercise No 3:

A company has 10,000 shares of Rs 100 each. The capitalisation rate is 12%. Income before tax is Rs 1,50,000. Tax rate is 30%. Dividend pay-out ratio is 60%. The company has to take up a project costing Rs 4,00,000. Find Market Price Per Share (MPS) at the end of the current year and the number of shares to be issued for financing the new project if (a) dividend is paid, and (b) if dividend is not paid. Base the answer on M-M approach.

Solution

Net income = ₹ 1,50,000(1 – 0.30) = ₹ 1,05,000

Dividend = ₹ 1,05,000 × 0.6 = ₹ 63,000

Dividend per share = ₹ 63,000/10,000 = ₹ 6.30

MPS when dividend is paid= ₹ (100 × 1.12) – 6.30 = ₹ 105.70

Additional investment required = ₹ 4,00,000 – ₹ 1,05,000 – ₹ 63,000 = ₹ 2,32,000

No. of shares to be issued additionally = ₹ 2,32,000/105.70 = 2,195

MPS when dividend is not paid= ₹ 105.70 + 6.30 = ₹ 112

Additional investment required = ₹ 4,00,000 − 1,05,000 = ₹ 2,95,000

No. of shares to be issued additionally = ₹ 2,95,000/112 = 2,634 shares

Exercise No. 4

From the following information supplied to you, determine the theoretical market value of equity shares of a company as per Walter's model:

Earnings of the company	₹ 5,00,000
Dividends paid	₹ 3,00,000
Number of shares outstanding	₹ 1,00,000
Price earnings ratio	8
Rate of return on investment	0.15

Are you satisfied with the current dividend policy of the firm? If not, what should be the optimal dividend payout ratio in this case?

Solution

$$P = \frac{D + \frac{r}{k_e}(E - D)}{k_e} = \frac{₹3 + \left[\frac{0.15}{0.125}\right](₹5 - ₹3)}{0.125} = ₹43.20$$

No, we are not satisfied with the current dividnent policy.

The optimal dividend payout ratio, given the facts of the case, should be zero.

Working Notes

(i) k_e is the reciprocal of P/E ratio = 1/8 = 12.5 per cent

(ii) E = Total earnings ÷ Number of shares outstanding

(iii) D = Total dividends ÷ Number of shares outstanding

Exercise No. 5

X company earns ₹ 5 per share, is capitalised at a rate of 10 per cent and has a rate of return on investment of 18 per cent. According to Walter's model, what should be the price per share at 25 per cent dividend payout ratio? Is this the optimum payout ratio according to Walter?

Solution

$$(a)\ P = \frac{D + \frac{r}{k_e}(E - D)}{k_e} = \frac{₹1.25 + \left[\frac{0.18}{0.10}\right](₹50 - ₹1.25)}{0.10} = ₹80$$

This is not the optimum dividend payout ratio because Walter suggests a zero per cent dividend payout ratio in situations where r > k_e to maximise the value of the firm. At this ratio, the value of the share would be maximum, that is, ₹ 90.

Exercise No. 6

A company has the following facts:

Cost of capital (ke) = 0.10

Earnings per share (E) = ₹10

Rate of return on investments (r) = 8%

Dividend payout ratio: Case A: 50% Case B: 25%

Show the effect of the dividend policy on the market price of the shares.

Solution:

Case A:

D/P ratio = 50%

When EPS = ₹10 and D/P ratio is 50%, D = 10 x 50% = ₹5

$$P = \frac{5 + [0.08 / 0.10][10 - 5]}{0.10} = ₹90$$

Case B:

D/P ratio = 25%

When EPS = ₹10 and D/P ratio is 25%, D = 10 x 25% = ₹ 2.5

$$P = \frac{2.5 + [0.08 / 0.10][10 - 2.5]}{0.10} = ₹85$$

Exercise No. 7: Determination of value of shares, given the following data:

	Case A	Case B
D/P Ratio	40	30
Retention Ratio	60	70
Cost of capital	17%	18%
r	12%	12%
EPS	₹20	₹20

Solution

P = $\frac{₹20 (1 - 0.60)}{0.17 - (0.60 \times 0.12)}$ => ₹ 81.63 (Case A)

P = $\frac{₹20 (1 - 0.70)}{0.18 - (0.70 \times 0.12)}$ => ₹ 62.50 (Case B)

Gordon's model, thus, asserts that the dividend decision has a bearing on the market price of the shares and that the market price of the share is favorably affected with more dividends.

LESSON ROUND-UP

– Dividend Policy determines what portion of earnings will be paid out to stockholders and what portion will be retained in the business to finance long term growth.

– The amount of dividend payout fluctuates from period to period in keeping with fluctuations in the amount of acceptable investment opportunities available to the firm. If the opportunities abound,

percentage of payout is likely to be zero; on the other hand, if the firm is unable to find out profitable investment opportunities, payout will be 100 per cent.

– Walter's Model: Prices reflect the present value of expected dividend in the long run. A firm is able to earn a higher return on earnings retained than the stockholder is able to earn on a like investment then it would appear beneficial to retain these earnings all other things being equal. Walter's model is as under:

$$P = \frac{D + \frac{r}{k}(E - D)}{k}$$

– Dividend Capitalization model projects that dividend decision has a bearing on the market price of the share.

$$P = \frac{E(1 - b)}{Ke - br}$$

– Modigliani Miller Approach: According to MM, the discounted value per share before and after a dividend payment will be same as if earnings had been retained.

$$nP_0 = \frac{1}{1+r}[nD_1 + (n+\Delta n)P_1 - \Delta nP_1]$$

– Dividend Policy is determined by the Board of Directors having taken into consideration a number of factors which include legal restrictions imported by the Government to safeguard the interest of various parties or the constituents of the company.

– An appropriate dividend policy must be evaluated in the light of the objectives of the firm.

SELF-TEST QUESTIONS

(*These are meant for re-capitulation only. Answers to these questions are not to be submitted for evaluation*)

1. What do you understand by 'dividend policy'? What are the main determinants of dividend policy in a corporate enterprise?

2. Do you feel that a dividend decision is backed by a theoretical framework? What are different dividend theories? Describe each of them briefly.

3. What steps as a corporate executive would you suggest to the management for following an appropriate dividend policy for your company that may be appreciated by the investors in general? Give reasons for your recommendations.

4. How would you justify elimination of dividend entirely as a policy of your company to your shareholders? Under what circumstances a company should follow such a dividend policy?

5. Write short notes on the following:

   (1) Steady Dividend Policy.

   (2) Fluctuating Dividend Policy.

Lesson 7
Working Capital

LESSON OUTLINE

– Meaning, Types, Determinants and Assessment of Working Capital Requirements,

– Negative Working Capital

– Operating Cycle Concept and Applications of Quantitative Techniques

– Financing of Working Capital; Banking Norms and Macro Aspects

– Cash Management, Inventories Management, Receivables Management

– Factoring and Forfeiting

– Case Studies

– LESSON ROUND UP

– SELF TEST QUESTIONS

LEARNING OBJECTIVES

Working capital is very important aspect for an organisation. It is called the blood of the organisation. As without proper blood circulation in the body, it will face various diseases, similarly proper circulation of working capital is vital for the proper and smooth functioning of an organisation. Seeing the importance of working capital management, it is very necessary for a corporate professional to know about management of different constituents of working capital.

The object of the study is to enable the student to understand:

– Concept of Working Capital

– Determinants of Working Capital

– Current Assets and Fixed Assets Financing

– Operating Circle

– Application of Quantitative Techniques

– Techniques for Allocation and control of Working Capital

– Financing of Working Capital

– Working Capital Leverage

– Banking Norms and Macro Aspect of Working Capital Management

– Cash Management

– Inventory Management

– Receivable Management

All companies should focus on the proper management of working capital. Inventory, accounts receivable, and accounts payable are of specific importance since they can be influenced most directly by operational management and here starts the role of Management.

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MEANING OF WORKING CAPITAL -THE BASIC CONCEPT

The capital which is required to finance current assets is called working capital. It is the capital of a busniess which is used to carry out day-to-day business operations of a firm.

"Working capital may be defined as all the short term assets used in daily operation"—John. J Harpton.

Current Assets: An asset is classified as current when:

   (i) It is expected to be realised or intends to be sold or consumed in normal operating cycle of the entity;

  (ii) The asset is held primarily for the purpose of trading;

 (iii) It is expected to be realised within twelve months after the reporting period;

 (iv) It is non- restricted cash or cash equivalent.

Generally current assets of an entity, for the purpose of working capital management can be grouped into the following main heads:

   (a) Inventory (raw material, work in process and finished goods)

   (b) Receivables (trade receivables and bills receivables)

   (c) Cash or cash equivalents (short-term marketable securities)

   (d) Prepaid expenses.

Current Liabilities: A liability is classified as current when:

   (i) It is expected to be settled in normal operating cycle of the entity

  (ii) The liability is held primarily for the purpose of trading

 (iii) It is expected to be settled within twelve months after the reporting period.

Generally current liabilities of an entity, for the purpose of working capital management can be grouped into the following main heads:

(a) Payable (trade payables and bills receivables) (b) Outstanding payments (wages & salary etc.)

In general, Working capital management is essentially managing Current Assets, management of working capital arises as a part of the process of such management.

Short term assets of a firm means cash money, short-term securities, inventory, bill receivable, note receivable, debtors etc. In operating daily business, fixed assets are also needed in addition to current assets. Though some fixed assets help on the daily operation of a firm, these can't be termed as working capital, because these can't be converted into cash in the current accounting period. So, the assets which can be converted into raw material from cash—R/M—Finished Goods—B/R—Cash and helps in operating daily business of the firm, is called working Capital. Working capital is also called 'Trading Capital", Circulating capital/Short term capital / Short /Current Assets management.

Working capital is defined keeping in view the varying objectives and purposes. To businessmen, working capital comprises current assets of business whereas to the accountant/creditors/investment analysts working capital is understood as the difference of current assets and current liabilities. This is also called the Net Working Capital. There is operative aspects of working capital i.e. current assets (which is known as 'funds' also) employed in the business process from the gross working capital. Current assets comprise: cash, receivables, inventories, marketable securities held as short-term investment and other items near cash or equivalent to cash. This is also known as going-concern concept of working capital.

SIGNIFICANCE OF WORKING CAPITAL

Importance of Adequate Working Capital

Management of working capital is an essential task of the finance manager. He has to ensure that the amount of working capital available with his concern is neither too large nor too small for its requirements. A large amount of working capital would mean that the company has idle funds. Since funds have a cost, the company has to pay huge amount as interest on such funds. If the firm has inadequate working capital, such firm runs the risk of insolvency. Paucity of working capital may lead to a situation where the firm may not be able to meet its liabilities. The various studies conducted by the Bureau of Public Enterprises have shown that one of the reasons for the poor performance of public sector undertakings in our country has been the large amount of funds locked up in working capital. This results in over capitalization. Over capitalization implies that a company has too large funds for its requirements, resulting in a low rate of return, a situation which implies a less than optimal use of resources. A firm, therefore, has to be very careful in estimating its working capital requirements. Maintaining adequate working capital is not just important in the short-term. Sufficient liquidity must be maintained in order to ensure the survival of the business in the long- term as well. When businesses make investment decisions they must not only consider the financial outlay involved with acquiring the new machine or the new building, etc., but must also take account of the additional current assets that are usually required with any expansion of activity. For e.g.:-Increased production leads to holding of additional stocks of raw materials and work-in-progress. An increased sale usually means that the level of debtors will increase. A general increase in the firm's scale of operations tends to imply a need for greater levels of working capital. A question then arises what is an optimum amount of working capital for a firm? We can say that a firm should neither have too high an amount of working capital nor should the same be too low. It is the job of the finance manager to estimate the requirements of working capital carefully and determine the optimum level of investment in working capital.

OPTIMUM WORKING CAPITAL

If a company's current assets do not exceed its current liabilities, then it may run into trouble with creditors that want their money quickly. Current ratio (current assets/current liabilities) (along with acid test ratio to supplement it) has traditionally been considered the best indicator of the working capital situation. It is understood that a current ratio of 2 (two) for a manufacturing firm implies that the firm has an optimum amount of working capital. This is supplemented by Acid Test Ratio (Quick assets/Current liabilities) which should be at least 1 (one). Thus, it is considered that there is a comfortable liquidity position if liquid current assets are equal to current liabilities. Bankers, financial institutions, financial analysts, investors and other people interested in financial statements have, for years, considered the current ratio at 'two' and the acid test ratio at 'one' as indicators of a good working capital situation. As a thumb rule, this may be quite adequate. However, it should be remembered that optimum working capital can be determined only with reference to the particular circumstances of a specific situation. Thus, in a company where the inventories are easily saleable and the sundry debtors are as good as liquid cash, the current ratio may be lower than 2 and yet firm may be sound. In nutshell, a firm should have adequate working capital to run its business operations. Both excessive as well as inadequate working capital positions are dangerous.

TYPES OF WORKING CAPITAL

The working capital in certain enterprise may be classified into the following kinds.

1. Initial working capital: The capital, which is required at the time of the commencement of business, is called initial working capital. These are the promotion expenses incurred at the earliest stage of formation of the enterprise which include the incorporation fees, attorney's fees, office expenses and other preliminary expenses.

2. Regular working capital: This type of working capital remains always in the enterprise for the successful operation. It supplies the funds necessary to meet the current working expenses i.e. for purchasing raw material and supplies, payment of wages, salaries and other sundry expenses.

3. Fluctuating working capital: This capital is needed to meet the seasonal requirements of the business. It is used to raise the volume of production by improvement or extension of machinery. It may be secured from any financial institution which can, of course, be met with short term capital. It is also called variable working capital.

4. Reserve margin working capital: It represents the amount utilized at the time of contingencies. These unpleasant events may occur at any time in the running life of the business such as inflation, depression, slump, flood, fire, earthquakes, strike, lay off and unavoidable competition etc. In this case, greater amount of capital is required for maintenance of the business.

5. Permanent and Temporary Working Capital: The Operating Cycle creates the need for Current Assets (Working Capital). However, the need does not come to an end once the cycle is completed. It continues to exist. To explain the continuing need of current assets, a distinction should be drawn between temporary and permanent working capital.

Business Activity does not come to an end after the realization of cash from customers. For a company, the process is continuing, and hence, the need for regular supply of working capital. However, the, magnitude of Working Capital required is not constant but fluctuating. To carry on a business, a certain minimum level of working capital is necessary on a continuous and uninterrupted basis. For all practical purposes, this requirement has to be met permanently as with other fixed assets. This requirement is referred to as permanent or fixed working capital.

Any amount over and above the permanent level of working capital is temporary, fluctuating or variable working capital. The position of the required working capital is needed to meet fluctuations in demand consequent upon changes in production and sales as a result of seasonal changes.

Both kinds of working capital are necessary to facilitate the sales proceeds through the Operating Cycle.

Permanent & Temporary Working Capital
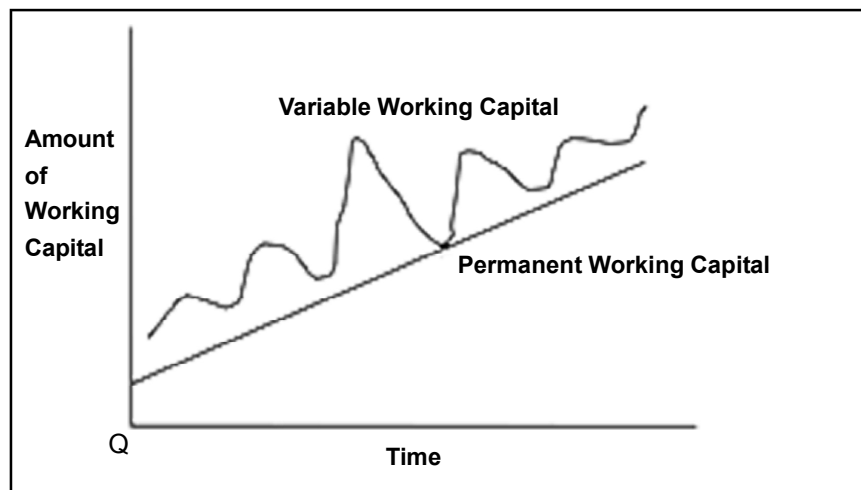
6. Long Term working capital: The long-term working capital represents the amount of funds needed to keep a company running in order to satisfy demand at lowest point. There may be many situations where demand may fluctuate considerably. It is not possible to retrench the work force or instantly sell all the inventories whenever demand declines due to temporary reasons. Therefore the value, which represents the long-term working capital, stays with the business process all the time. It is for all practical purpose known as permanent fixed assets. In other words, it consists of the minimum current assets to be maintained at all times. The size of the permanent working capital varies directly with the size of Operation of a firm.

7. Short term working capital: Short-term capital varies directly with the level of activity achieved by a company. The Volume of Operation decides the quantum of Short-term working capital. It also changes from one form to

another; from cash to inventory, from inventory to debtors and from debtors back to cash. It may not always be gainfully employed. Temporary Working capital should be obtained from such sources, which will allow its return when it is not in use.

8. Gross Working Capital: Gross working capital refers to the firm's investment in current assets. Current assets are those assets which can be converted in to cash with in an accounting year and includes cash, short term securities, debtors bills receivable and stock.

9. Net Working Capital: Net working capital refers to the difference between current asset and Current liabilities. Current liabilities are those claims of outsiders, which are expected to mature for payment within accounting year and include creditors, bills payable and outstanding expenses. Net Working capital can be positive or negative. A positive net working capital will arise when current assets exceed current liabilities.

The Gross working capital concept focuses attention on two aspect of current assets management.

   (a) How to optimize investment in current assets?

   (b) How should current assets be financed?

Both the question is the most decision making action of the management. It should be given due consideration before taking decision.

Both Net and Gross working capital is important and they have equal significance from management point of view.

DETERMINANTS OF WORKING CAPITAL

Working capital management is concerned with:-

   (a) Maintaining adequate working capital (management of the level of individual current assets and the current liabilities) and

   (b) Financing of the working capital.

For the point a) above, a Finance Manager needs to plan and compute the working capital requirement for its business. And once the requirement has been computed, he needs to ensure that it is financed properly. This whole exercise is nothing but Working Capital Management. Sound financial and statistical techniques, supported by value judgment should be used to predict the quantum of working capital required at different times. Some of the factors which need to be considered while planning for working capital requirement are:-

1. Nature of Business: A company's working capital requirements are directly related to the kind of business it conducts. A company that sells a service primarily on a cash basis does not have the pressure of keeping considerable amounts of inventories or of carrying customer's receivables. On the other hand, a manufacturing enterprise ordinarily finances its own customers, requires large amounts to pay its own bills, and uses inventories of direct materials for conversion into end products. These conditions augment the working capital requirements.

2. Degree of Seasonality: Companies that experience strong seasonal movements have special working capital problems in controlling the internal financial savings that may take place. Aggrevating this difficulty is the fact that no matter how clearly defined a pattern may be, it is never certain. Unusual circumstances may distort ordinary relationships. Although seasonality may pull financial manager from the security of fixed programmes to meet recurring requirements, flexible arrangements are preferable to guard against unforeseen contingencies. An inability to cope with sharp working capital swings is one of the factors that encourages companies to undertake diversification programmes.

3. Production Policies: Depending upon the kind of items manufactured, by adjusting its production schedules a company may be able to offset the effect of seasonal fluctuations upon working capital, at least to some degree, even without seeking a balancing diversified line. Thus, in one year, in order to avoid burdensome

inventories, firm may curtail activity when a seasonal upswing normally takes place. As a matter of policy, the choice will rest on the one hand, and maintaining a steady rate of production and permitting stocks of inventories to build up during off season periods, on the other. In the first instance, inventories are kept to minimum levels but the production manager must shoulder the burden of constantly adjusting his working staff; in the second, the uniform manufacturing rate avoids fluctuations of production schedules, but enlarged inventory stocks create special risks and costs. Because the purchase of inventories is often financed by suppliers, the mere fact that a company carries bigger amounts does not necessarily mean that its cash problem is more serious.

4. Growth Stage of Business : As a company expands, it is logical to expect that larger amounts of working capital will be required to avoid interruptions to the production sequence. Although this is true it is hard to draw up firm rules for the relationship between the growth in the volume of a company's business and the growth of its working capital. A major reason for this is management's increasing sophistication in handling the current assets, besides other factors operating simultaneously.

5. Position of the Business Cycle: In addition to the long-term secular trend, the recurring movements of the business cycle influence working capital changes. As business recedes, companies tend to defer capital replacement programmes and deflect depreciations to liquid balances rather than fixed assets. Similarly, curtailed sales reduce amounts receivable and modify inventory purchases, thereby contributing further to the accumulation of cash balances. Conversely, the sales, capital, and inventory expansions that accompany a boom produce a greater concentration of credit items in the balance sheet.

The tendency for companies to become cash-poor as the tide of economic prosperity rises and cash-rich as it runs out is well known economic phenomenon. The pressure on company finances during boom years is reflected in the business drive for loans and the high interest rate of these years as compared with a reversal of such conditions during the periods of economic decline. The financial implications of these movements may be deceptive. A weakening of the cash position in favourable economic environment may suggest the need or difficulty of raising capital for the further expansion rather than a shortage of funds to take care of current needs. On the other hand, a strong cash position when the economic outlook is bleak may be the forerunner of actual financial difficulties. The financial manager must learn to look behind the obvious significance of the standard test of corporate liquidity interpret their meaning in the light of his knowledge of the company's position in the industry, the prospects of new business and the availability of external sources for supplying additional capital.

6. Competitive Conditions: A corporation that dominates the market may relax its working capital standard because failing to meet customers requirements promptly does not necessarily lead to a loss of business. When competition is keen, there is more pressure to stock varied lines of inventory to satisfy customer's demands and to grant more generous credit terms, thereby causing an expansion in receivables.

7. Production Collection Time Period: Closely related to a company's competitive status are the credit terms, it must grant. These arrangements may be result of tradition, policy within the industry, or even carelessness in failing to carry out announced principles. And the arrangements, in turn, are part of the overall production collection time sequence, that is, the time intervening between the actual production of goods and the eventual collection of receivables, flowing from sales. The length of this period is influenced by various factors.

Purchases may be on a cash basis, but the manufacturing cycle may be prolonged and sales terms generous, causing a wide gap between cash expenditure and receipt and possibly placing heavy financing pressure on the firm. The pressure may be eased, despite long manufacturing cycle, if the company can persuade its suppliers to bear a large part of its financing burden or the manufacturing cycle may be short, and get the pressures heavy because suppliers do not bear a large part of financial burden. The financing requirements of the company may always be traceable to the relation between purchasing and sales credit volume and terms of operations.

8. Dividend Policy: A desire to maintain an established dividend policy may affect the volume of working capital, or changes in working capital may bring about an adjustment of dividend policy. In either event, the

relationship between dividend policy and working capital is well established, and very few companies ever declare a dividend without giving consideration to its effect on cash and their needs for cash.

9. Size of Business: The amount needed may be relatively large per unit of output for a small company subject to higher overhead costs, less favourable buying terms, and higher interest rates. Small though growing companies tend to be hard pressed in financing their working capital needs because they seldom have access to the open market as do large established business firms have.

10. Sales Policies: Working capital needs vary on the basis of sales policy of the same industry. A department store which caters to the "carries trade" by carrying a quality line of merchandise and offering extensive charge accounts will usually have a slower turnover of assets, a higher margin on sales, and relatively larger accounts receivable than many of its non-carriage, trade competitors. Another department store which stresses cash and carry operations will usually have a rapid turnover, a low margin on sales, and small or no accounts receivable.

11. Risk Factor: The greater the uncertainty of receipt and expenditure, more the need for working capital. A business firm producing an item which sells for a small unit price and which necessitates repeat buying, such as canned foods or staple dry goods etc., would be subject to less risk than a firm producing a luxury item which sells for a relatively high price and is purchased once over a period of years, such as furniture, automobiles etc.

INVESTMENT AND FINANCING OF WORKING CAPITAL

Working capital policy is a function of two decisions, first, investment in working capital and the second is financing of the investment. Investment in working capital is concerned with the level of investment in the current assets. It gives the answer of 'How much' fund to be tied in to achieve the organisation objectives (i.e. Effectiveness of fund). Financing decision concerned with the arrangement of funds to finance the working capital. It gives the answer 'Where from' fund to be sourced' at lowest cost as possible (i.e. Economy). Financing decision, we will discuss this in later part of this chapter.

Investment of working capital

How much to be invested in current assets as working capital is a matter of policy decision by an entity. It has to be decided in the light of organisational objectives, trade policies and financial (cost-benefit) considerations. There is not set rules for deciding the level of investment in working capital. Some organisations due to its peculiarity require more investment than others. For example, an infrastructure development company requires more investment in its working capital as there may be huge inventory in the form of work in process on the other hand a company which is engaged in fast food business, comparatively requires less investment. Hence, level of investment depends on the various factors listed below:

(a) **Nature of Industry:** Construction companies, breweries etc. requires large investment in working capital due long gestation period.

(b) **Types of products:** Consumer durable has large inventory as compared to perishable products.

(c) **Manufacturing Vs Trading Vs Service:** A manufacturing entity has to maintain three levels of inventory i.e. raw material, work-in-process and finished goods whereas a trading and a service entity has to maintain inventory only in the form of trading stock and consumables respectively.

(d) **Volume of sales:** Where the sales are high, there is a possibility of high receivables as well.

(e) **Credit policy:** An entity whose credit policy is liberal has not only high level of receivables but requires more capital to fund raw material purchases.

Approaches of working capital investment

Based on the organisational policy and risk-return trade off, working capital investment decisions are categorised into three approaches i.e. aggressive, conservative and moderate.

(a) **Aggressive:** Here investment in working capital is kept at minimal investment in current assets which means the entity does hold lower level of inventory, follow strict credit policy, keeps less cash balance etc. The advantage of this approach is that lower level of fund is tied in the working capital which results in lower financial costs but the flip side could be that the organisation could not grow which leads to lower utilisation of fixed assets and long term debts. In the long run firm stay behind the competitors.

(b) **Conservative:** In this approach of organisation use to invest high capital in current assets. Organisations use to keep inventory level higher, follows liberal credit policies, and cash balance as high as to meet any current liabilities immediately. The advantage of this approach are higher sales volume, increased demand due to liberal credit policy and increase goodwill among the suppliers due to payment in short time. The disadvantages are increase cost of capital, higher risk of bad debts, shortage of liquidity in long run to longer operating cycles.

(c) **Moderate:** This approach is in between the above two approaches. Under this approach a balance between the risk and return is maintained to gain more by using the funds in very efficient manner.

Current Assets to Fixed Assets Ratio

The finance manager is required to determine the optimum level of current assets so that the shareholders' value is maximized. A firm needs fixed and current assets to support a particular level of output. As the firm's output and sales increases, the need for current assets also increases. Generally, current assets do not increase in direct proportion to output; current assets may increase at a decreasing rate with output. As the output increases, the firm starts using its current asset more efficiently. The level of the current assets can be measured by creating a relationship between current assets and fixed assets. Dividing current assets by fixed assets gives current assets/fixed assets ratio. Assuming a constant level of fixed assets, a higher current assets/fixed assets ratio indicates a conservative current assets policy and a lower current assets/fixed assets ratio means an aggressive current assets policy assuming all factors to be constant. A conservative policy implies greater liquidity and lower risk whereas an aggressive policy indicates higher risk and poor liquidity. Moderate current assets policy will fall in the middle of conservative and aggressive policies. The current assets policy of most of the firms may fall between these two extreme policies. The following illustration explains the risk-return trade off of various working capital management policies, viz., conservative, aggressive and moderate.

Example 1

A firm has the following data for the year ending 31st March, 2017:

	(₹)
Sales (1,00,000 @ ₹ 20)	20,00,000
Earnings before Interest and Taxes	2,00,000
Fixed Assets	5,00,000

The three possible current assets holdings of the firm are ₹ 5,00,000, ₹ 4,00,000 and ₹ 3,00,000. It is assumed that fixed assets level is constant and profits do not vary with current assets levels. Show the effect of the three alternative current assets policies.

SOLUTION

Effect of Alternative Working Capital Policies

Working Capital Policy	Conservative (₹)	Moderate (₹)	Aggressive(₹)
Sales	20,00,000	20,00,000	20,00,000
Earnings before Interest and Taxes (EBIT)	2,00,000	2,00,000	2,00,000
Current Assets	5,00,000	4,00,000	3,00,000
Fixed Assets	5,00,000	5,00,000	5,00,000
Total Assets	10,00,000	9,00,000	8,00,000
Return on Total Assets (EBIT÷ Total Assets)	20%	22.22%	25%
Current Assets/Fixed Assets	1.00	0.80	0.60

The aforesaid calculation shows that the conservative policy provides greater liquidity (solvency) to the firm, but lower return on total assets. On the other hand, the aggressive policy gives higher return, but low liquidity and thus is very risky. The moderate policy generates return higher than Conservative policy but lower than aggressive policy. This is less risky than aggressive policy but riskier than conservative policy. In determining the optimum level of current assets, the firm should balance the profitability – solvency tangle by minimizing total costs – Cost of liquidity and cost of illiquidity.

ESTIMATING WORKING CAPITAL NEEDS

Operating cycle is one of the most reliable methods of Computation of Working Capital. However, other methods like ratio of sales and ratio of fixed investment may also be used to determine the Working Capital requirements. These methods are briefly explained as follows:

(i) **Current Assets Holding Period:** To estimate working capital needs based on the average holding period of current assets and relating them to costs based on the company's experience in the previous year. This method is essentially based on the Operating Cycle Concept.

(ii) **Ratio of Sales:** To estimate working capital needs as a ratio of sales on the assumption that current assets change with changes in sales.

(iii) **Ratio of Fixed Investments:** To estimate Working Capital requirements as a percentage of fixed investments. A number of factors will, however, be impacting the choice of method of estimating Working Capital. Factors such as seasonal fluctuations, accurate sales forecast, investment cost and variability in sales price would generally be considered. The production cycle and credit and collection policies of the firm will have an impact on Working Capital requirements. Therefore, they should be given due weightage in projecting Working Capital requirements.

CURRENT ASSETS AND FIXED ASSETS FINANCING

The more of the funds of a business are invested in working capital, lesser is the return in term of profitability and less amount is available for investing in long-term assets such as plant and machinery, etc. Therefore, the corporate enterprise has to minimise investment in working capital and to concentrate on investment of resources in fixed assets. Some economists argue that current assets be financed by current liabilities. But this all depends upon economic conditions prevailing in the economy at particular time requiring a company to keep business resources liquid so that business can take immediate advantage of knocking opportunities. In short-run, opportunity may arise for investment in stocks to make immediate gains due to movement in prices, whereas investment in plant and machinery may not be possible.

Current assets financing can be viewed from the working capital pool as under:

(All Current Accounts)

Marketable Securities

Accounts Receivables   →   Cash   →   Accounts Payables

Inventory

Working Capital Pool
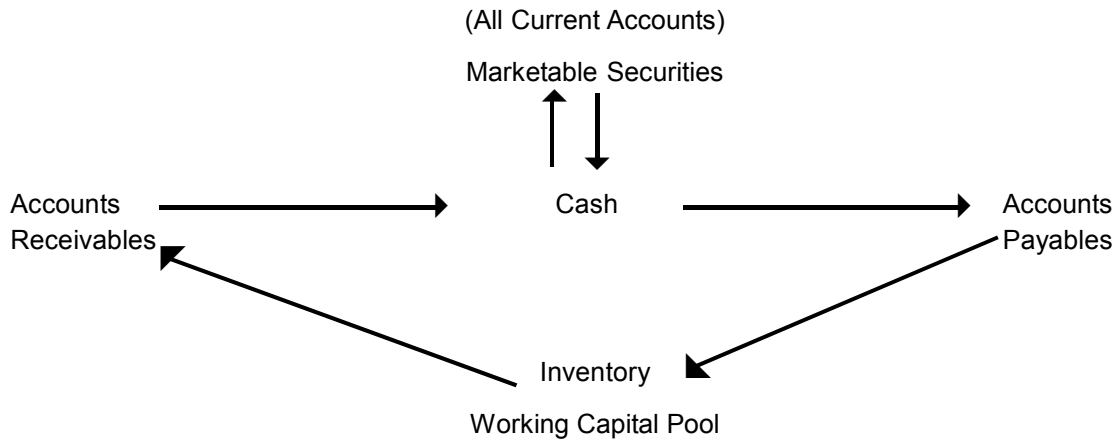
Current assets usually are converted into cash within a current accounting cycle in one year. Cash is used to purchase raw material etc., i..e. to create inventories. When inventories are sold, it gives rise to accounts receivables. Collection of receivables brings cash into company and the process forms a circle and goes on as depicted in figure above:

Thus, the current assets represent cash or near cash necessary to carry on business operations at all times. A level of current assets is thus maintained throughout the year and this represents permanent working capital. Additional assets are also required in business at different times during the operating year. Added inventory must be maintained to support peak selling period when receivables also increase and must be financed. Extra cash is needed to pay increased obligations due to spurt in activities.

Fixed assets financing is different to current assets financing. In fixed assets investment is made in building, plant and machinery which remains blocked over a period of time and generates funds through the help of working capital at a percentage higher than the return on investment in current assets. Working capital financing or current assets financing is done by raising short-term loans or cash credits limits but fixed assets financing is done by raising long-term loans or equity.

The working capital leverage and the capital structure leverage are, therefore, two different concepts. Capital structure leverage is associated with the fixed assets, financing, with an optional mix of owner's funds and borrowed funds. Owner's funds are the internal funds of the company comprised of equity holder's money in the shape of equity, retained earnings, depreciation fund and reserves. Borrowed funds are the external sources of funds raised from banks, financial institutions, issue of debentures, stock and term deposits from public. Financing of fixed assets with borrowed funds is cheaper than using owner's funds which increases the earnings per share and tends to increase the value of owner's capital in the share market. The detailed discussion on this aspect can not be accommodated as this topic is entirely devoted to the aspects of working capital.

OPERATING OR WORKING CAPITAL CYCLE : CONCEPT AND APPLICATION OF QUANTITATIVE TECHNIQUES

The operating cycle is the length of time between the company's outlay on raw materials, wages and other expenditures and the inflow of cash from the sale of the goods. In a manufacturing business, operating cycle is the average time that raw material remains in stock less the period of credit taken from suppliers, plus the time taken for producing the goods, plus the time the goods remain in finished inventory, plus the time taken by customers to pay for the goods. Operating cycle concept is important for management of cash and management of working capital because the longer the operating cycle the more financial resources the company needs. Therefore, the management has to remain cautious that the operating cycle should not become too long.

Most businesses cannot finance the operating cycle (accounts receivable days + inventory days) with accounts payable financing alone. Consequently, working capital financing is needed. This shortfall is typically covered by

the net profits generated internally or by externally borrowed funds or by a combination of the two. The duration of working capital cycle may vary depending on the nature of the business. In the form of an equation, the operating cycle process can be expressed as follows:

<div align="center">

Operating Cycle = R + W + F + D – C

</div>

Where,

R = Raw material storage period

W = Work-in-progress holding period

F = Finished goods storage period

D = Receivables (Debtors) collection period.

C = Credit period allowed by suppliers (Creditors).

The stages of operating cycle could be depicted through the following diagram :
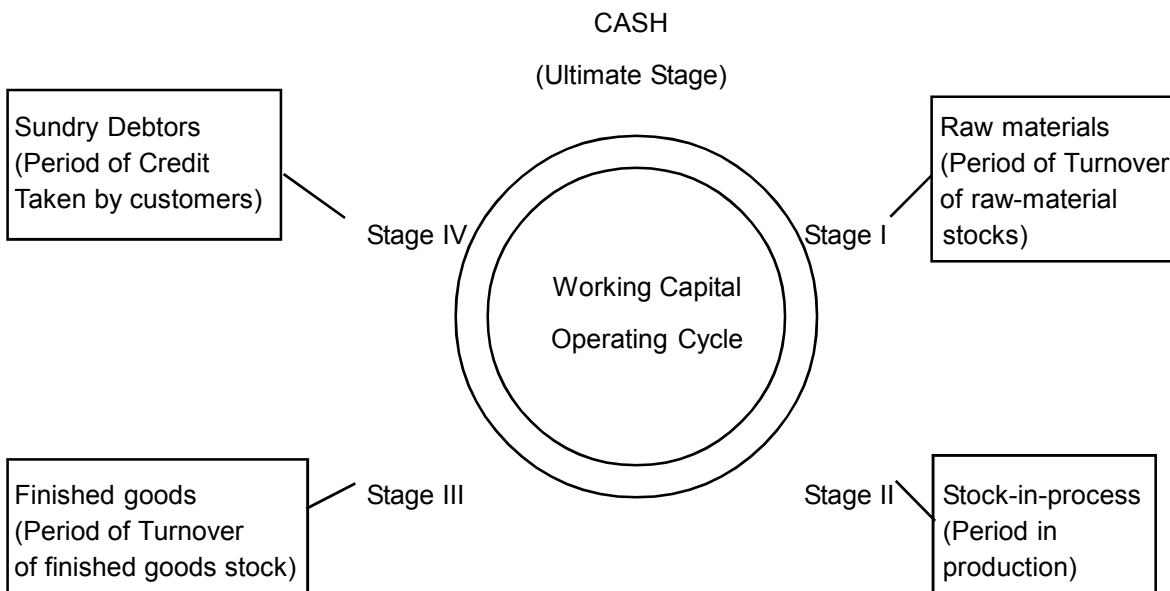
The above figure would reveal that operating cycle is the time that elapses between the cash outlay and the cash realisation by the sale of finished goods and realisation of sundry debtors. Thus, cash used in productive activity, often some time comes back from the operating cycle of the activity. The length of operating cycle of an enterprise is the sum of these four individual stages i.e. components of time.

The various component operating cycle can be calculated as shown below:

S.No.	Name of Working Capital Component	Formula	Days
1.	**Raw materials** Period of raw material stock *Less*: Period of credit granted by supplier	$\dfrac{\text{Average value of Raw material stock}}{\text{Consumption of raw material per day}}$ $\dfrac{\text{Average level of creditors}}{\text{Purchase of raw materials per day}}$	

2.	Period of Production	$\dfrac{\text{Average value of work in progress}}{\text{Average cost of production per day}}$	
3.	Period of turnover of finished goods stock	$\dfrac{\text{Average Stock of finished goods}}{\text{Average cost of goods sold per day}}$	
4.	Period of credit taken by customers	$\dfrac{\text{Average receivable}}{\text{Average value of credit sales per day}}$	
	Total operating cycle period	Sum of Sl. Nos. 1, 2, 3, 4	

Example No. 2

Calculate the Operating cycle from the following figures related to company 'X':

Particulars	Average amount Outstanding ₹	Average value per day (340 days assumed) ₹
Raw Material inventory	1,80,000	
Work-in-progress inventory	96,000	
Finished goods inventory	1,20,000	
Debtors	1,50,000	
Creditors	1,00,000	
Purchase of Raw Material		2,500
Cost of Sales		4,000
Sales		5,000

Solution

Calculation of operating cycle

			Days
1. Period of Raw Material Stock	$\dfrac{1,80,000}{2500}$	72	
Less: Credit granted by supplier	$\dfrac{1,00,000}{2500}$	<u>40</u>	32
2. Period of Production	$\dfrac{96,000}{4,000}$		24
3. Turnover of Finished Goods	$\dfrac{1,20,000}{4000}$		30
4. Credit taken by customers	$\dfrac{1,50,000}{5000}$		30
Operating Cycle Period			116

Comments: Operating cycle is long and a number of steps could be taken to shorten this operating cycle. Debtors could be cut by a quicker collection of accounts.

Finished goods could be turned over more rapidly, the level of raw material inventory could be reduced or the production period shortened.

Example No. 3

The following information is available for Swati Ltd.

	Amount (₹)
Average stock of raw materials and stores	2,00,000
Average work-in-progress inventory	3,00,000
Average finished goods inventory	1,80,000
Average accounts receivable	3,00,000
Average accounts payable	1,80,000
Average raw materials and stores purchased on credit and consumed per day	10,000
Average work-in-progress value of raw materials committed per day	12,500
Average cost of goods sold per day	18,000
Average sales per day	20,000

Calculate the duration of operating cycle.

Solution

Calculation of operating cycle

Period of raw material stage	$\dfrac{2,00,000}{10,000}$	= 20 days
Period of work-in-progress stage	$\dfrac{3,00,000}{12,500}$	= 24 days
Period of finished goods stage	$\dfrac{1,80,000}{18,000}$	= 10 days
Period of Accounts receivable stage	$\dfrac{3,00,000}{20,000}$	= 15 days
Period of Accounts payable stage	$\dfrac{1,80,000}{10,000}$	= 18 days

Duration of operating cycle = (20 + 24 + 10 + 15) – 18 =51 days

ASSESSMENT OF WORKING CAPITAL

Requirement of working capital over the operating cycle period could be guessed for short-term, medium term as well as long-term. For short term, working capital is required to support a given level of turnover to pay for the goods and services before the cash is received from sales to customers. Effort is made that there remains no idle cash and no shortage of money to erase liquidity within the company's working process. For this purpose sales budget could be linked to the expected operating cycle to know working capital requirement for any given period of time or for each month. Medium term working capital include profit and depreciation provisions. These funds are retained in business and reduced by expenditure on capital replacements and dividend and tax payment. By preparing budget the minimum amount required for medium term working capital can be estimated. The company can work out its working capital needs for different periods through cash budget which is key part of

working capital planning. To prepare such a budget operating cycle parameters are of great use as estimation of future sales level, time and amount of funds flowing into business, future expenditure and costs all can be made with least difficulty to help the main target.

Then, operating cycle help in assessing the needs of working capital accurately by determining the relationship between debtors and sales, creditors and sales and inventory and sales. Even requirement of extra working capital can be guessed from such estimate.

WORKING CAPITAL REQUIREMENT ASSESSMENT

Working capital requirement assessment requires :

1. Calculation of average value of Raw Material Inventory, Work in Progress inventory and Finished Goods inventory

2. Calculation of Trade receivables

3. Calculation of Cash and Cash Convertibles required for normal running of business,

4. Calculation of trade payables.

The formula which is used for assessing the working capital requirement is listed below:

		₹
A.	Current Assets	
	Value of Raw Material Stock	XXXX
	Value of Work in Progress	XXXX
	Value of Finished Goods Stock	XXXX
	Value of Trade Receivables	XXXX
	Value of Cash Required	XXXX
	Total of A	XXXXX
B.	Current Liabilities	
	Value of Trade Payable	XXXX
	Value of Bank Overdraft	XXXX
	Value of Outstanding expenses	XXXX
	Total of B	XXXXX
	Working Capital Total of (A)-Total of (B)	XXXX

NEGATIVE WORKING CAPIAL

Generally, negative working capital is a sign that the company may be facing bankruptcy or a serious financial trouble. Under the best circumstances, poor working capital leads to financial pressure on a company, increased borrowing, and late payments to creditor - all of which result in a lower credit rating. A lower credit rating means banks charge a higher interest rate, which can cost a corporation a lot of money over time.

In general, companies that have a lot of working capital will be more successful since they can expand and improve their operations. Companies with negative working capital may lack the funds necessary for growth.

However, some companies can sell their inventory and generate cash so quickly that they actually have a negative working capital. This is generally true of companies in the restaurant business (McDonald's had a negative working capital of $698.5 million between 1999 and 2000). Amazon.com is another example. This happens because customers pay upfront and so rapidly that the business has no problems raising cash. In these companies, products are delivered and sold to the customer before the company even pays for them.

In order to understand how a company can have a negative working capital, let us take an example of Wal-Mart. Suppose Wal-Mart orders 500,000 copies of a DVD to Warner Brothers and they were supposed to pay within 30 days. What if by the sixth or seventh day, Wal-Mart had already put the DVDs on the shelves of its stores across the country? By the twentieth day, they may have sold all of the DVDs. Here, Wal-Mart received the DVDs, shipped them to its stores, and sold them to the customer (making a profit in the process), all before they had paid Warner Brothers! If Wal-Mart can continue to do this with all of its suppliers, it doesn't really need to have enough cash on hand to pay all of its accounts payable. As long as the transactions are timed right, they can pay each bill as it comes due, maximizing their efficiency.

The bottom line is that a negative working capital can also be a sign of managerial efficiency in a business with low inventory and accounts receivable (which means they operate on an almost strictly cash basis).

Example No. 4

From the following information, you are required to estimate the net working capital:

	Cost per unit (₹)
Raw Material	200
Direct Labour	100
Overheads (excluding depreciation)	250
Total Cost	550

Estimated data for the forthcoming period is given as under:

Raw material in stock	average 6 weeks
Work-in-progress (assume 50% completion stage with full material consumption)	average 2 weeks
Finished goods in stock	average 4 weeks
Credit allowed by suppliers	average 4 weeks
Credit allowed to debtors	average 6 weeks
Cash at bank is expected to be	₹ 75,000
Selling price	₹ 800 per unit
Output	52,000 units per annum

Assume that production is sustained at an even pace during the 52 weeks of the year. All sales are on credit basis. State any other assumptions that you might have made while computing.

Solution

Computation of Net working Capital

Nature of Asset/Liabilities	Basis of Calculation	Amount (₹)
A. Current Assets		
(i) Raw material stock	Average 6 weeks $$\frac{52,000 \times 200 \times 6}{52}$$	12,00,000
(ii) Work-in-progress	Average 2 weeks	

	(a) Raw Material	$\dfrac{52,000 \times 200 \times 2}{52}$	4,00,000
	(b) Direct labour and overhead (50% completion stage)	$\dfrac{52,000 \times 175 \times 2}{52}$	3,50,000
	(iii) Finished goods stock	Average 4 weeks $\dfrac{52,000 \times 550 \times 4}{52}$	22,00,000
	(iv) Debtors	Average 6 weeks $\dfrac{52,000 \times 800 \times 6}{52}$	48,00,000
	(v) Cash at bank		75,000
	Total of A		90,25,000
B.	Current Liabilities		
	(i) Creditors	Average 4 weeks $\dfrac{52,000 \times 200 \times 4}{52}$	8,00,000
C.	Net Working Capital (A-B)		82,25,000

Note: (i) It has been assumed that the material has been introduced at the commencement of the process.

(ii) Lag in payment of overheads is nil.

(iii) There is no depreciation charge.

Example No. 5

Astle Garments Ltd. is a famous manufacturer and exporter of garments to the European countries. The Finance manager of the company is preparing its working capital forecast for the next year. After carefully screening all the documents, following information is collected:

Production during the previous year was 15,00,000 units. The same level of activity is intended to be maintained during the current year. The expected ratios of cost to selling price are:

Raw material   40%
Direct wages   20%
Overheads   20%

The raw materials ordinarily remain in stores for 3 months before production. Every units of production remains in the process for 2 months and is assumed to be consisting of 100% raw material, wages and overheads. Finished goods remain in the warehouse for 3 months. Credit allowed by the creditors is 4 months from the date of the delivery of raw material and credit given to debtors is 3 months from the date of dispatch.

Estimated balance of cash to be held	₹ 2,00,000
Lag in payment of overhead expenses	½ month
Lag in payment of direct wages expenses	½ month

Selling price is ₹ 10 per units. Both production and sales are in regular cycle. You are required to make provision of 10% for contingency (except cash). Relevant assumption may be made.

As the Finance Manager of the Company you are required to prepare the forecast statement of estimated working capital required.

Solution

Calculation of Profit Margin

Particulars	%	₹ (per unit)
Raw material	40	4
Direct wages	20	2
Overheads	<u>20</u>	<u>2</u>
Total cost	80	8
Add: Profit	<u>20</u>	<u>2</u>
Selling price	100	10

Estimation of Working Capital (₹)

Current Assets		
Raw materials stock	(15,00,000 units × ₹ 4 × 3/12)	15,00,000
Work-in-progress	(15,00,000 units × ₹ 8 × 2/12)	20,00,000
Finished goods stock	(15,00,000 units × ₹ 8 × 3/12)	30,00,000
Debtors	(15,00,000 units × ₹ 10 × 3/12)	<u>37,50,000</u>
	(a)	<u>1,02,50,000</u>
Current Liabilities		
Creditors for raw material	(15,00,000 units × ₹ 4 × 4/12)	20,00,000
Wages outstanding	(15,00,000 units × ₹ 2 × 0.5/12)	1,25,000
Outstanding expenses	(15,00,000 units × ₹ 2 × 0.5/12)	<u>1,25,000</u>
	(b)	<u>22,50,000</u>
Current assets *less* current liabilities	(a) – (b)	80,00,000
Add: Contingency	(10% of ₹ 80,00,000)	8,00,000
Add: desired cash balance		<u>2,00,000</u>
Estimated Working capital		<u>90,00,000</u>

Quantitative Techniques for Forecasting Working Capital Needs

A company very often faces fluctuations in business operations which affect the levels of current assets and liabilities due to cyclical and seasonal fluctuations. Estimation of future needs of working capital becomes difficult in such situations. But the data collected for past working may establish a trend relationship between the sales per month or per week and the level of working capital. Linear regression model is used to judge the relationship of two variables for estimating the working capital needs for the given amount of working capital needs. The most widely used regression technique employs the method of least squares:

The linear equation technique solve the equation problem as under:

$y = a + b (x)$

When	x	=	the independent variable i.e. sales
	y	=	the dependent variable i.e. working capital level
	a	=	intercept of the least square line with the vertical axis

b = the slope of the line. With the help of such model, linear equation could be solved.

Working capital = a + b (prior months sales).

Linear regression can be used in assisting the analyst in making estimates but it must be used with care. A straight line can be fitted to any data, some additional statistical technique would be needed to see how well the regression line actually describes the relationship between four variables. In those events where the relationship is not linear, more sophisticated analytical tools would be needed to express it accurately. The degree of accuracy will depend upon the skill and expertise of the analyst in using the information and making forecasting.

To forecast the working capital requirement for the next period, the following may also be used:

$$C + \frac{O.C.}{\text{Number of working days in the period}} \times C.O.G.S$$

Where, C = Cash balance required

O.C. = Operating cycle

C.O.G.S. = Estimated cost of goods sold.

Financing of Working Capital

Sources of financing of working capital differ as per the classification of working capital into permanent working capital and variable working capital.

1. Sources of permanent working capital are the following:

(a) Owner's funds are the main source. Sale of equity stock or preference stock could provide a permanent working capital to the business with no burden of repayment particularly during short period. These funds can be retained in the business permanently. Permanent working capital provides more strength to the business.

(b) Another source of permanent working capital is bond financing but it has a fixed maturity period and ultimately repayment has to be made. For repayment of this source, company provides sinking funds for retirement of bonds issued for permanent working capital.

(c) Term loan from banks or financial institutions has the same characteristics as the bond financing of permanent working capital.

(d) Short-term borrowing is also a source of working capital finance on permanent basis.

2. Source of variable working capital

Working capital required for limited period of time may be secured from temporary sources as discussed below:

(a) **Trade Creditors:** Trade credit provide a quite effective source of financing variable working capital for the period falling between the point goods are purchased and the point when payment is made. The longer this period, the more advantageous it becomes for the firm to avoid efforts of seeking finance for holding inventories or receivables.

(b) **Bank loan:** Bank loan is used for variable or temporary working capital. Such loans run from 30 days to several months with renewals being very common. These loans are granted by bank on the goodwill and credit worthiness of the borrower, and collateral may include goods, accounts/notes receivable or Government obligations or other marketable securities, commodities and equipments.

(c) **Commercial Paper:** It can be defined as a short term money market instrument, issued in the form of promissory notes for a fixed maturity. It will be totally unsecured and will have a maturity period ranging from 90 days to 180 days. It will meet the short term finance requirements of the companies and will be good short term investment for parking temporary surpluses by corporate bodies.

(d) **Depreciation as a source of working capital:** Increase in working capital results form the difference in the amount of depreciation allowance deducted from earnings and new investment made in fixed assets.

Usually, the entire amount deducted towards depreciation on fixed assets is not invested in the acquisition of fixed assets and is saved and utilised in business as working capital. This is also a temporary source of working capital so long as the acquisition of fixed asset is deferred.

(e) *Tax liabilities:* Deferred payment of taxes is also a source of working capital. Taxes are not paid from day-to-day, but estimated liability for taxes is indicated in Balance Sheet. Besides, business organisations collect taxes by way of income tax payable on salaries of staff deducted at source, old age retirement benefits, excise taxes, sales taxes, etc. and retain them for some period in business to be used as working capital.

(f) Other miscellaneous sources are Dealer Deposits, Customer advances etc.

WORKING CAPITAL – A POLICY DECISION

In formulating a Firm's Working Capital Policy, an important consideration is the trade-off between profitability and risk. In other words, the level of a firm's Net Working Capital (Current Assets – Current Liabilities) has a bearing on its profitability as well as risk. The term profitability here means profits after expenses. The term risk is defined as the probability that a firm will become technically insolvent so that it will not be able to meet its obligations when they become due for payment.

The risk of becoming technically insolvent is measured using net working capital. It is assumed that the greater the amount of Net Working Capital, the less risky the firm is, and *vice-versa*. The relationship between liquidity, Net Working Capital and risk is such that if either net working capital or liquidity increases, the firm's risk decreases.

What proportion of current assets should be financed by current liabilities and how much by long term sources will depend, apart from liquidity – profitability trade off, on the risk perception of the management. Two broad policy alternatives, in this respect, are:

(a) **A conservative current Asset financing policy**: It relies less on short term bank financing and more on long term sources.

No doubt it reduces the risk that the firm will be unable to repay its short term debt periodically, but enhances the cost of financing.

(b) **An aggressive current Asset Financing Policy**: It relies heavily on short term bank finance and seeks to reduce dependence on long term financing. It exposes the firm to a higher degree of risk, but reduces the average cost of financing thereby resulting in higher profits.

The relationship between current assets and sales under different current asset policies is shown in the following figure:

Investment in Current Assets or Working Capital
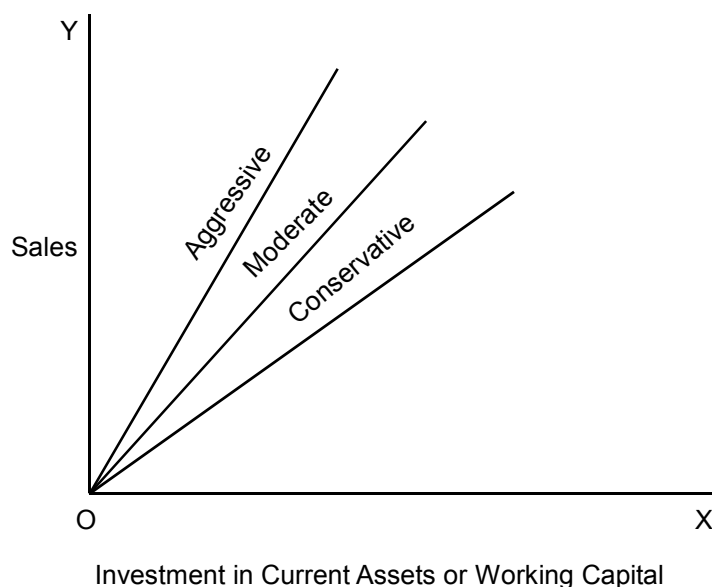
To explain, an aggressive current asset policy aims at minimising the investment in current assets corresponding to increase in sales thereby exposing the firm to greater risk but at the result of higher expected profitability. On the other hand conservative policy aims at reducing the risk by having higher investment in current assets and thereby depressing the expected profitability. In between these two, lies a moderate current asset policy.

Working Capital Leverage

Working capital leverage may refer to the way in which a company's profitability is affected in part by its working capital management. Profitability of a business enterprise is affected when working capital is varied relative to sales but not in the same proportion. If the flow of funds created by the movements of working capital through the various business processes is interrupted, the turnover of working capital is decreased as is the rate of return on investment. Working capital management should enhance the productivity of the current assets deployed in business. This correlates the working capital with Return-on-Investment (ROI). ROI is product of two factors – assets turnover and profits margin. If either of these ratios can be increased, ROI will be increased to a great degree. DU Pont Chart illustrates this position as under:

If profit margins is 6% and Asset Turnover is 3 times then ROI would be 18%	By increasing profit margin by 1%, ROI increases by 3% i.e. 6 + 1 = 7 x 3 = 21%	By increasing assets turnover by 1, ROI increases by 6% 6% x 4 = 24

Assets turnover side of ROI computation may also reflect the working capital management.

Current assets reflect the funds position of a company and is known as Gross Working Capital. Working Capital leverage is nothing but current assets leverage which refers to the asset turnover aspect of ROI. This reflects company's degree of efficiency in employing current assets. In other words, the ability of the company to guarantee large volume of sales with small current asset base is a measure of company's operating efficiency. This phenomenon is asset turnover which is a real tool in the hands of finance manager in a company to monitor the employment of fund on a cumulative basis to result into high degree of working capital leverage.

Short-term loans or cash credit raised by the company to meet the requirements of working capital i.e. to finance the current assets, add to the profitability of the company's turnover of current assets in comparison to the cost associated in terms of interest charges on such loans. This is the exact measure of working capital leverage. However, the concept of working capital leverage has not been much in use in academic discussions and its real importance is also to be understood by the business enterprises. To maximise profits, finance managers unanimously view the investment in current assets be kept to the minimum and should be financed from the funds such as current liabilities or low cost funds.

Ways to Improve Working Capital Position

Working capital is a highly effective barometer of a company's operational and financial efficiency and effectiveness. The better its condition, the better positioned a company is to focus on developing its core business. By addressing the drivers of working capital, in fact, a company is sure to reap significant operating cost and customer service improvement.

Liberating the billions in cash trapped on the balance sheet is easier than one may think. Dell Inc., for instance a lauded for overall strong corporate management and working capital performance builds a computer only when it has received payment for an order, and doesn't pay its own suppliers for an agreed-upon period of time thereafter. As a result, Dell enjoys negative working capital and, the more it grows, the more its suppliers finance its growth.

Not all companies can operate like Dell, but most can improve their working capital position by at least 20 percent over time if they pay attention to the following list of cash management do's and don'ts:

(**1) Get educated.** There is more to working capital management than simply forcing debtors to pay as quickly as possible, delay paying suppliers as long as possible and keep stock levels as lean as possible. A properly conceived and executed improvement program will certainly focus on optimizing each of these components, but also, it will deliver additional benefits that extend far beyond operational rewards. All this underscores the need for ambitious executives to integrate working capital management into their strategic and tactical thinking, rather than view it as an extraneous added bonus.

(**2) Institute dispute management protocols.** Consider a case where a company's working capital is deteriorating due to an increase in past-due accounts receivable (A/R). A review of the past-due A/R illustrates a high level of customer disputes, which are taking on average of 30 days to resolve and consuming significant amounts of sales, order-entry and cash collectors' time.

By tackling the root cause of the disputes in this case, poor adherence to pricing policies the company can eliminate the disputes, thereby improving customer service. Established dispute-management protocols free up time for sales, order-entry and cash collections' personnel to be more effective at their designated roles, and they also will increase productivity, reduce operating costs and potentially boost sales. And finally, days payable outstanding (DPO) and working capital will improve, as customers won't have reason to hold payment.

This example illustrates how working capital is one of the best indicators of underlying inefficiency within an organization and why it is critical that senior executives remain focused on addressing the primary causes of working capital excesses to control operating costs and remain competitive.

(**3) Facilitate collaborative customer management.** One of the most important cash management and working capital strategies that executives CFOs and treasurers, as well as CEOs can employ is to avoid thinking linearly and concerning themselves solely with their own company's needs. If it is feasible to collaborate with customers to help them plan their inventory requirements more efficiently, it may be possible to match your production to their consumption, efficiently and cost-effectively, and replicate this collaboration with your suppliers.

The resulting implications for inventory levels can be massive. By aligning ordering, production and distribution processes, companies can increase inherent efficiency and achieve direct cost savings almost instantly. At this point, payment terms can be most effectively negotiated.

(**4) Educate personnel, customers and suppliers.** A business imperative should be to educate staff to consider the trade-offs between various working capital assets when negotiating with customers and suppliers. Depending on the usage pattern of a raw material, there may be more to gain from negotiating consignment stock with a supplier instead of pushing for extended terms - particularly in cases of long lead-time items or those that require high minimum-order quantities.

The same can hold true for customers. Would vendor-managed inventory at a customer site provide you the insight into true usage to better plan your own production? It is important to remember, however, that this is not the solution for all products, and it should be evaluated on a case-by-case basis.

(**5) Agree to formal terms with suppliers and customers and document carefully.** This step cannot be stressed enough. Terms must be kept up to date and communicated to employees throughout the organization, especially to those involved in the customer-to-cash and purchase-to-pay processes; this includes your sales organization.

Avoid prolific new product introductions without first establishing a clear product-range management strategy. Whether in the consumer products or aluminium extrusions business, many companies rely heavily on new products to maintain and grow market share. However, poor product-range management creates inefficiency in the supply chain, as companies must support old products with inventory and manufacturing capability. This increases operating costs and exposes the company to obsolete inventory.

(**6**) **Don't forget to collect your cash.** This may sound obvious, but many businesses fail to implement effective ongoing collection procedures to prevent excess overdue funds or build-up of old debts. Customers should be asked if invoices have been received and are clear to pay and, if not, to identify the problems preventing timely payment. Confirm and reconfirm the credit terms. Often, credit terms get lost in the translation of general payment terms and what's on the payables ledger in front of the payables clerk.

(**7**) **Steer clear of arbitrary top-down targets.** Too many companies, for example, impose a 10 percent reduction in working capital for each division that fails to take into account the realistic reduction opportunities within each division. This can result in goals that de-motivate employees by establishing impossible targets, creating severe unintended consequences. Instead, try to balance top-down with bottom-up intelligence when setting objectives.

(**8**) **Establish targets that foster desired behaviours.** Many companies will incentivise collections staff to minimize A/R over 60 days outstanding when, in fact, they should reward those who collect A/R within the agreed-upon time period. After all, what would stop someone from delaying collections activities until after 60 days when they can expect to be rewarded? Likewise, a purchasing manager may be driven by the purchase price and rewarded for buying when prices are low, but this provides no incentive to manage lot sizes and order frequency to minimize inventory.

(**9**) **Do not assume all answers can be found externally.** Before approaching existing customers and suppliers to discuss cash management goals, fully understand your own process gaps so you can credibly discuss poor payment processes. Approximately 75 percent of the issues that impact cash flow are internally generated.

(**10**) **Treat suppliers as you would like customers to treat you.** Far greater cash flow benefits can be realized by strategically leveraging your relationship with suppliers and customers. A supplier is more likely to support you in the case of emergency if you have treated them fairly, and, likewise, a customer will be willing to forgive a mistake if you have a strong working relationship.

That said, also realize that each customer is unique. Utilize segmentation tactics to split your customers and suppliers into similar groups. For customers, segmentation may be based on criteria including, profitability, sales, A/R size, past-due debt, average order size and frequency. Once segmentation is complete, it is important to define strategies for each segment based around the segmentation criteria and your strategic goals.

For example, you should minimize the management cost for low-margin customers by changing service levels, automating interaction, etc. Finally, allocate your resources according to the segmentation, with the aim of maximizing value.

Control of Working Capital

The direct approach to working capital control is to develop effective policies for the control of each of the components of working capital. Since deviations occur in actual operations, indirect control techniques are needed by management to reduce its working capital requirements. Control of cash, receivables and inventories be maintained in a synchronized way so that a matching balance in all parameters of working capital could be obtained.

BANKING NORMS AND MACRO ASPECT OF WORKING CAPITAL MANAGEMENT

Banks normally provide working capital finance to hold an acceptable level of current assets viz. raw materials and stores, stocks in progress, finished goods and sundry debtors for achieving a pre-determined level of production and sales. The assessment of funds required to be blocked in each of these items of the working capital required by an industry is discussed as under:

1. *Raw Material:* Raw material, of any kind is necessarily required by an industrial unit to continue the production process. Different raw material could be procured from different sources may be indigenous or overseas and accordingly different treatment of procurement time is bound to be given. Mode of payment for the raw material may also be different. Thus, affecting the credit requirements of the client, the funds blocked up in procurement and stocking of material will have to be taken into consideration. Total materials including those in transit and for which advance payment is made can normally be expressed in terms of number of months consumption and requirements of funds can be assessed by multiplying the figure by the amount of monthly consumption.

2. *Work in Process:* The time taken by the raw material to be converted into finished product is the period of material processing and all the expenses of the process are involved in it. Therefore, the assessment of funds blocked in the process is made by taking into account the raw material consumption during the processing period and the expenses incurred during such period i.e. the cost of production for the period of processing.

3. *Finished goods in the next stage:* The funds blocked in finished goods inventories are assessed by estimating the manufacturing cost of product.

4. *Sundry Debtors:* When goods sold is not realised in cash, sundry debtors are generated. The credit period followed by a particular industrial unit in practice is generally the result of industry practices. Investment in accounts receivable remains blocked from the time of sale till the time amount is realised from debtors. The assessment of funds blocked should be on the basis of cost of production of the materials against which bank extends working capital credit.

5. *Expenses:* One month's total expenses, direct or indirect, are provided by way of cushion in assessing the requirement of funds which may include rent, salaries, etc. depending upon the length of operating cycle.

6. *Trade Credit* received on purchases reduces working capital funds requirements and has to be taken into account for correct assessment of funds.

7. *Advances* received alongwith purchase orders for the products also reduce the funds requirements for working capital.

Taking into consideration the above parameters of operating cycle, the working capital for a unit can be assessed as under:

S.No.	Component of Working Capital	Basis of Calculation	₹
1.	Raw material	Month's consumption	100
2.	Stock in process	Week's (cost of production for period of processing)	100
3.	Finished goods	Month's cost of production required to be stocked	100
4.	Sundry debtors	Month's cost of production	100
5.	Expenses	One month's	100
		Total	500
Less: Trade credit on month's purchases		₹ 100	
Less: Advance payment on Orders received		₹ 100	200
	Working Capital required		300

Banks do not provide the entire amount of ₹ 300 towards working capital. At every stage bank would insist upon

the borrower's stake in the form of margin which depends on various factors like saleable quality of product, durability, price fluctuations, market conditions and business environment, etc. Thus, the bank at every stage would allow the margin at the pre-determined rate as noted below:

		Permissible Limit (₹)
Raw material *Less:* Margin 10%	100 10	90
Stock in process *Less:* Margin 40%	100 40	60
Finished goods *Less:* Margin 25%	100 25	75
Sundry Debtors (at sale value) *Less:* Margin 10%	100 10	90
Expenses for one month 100% Margin	100 100	–
Total permissible limit		**315**
Working capital requirement of the unit		500
Permissible limits (Bank loan)		315
Gap (contribution to be provided by Borrower)		185

Before sanctioning the working capital of ₹ 315, the bank would ensure that borrower is in a position to bring in margin money of ₹ 185 by way of excess current assets over current liabilities based on projected balance sheet.

DIFFERENT COMMITTEE OF RBI FOR WORKING CAPITAL MANAGEMENT

Commercial banks grant working capital advances by way of cash credit limits and are the major suppliers of working capital to trade and industry. In the past, the practices in commercial banks as revealed by the findings of different Study Groups appointed by RBI were as follows:

1. Daheja Study Group

The current limit was related to the security offered by the clients of banks without assessing financial position of the borrower through cash flow analysis. Short-term advances were not utilised for short-term purposes and defeated their self liquidating objective. In large number of accounts, no credit balance existed nor was the debit balance fully wiped out over a period of years because withdrawals were more than deposits.

To control the tendency of over-financing and the diversion of the banks funds, Daheja Study Group (National Credit Council constituted in 1968 under the Chairmanship of V.T. Daheja) made recommendations for the banking system to finance industry on the basis of a total study of the borrower's operations rather than on security considerations. Further, present as well as future cash credit accounts should be distinguished as between the 'hard core' and the 'short-term components'. The hard core should represent the minimum level of raw materials, finished goods and stores which the industry required to hold in order to maintain a given level of production, and the bank finance should be provided on strong financial basis as term loan and be subjected to regular repayment schedule whereas short-term component of the account would represent the requirement of funds for temporary purposes i.e. a short term increase in inventories, tax, dividends and bonus payments, etc. the borrowing being adjsuted in a short period out of sales.

2. Tandon Committee

Although the above recommendations were implemented but no improvement was noticed in money drain to strong industrial groups by banks and RBI appointed another study group under the chairmanship of Shri P.L. Tandon in July, 1974. Tandon committee made certain recommendations *inter alia* comprising of recommendations on norms for inventory and receivables for 15 major industries, new approach to bank lending, style of lending credit, information system and follow up, supervision and control and norms of capital structure. A brief appraisal of the Tandon committee recommendations would prove more enlightening as given below:

1. Norms for inventory and receivables recommended by Tandon Committee for 15 major industries, cover about 50 per cent of industrial advances of banks. These norms were arrived at after examining the trends reflected in the company finance studies conducted by the Reserve Bank of India and detailed discussion with representatives and experts of the industries concerned.

2. Bank lending: The Committee introduced the concept of working capital gap. This gap arised due to the non-coverage of the current assets by the current liabilities other than bank borrowings. A certain portion of this gap will be filled up by the borrower's own funds and long-term borrowings. The Committee developed three alternatives for working out the maximum permissible level of bank borrowings:

1. 75% of the working capital gap will be financed by the bank i.e.

   Total Current assets

   Less: Current Liabilities other than Bank Borrowings

   = Working Capital Gap.

   Less: 25% of Working Capital gap from long-term sources.

2. Alternatively, the borrower has to provide for a minimum of 25% of the total current assets out of long-term funds and the bank will provide the balance. The total current liabilities inclusive of bank borrowings will not exceed 75% of the current assets:

   Total Current Assets

   Less: 25% of current assets from long-term sources.

   Less: Current liabilities other than Bank borrowings

   = Maximum Bank Borrowing permissible.

3. The third alternative is also the same as the second one noted above except that it excludes the permanent portion of current assets from the total current assets to be financed out of the long-term funds, viz.

   Total Current assets

   Less: Permanent portion of current assets

   Real Current Assets

   Less: 25% of Real Current Assets

   Less: Current liabilities other than Bank Borrowings

   = Maximum Bank Borrowing permissible.

Thus, by following the above measures, the excessive borrowings from banks will be gradually eliminated and the funds could be put to more productive purposes.

The above methods may be reduced to equation as under:

1st Method : $PBC = 75/100 \times WCG$

2nd Method : $PBC = TCA - [(25/100 \times TCA) + OCL]$

3rd Method : $PBC = TCA - [CRA + 25/100 (TCA - CRA) + OCL]$

Where,

PBC stands for Permissible Bank Credit

WCG stands for Working Capital Gap

TCA stands for Total Current Assets

OCL stands for Other Current Liabilities

(i.e. Current Liabilities other than Bank Borrowings)

CRA stands for Amount required to finance Core Assets.

3. *Style of credit:* A change in the style of lending has also been suggested by the Committee so as to bifurcate the cash credit into a loan account and demand cash credit instead of treating the entire credit limit as cash credit for a year. This will make the credit less expensive to borrowers. The demand cash credit will meet the seasonal requirements of industry and will be wiped out automatically at the end of the business cycle. This will introduce a better financial discipline in the credit system and will generate better financing system in the banking economy with numerous advantages.

4. *Information system:* To monitor better credit information system in the banking industry, the committee suggested for the borrower to submit quarterly statements in the prescribed format about its operations, current assets and current liabilities and funds flow statements with monthly stock statements and projected balance sheets and profit and loss account at the end of financial year.

5. *Follow up:* The Committee also suggested a close follow up for supervision and control of the use of credit by the banks and change in attitude of the banks from security-oriented lending to production oriented lendings/ credit.

6. *Norms of Capital Structure:* For examining the capital structure of the company the norms have also been suggested by the committee for monitoring a better equity : debt relationship.

3. Chore Committee

Reserve Bank of India accepted the above recommendations of the Tandon Committee but found that the gap between sanctioned cash credit limit and its utilisation has remained unanswered. In this context, RBI appointed in April 1979 a working group under the Chairmanship of Mr. K.B. Chore to look into this gap between the sanctioned limits and their utilisation.

The Chore Committee has, *inter alia*, recommended as follows:

(1) emphasised need for reducing the dependance of large and medium scale units on bank finance for working capital;

(2) to supplant the cash credit system by loans and bills wherever possible; and

(3) to follow simplified information system but with penalties when such information is not forthcoming within the specified limit.

Chore Committee also suggested that the banks should adopt henceforth Method II of the lending recommended by the Tandon Committee so as to enhance the borrowers' contribution towards working capital. The observance of these guidelines will ensure a minimum current ratio of 1.33 : 1. Where the borrowers are not in a position to comply with this, excess borrowings on account of adoption of Method II should be segregated and converted into a working capital term loan (WCTL). This loan should be made repayable in half-yearly instalments over a period not exceeding five years. WCTL may carry a rate of interest higher than the rate applicable on the relative cash credit limit, not exceeding the ceiling with a view to encouraging an early liquidation of WCTL.

It was also suggested that banks should fix separate limits where feasible for peak level and non-peak level requirements with periods where there is a pronounced seasonal trend. This will not apply to agro-based industries but also to certain consumer industries like fans, refrigerators, etc. The borrower should be discouraged from approaching banks frequently for *ad hoc* limits in excess of the sanctioned limits excepting those special circumstances when such requests be considered for short duration with 1 per cent additional interest over

normal rate which could be waived in general cases on merits. Sick units may be allowed general exemptions from the above requirements. The Committee also favoured encouragement be given to bill finance i.e. bill acceptance and bill discounting practices involving banks, buyers and sellers. The Committee suggested some modifications and improvements in the system earlier recommended by the Tandon Committee. The modified system includes that banks should submit half-yearly statements to RBI above credit limits of borrowers with aggregate working capital of ₹ 50 lakhs and above from the banking system.

4. Marathe Committee

In 1982, it was felt that an independent review of the Credit Authorisation Scheme (CAS) which had been in operation for several years would be useful and accordingly the Reserve Bank of India appointed a Committee referred as "Marathe Committee" in November 1982 to review the working of the Credit Authorisation Scheme. The Committee submitted its report in July 1983.

The Marathe Committee which was given terms of reference to examine the Credit Authorisation Scheme from the point of view of its operational aspects stressed that the 'CAS is not to be looked upon as a mere regulatory measure which is confined to large borrowers. The basic purpose of CAS is to ensure orderly credit management and improve quality of bank lending so that all borrowings, whether large or small, are in conformity with the policies and priorities laid down by the Central Banking Authority. If the CAS scrutiny has to be limited to a certain segment of borrowers, it is because of administrative limitations or convenience, and it should not imply that there are to be different criteria for lending to the borrowers above the cut off point as compared to those who do not come within the purview of the scheme.

5. Chakraborty Committee

The Reserve Bank of India constituted a committee under the chairmanship of Sukhomoy Chakraborty to review the working of monetary system in India. The committee examined the matter in details and submitted its report in April, 1985 with wide ranging suggestions for its improvement. The committee made two major recommendations which were as under –

i) The observation of the committee was that the delay in making payment by public sector units, some big private sector units and Government, departments continues unabated. The suggestion of committee in this regard was that the Government, should take initiative to include a penal interest payment clause in purchase contracts with suppliers for delayed payments beyond a pre-specified period.

ii) The credit limits to be sanctioned to a borrower should be segregated under three different heads - Cash credit-I - to cover the supplies to Govt. Cash credit II - to cover special circumstances and contingencies Normal working capital limit - to cover the balance of the credit facilities.

6. Kannan Committee

With a view to free the banks from rigidities of the Tandon Committee recommendations in the area of Working Capital Finance and considering the ongoing liberalizations in the financial sector, IBA constituted, following a meeting of the Chief Executives of Selected public sector banks with the Deputy Governor of Reserve Bank of India on 31.8.96, a committee on 'Working Capital Finance' including Assessment of Maximum Permissible Bank Finance (MPBF), headed by Mr. K. Kannan, the then Chairman and Managing Director of the Bank of Baroda.

The Committee examined all the aspects of working capital finance and gave far reaching recommendations on the modalities of assessment of working capital finance in its report, submitted to IBA on February 25, 1997. It observed that since commercial banks in India were undergoing a metamorphosis of deregulations and liberalizations, it was imperative that micro-level credit administration should be handled by each bank individually with their own risks-perceptions, risks-analysis and risks-forecastings. The final report of the Committee was submitted to RBI for its consideration in March, 1997. In its final report, the Kannan Committee also pointed that

alongwith modification of existing systems of working capital assessment and credit monitoring, certain undermentioned areas also need to be addressed:

(1) Regular interface with the borrower to have a better understanding of (i) his business/activity; and, (ii) problems/constraints faced by him and the future action plan envisaged;

(2) Periodical obtaining of affidavits from the borrowers, declaring highlights of their assets, liabilities and operating performance (in lieu of subjecting even the high rated/high valued borrowers to several routine inspections/ verifications) in order to bestow faith-oriented, rather than *ab initio* doubt-oriented, approach in monitoring the credit dispensation.

(3) Periodical exchange of information between/among financing banks/financial institutions to pick-up the alarm signals at the earliest.

(4) Establishing, within, a time bound programme, a "Credit Information Bureau" to provide updated information of existing/new borrowers before taking a credit decision. (Modality of Information Bureau in advanced countries may be taken as a guide for floating an appropriate Credit Information Bureau).

Accordingly, the Kannan Committee recommended that the arithmetical rigidities, imposed by Tandon Committee (and reinforced by Chore Committee) in the form of MPBF-computation, having so far been in vogue, should be given a go-by. The committee also recommended for freedoms to each bank in regard to evolving their own system of working capital finance for a faster credit delivery in order to serve more effectively various segments of borrowers in the Indian economy.

Concurring with recommendations of the Kannan Committee, Reserve Bank of India (vide circular No. IECD No. 23/08.12.01/96 dated 15.04.1997) advised to all the banks, inter-alia, as under:

It has now been decided that the Reserve Bank of India shall withdraw forthwith the prescription in regard to assessment o working capital needs based on the concept of maximum permissible bank finance (MPBF) enunciated by Tandon Working Group. Accordingly, an appropriate system may be evolved by banks for assessing the working capital needs of borrowers within the prudential guidelines and exposure norms already prescribed.

The turnover method, as already prevalent for small borrowers, may continue to be used as a tool of assessment for this segment; since major corporates have adopted cash budgeting as a tool of funds management, banks may follow cash budget system for assessing the working capital finance in respect of large borrowers; there should also be no objection to the individual banks retaining the concept of the present maximum permissible bank finance, with necessary modifications or any system."

Reserve Bank of India further directed that Working capital credit may henceforth be determined by banks according to their perception of the borrower and the credit needs. Banks should lay down, through their boards a transparent policy and guidelines for credit dispensation in respect of each broad category of economic activity.

OTHER ISSUES INVOLVED IN THE MANAGEMENT OF WORKING CAPITAL

Apart from the discussion of the nature of various components of working capital, we need to consider various other aspects of this intricate system of financial management. These aspects undertake a finer and more microscopic analysis of the components in order to strengthen control over the current assets on one hand and to improve the productivity of working capital on the other. Some of the relevant issues are described as under:

(A) The Concept of Negative Working Capital

Net working capital is the term used to denote the difference of current assets and current liabilities. Traditionally it has been assumed that the current assets of a firm should be more than adequate to meet the current liabilities. In other words, the current ratio, i.e. the ratio of current assets to current liabilities should be more than one. The rationale behind this assumption is that the firm should at all times be in a position to maintain liquidity. By

definition, current assets are treated as those assets which are capable of quick conversion into cash and secondly, the time period for conversion into cash is usually small but not more than one year in any case. Carrying the argument further, one can postulate that the older the current asset gets, the lesser are its chances of easy conversion into cash. So, in order to maintain the quality of its current assets, the firm seeks to reduce their holding period. Simultaneously, the firm tries to prolong the time period available for payment of its current liabilities by building up the level of inventory through trade finance and using bank borrowing against inventory and debtors. The result of this exercise is that the net working capital of the firm turns negative and its current ratio becomes less than one.

On the face of, it the concept of negative net working capital appears to be thought with unfavorable consequences for the firm. In such a situation, if the firm is required to meet its current obligations all at once, it might not have adequate liquidity available and as a result, it could default on its obligations. This could happen in a situation where the cash has moved out of the operating cycle to long term uses like creation of fixed assets or towards non-productive investments in other firms. But if the firm has, as part of its conscious working capital management policy, kept the level of current assets to the minimum and deployed the surplus cash in non-working capital, yet liquid investments, then it can afford to function with a net working capital that is negative.

Hence so long as a firm does not default on payment of its current liabilities, the fact that it has a negative net working capital need not be a cause for concern. This may not always be true as most of the organisatons may like to see current assets more than current liabilities. Example of such organisations could be banks who provide short-term credit or suppliers of raw material who sell on credit to firms.

(B) The Myth of Adequate Current Assets

Aligned to the first issue is the myth of adequate current asset. Traditionally, it has been believed that liquidity is proportional to the level of current assets. A firm having a high current ratio is treated as favorably placed as regards payment of its current liabilities. This is myth since the holding of current assets is always in proportion to the turnover. If level of current assets is rising disproportionately to the turnover, then notwithstanding the high current ratio, the situation has the following implications:

– The age of current assets is increasing which tells upon their quality. As the current assets, particularly inventory and receivables, get older the chances of their easy and complete conversion into cash recede. Once this happens, there is every possibility of the operating cycle cracking.

– The firm is paying a huge cost for the higher build up of current assets. This cost consists of

  (a) The amount spent towards raw materials and intermediate inputs

  (b) The cost incurred towards storing and maintaining the inventory.

  (c) The interest cost for obtaining finance against these current assets

  (d) The cost of obsolescence associated with holding inventory for longer periods and

  (e) The cost of expected default on receivables as reflected in charge to profit and loss account towards bad debts.

(C) Does the balance sheet give a true picture of current assets?

We have restricted the discussion of current assets to the position obtained as on a particular date. This position may not be representative of the state of affairs prevailing on a day to day basis throughout the year. In order to even out the effects of daily variation in the level of current assets, it is advisable to take average of weekly, monthly or quarterly holding depending upon the nature of the industry and turnover of the assets. The position at the end of a day is a static position which is not representative of the entire year. By taking period averages some amount of dynamism is brought into the picture.

The second point to be noted is that an industry might have seasonal peaks or troughs of working capital requirement. For example agro based industry like fruit processing unit would need to stock more raw material during the peak season when the crop has been harvested than during the lean season. In such cases different norms have to be applied for peak season and non peak season for holding of current assets for judging the reasonability of their holding.

We find, therefore that the high level of current assets is nothing but a fiction when we seek to realize the current assets. It may happen that the inventory carried by the firm may consist of obsolete items, packing materials, finished goods which have been rejected by buyers and items like dies and tools which are more fixed than current in character. Prudence would advise that the firm should get rid of these current assets as early as possible.

On the other hand, the current liabilities are more ascertainable and less fictions. The payment of these liabilities, if not possible from the operating cycle, has to be arranged from long term sources of funds which results in a mismatch that is not conducive to financial health of the firm.

(D) The various forms of cash holding

Cash is considered to be the most liquid of current assets. It is held either as cash balances with the firms or in bank accounts. There are two ways of holding bank balances – first as current accounts through which the day to day transactions of the firm are carried out and secondly as fixed deposits in which balances are held for a specified twice period. Current account balances are most liquid. Fixed account balances are convertible into cash by adjustment downwards of the rate of interest even before maturity. Hence even fixed deposit balances should be treated at par as regards liquidity. But there is a catch here. Quite a few fixed deposits are not held perse, but as margin money deposits for availing the facilities like letters of credit and guarantee from banks. To the extent of such margin money deposits, the liquidity of bank balances of the firm is impaired.

Cash balances are also held as un availed portion of the working capital facilities granted by the banks. All such balances earn money for the firm in terms of the interest that is saved on unavailed portion. Yet the money remains available to the firm almost on call. Such balances are most suitable to a firm for enhancement of liquidity provided the firm has the policy of availing bank finance for its working capital requirements.

These firms maintain just enough balance in their current accounts and transfer the surplus immediately to the borrower accounts for saving interest thereon. In most such cases, even the routine transactions are carried out through the borrowal accounts, thus precluding the need for maintaining current accounts even.

Example No.6

MNO Ltd. has furnished the following cost data relating to the year ending of 31st March, 2017.

	₹ *(in Lakhs)*
Sales	450
Material consumed	150
Direct wages	30
Factory overheads (100% variable)	60
Office and Administrative overheads (100% variable)	60
Selling overheads	50

The company wants to make a forecast of working capital needed for the next year and anticipates that:

– Sales will go up by 100%,

– Selling expenses will be ₹ 150 lakhs,

– Stock holdings for the next year will be-Raw material for two and half months, Work-in-progress for one month, Finished goods for half month and Book debts for one and half months,

– Lags in payment will be of 3 months for creditors, 1 month for wages and half month for Factory, Office and Administrative and Selling overheads.

You are required to:

(i) Prepare statement showing working capital requirements for next year, and

(ii) Calculate maximum permissible bank finance as per Tandon Committee guidelines assuming that core current assets of the firm are estimated to be ₹ 30 lakhs.

Solution

Working:

Statement showing the projected Cost and Profitability for the year ending on 31-3-2018

	Year ending 31/3/2017 (₹ in lakhs)	Increase/ Decrease	Forecast for the next Year ending 31/3/2018 (₹ in lakhs)	Per month
Sales:	<u>450</u>	+100%	<u>900</u>	<u>75</u>
Direct Materials Consumed	150	+100%	300	25
Direct Wages	<u>30</u>	+100%	<u>60</u>	<u>5</u>
Prime Cost	180		360	30
+ Factory overheads	<u>60</u>	+100%	<u>120</u>	<u>10</u>
Works cost	240		480	40
+ Office & Administrative overheads	<u>60</u>	+100%	<u>120</u>	<u>10</u>
Cost of Production	300		600	50
+ Selling overheads	<u>50</u>	Increase	<u>150</u>	<u>12.50</u>
Total Cost	**350**		**750**	**62.50**
Profit	**100**		**150**	**12.50**

(i) Statement showing Working Capital Requirements of MNO Ltd. for the year 31-3-2018

Amount (₹ in lakhs)

(A) Current Assets		
Raw Material	(25 x 2.5 month)	62.50
Work-in-Progress		
Raw Material	(25 x 1 month)	25.00
Direct Wages	(5 x 1 month)	5.00
Factory Overheads	(10 x 1 month)	10.00
Finished goods	(600 x 0.5/ 12)	25.00
Debtors	(900 x 1.5/12)	<u>112.50</u>
Total (A)		**240.00**
(B) Current Liabilities - Lags in payment:		
(i) Creditors	(300 x 3/12)	75.00
(ii) Wages	(60 x 1/12)	5.00
(iii) Factory overheads	(120 x 0.5/12)	5.00

(iv) Office & Administrative overheads	(120 x 0.5/12)	5.00
(v) Selling overhead	(150 x 0.5/12)	6.25
Total (B)		**96.25**
Networking capital (A-B)		**143.75**

Note: In the above answer while computing Work-in-Progress the degree of completion in respect of Labour and Overheads components have been assumed at 100%, which can be assumed otherwise also.

(ii) Maximum permissible Bank Finance (MPBF):

First Method	₹ in lakhs
Total current assets	240
(-) Current Liabilities	96.25
Working Capital gap	143.75
(-) 25% from long term sources (approx.)	35.94
MPBF	**107.81**

Second Method	
Total current assets	240
(-) 25%from long term sources	60
	180
(-) Current Liabilities	96.25
MPBF	**83.75**

Third Method	
Total current assets	240
(-) Core Current Assets	30
	210
(-) 25% from long term sources	52.5
	157.5
(-) Current Liabilities	96.25
MPBF	**61.25**

CASH MANAGEMENT

By cash management, we mean the management of cash in currency form, bank balances and readily marketable securities. Cash is the most important component of working capital of a firm. It is also the terminal conversion point for other constituents. Each firm holds cash to some extent at any point of time. Source of this cash may be the working capital operating cycle or capital inflows. Similarly the outflow of cash from the cash reservoir of a firm can be either to the operating cycle or for capital repayment.

Motives for holding cash

At the basic level, a firm like individuals, has three motives for holding cash. These are as under:

(a) Transactional motive

(b) Speculative motive

(c) Contingency motive

(a) Transactional Motive

This is the most essential motive for holding cash because cash is the medium through which all the transactions of the firm are carried out. Some examples of transactions of a manufacturing firm are given below:

– Purchase of Capital Goods like plant and machinery

– Purchase of raw material and components

– Payment of rent and wages

– Payment for utilities like water, power and telephone

– Payment for service like freight and courier

These transactions are paid for from the cash pool or cash reservoir which is all the time being supplemented by inflows. These inflows are of the following kinds:

– Capital inflows from promoters' capital and borrowed funds

– Sales proceeds of finished goods

– Capital gains from investments

The size of the cash pool depends upon the overall operations of the firm. Ideally, for transaction purposes, the working capital inflows should be more than the working capital outflows at any point of time. The non-working capital inflows should be utilized for similar outflows such as purchase of fixed assets together with the surplus of working capital inflows.

(b) Speculative Motive

Since cash is the most liquid current asset, it has the maximum potential of value addition to a firm's business. The value addition can come in two forms. First, as the originating and terminal point of the operating cycle, cash is invaluable. But cash has an opportunity cost also and if cash is kept idle, it becomes a liability rather than an asset. Therefore, efficient firms seek to deploy surplus cash in short term investments to get better returns. It is here that the second form of value addition from cash can be had. Since this deployment of cash needs to be done skillfully, not all the firms hold cash for speculative motive. Further, the amount of cash held for speculative motive should not cause any strain upon the operating cycle.

(c) Contingency Motive

This motive of holding cash takes into account the element of uncertainty associated with any form of business. The uncertainty can result in prolongation of the working capital operating cycle or even its disruption. It is possible that cost of raw materials or components might go up or the time taken for conversion of raw materials into finished goods might increase. For such contingencies, some amount of cash is kept by every firm.

Level of cash holding

The level of cash holding of a firm depends upon a number of factors. Prominent among these factors are the nature of the firms' business, the extent and reach of the business. The level of cash is measured as a percentage of turnover of the firm.

1. Nature of the business

If the firm is engaged in cash purchase of raw material from a number of sources, its requirement of cash would be more than that a firm which buys on credit. Also a firm having cash purchase and cash sale would need to maintain more cash balance than a firm which buys on credit and sells on credit. A firm buying in cash and

selling on credit is likely to have strained cash flows. On the other hand, a firm buying on credit and selling in cash has comfortable cash balances.

2. Extent and reach of the business

A multi location firm having a number of large and small branches has more cash requirement than a single location firm. Also the problems associated with moving cash between the branches and maintaining liquidity are much more in a multi location firm.

For illustration, let us assume the amount of cash and bank balances maintained by the firm:

(₹ in crores)

	Firm A		Firm B		Firm C	
	2016	**2017**	**2016**	**2017**	**2016**	**2017**
Income	3,031.76	3,322.44	10,948.86	11,353.68	1,381.91	1,882.61
Cash and Bank Balances	27.95	27.49	522.08	913.16	315.21	1,089.34
Cash balance as Percentage of Income	0.92	.082	4.77	8.04	22.81	57.86

Firm A is a large cement manufacturer, Firm B is a FMCG giant and Firm C is a leading software company. Out of the above three Firms, Firm A has been holding the minimum quantum of cash and bank balances as percentage of total income while Firm C has the maximum quantum. On the face of it, the first impression that one is likely to get is that Firm A is the most efficient user of cash and bank balances while Firm C is the most inefficient user. But that would be a hasty conclusion. We have to move further and probe into the status of cash and bank balances *vis-à-vis* other current assets:

Current Assets incl. Loans and Advances	Firm A		Firm B		Firm C	
	2016	**2017**	**2016**	**2017**	**2016**	**2017**
Inventories	312.60	30.12	1182.10	1240.03	0	0
Sundry Debtors	247.63	216.50	264.51	424.78	375.22	395.61
Cash and Bank Balances	27.95	27.49	522.08	913.16	151.74	1098.34
Other Current Assets	12.81	6.02	48.53	50.61	0	0
Loans and Advances	306.29	351.42	744.09	798.19	147.68	129.26
Total Current Assets	907.48	901.55	2761.31	3426.77	674.64	1623.1
Cash & Bank Balance as % of Total current Assets	3.08	3.05	18.90	26.65	22.49	67.66

From the above table, we may note that Firm A holds just around 3% of its current assets as cash balances, i.e. its operating cycle has an extended and large span requiring conversion into Loans and Advances, Inventories, Sundry Debtors before re-conversion into cash. Firm B is engaged in manufacture and trading of consumer non-durables having a relatively shorter operating cycle. As such, holding of cash by this firm as a percentage of total current assets is larger. Firm C has 22.49% of the current assets in cash and bank balances in 2016 while the figure has gone up to 67.66% in 2017. The abnormal rise is due to the fact that out of the cash and bank balances of ₹ 1098.34 lacs represented unutilised proceeds of the capital issue made by the firm. Ignoring this figure, the cash and bank balances are ₹ 666.84 lacs, still 56.43% of the current assets. The implication of this is that the firm C, being in the services sector as a software exports, has a short operating cycle. The inventory

holding is nil and current assets and generally held either as cash or receivables. So, the level of cash and bank balances viewed *per se*, is no indicator of the efficiency of cash management. We have to analyse the various components of cash holding to arrive at a more accurate conclusion.

Components of cash and bank balances

Cash and bank balances are held by the firms in three major forms, i.e. cash and cheques in hand, balances with banks and investment in liquid securities.

1. Cash and Cheques in hand

This is the most liquid and readily accessible component of cash. The cash is held to meet day-to-day payments of small amounts. It is generated from counter cash receipts of the firm, if any, and from cash withdrawals from the bank. The volume of cash in hand maintained by the firm again depends upon the nature of operations of the firm. In case of major portion of the sales being in cash, firm is left with large amounts of cash at the end of the day which needs to be taken care of safely. This entails security and custody arrangements for the cash before it is deposited in the bank. Moreover, since receipt and payment of cash is a primary level transaction which is culminated with the handing over of the cash, special care is required while handling cash.

Cheques in hand are clubbed with cash in a categorization because a cheque is a secondary form of cash and is equivalent to holding cash. The care and precaution required for holding cheques is much less than required for cash because almost all the cheques are "account payee cheques" which can be credited to the account of the firm only. The cheques in hand need to be deposited carefully and expeditiously into the bank in order to get credit to the correct account well in time. Attention also needs to be paid to those cheques which are dishonoured at the time of presentation to the payee banks since the drawer of the cheques has to be contacted for obtaining rectified cheques.

2. Bank Balances

Bank balances represent the amount held with banks in savings, current or deposit accounts. In the case of firms, balances are not held in savings accounts. A firm has at least one main current account with a bank through which the transactions are carried out. All the excess cash is deposited into this account together with the cheques. Payments to employees, creditors and suppliers are made by way of cheques drawn on this account. Being a current account, no interest is payable to the firm on the balance maintained in this account. Therefore, the firm seeks to keep just sufficient balance in the current account for meeting immediate payment liabilities. After accounting for these liabilities, the surplus is transferred either to an interest bearing deposit account or invested in short term liquid instruments. In case the firm has borrowed funds for working capital, the surplus cash and cheques are credited to those accounts, thereby reducing the liability of the company.

William J. Baumal Model for Optimal Cash Balance Management

Cash management model of William J. Baumal assumes that the concerned company keeps all its cash on interest yielding deposits from which it withdraws as and when required. It also assumes that cash usage is linear over time. The amount of money is withdrawn from deposits in such a way that the cost of withdrawal is optimally balanced with those of interest foregone by holding cash. The model is almost same as economic stock order quantity model.

Formula Economic lot size $= \sqrt{\dfrac{2 \times Tb}{I}}$

Where T= Projected cash requirement

b= Conversion cost per lot

I= Interest earned on marketable securities per annum.

Strategy for effective cash management

The strategy for effective cash management in any firm has a core component of ensuring uninterrupted supply of cash to the operating cycle. This cash is ideally generated from the cycle itself but under certain circumstances infusion of cash from outside the cycle also takes place. Examples of such circumstances are:

(a) when the firm has been newly set up and the cycle has yet to commence;

(b) when due to disruption in the cycle, cash gets stuck in other current assets and outside cash infusion in the form of promoters lenders' contribution is done.

Essential elements of a successful cash management strategy are:-

– Realistic cash forecasting

– Speeding up collections

– Spreading out payments

(1) Realistic cash forecasting

By realistic cash forecasting we mean that a cash forecast for the entire next year should be prepared at its commencement. The cash forecast has two parts—one is the forecast of cash flows from the operating cycle and the second part is the capital flows. The first part originates from the sales forecast for the year while the second part originates from the capital budget. The surplus of cash generated from the operating cycle in called the internal accruals of the firm and it is used to fund the capital outlays together with bank borrowings.

For a realistic cash forecast, the sales projections and capital budget have to be drawn up after extensive deliberations in the management committee of the firm. Such a forecast carries a cushion for normal contingences like sudden spurt or shrinkage in demand for which mid-term modifications in the forecast are made. Involvement of operational level people, both from production and sales areas, is essential for a realistic cash forecast.

(2) Speeding up Collections

After the cash forecast has been prepared, the firm should ensure that in day to day operations cash (including cheques) should be collected speedily. Towards this end, a schedule of receivables should be prepared and kept updated. Before due date of each payment, the debtor should be reminded for it. When the cheques are received on due dates, these should be credited to the bank account expeditiously. For a multi-locational firm, arrangements should be made with the bank for on-line transfer of funds to the main account. Similarly, facilities like drop boxes can be provided by firms having a large user base whereby customers can drop their payments in boxes placed at vantage locations.

(3) Spreading out Payments

Simultaneously with speeding up collection, the firm should spread out payments as far as possible. It means that if credit period is available in some payments, it should be utilized fully. Bunching of payments should be avoided. For outstation customers, arrangement can be made with the bank for making at par payment.

Example No.7

The annual cash requirement of A Ltd. is ₹ 10 Lakhs. The company has marketable securities in lot sizes of ₹ 50,000, ₹ 1,00,000, ₹ 2,00,000, ₹ 2,50,000 and ₹ 5,00,000. Cost of conversion of marketable securities per lot is ₹ 1,000. The company can earn 5% annual yield on its securities.

You are required to prepare a table indicating which lot size will have to be sold by the company.

Also show that the economic lot size can be obtained by the Baumal Model.

Solution

Table indicating lot size of securities

Total annual cash requirements =T= ₹ 10,00,000

Lot Size (₹) =C	50,000	1,00,000	2,00,000	2,50,000	5,00,000
Number of Lots (T/C)	20	10	5	4	2
Conversion Cost (₹)=(T/C) b Where b = cost of conversion per lot.	20,000	10,000	5,000	4,000	2,000
Interest charges ₹ =(C/2)I	1,250	2,500	5,000	6,250	12,500
Total Cost ₹ =	21,250	12,500	10,000	10,250	14,500

Economic lot size is ₹ 2,00,000 at which total costs are minimum.

Optimal Cash Balance Management Model of William J. Baumal assumes that the concerned company keeps all its cash on interest yielding deposits form which it withdraws as and when required. It also assumes that cash usage is linear over time. The amount of money is withdrawn from deposits in such a way that the cost of withdrawal are optimally balanced with those of interest foregone by holding cash. The model is almost same as economic stock order quantity model.

Formula Economic lot size = $\sqrt{\dfrac{2 \times Tb}{I}}$

Where T= Projected cash requirement   = ₹ 10,00,000

b= Conversion cost per lot   = ₹ 1000

I= Interest earned on marketable securities per annum.   = 5%

By substituting the figures in the formula

Economic lot size   = $\sqrt{\dfrac{2 \times 10,00,000 \times 1000}{0.05}}$

= ₹ 2,00,000

INVENTORY MANAGEMENT

Inventory Management is the second important segment of working capital management Inventory is the second step in the operating cycle wherein cash in converted into various items of the inventory. Inventory has the following major components:

(a) Raw Material

(b) Work in Process

(c) Finished Goods.

Inventories form a link between production and sale of a product. A manufacturing company must maintain a certain amount of inventory during production, the inventory known as work in process (WIP). Although other types of inventory – namely, raw materials and finished goods – are not necessary in the strictest sense, they allow the company to be flexible. Raw materials inventory gives the firm flexibility in its purchasing. Finished goods inventory allows the firm flexibility in its production scheduling and in its marketing. Production does not

need to be geared directly to sales. Large inventories also allow efficient servicing of customer demands. If a product is temporarily out of stock, present as well as future sales may be lost. Thus, there is an incentive to maintain large stocks of all three types of inventory.

Benefits versus Costs

The advantages of increased inventories are several. The firm can effect economies of production and purchasing and can fill orders more quickly. In short, the firm is more flexible. The obvious disadvantages are the total cost of holding the inventory, including storage and handling costs, and the required return on capital tied up in inventory. An additional disadvantage is the danger of obsolescence. Because of the benefits, however, the sales manager and production manager are biased toward relatively large inventories. Moreover, the purchasing manager often can achieve quantity discounts with large orders, and there may be a bias here as well. It falls on the financial manager to dampen the temptation for large inventories. This is done by forcing consideration of the cost of funds necessary to carry inventories as well as perhaps the handling and storage costs.

Inventories should be increased as long as the resulting savings exceed the total cost of estimates of holding the added inventory. The balance finally reached depends on the estimates of actual savings, the cost of carrying additional inventory, and the efficiency of inventory control. Obviously, this balance requires coordination of the production, marketing, and finance areas of the firm in keeping with an overall objective. Our purpose is to examine various principles of inventory control by which an appropriate balance might be achieved.

Extent and Quantum of Inventory Management

Let us take a look at the extent and quantum of inventory in real life examples taken up for consideration by us for working capital management.

(₹ in crores)

	Firm A		Firm B		Firm C	
	2016	**2017**	**2016**	**2017**	**2016**	**2017**
Total Current Assets	**907.47**	**955.73**	**2,761.30**	**3610.78**	**674.64**	**1,623.21**
Inventories	312.8	300.12	1182.10	1424.04	0	0
Sundry Debtors	247.63	216.50	264.51	424.78	375.22	395.61
Cash and Bank Balance	27.95	27.49	522.08	913.16	151.75	1,098.34
Other Current Assets	12.51	60.2	48.53	50.61	0	0
Loans and advances	306.29	351.42	744.08	798.19	147.68	129.26
Inventory as % of Total current assets	34.48	31.40	42.80	39.43	0	0

Firm A, being in the current manufacturing sector has over 30% of the current assets held in the form of inventories, while firm B, being in the FMCG manufacturing and trading sector has over 35% of the current assets in the inventory form. Firm C, in the software export segment has obviously zero inventory holding.

Strategy for Inventory Management

A successful strategy for inventory management has at its core the objective of holding the optimum level of inventory at the lowest cost.

The cost of holding inventory has the following three elements:

(i) Carrying Cost

This is the cost of keeping or maintaining the inventory in a usable condition. This includes the storage costs, i.e. the cost of storing the inventory in rented premises or the opportunity cost of storing in own premises + the wage cost of personnel assigned to storing and securing it + cost of utilities and insurance + cost of financing.

Inventory carrying cost is directly proportional to the level of inventory assuming that the loading of carrying cost is done pro rata to the space occupied. Thus if inventory level rises, its carrying cost also rises.

(ii) Ordering Cost

It is the cost associated with placing each individual order for supply of raw materials, stores, packing materials etc. If these items are procured in small lots, then the ordering cost per unit of inventory would be more and vice versa.

(iii) Stock-out Cost

It is the cost associated with procuring an inventory item, which has gone out of stock and is needed for immediate supply. This cost includes the reduction of profit and costs accruing due to disruption in the operating cycle.

How cost of inventory can be lowered:

Cost of inventory can be lowered by–

– Entering into long term arrangements for supply of raw materials at market driven prices.

– Arranging for direct supply of raw material at manufacturing locations.

– Promoting ex-factory sales of the finished goods.

– Availing quantity discounts and spot payment discounts if the carrying cost and financing cost is less than the discounts.

– Apart from these general steps, a technique called ABC analysis is also used for monitoring inventory costs.

Managing the Inventory Level

1. Economic Order Quantity (EOQ) Model

Inventory level can be managed by adopting the Economic Order Quantity (EOQ) model. This model determines the order size that will minimize the total inventory cost. According to this model, three parameters are fixed for each item of the inventory:

(1) Minimum level of that inventory to be kept after accounting for usage rate of that item and time lag in procuring that item and contingences.

(2) The level at which next order for the item must be placed to avoid possibility of a stock-out.

(3) The quantity of the item for which the re-order must be placed.

In addition to the determination of above parameters, the EOQ model is based on the following assumptions:

– The total usage of that particular item for a given period is known with certainty and the usage rate is even throughout the period.

– There is no time gap between placing an order and receiving supply.

– The cost per order of an item is constant and the cost of carrying inventory is also fixed and is given as a percentage of the average value of inventory.

– There are only two costs associated with the inventory and these are the cost of ordering and the cost of carrying the inventory.

Given the above assumptions, the optimum or economic order quantity is represented as:

$$EOQ = \sqrt{\frac{2AO}{C}}$$

Where A = Total annual requirement for the item

O = Ordering cost per order of that item

C = Carrying cost per unit per annum.

2. ABC Analysis

This system is based on the assumption that in view of the scarcity of managerial time and efforts, more attention should be paid to those items which account for a larger chunk of the value of consumption rather than the quantity of consumption. Let us take an example of a firm having three major components of raw material:

Component	Units Consumed	% to total	Value per unit	Total Value (Lacs)	%
A	5000	45.45	1000	50.00	22.93
B	4000	36.36	1200	48.00	22.00
C	2000	18.18	6000	120.00	55.05
	11000	100.00	218.00	100.00	

Thus, the cost of raw material C which accounts for 55% of the total consumption value should be given priority over item A although the number of units consumed of the latter is much more than former.

Example No.8

(a) The following details are available in respect of a firm:

(i) Annual requirement of inventory   40,000 units

(ii) Cost per unit (other than carrying and ordering cost)   ₹ 16

(iii) Carrying cost are likely to be   15% per year

(iv) Cost of placing order   ₹ 480 per order.

Determine the economic ordering quantity.

(b) The experience of the firm being out of stock is summarised below:

(1)   *Stock out (No. of units)*   *No. of times (% Probability)*

500   1   (1)

400   2   (2)

250   3   (3)

100   4   (4)

50   10   (10)

0   80   (80)

Figures in brackets indicate percentage of time the firm has been out of stock.

(2) Stock out costs are ₹ 40 per unit.

(3) Carrying cost of inventory per unit is ₹ 20

Determine the optimal level of stock out inventory.

(c) A firm has 5 different levels in its inventory. The relevant details are given. Suggest a breakdown of the items into A, B and C classifications:

Item No.	Avg. No. of units inventory	Avg. Cost per unit
1	20,000	₹ 60
2	10,000	₹ 100
3	32,000	₹ 11
4	28,000	₹ 10
5	60,000	₹ 3.40

Solution

(a) Carrying cost per unit per annum

= cost per unit x carrying cost % p.a.

= ₹ 16 x 0.15 = ₹ 2.40

Now from the formula for Economic Order Quantity (EOQ)

$$= \sqrt{\frac{2 \times \text{total consumption p.a.} \times \text{ordering cost per order}}{\text{Carrying cost per unit}}}$$

$$= \sqrt{\frac{2 \times 40{,}000 \times 480}{2.40}} = 4000 \, \text{units}$$

Alternative working:

Ordering size (units)	1,000	2,000	2,500	4,000	5,000	8,000	10,000
No. of orders required	40	20	16	10	8	5	4
Average inventory (units)	500	1,000	1,250	2,000	2,500	4,000	5,000
Total carrying cost of Average inventory in ₹	1,200	2,400	3,000	4,800	6,000	9,600	12,000
Total ordering cost = No. of orders x Cost of placing each order	19,200	9,600	7,680	4,800	3,840	2,400	1,920
Total cost in ₹	20,400	12,000	10,680	9,600	9,840	12,000	13,920

Hence, least cost of ₹ 9,600 is at the ordering size of 4,000 units.

(b)

Safety stock level (units) (1)	Stock out (units) (2)	Stock out cost @ ₹ 40 per unit ₹ (3)	Probability of stock out (4)	Expected stock out at this level (5)	Total expected stock out cost (6)
500	0	0	0	0	0
400	100	4000	0.01	40	40
250	250	10,000	0.01	100	
	150	6000	0.02	120	260
100	400	16,000	0.01	160	
	300	12,000	0.02	240	
	150	6,000	0.03	180	840
50	450	18,000	0.01	180	
	350	14,000	0.02	280	
	200	8,000	0.03	240	
	50	2,000	0.04	80	1,620
0	500	20,000	0.01	200	
	400	16,000	0.02	320	
	250	10,000	0.03	300	
	100	4,000	0.04	160	
	50	2,000	0.10	200	2,800

Safety stock level (units)	Expected stock out costs	Carrying ₹ cost at ₹ 20 per unit	Total safety stock cost
0	2,800	0	2,800
50	1,620	1,000	2,620
100	840	2,000	2,840
250	260	5,000	5,260
400	40	8,000	8,040
500	0	10,000	10,000

Optimum safety stock where the total cost is the least is at 50 units level.

(c)

Item No.	Units	% of total Units	Unit cost₹	Total cost₹	% of total cost
1	20,000	13.3	60.00	12,00,000	39.5]
2	10,000	6.7	100.00	10,00,000	32.9] A
3	32,000	21.3	11.00	3,52,000	11.6]

4	28,000	18.7	10.00	2,80,000	9.2]	B
5	60,000	40.0	3.40	2,04,000	6.8]	C
	1,50,000	100.0		30,36,000	100.0	

Item Nos. I and II being very valuable are to be controlled first though in quantity are hardly 20% of the total, hence can be classified as A. Next priority is for items 3 and 4, though quantity wise 40% to be classified as B and last priority item 5 though in quantity bulk but value is less hence to be classified as C.

Example No.9

A publishing house purchases 72,000 rims of a special type paper per annum at cost ₹ 90 per rim. Ordering cost per order is ₹ 500 and the carrying cost is 5 per cent per year of the inventory cost. Normal lead time is 20 days and safety stock is NIL. Assume 300 working days in a year:

You are required:

  (i) Calculate the Economic Order Quantity (E.O.Q).

  (ii) Calculate the Reorder Inventory Level.

  (iii) If a 1 per cent quantity discount is offered by the supplier for purchases in lots of 18,000 rims or more, should the publishing house accept the proposal?

Solution

(i) $\text{EOQ} = \sqrt{\dfrac{2\,\text{AO}}{\text{C}}}$

Where,

A   = Annual consumption

O   = Ordering cost per order

C   = Stock carrying cost per unit per annum

$$= \sqrt{\dfrac{2 \times 72{,}000 \times 500}{5\% \text{ of Rs. } 90}}$$

$$= \sqrt{1{,}60{,}00{,}000}$$

= 4,000 Rims.

(ii) Re-order Level = Normal Lead Time ´ Normal Usage

= 20 x 240

= 4,800 Rims.

Note:

$$\text{Normal Usage} = \dfrac{\text{Annual usage}}{\text{Normal working days in a year}}$$

$$= \dfrac{72{,}000}{300} = 240 \text{ Rims.}$$

(iii) Evaluation of Quantity Discount Offer:

	EOQ	Discount Offer
Size of order	4,000 Rims	18,000 Rims
No. of orders in a year	18	4
Average inventory $\left(\dfrac{\text{Order size}}{2}\right)$	2,000 Rims	9,000 Rims
Cost:	₹	₹
Ordering Cost @ ₹ 500 per order	9,000	2,000
Inventory carrying cost		
At EOQ – (4,000/2) x ₹ 4.5	9,000	-
At Discount offer – (18,000/2) x ₹ 4.455	-	40,095
Purchases Cost		
At EOQ – 72,000 x ₹ 90	64,80,000	-
At discount offer – 72,000 x ₹ 89.10		64,15,200
Total Cost	**64,98,000**	**64,57,295**

The total cost is less in case of quantity discount offer. Hence, quantity discount offer should be accepted.

RECEIVABLES MANAGEMENT

Receivables are near the terminating point of the operating cycle. When raw material has been converted into finished goods, the final product is sold by the firm. Some of the sales are done on spot basis while the remaining sales are made on credit. The extent of credit sales varies from industry to industry and within an industry. Period of credit depends upon the position of the firm in the industry. If the firm has a monopoly position, period of credit would be very low. If the industry consists of a large number of players in keen competition with each other, the period of credit would tend to be fairly long. Also, during periods of demand recession, even a firm in monopoly situation might be forced to extend credit in order to promote sales.

Receivables are generally referred to by the name of "Sundry Debtors" in the books of account, Strictly speaking, Sundry Debtors refer to receivables created in the course of operation of the working capital cycle, i.e. those persons which owe payment to the firm for goods supplied or services rendered. Thus sundry debtors represent an intermediate stage between reconversion of finished goods into cash. So long as the sundry debtors persist, the firm is strained of cash. So, logically the firm seeks to minimize the level of sundry debtors.

The period of credit allowed to debtors also depends upon the industry practice. This period of credit has two components. First component is a small period of week to ten days which is normally allowed in all industries and no interest is charged on the amount due. The second component is the larger one, length of which varies from industry to industry and interest is usually charged for this period. In the alternative, the firm may charge full invoice value for payment made after the credit period and allow discount for spot payments.

Apart from the Sundry Debtors, cash flow of the firm is also affected by Loans and Advances made to suppliers, subsidiaries and others. These advances are not exactly working capital advances but nevertheless these are treated as current assets because these are assumed to be recoverable or converted into inventory, fixed assets or investments within one year.

Credit policy can have a significant influence on sales. In theory, the firm should lower its quality standard for accounts accepted as long as the profitability of sales generated exceeds the added costs of the receivables. What are the costs of relaxing credit standards? Some arise from an enlarged credit department, the clerical

work of checking additional accounts, and servicing the added volume of receivables. We assume for now that these costs are deducted from the profitability of additional sales to give a net profitability figure for computational purpose. An other cost comes from the increased probability of bad-debt losses.

Illustration

To assess the profitability of a more liberal extension of credit, we must know the profitability of additional sales, the added demand for products arising from the relaxed credit standards, the increased slowness of the average collection period, and the required return on investment. Suppose a firm's product sells for ₹ 10 a unit, of which ₹8 represents variable costs before taxes, including credit department costs. The firm is operating at less than full capacity, and an increase in sales can be accommodated without any increase in fixed costs. Therefore, the contribution margin of an additional unit of sales is the selling price less variable costs involved in producing the unit, or ₹10 – ₹8 = ₹2.

At present, annual credit sales are running at a level of ₹2.4 million, and there is no underlying trend in such sales. The firm may liberalize credit, which will result in an average collection experience of new customers of 2 months. Existing customers are not expected to alter their payment habits and continue to pay in 1 month. The relaxation in credit standards is expected to produce a 25 percent increase in sales, to ₹3 million annually. This ₹6,00,000 increase represents 60,000 additional units if we assume that the price per unit stays the same. Finally, assume that the opportunity cost of carrying additional receivables is 20 percent before taxes.

This information reduces our evaluation to a trade-off between the added profitability on the additional sales and the opportunity cost of the increased investment in receivables. The increased investment arises solely from new, slower paying customers; we have assumed existing customers continue to pay in 1 month. With the additional sales of ₹6,00,000 and receivable turnover of 6 times a year (12 months divided by the average collection period of 2 months), the additional receivable are ₹ 6,00,000 / 6 = ₹ 1,00,000. For these additional receivables, the firm invests the variable costs tied up in them. For our example, ₹ .80 of every Re.1.00 in sales represents variable costs. Therefore, the added investment in receivables is .80 x ₹1,00,000 = ₹80,000. In as much as the profitability on additional sales, ₹1,20,000, far exceeds the required return on the additional investment in receivables, ₹16,000, the firm would be well advised to relax its credit standards. An optimal credit policy would involve extending trade credit more liberally until the marginal profitability on additional sales equals the required return on the additional investment in receivables.

Now, we shall revert back to our sample firms and examine the level of Sundry Debtors and loans and Advances *vis-a-vis* the level of operations.

How do firms ensure realisations?

Timely realisation of receivables is an important element of working capital management. Practices in this respect vary from firm to firm. Most of the firms dissuade credit sales to first time customers and gradually allow credit after development of relationship. While giving credit, some firms obtain post dated cheques from their clients. In other cases, firms have special staff earmarked for recovery efforts. The key elements here are the opportunity cost of funds blocked in receivables and the net expenses of maintaining recovery infrastructure. Expenses of maintaining recovery infrastructure include the costs associated with recovering the amount from debtors. If the funds realised from receivables can yield better return than the interest recovered from debtors, then the firm would be better off by promoting cash sales.

Desirable Level of receivables

Considering the under given situation, let us find out whether there is a desirable level of receivables for a firm in relation to its turnover:

₹ in crores

		A		B		C	
		2016	**2017**	**2016**	**2017**	**2016**	**2017**
1	Sundry Debtors	247.63	216.50	264.51	424.78	470.76	464.10
2	Loans and Advances	306.29	351.42	744.09	798.19	136.91	104.73
3	Sales/Services	3,031.76	3,322.44	10,603.79	10,971.90	1,381.91	1,882.61
4	(1) as % of (3)	8.17	6.52	2.49	3.87	34.08	24.65
5	(2) as % of (3)	10.10	10.57	7.02	7.27	9.91	5.56

Obviously firm B has adopted a tight and conservative policy towards debtors. It is recovering its receivables quickly. Similarly the outgo on loans and advances is not disproportionate as compared to sales. One reason for this is that the firm B has undertaken a qualitative analysis of loans and advances and has treated some of these as doubtful. Such doubtful advances, including loans and advances to subsidiary companies have been charged to the Profit and Loss Account as part of prudent accounting practice. Similar treatment has been accorded to sundry debtors as well.

In the case of firm C, the sundry debtors are a fairly high percentage of total sales and rightly so, because the firm has no inventory and most of the working capital is locked in receivables only. The loans and advances are, however at around 6-10% of sales.

It is difficult to prescribe a reasonable level for loans and advances for any firm because of the percentage of sundry debtors to sales varies widely among these firms. In case of firm A sundry debtors are between 6 to 8% of sales while loans and advances are around 10% of sales. The loans and advances consist of various types of deposits, pre payments and advances etc. Not all loans and advances are meant to be converted into cash. That is why loans and advances, although considered as current assets, are not treated part of the working capital. In fact some of the advances get converted into either capital expenditure or investments. For example advances for supply of capital goods would ultimately get shaped into fixed assets. Advances towards share application money or as loans to subsidiary are converted into investments. Similarly, pre-paid taxes & duties are ultimately treated as expenses. In the case of firm B, the sundry debtors are just around 3-4% of sales while loans and advances are around 7% of sales.

If a firm is buying raw material or traded goods on credit, then ideally the level of such creditors should be more than the level of debtors at any point of time. Benchmarking of the receivable level can also be done against historical industry trends. To guard against the receivables rising beyond tolerable levels, firms usually treat all advances and debts over six months old as doubtful cases and, if needed, charge such amounts to the profit and loss account.

FACTORS DETERMINING CREDIT POLICY

The credit policy is an important factor determining both the quantity and the quality of accounts receivables. Various factors determine the size of the investment a company makes in accounts receivables. They are, for instance:

   (i) The effect of credit on the volume of sales;

  (ii) Credit terms;

 (iii) Cash discount;

 (iv) Policies and practices of the firm for selecting credit customers;

   (v) Paying practices and habits of the customers;

   (vi) The firm's policy and practice of collection; and

   (vii) The degree of operating efficiency in the billing, record keeping and adjustment function, other costs such as interest, collection costs and bad debts etc., would also have an impact on the size of the investment in receivables.

The rising trend in these costs would depress the size of investment in receivables. The firm may follow a lenient or a stringent credit policy. The firm which follows a lenient credit policy sells on credit to customers on very liberal terms and standards. On the contrary a firm following a stringent credit policy sells on credit on a highly selective basis only to those customers who have proper credit worthiness and who are financially sound. Any increase in accounts receivables that is, additional extension of trade credit not only results in higher sales but also requires additional financing to support the increased investment in accounts receivables. The costs of credit investigations and collection efforts and the chances of bad debts are also increased.

EVALUATION OF CREDIT POLICIES (FORMAT)

	Existing Policy	Option I	Option 2	Option 3
A. Expected Profit:				
(a) Credit Sales	xxxx	xxxx	xxxx	xxxx
(b) Total Cost other than Bad Debts				
(i) Variable Costs	xxx	xxx	xxx	xxx
(ii) Fixed Costs	xxx	xxx	xxx	xxx
(c) Bad Debts	xxx	xxx	xxx	xxx
(d) Cash discount	xxx	xxx	xxx	xxx
(e) Expected Net Profit before Tax (a-b-c-d)	xxx	xxx	xxx	xxx
(f) Less: Tax	xxx	xxx	xxx	xxx
(g) Expected Profit after Tax	Xxx	xxx	xxx	xxx
B. Opportunity Cost of Investments in Receivables locked up in Collection Period	Xxx	xxx	xxx	xxx
Net Benefits (A – B)	xxx	xxx	xxx	xxx

Here

   (i) Total Fixed Cost = [Average Cost per unit – Variable Cost per unit] x No. of units sold on credit under Present Policy

   (ii) Opportunity Cost = Total Cost of Credit Sales $\times \dfrac{\text{Collection period (Days)}}{365 \text{ (or 360)}} \times \dfrac{\text{Required Rate of Return}}{100}$

Example No. 9

Ash Ltd. follows collection policy as detailed below :

   (i) 10% of the sales is collected in the same month

   (ii) 20% of the sales is collected in the 2nd month

   (iii) 40% of the sales is collected in the 3rd month

   (iv) 30% of the sales is collected in the 4th month.

Sales of the company for the first three quarters of the year are as follows :

Month of the Quarter	Quarter-I	Quarter-II	Quarter-III
1	15,000	7,500	22,500
2	15,000	15,000	15,000
3	15,000	22,500	7,500
Total	45,000	45,000	45,000
No. of working days	90	90	90

You are required to work out average age of receivables.

Solution: Calculation of Receivable at the end of 3rd month of quarter

Out of sale of Month		*1*		*2*		*3*	Balance at the end
1	100 –	(10%	+	20%	+	40%)	30%
2	100 –			(10%	+	20%)	70%
3	100 –					(10%)	90%

Rocoverable at the end of Q-I

Month	Amount Recoverable	Recovered	Balance	Balance Amount
1	15,000	70%	30%	4,500
2	15,000	30%	70%	10,500
3	15,000	10%	90%	13,500
	45,000			28,500

Average age of receivables = 28500/45000*90 = 57 days

Rocoverables at the end of Q-II

Month	Amount Recoverable	Recovered	Balance	Balance Amount
1	7,500	70%	30%	2,250
2	15,000	30%	70%	10,500
3	22,500	10%	90%	20,250
	45,000			33,000

Average age of receivables = 33000/45000*90 = 66 days

Recoverables at the end of Q-III

Month	Amount Recoverable	Recovered	Balance	Balance Amount
1	22,500	70%	30%	6,750
2	15,000	30%	70%	10,500
3	7,500	10%	90%	6,750
	45,000			24,000

Average age of receivables = 24,000/45,000*90 = 48 days

Recovery speed is lowest in Q-II

Example No.10

XYZ Co. Ltd, manufacturer of electronic gadgets, has an annual sales of ₹ 50 lakh. It offers 30 days credit on sales. The fixed costs are ₹ 5 lakh and the variable costs are 80% of the sales.

The company is considering a change in its credit policy. Based upon its knowledge of market response, it has estimated likely sales figure against each of the proposed collection period as follows:

Policy	Collection period (days)	Projected sales (₹ lakhs)
A	45	56
B	60	60
C	75	62
D	90	63

If the expected rate of return is 20%, which policy should be adopted and why?

Solution:

Evaluation of credit policy   (₹ lakhs)

	Current policy	Policy A	Policy B	Policy C	Policy D
Credit period (days)	30	45	60	75	90
Projected sales	50	56	60	62	63
Less: variable cost @ 80%	40	44.8	48	49.6	50.4
Contribution	10	11.2	12	12.4	12.6
Less: Fixed cost	5	5	5	5	5
Net profit	5	6.2	7	7.4	7.6
Cost of sales (Variable cost + Fixed cost)	45	49.8	53	54.6	55.4
Investment in debtorsCost of sales × credit period/360 days	3.75	6.225	8.833	11.375	13.85
Net profit	5	6.2	7	7.4	7.6
Less: cost of funds in debtors balances @ 20%	0.75	1.245	1.767	2.275	2.77
Net return	4.25	4.955	5.233	5.125	4.83

Analysis: Since the net return is highest for credit policy B, it is suggested to extend the credit policy upto 60 days, to maximize the company's profitability.

Control of Bad debts

Control of bad-debts is an important part of controlling the working capital or the current assets of the company. Credit policy should be followed which may not lead to bad-debts and expedite collections. Periodical checks should be maintained by classifying debtors as outstandings from 0-30 days, 30-60 days, 60-90 days and 90 and over. Amount due for 60 days or more should be followed seriously and collected.

FACTORING SERVICES

As the accounts receivable amount to the blocking of the firm's funds, the need for an outlet to impart these liquidity is obvious. Other than the lag between the date of sale and the date of receipt of dues, collection of receivables involves a cost of inconvenience associated with tapping every individual debtor. Thus, if the firm could contract out the collection of accounts receivable it would be saved from many things such as administration of sales ledger, collection of debt and the management of associated risk of bad-debts etc.

Factoring is a type of financial service which involves an outright sale of the receivables of a firm to a financial institution called the factor which specialises in the management of trade credit. Under a typical factoring arrangement, a factor collects the accounts on the due dates, effects payments to the firm on these dates (irrespective of whether the customers have paid or not) and also assumes the credit risks associated with the collection of the accounts. As such factoring is nothing but a substitute for in-house management of receivables. A factor not only enables a firm to get rid of the work involved in handling the credit and collection of receivables, but also in placing its sales *in effect* on cash basis.

Definition and functions – Factoring Services

"Factoring may be defined as a relationship between the financial institution or banker ('factor') and a business concern (the 'supplier') selling goods or providing services to trade customers (the customer) whereby the factor purchases book debts with or without recourse ('with a recourse' means that in the event of bad debts factor can approach the 'supplier') to the supplier and in relationship thereto controls the credit extended to the customers and administers the sales ledger of the supplier."

Though the purchase of book debts is fundamental to the functioning of factoring, there are a number of functions associated with this unique financial services. A proper appreciation of these functions would enable one to distinguish it from the other sources of finance against receivables. They are:

– assumption of credit and collection function;

– credit protection;

– encashing of receivables;

– collateral functions such as:

(a) loans on inventory,

(b) loans on fixed assets, other security and on open credit,

(c) advisory services to clients.

Factoring vs. Accounts Receivable Loans

Accounts receivable loan is simply a loan secured by a firm's accounts receivable by way of hypothecation or assignment of such receivables with the power to collect the debts under a power of attorney. In case of factoring

however, there is an outright sale of receivables. Thus, in case of the former, the bank may debit client's account for 'handling charges' if the debt turns out to be bad as against non-recourse factoring.

Factoring vs. Bill Discounting

Under a bill discounting arrangement, the drawer undertakes the responsibility of collecting the bills and remitting the proceeds to the financing agency, whereas under factoring agreement, the factor collects client's bills. Moreover, bill discounting is always with recourse whereas factoring can be either with recourse or without recourse. The finance house discounting bills does not offer any non-financial services unlike a factor which finances and manages the receivables of a client.

Mechanics of Factoring

Factoring offers a very flexible mode of cash generation against receivables. Once a line of credit is established, availability of cash is directly geared to sales so that as sales increase so does the availability of finance. The dynamics of factoring comprises of the sequence of events outlined in figure.

(1) Seller (client) negotiates with the factor for establishing factoring relationship.

(2) Seller requests credit check on buyer (client).

(3) Factor checks credit credentials and approves buyer. For each approved buyer a credit limit and period of credit are fixed.

(4) Seller sells goods to buyer.

(5) Seller sends invoice to factor. The invoice is accounted in the buyers account in the factor's sales ledger.
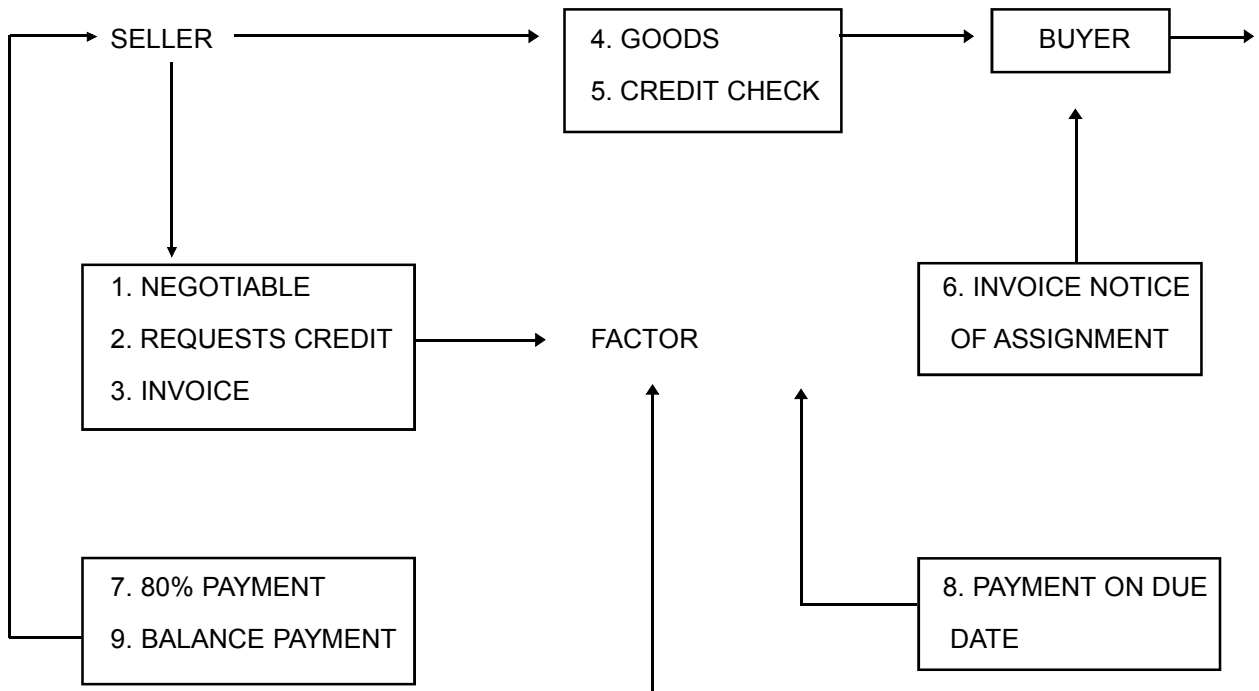
Figure: Mechanics of Factoring
Source: Ranjani Chari, 1991, Factoring in India, M.Phil, Dissertation, Delhi University.

(6) Factor sends copy of the invoice to buyer.

(7) Factor advices the amount to which seller is entitled after retaining a margin, say 20%, the residual amount paid later.

(8) On expiry of the agreed credit period, buyer makes payment of invoice to the factor.

(9) Factor pays the residual amount to seller.

Types of Factoring: Factoring services may be rendered to cover domestic as well as international sales. The various services offered by factors for domestic sales are of six types whose essential characteristics are outlined in Table 1.

Table 1 : Types of Factoring Services

Type of Factoring	Type of Functions					
	Avail-ability of Finance bad debts	Pro-tection* against	Credit Advice	Sales Ledger Adminis-tration	Collec-tion	Disclo-sure Custo-mers
Full Source(Non-Recourse)	Yes	Yes	Yes	Yes	Yes	Yes
Recourse Factoring	Yes	¾	Yes	Yes	Yes	Yes
Agency Factoring	Yes	Possible	¾	No	No	Yes
Bulk Factoring	Yes	Possible	¾	No	No	Yes
Invoice** Discounting	Yes	Possible	No	No	No	No
Undisclosed Factoring	Yes	Possible	No	No	No	No

* Any form which includes this element may be referred to as 'non-recourse factoring'

** Also referred to as confidential or non-notification factoring.

Source: Ranjani Chari-opcit. P. 28.

Example No.11

- The turnover of Zenith Ltd. is ₹ 100 lakh of which 72% is on credit. Debtors are allowed one month to clear off the dues. A factoring company is willing to advance 80% of the bills raised on credit for a fee of 1% a month plus a commssion of 5% on the total amount of debts. Zenith Ltd. as a result of this arrangement is likely to save ₹ 48,000 annually in management costs and avoid bad debts at 1% on the credit sales.

- A bank has come forward to make an advance equal to 80% of the debts at an annual interest rate of 15%. However, its processing fee will be at 1% on the debts. Would you accept factoring or the offer from the bank?

Solution:

Cost of Factoring

Annual Credit Sales	=	100 x 72%	= ₹ 72 Lakh
Monthly Credit Sales	=	72 Lakh / 12	= ₹ 6 Lakh
Fee [6,00,000 x 0.80]	=	4,80,000	
4,80,000 x 0.01			= ₹ 4,800
Commission [600000 x 0.05]			= ₹ 30,000
			= ₹ 34,800

Less : Savings in Cost:		
Management Cost [48000/12]	₹ 4,000	
Savings in Bad Debts [₹ 600000 x 0.01]	₹ 6,000	₹ 10,000
Net Cost of Factoring [Per Month]		₹ 24,800
Cost of Bank Advance		
Interest [₹ 600000 x 0.80 x 0.15 x 1/12]		₹ 6,000
Processing Fee [₹ 600000 x 0.01]		₹ 6,000
Bad Debts [₹ 600000 x 0.01]		₹ 6000
Management Cost		₹ 4,000
Net Cost (Per Month)		₹ 22,000

Since cost of Bank Finance is les than the cost of factoring, therefore, it is advisable to accept bank offer.

OTHER TECHNIQUES FOR CONTROL OF WORKING CAPITAL

Cash forecast technique can be used for control of funds flowing in and out of business to check surpluses and shortages. Daily, weekly, monthly, cash flow statements are used to regulate flow of funds and arrange for fund shortage and invest surplus cash.

1. Fund Flow Statement

Fund flow statements are used to find changes in assets over a period of time showing uses of funds and sources of funds. Funds flow represent movement of all assets particularly of current assets because movement in fixed asserts is expected to be small except at times of expansion or diversification.

2. Forfaiting Services

Forfaiting is a form of financing of receivables pertaining to international trade. It denotes the purchase of trade bills/promissory notes by a bank/financial institution without recourse to the seller. The purchase is in the form of discounting the documents covering entire risk of non-payment in collection. All risks and collection problems are fully the responsibility of the purchaser (forfeiter) who pays cash to seller after discounting the bills/notes. The salient features of forfaiting as a form of export relating financing are as under:

(i) The exporter sells and delivers goods to the importer on deferred payment basis.

(ii) The importer draws a series of promissory notes in favour of the exporter for payment including interest charge. Alternatively the exporter draws a series of bill which are accepted by the importer.

(iii) The bills/notes are sent to the exporter. The promissory notes/bills are guaranteed by a bank which may not necessarily be the importer's bank. The guarantee by the bank is referred to as an Aval, defined as an endorsement by a bank guaranteeing payment by the importer.

(iv) The exporter enters into a forfaiting agreement with a forfeiter which is usually a reputed bank. The exporter sells the avalled notes/bills to the bank at a discount without recours and recives the payment.

(v) The forfeiter may hold these notes/bills till maturity for payment by the importers bank.

Forfaiting vs. Export Factoring

Forfaiting is similar to cross border factoring to the extent both have common features of non recourse and advance payment. But they differ in several important respects:

(a) A forfeiter discounts the entire value of the note/bill but the factor finances between 75-85% and retains a factor reserve which is paid after maturity.

(b) The avalling bank which provides an unconditional and irrevocable guarantee is a critical element in the forfaiting arrangement wheras in a facoring deal, particularly non-recourse type, the export factor bases his credit decision on the credit standards of the exporter.

(c) Forfaiting is a pure financing arrangement while factoring also includes ledger administration, collection and so on.

(d) Factoring is essentially a short term financing deal. Forfaiting finances notes/bills arising out of deferred credit transaction spread over three to five years.

(e) A factor does not guard against exchange rate fluctuations; a forfeiter charges a premium for such risk.

3. Ratio Analysis

Ratio Analysis is normally used for working capital control. The following ratios are commonly used:

1. Current Ratio $= \dfrac{\text{Current Assets}}{\text{Current Liabilities}}$

2. Acid Test Ratio $= \dfrac{\text{Current Assets} - \text{Inventories}}{\text{Current Liabilities}}$

3. Inventory Turnover $= \dfrac{\text{Cost of goods sold}}{\text{Average Inventory}}$

4. Current Assets Turnover $= \dfrac{\text{Annual Sales}}{\text{Current Assets}}$

5. Receivable Turnover $= \dfrac{\text{Sales}}{\text{Debtors}}$

6. Debt-equity ratio $= \dfrac{\text{Total long term debts}}{\text{Shareholder funds}}$

Besides above, for managing current assets, it is advisable to calculate the following ratios also:

1. Quantum of shareholders funds invested in current assets.

2. Quantum of shareholders funds and long-term debts invested in current assets.

3. Relationship between the shareholders and long term funds on one hand and the short term funds on the other pertaining to current assets.

CASE STUDIES

Exercise No. 1 : Calculate cash conversion period from the financial variables given hereunder:

(₹ in lakh)

	Year 2010-2011	Year 2011-12	Year 2012-13
Sales	7,936		
Cost of Goods sold	7,036		
Inventory		940	936
Bills Receivables		942	962
Bills Payable		608	606

Solution :

Inventory conversion period:	$\dfrac{\{(940 + 936)/2 * 365}{(7,036)}$ = 48.7 days
B/R conversion period:	$\dfrac{\{942 + 962)/2*365\}}{(7,936)}$ = 43.8 days
Payables conversion period:	$\dfrac{\{(608+606)/2\}}{7036}$ = 31.5 days
Cash conversion period:	48.7 + 43.8 – 31.5 = 61 days

Exercise No. 2: Find the average conversion period with the help of the following data:

Gross operating cycle	88 days
Net operating cycle	65 days
Raw material storage period	45 days
Work-in-progress conversion period	4 days
Finished goods storage period	25 days

Solution :

Average conversion period : 88 - (45 + 4 + 25) = 14 days

Exercise No. 3: Calculate the finished goods conversion period if:

	(₹ lakh)
Finished goods opening stock	525
Finished goods closing stock	850
Cost of production	8,000
Administrative expenses	2,250
Excise duty	3,000

Solution :

Average stock of finished goods : ₹ (525 + 850)/2 = ₹ 687.5 lakh

Cost of goods sold : ₹ 525 Lakh + 8,000 Lakh + 2,250 Lakh + 3,000 Lakh – 850 Lakh = ₹ 12,925 lakh

Daily average = 12,925/365 ₹ 35.41 lakh

Finished goods conversion period = 687.5/35.41 = 19.42 days

Exercise No. 4 : Firm uses 1,100 units of a raw material per annum, the price of which is ₹ 1,500 per unit. The order cost per order is ₹ 150 and the carrying cost of the inventory is ₹ 200 per unit. Find the EOQ and the number of orders that are to be made during the year.

Solution :

Economic Order Quantity

$$= \sqrt{\dfrac{2 \ X \ Annual \ Requirement \ X \ Ordering \ Cost \ Per \ order}{Carrying \ Cost \ per \ unit \ per \ annum}}$$

$$= \sqrt{\frac{2 \times 1100 \times 150}{200}}$$

= 41

No. of orders during the year = 1,100/41 = 26.8 or 27

Exercise No. 5 : A factory uses 40,000 tonnes of raw material priced at ₹ 50 per tonne. The holding cost is ₹ 10 per tonne of inventory. The order cost is ₹ 200 per order. Find the EOQ. Will this EOQ be maintained if the supplier introduces 5% discount if the order lot is 2000 tonnes or more?

Solution :

Economic Order Quantity $= \sqrt{\dfrac{2 \times Annual\ Requirement \times Ordering\ Cost\ Per\ order}{Carrying\ Cost\ per\ unit\ per\ annum}}$

$$EOQ\ Without\ discount = \sqrt{\frac{2 \times 40,000 \times 200}{10}}$$

= 1265

No. of orders = 40,000/1265 = 31.62

Order cost = ₹ 200 × 31.62 = 6325

Carrying cost = ₹ 10/2 × 1265 = 6,325

Total cost = ₹ 6,325 + 6,325 = ₹ 12,650

EOQ with discount:

No. of orders = 40,000/2000 = 20

Order cost = ₹ 200 × 20 = ₹ 4,000

Carrying cost = ₹ 10/2 × 2,000 = ₹ 10,000

Price discount = 40000 × 0.05 = ₹ 2,000

Total cost = 4,000 + 10,000 – 2,000 = ₹ 12,000

Since total cost without discount > total cost with discount, discount may be availed. In this case, there will be deviation from the EOQ.

Exercise No. 6 : Find out the average size of receivables if the goods are sold for ₹ 10,00,000 on a net 60 credit term with an assumption that 20% of the customers do not pay within the prescribed time. Will there be any change in the average size if the terms of credit change to 2/10 net 60 with an assumption that 60% of the customers avail the discount?

Solution

Case I:

Average collection period = 60 + 0.20 × 60 = 72 days

Average size of receivables = ₹ (10,00,000/360) × 72 = ₹ 2,00,000

Case II:

Average collection period = (0.6 × 10) + 0.4 (60 + 0.2 × 60)

= 6 + 28.8 = 35 days

Average size of receivables = ₹ (10,00,000 / 360) × 35 = ₹ 97,222.22

Exercise No. 7 : A firm sells 25,000 units at an average price of ₹ 200 per unit. The variable cost is 80 per cent of the sale price. The credit term is 1/10 net 30. One-tenth of the customers avail the discount and the average collection period is 28 days. Administrative cost is ₹ 20,000. Collection cost/sales and bad debt/sales ratios are 2% each. To increase the level of sales, credit term is changed as 2/10 net 30 as a result of which the sales are expected to be 50,000 units. The administrative cost, collection cost ratio and bad debt ratio are expected to be unchanged. The cost of funds is 10%. Tax rate is 30%. Find the net benefit of the changed credit terms.

Solution

Average size of receivables:

Case I : ₹ (50,00,000 /360) × 28 = ₹ 3,88,889

Case II : ₹ (1,00,00,000 /360) × 28 = ₹ 7,77,778

Financing cost:

Case I: ₹ 3,88,889 × 0.10 = ₹ 38,889

Case II: ₹ 7,77,778 × 0.10 = 77,778

Net Benefit: *Amount (₹)*

	Case I	*Case II*
Revenue (sales)	50,00,000	1,00,00,000
Less variable cost	40,00,000	80,00,000
Net revenue	10,00,000	20,00,000
Less financing cost	38,889	77,778
Less administrative cost	20,000	20,000
Less collection cost	1,00,000	2,00,000
Less bad debt losses	1,00,000	2,00,000
Profit before tax	7,41,111	15,02,222
Less tax @ 30%	2,22,333	4,50,667
Net profit after tax	5,18,778	10,51,555

Net benefit of liberal term = ₹ 10,51,555 – 5,18,778 = ₹ 5,32,777

Exercise No. 8 : From the following information extracted from the books of a manufacturing company, compute the operating cycle in days and the amount of working capital required:

Particulars	*Amount in ₹*
Average Total of Debtors Outstanding	48,000
Raw Material Consumption	4,40,000
Total Production Cost	10,00,000
Total Cost of Sales	10,50,000
Sales for the year	16,00,000

Value of Average Stock maintained:

Raw Material	32,000
Work-in-progress	35,000
Finished Goods	26,000
Period Covered in days	365
Average period of credit allowed by suppliers in days	16

Solution

Computation of Operating Cycle

(i) *Raw material held in stock:*

$$\text{Raw material Inventory holding period} = \frac{\text{Average stocks of raw material held}}{\text{Average raw material consumption per day}}$$

$$= \frac{320 \times 365}{4400} = 27 \text{ days}$$

  Less: Average credit period granted by Suppliers = 16 days

    Period for raw material holding = 11 days

(ii) $Work\ in\ progres\ holding\ period = \dfrac{\text{Average WIP Maintained}}{\text{Average cost of production per day}}$

$$= \frac{350 \times 365}{10,000} = 13 \text{ days}$$

(iii) $Finished\ goods\ holding\ period = \dfrac{\text{Average Finished Goods Maintained}}{\text{Average cost of Goods sold}}$

$$= \frac{260 \times 365}{10,500} = 9 \text{ days}$$

(iv) $Credit\ period\ allowed\ to\ debtors = \dfrac{\text{Average debtors outstanding}}{\text{Average credit sales per day}}$

$$= \frac{480 \times 365}{16,000} = 11 \text{ days}$$

Total operating cycle period: (i) + (ii) + (iii) + (iv) = 44 days

Number of Operating cycles in a year = 365/44 = 8.30

$$\text{Amount of Working Capital required} = \frac{\text{Total Operating Cost}}{\text{Number of operating cycle in a year}}$$

$$\text{Amount of Working Capital required} = \frac{10,50,000}{8.30} = ₹\ 1,26,500$$

Exercise No. 9 : From the following information calculate;

 (1) Re-order level

 (2) Maximum level

(3) Minimum level

(4) Average level

Normal usage	: 100 units per week
Maximum usage	: 150 units per week
Minimum usage	: 50 units per week
Re-order quantity (EOQ) 500	: units
Lag in time	: 5 to 7 weeks

Solution

(1) Re-order Level

= Maximum consumption × Maximum Re-order period

= 150×7=1050 units

(2) Maximum Level

= Re-order level + Re-order quantity – (Minimum consumption × Minimum delivery period)

= 1050 + 500 – (50 × 5) = 1300 units

(3) Minimum Level

= Re-order level – (Normal consumption × Normal delivery period)

= 1050 – (100 × 6) = 450 units

(4) $\text{Average Level} = \dfrac{Maximum\ Stock\ Level + bMinim\ Stock\ level}{2}$

$\text{Average Level} = \dfrac{1300 + 450}{2}$ = 875 units

Exercise No. 10

A Ltd. has a total sales of ₹ 3.2 crores and its average collection period is 90 days. The past experience indicates that bad-debt losses are 1.5% on sales. The expenditure incurred by the firm in administering its receivable collection efforts are ₹ 5,00,000. A factor is prepared to buy the firm's receivables by charging 2% commission. The factor will pay advance on receivables to the firm at an interest rate of 18% p.a. after withholding 10% as reserve.

Calculate the effective cost of factoring to the Firm.

Answer		**₹**
Average level of Receivables = 3,20,00,000 x 90/360		80,00,000
Factoring commission	= 80,00,000 x 2/100	1,60,000
Factoring reserve	= 80,00,000 x 10/100	8,00,000
Factor will deduct his interest @ 18% :-		
Interest = $\dfrac{₹\ 70,40,000\ x\ 18\ x\ 90}{100\ x\ 360}$		= 3,16,800

Advance to be paid = ₹ 70,40,000 – ₹ 3,16,800 = ₹ 67,23,200

Annual Cost of Factoring to the Firm:	₹
Factoring commission (₹ 1,60,000 x 360/90)	6,40,000
Interest charges (₹ 3,16,800 x 360/90)	<u>12,67,200</u>
Total	<u>19,07,200</u>

Firm's Savings on taking Factoring Service:	₹
Cost of credit administration saved	5,00,000
Cost of Bad Debts (₹ 3,20,00,000 x 1.5/100) avoided	<u>4,80,000</u>
Total	<u>9,80,000</u>
Net Cost to the firm (₹ 19,07,200 – ₹ 9,80,000)	<u>9,27,200</u>

Effective rate of interest to the firm = $\dfrac{₹9,07,206}{68,23,200}$ = 13.79%*

Note: The number of days in a year have been assumed to be 360 days.

LESSON ROUND-UP

- Gross Working Capital is the total of all current assets. Networking capital is the difference between current assets and current liabilities.

- Permanent Working Capital is that amount of funds which is required to produce goods and services necessary to satisfy demand at its lowest point.

- Various factors such as nature of firm's activities, industrial health of the country, availability of material, ease or tightness of money markets affect the working capital.

- Factors which influence cash balance include credit position of the company, status of receivables and inventory accounts, nature of business enterprise and management's attitude towards risk.

- The amount of time needed for inventories to travel through the various process directly affect the amount of investment. The investment in inventories is guided by minimization of costs and management's ability to predict the forces that may cause disruption in the follow of inventories like strikes or shifts in demand for the product.

- Factors influencing investment in receivables are mainly the cost and time values of funds.

- The operating cycle is the length of time between the company's outlay on raw materials, wages and other expenditures and the inflow of cash from the sale of the goods.

- In deciding company's working capital policy, an important consideration is trade-off between profitability and risk.

- Working capital leverage may refer to the way in which a company's profitability is affected in part by its working capital management.

- Funds flow represent movement of all assets particularly of current assets because of movement in fixed assets is expected to be small except at times of expansion or diversification.

- Cash management means management of cash in currency form, bank balance and reality marketable securities.

- As John Maynard Keynes put, these are three possible motives for holding cash, such as transaction motive, precautionary motives and speculative motive.

- Inventory management has at its core the objective of holding the optimum level of inventory at the lowest cost.

- There are various technical tools used in inventory management such as ABC analysis, Economic Order Quantity (EOQ) and inventory turnover analysis.

- ABC analysis is based on paid to those item which account for a larger value of consumption rather than the quantity of consumption.

- EOQ determines the order size that will minimize the total inventory cost $EOQ = \sqrt{\dfrac{2AO}{C}}$

- Factoring is a type of financial service which involves an outright sale of the receivables of a firm to a financial institution called the factor which specializes in the management of trade credit.

SELF-TEST QUESTIONS

(These are meant for re-capitulation only. Answers to these questions are not to be submitted for evaluation)

1. What do you understand by working capital? What are its components?

2. "Working Capital Management is nothing more than deciding about level, structure and financing of current assets". Comment.

3. How would you assess the working capital requirements for seasonal industry in which you have been appointed as Finance Manager? Illustrate your answer with the example.

4. What are the norms for working capital management to be observed in sick industries? How would you control the liquidity of resources to avoid sickness in industrial unit facing shortage of cash resources?

5. Write short note on banking norms and macro aspects of working capital management keeping in view the recommendations of the Tandon Committee and Chore Committee.

6. What is the significance of working capital for a firm?

7. Briefly describe main constituents of working capital?

8. Why does the operating cycle determine the extent of working capital?

9. Describe the principles of effective cash management.

10. What are the main components of inventory?

11. Write short notes on the following:

 (i) Working Capital Leverage.

 (ii) Financing of working capital.

 (iii) Techniques for control of working capital.

Lesson 8
Security Analysis

LEARNING OBJECTIVES

Security Analysis is very important aspect of financial management and is an essential function of a finance manager. Security analysis is about valuing the securities using publicly available information. Keeping this important aspect in view, the subject Security Analysis has been included in the syllabus. The object of the study is to enable the students to understand:

– Concept of Investment and Security Analysis

– Risks and its types

– Approaches to Valuation of a Security

– Fundamental Analysis

– Technical Analysis

– Efficient – Market Theory

"Security analysis does not assume that a past average will be repeated, but only that it supplies a rough index to what may be expected of the future. A lead, however, cannot be used as a rough index; it represents a definite prediction of either better or poorer results, and it must be either right or wrong."

– Benjamin Graham

INTRODUCTION

"An Investment is the current commitment of money or other resources in the expectation of reaping future benefits." (Zvi Bodie, 2016). Investment means to forego present consumption for the increased consumption resource available in the future. It can be in any form, assets of all type and kind be it jewellery, commodity, real estate etc. An investor can buy a share of a company in anticipation of getting good returns in future. In this section of the book, we are interested in the Financial Assets or securities like equity shares, bonds and debentures etc. At this point, reader should understand that the financial assets are different from real assets. While financial assets are the paper claim representing an indirect claim to real assets in form of debt or equity commitments, the real assets are land and building, machines, etc., which are used to produce goods and services. Therefore, a security is understood to be a debt or equity instrument issued by a firm in lieu of the funds raised by it to meet its long term and short term requirements. Among the many properties that distinguish real from financial assets are liquidity and marketability. These features make the financial assets more attractive for investors as they are able to liquidate their investments easily in ready and active markets.

The decision of the investor is confronted with many issues, like- in which asset class to invest; shares, bonds, bullion etc. The investor must decide the time horizon for which he/she needs to invest and balance the combination of his/her expected return to the risk they are ready to face. These are some of the issues which any investor will face. In this chapter we shall describe the term securities generally and discuss the prevalent options available in the Indian Securities market.

WHAT ARE SECURITIES

Securities may be defined as instruments issued by seekers of funds in the investment market to the providers of funds in lieu of funds.

These instruments *prima facie* provide evidence of ownership to the holder of the instrument. The owner is entitled to receive all the benefits due on the instrument and to retrieve his investment at the time of redemption. Securities can broadly be divided into two categories – Debt Securities and Equity Securities. However, Section 2(h) of Securities Contract (Regulation) Act, 1956, defines securities as under:

Securities include –

(i) shares, scrips, stocks, bonds, debentures, debenture stock or other marketable securities of a like nature in or of any incorporated company or other body corporate.

(ia) derivative.

(ib) units or any other instrument issued by any collective investment scheme to the Investors in such schemes.

(ic) security receipt as defined in clause (zg) of Section 2 of the Securitisation and Reconstruction of Financial Assets and Enforcement of Security Interest Act, 2002.

(id) units or any other such instrument issued to the investors under any mutual fund scheme.

(ii) Government securities.

(iia) such other instruments as may be declared by the Central Government to be securities and,

(iii) rights or interests in securities.

INVESTMENT

Investment is the employment of funds on assets with the aim of earning income or capital appreciation. Investment has two attributes namely time and risk. Present consumption is sacrificed to get a return in the future. The

sacrifice that has to be borne is certain but the return in the future may be uncertain. This attribute of investment indicates the risk factor. The risk is undertaken with a view to reap some return from the investment.

The investor makes a comparison of the returns available from each avenue of investment, the element of risk involved in it and then makes the investment decision that he perceives to be the best having regard to the time frame of the investment and his own risk profile.

INVESTMENT VS. SPECULATION

According to Benjamin Graham "An investment operation is one which, upon thorough analysis, promises safety of principal and an adequate return. Operations not meeting these requirements are speculative."

Thus investment differs from speculation. Speculation also involves deployment of funds but it is not backed by a conscious analysis of pros and cons. Mostly it is a spur of the moment activity that is promoted and supported by half-baked information and rumours. Speculative deployment of funds is generally prevalent in the secondary equity market. What attracts people to speculation is a rate of return that is abnormally higher than the prevailing market rates. The balancing of risk and return nevertheless operates in speculative activity also and as such the risk element in speculation is very high. Very broadly, the characteristics of an investor differ from the speculator as follows:

BASIS FOR COMPARISON	INVESTMENT	SPECULATION
Meaning	The purchase of an asset with the hope of getting returns is called investment.	Speculation is an act of conducting a risky financial transaction, in the hope of substantial profit.
Basis for decision	Fundamental factors, i.e. performance of the company.	Hearsay, technical charts and market psychology.
Time horizon	Long term	Short term
Risk involved	Moderate risk	High risk
Intent to profit	Changes in value	Changes in prices
Expected rate of return	Modest rate of return	High rate of return
Funds	An investor uses his own funds.	A speculator uses borrowed funds.
Income	Stable	Uncertain and Erratic
Behavior of participants	Conservative and Cautious	Daring and Careless

INVESTMENT VS. GAMBLING

Investment differs from gambling and betting also. Both gambling and betting are games of chance in which return is dependent upon a particular event happening. Here also, there is no place for research-based activity. The returns in gambling are high and known to the parties in advance. Gambling is different from Investment in the following respects:

BASIC FOR COMPARISION	INVESTMENT	GAMBLING
PlanningHorizon	Longer Planning Horizon	Short Planning Horizon
Basis for Decisions	Scientific Analysis of Intrinsic worth of the security	Based on tips and rumors

Nature	Planned activity	Unplanned activity
Risk	Commercial Risk	Artificial Risk
Return Expectation	Risk-return trade-off determines return	Negative returns are expected
Motive	Safety of principal and stability of returns	Entertainment while earning

To say that investors like return and dislike risk is, however, simplistic. To facilitate our job of analyzing securities and portfolios within a risk return context, we must begin with a clear understanding of what risk and return are, what creates them and how they should be measured.

RISK AND ITS TYPES

Risk in security analysis is generally associated with the possibility that the realized returns will be less than the returns that were expected. In finance, different types of risk can be classified under two main groups, viz., systematic risk and unsystematic risk.
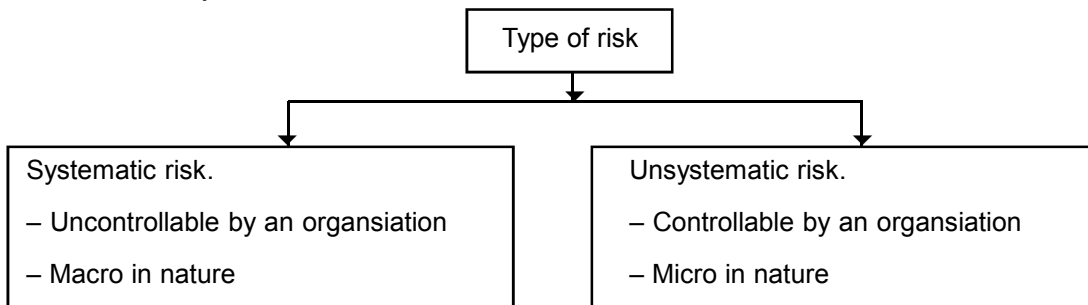
A. Systematic risk.

B. Unsystematic risk.

A. Systematic Risk

Those forces that are uncontrollable, external and broad in their effect are called sources of systematic risk. Systematic risk is due to the influence of external factors on an organization. Such factors are normally uncontrollable from an organization's point of view. Systematic risk is a macro in nature as it affects a large number of organizations operating under a similar stream or same domain. It cannot be planned by the organization.

In this way economic, political and sociological changes are sources of systematic risk. For example, if an economy moves into recession or if there is a political upheaval, it will cause the prices of nearly all the securities, whether bond or equity to decline.

Firms with high systematic risk tend to be those whose sales, profits and stock prices follow the general trend in the level of economic or stock market activity. These may include companies that deal in basic industrial goods like automobile manufactures.

The types of systematic risk are depicted and listed below.
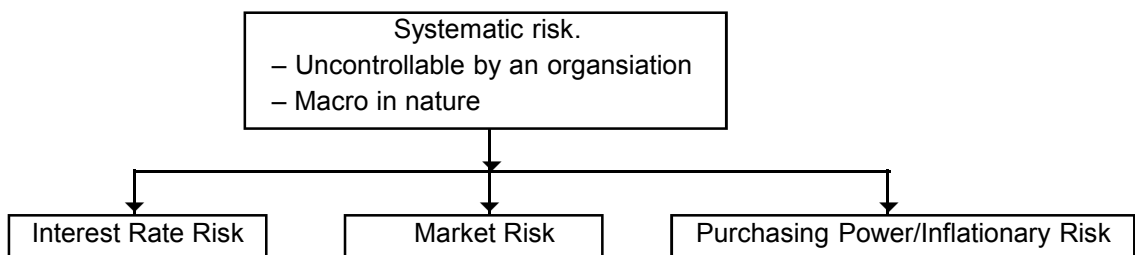
1. Interest rate risk,

2. Market risk and

3. Purchasing power or inflationary risk.

Now let's discuss each risk classified under this group.

1. Interest rate risk

Interest-rate risk is the variation in the single period rates of return caused by the fluctuations in the market interest rate. It particularly affects debt securities as they carry the fixed rate of interest.

2. Market risk

Market risk is associated with consistent fluctuations seen in the trading price of any particular shares or securities. That is, it arises due to rise or fall in the trading price of listed shares or securities in the stock market.

3. Purchasing power or inflationary risk

Purchasing power risk is also known as inflation risk. It is so, since it emanates (originates) from the fact that it affects a purchasing power adversely. It is not desirable to invest in securities during an inflationary period.

B. Unsystematic Risk

Unsystematic risk is due to the influence of internal factors prevailing within an organization. Such factors are controllable, internal factors which are peculiar to a particular industry or firm/(s). It may be because of change in management, labour strikes which will impact the returns of only specific firms which are facing the problem.

It is a micro in nature as it affects only a particular organization. It can be planned, so that necessary actions can be taken by the organization to mitigate (reduce the effect of) the risk.

Higher proportion of unsystematic risk is found in firms producing non durable consumer goods. Examples include suppliers of telephone, power and food stuffs.

The types of unsystematic risk are depicted and listed below.

```
                    ┌──────────────────────────────────┐
                    │          Unsystematic Risk        │
                    │  – Controllable by an organisation │
                    │  – Micro in nature                 │
                    └──────────────────────────────────┘
                                     │
               ┌─────────────────────┴──────────────────────┐
  ┌──────────────────────────────┐          ┌──────────────────────────────┐
  │  Business Risk/ Liquidity Risk │          │  Financial Risk/ Credit Risk  │
  └──────────────────────────────┘          └──────────────────────────────┘
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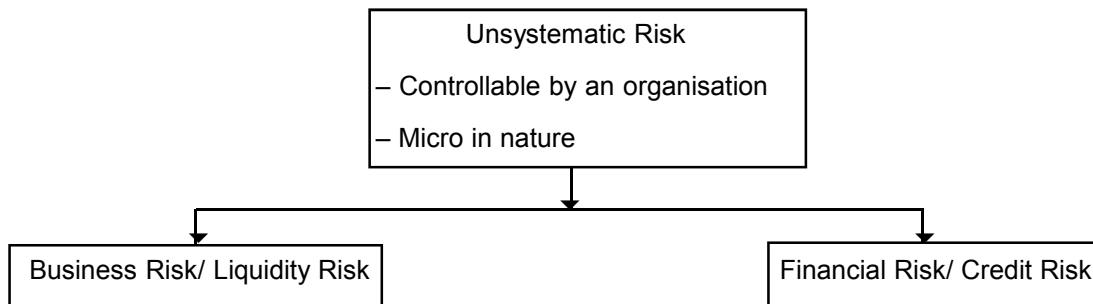
1. Business or liquidity risk,

2. Financial or credit risk

Now let's discuss each risk classified under this group.

1. Business or liquidity risk

Business risk is also known as liquidity risk. It is so, since it emanates (originates) from the sale and purchase of securities affected by business cycles, technological changes, etc.

2. Financial or credit risk

Financial risk is also known as credit risk. It arises due to change in the capital structure of the organization. The capital structure mainly comprises of three ways by which funds are sourced for the projects.
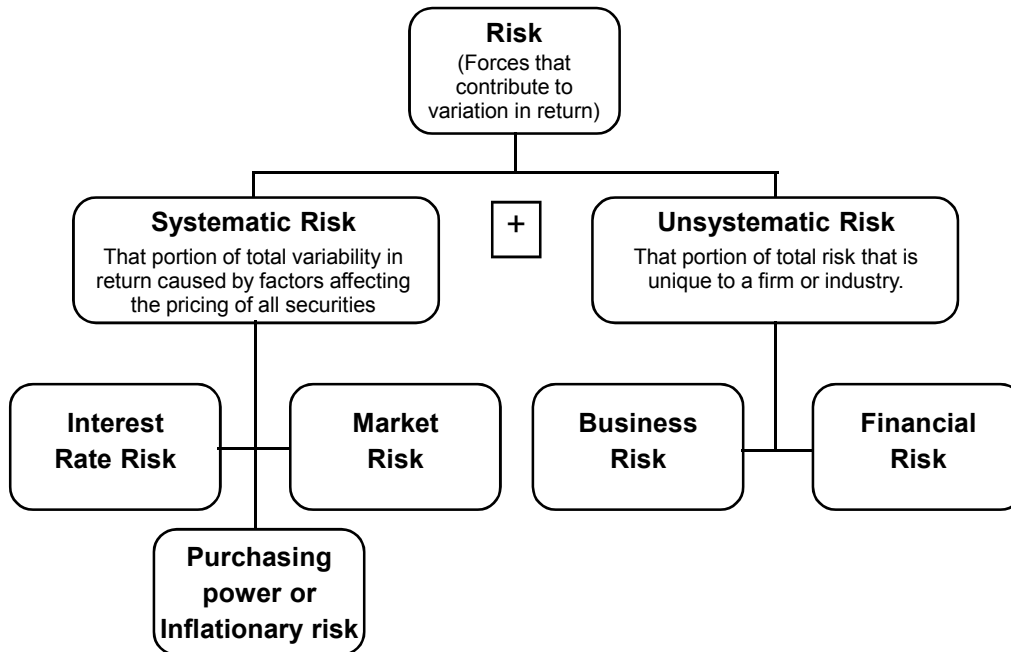
RETURN OF THE SECURITY

Return is the primary motivating force that drives investment. It represents the reward for undertaking investment. One of the important property of a security that the investors are concerned with is the return that can be expected from holding a security. Earning a return on an investment requires a passage of time. After some time has passed, one may make an objective measurement of the rate of an investment return that has been achieved. The word "return" can be misleading, since no single measure of return can answer all possible questions regarding results. The reasons lie in the fact that taxes, inflation, commissions, and the timing of cash flows all play major roles in "correct" calculation of returns.

The return of an investment consists of two components:

Current Return- The first component that comes to mind when one is thinking about return is the periodic cash flow (income), such as dividend or interest, generated by the investment. Current return is measured as the periodic income in relation to the beginning price of the investment.

Capital Return – The second component of return is reflected in the price change called the capital return – it is simply the price appreciation (or depreciation) divided by the beginning price of the asset. For assets like equity stocks, the capital return predominates.

Thus, the total return for any security is defined as:

$$\text{Total return} = \text{Current return} + \text{Capital return}$$

The current return can be zero or positive, whereas the capital return can be negative, zero or positive.

MEASURING RETURN

Total return, or holding period return (r), is perhaps the best unique, rational and comparable measures of results, no matter what type of asset is under discussion. Holding period return is the total return received from holding an asset or portfolio of assets over a period of time, generally expressed as a percentage. Holding period return is calculated on the basis of total returns from the asset or portfolio – i.e. income plus changes in value. It is particularly useful for comparing returns between investments held for different period of time.

Holding Period Return (HPR) and **annualized HPR** for returns over multiple years can be calculated as follows:

Holding Period Return = Income + (End of Period Value – Initial Value) / Initial Value

Annualized HPR = {[(Income + (End of Period Value – Initial Value)] / Initial Value+ 1}$^{1/n}$ – 1, where n = number of years.

Returns for regular time periods such as quarters or years can be converted to a holding period return through the following formula:

(1 + HPR) = (1 + r_1) x (1 + r_2) x (1 + r_3) x (1 + r_4) where r_1, r_2, r_3 and r_4 are periodic returns.

Thus,

$$HPR = [(1 + r_1) \times (1 + r_2) \times ... (1 + r_n)] - 1$$

r = % return per period

n = number of periods

Example:

Mr. A invested ₹10,000 in shares of XYZ Company 10 years ago, and that your shares (including reinvested dividends) are currently worth Rs. 23,800. Using this information, calculate total investment return of Mr. A.

$$\text{Total investment return} = \frac{₹23,800 - ₹10,000}{₹10,000} = 1.38 \text{ (or 138\%)}$$

So, total return over a decade has been 138%. Since we're considering a 10-year period, we will use (1/10) i.e. 0.1 as power to calculate the annualized return:

$$\text{Annualised return} = (1 + 1.38)^{0.1} - 1 = 0.0906$$

Translated to a percentage, this shows that Mr. A's 10-year investment in XYZ Company produced an annualized return of 9.06%.

Often, it is necessary to adjust the return for taxes which makes a difference to the total returns. Let us take a simple example to illustrate these point.

Portfolio Information		
Beginning value		₹ 1,00,000
Cash flows		
Dividends received	₹7,500	
Capital appreciation	₹12,500	
Ending value		₹1,20,000
Total Return	[(1,20,000/1,00,000)]-1 = **20%**	

Suppose the investor has a tax rate of 30%. The ₹7,500 in dividends yields only ₹5,250 after taxes (₹7500 *.70), and the capital gains is only ₹8,750 after taxes (₹12,500*.70). So, after-tax return equals

[(1,00,000+5,250+ 8,750)/1,00,000]-1= 14%

High nominal returns may also reflect high inflation rate. Suppose that during the performance measurement period a 10 percent return was required just to maintain purchasing power. After-tax real return equals

[(1,00,000+5,250+ 8,750)/1,00,000(1.10)]-1= 3.6364%

So, the rate of return to this portfolio is either 20% or 14% or 3.6364%. for a tax exempt investor the 20% return is appropriate. For a taxable investor, the return is only 14%. Inflation affects both equally.

APPROACHES TO VALUATION OF SECURITY

Security analysis begins with assessing the intrinsic value of security. There are three main schools of thought on the matter of security price evaluation. Advocates of different schools can be classified as (1) Fundamentalists;

(2) Technicians; and (3) efficient market advocates. Let us compare these different perspectives in summary form before describing them in detail.

(1) The Fundamental Approach: The Fundamental approach suggests that every stock has an intrinsic value. Estimate of intrinsic worth of a stock is made by considering the earnings potential of firm which depends upon investment environment and factors relating to specific industry, competitiveness, quality of management, operational efficiency, profitability, capital structure and dividend policy. The earning potential is converted into the present value of the future stream of income from that stock discounted at an appropriate risk related rate of interest. Security analysis is done to compare the current market value of particular security with the intrinsic or theoretical value. Decisions about buying and selling an individual security depends upon the comparison. If the intrinsic value is more than the market value, the fundamentalists recommend buying of the security and vice versa.

(2) Technical Approach: The technical analyst endeavours to predict future price levels of stocks by examining one or many series of past data from the market itself. The basic assumption of this approach is that history tends to repeat itself and the price of a stock depends on supply and demand in the market place and has little relationship with its intrinsic value. All financial data and market information of a given security is reflected in the market price of a security. Therefore, an attempt is made through charts to identify price movement patterns which predict future movement of the security. The main tools used by technical analysis are: (1) The Dow Jones theory which asserts that stock prices demonstrate a pattern over four to five years and these patterns are mirrored by indices of stock prices. The theory employs two Dow Jones averages – the industrial average and the transportation average. If industrial average is rising, then transport average should also rise. Simultaneous price movement is the main prediction which may show bullish as well as bearish results. Chart Patterns are used along with Dow Jones Theory to predict the market movements.

(3) Efficient Capital Market Theory : The theory is popularly known as "Efficient Capital Market Hypothesis: (ECMH). The advocates of this theory contend that securities markets are perfect, or at least not too imperfect. The theory states that it is impossible to beat the market because stock market efficiency causes existing share prices to always incorporate and reflect all relevant information. It is based on the assumption that in efficient capital markets prices of traded securities always fully reflect all publicly available information concerning those securities. Market efficiency was development in 1970 by the economist Eugene Fama, whose theory of efficient market hyphothesis stated that it is not possible for an investor to outperform the market because all available information built in to all stock prices. For market efficiency, there are three essential conditions; (i) all available information is cost free to all market participants; (ii) no transaction costs; and (iii) all investors similarly view the implications of available information on current prices and distribution of future prices of each security.

It has been empirically proved that stock prices behave randomly under the above conditions. These conditions have been rendered unrealistic in the light of the actual experience because there is not only transaction cost involved but traders have their own information base. Moreover, information is not costless and all investors do not take similar data and interpretation with them.

Efficient Market Hypothesis has put to challenge by the fundamental and technical analysts to the extent that random walk model is valid description of reality and the work of chartists is of no real significance in stock price analysis. In practice, it has been observed that markets are not fully efficient in the semi-strong or strong sense. Inefficiencies and imperfections of certain kinds have been observed in the studies conducted so far to test the efficiency of the market. Thus, the scope of earning higher returns exists by using original, unconventional and innovative techniques of analysis. Also, the availability of inside information and its rational interpretation can lead to strategies for deriving superior returns.

In short, if these theories are taken in their strongest forms, fundamentalists say that a security is worth the present value (discounted) of a stream of future income to be received from the security; technicians assert that the price trend data should be studied regardless of the underlying data; efficient market theorists contend that a share of stock is generally worth whatever it is selling for.

There are four confusing terms which are appearing at this juncture-face value, book value; market value and intrinsic value. Let us first clarify all them.

Face value of the security is the denominating value. It is also called the nominal value. When we say that authorized share capital of a company is ₹ 200 lac divided into 20 lac shares of ₹ 10 each, we mean that the face value or the nominal value of the share is ₹ 10/- each.

The book value may be much more than the face value. Let us assume that the shares of ₹ 10/- each are issued at ₹ 30/- each. The issuer is charging a premium of ₹ 20/- for the intrinsic value equalization. The issuer normally charges premium for the following attributes:

- Long years of establishment and profitable track record.

- Leadership position in the market.

- Potential for continued growth in the future.

- Existence of free reserves with the issuer which makes the book value higher than the face value.

Case Study

Let us clarify the concept of book value a little further. Assuming that a company has been incorporated with an authorized capital of 2 crore shares of ₹ 10/- each and the company operates profitably for three years, the broad financial position of the company shall be as under:

(₹ In lacs)

Item	Year 1	Year 2	Year 3
Income	600	1,200	2,400
Expenditure	800	1,000	1600
Profit/Loss	(200)	200	800
Equity Capital	2,000	2,000	2,000
Free Reserves	– 200	0	800
Face Value/share	10	10	10
Book Value/share (Share capital + free reserves)	9	10	14

Book value of the share of the company became less than face value at the end of the first year due to the loss incurred by it. The book value was equal to the face value at the end of the second year due to recoupment of the loss. At the end of the third year the book value become ₹ 14/- due to building up of reserves. If, after the end of the third year the issuer wishes to come up with an offering of additional shares, the offer price will not be less than ₹ 14.

In actual market conditions does the book value track the market value? We may observe the trend of few company

Sl. No.	Name of the Company	Face Value Per Share	Book Value	Market Value (As on 30 September)
(1)	(2)	(3)	(4)	(5)
1	HB Ltd.	1	13.8	168.70
2	FI Ltd.	10	136.3	250.50
3	IT Ltd.	5	314.3	3411.30
4	ITB Ltd.	10	175.8	349.80
5	BIS	10	299.3	229.70
6	RP Ltd.	10	20.4	22.60

7	RL Ltd.	10	138.2	562.60
8	IDD Ltd.	10	101.9	144.85
9	MTGL Ltd.	10	151.2	109.50
10	SC Ltd.	2	61.4	210.70
11	RLD Ltd.	5	190.5	821.15
12	HCT Ltd.	2	60.5	205.90
13	HPC Ltd.	10	173.8	172.45
14	CIP Ltd.	10	152.8	946.35
15	NES Ltd.	10	27.5	565.85
16	HH Ltd.	2	34.3	248.75
17	TISC Ltd.	10	93.6	116.50
18	LCET Ltd.	10	77.1	129.15
19	T&L Ltd.	10	133.0	167.00
20	BA Ltd.	10	283.2	380.05
21	BHL Ltd.	10	182.6	160.15
22	HIND Ltd.	10	621.5	522.10
23	ZTE Ltd.	1	99.2	57.50
24	BSS Ltd.	10	194.3	216.20
25	GRA Ltd.	10	295.3	309.00
26	GSIM Ltd.	10	75.3	367.15
27	GLX Ltd.	10	155.14	163.00
28	ASC Ltd.	10	171.17	138.15
29	CAS Ltd.	10	32.1	189.80
30	CIG Ltd.	10	18.2	131.20

We note that the market value is not equal to the book value for shares of any of the leading companies of the country. In fact, there is wide divergence between these two. The divergence is mostly on the upper side except in some cases. We can conclude, therefore, that book value is not a perfect indicator of the intrinsic value of a security. At best it can be an indicator of the floor value or base value below which the market value in normal circumstances should not slide. Book value is a historic indicator. It depicts what the company has earned and saved in the past. It does not reflect the future earning potential of the company.

Having considered that the book value is not an appropriate measure for ascertaining the real or intrinsic value of a security, let us take up a more rigourous process of evaluating securities called fundamental analysis.

FUNDAMENTAL APPROACH TO VALUATION

The investor seeks to arrive at the real value or the intrinsic value of a security through the process of security analysis. This value is arrived at by using a number of tools of financial analysis and it approximates the level at

which the demand and supply of stock of the security would be in equilibrium leading to stability of prices. Price of the security below and above this level would tend to be unstable.

Money has a "time value." the powerful tools of compounding and discounting can help us build a theoretical framework of valuation of bonds and stocks. Bond values are reasonably easy to determine. As long as a bond is not expected to go into default, the value of the bond is made up of present values of annual interest payments plus the principal amount to be recovered at maturity or sooner. Valuation of equity is different because earnings and dividend streams are uncertain as to timing of receipt and the amount of dividend. The value of an equity stock at any moment in time can be thought of as the discounted value of a series of uncertain future dividends that may grow or decline at varying rates over time.

It is easiest to start with equity valuation where the expected holding period is one year. The benefit any investor receives from holding an equity stock consists of dividends plus any change in price during the holding period. Suppose we buy one share of SBI at the beginning of the year for ₹ 500. We hold the stock for one year. ₹20 in dividends is collected at year-end, and the share is sold for ₹530. the rate of return achieved is the composite of dividend yield and change in price (capital gains yield). Thus, we get

Dividend yield = D/P= 20/500 = .04

Capital gains yield = 530-500/500= .06

The total rate of return achieved is .04+.06=.10 or 10 percent. How might we express this same notion in terms of present values? Thus:

$$P_0 = \frac{D_1}{(1+r)} + \frac{P_1}{(1+r)}$$

where:

D_1 = dividend to be received at the end of year 1

r = investor's required rate of return or discount rate

P_1 = selling price at the end of year 1

P_0 = selling price today

Therefore,

$$500 = \frac{₹\ 20}{(1+r)} + \frac{₹\ 530}{(1+r)}$$

Will r = .10 balance the equation? At a required rate of return of 10 percent, the dividend is worth ₹18.18 (₹20*.909) and selling price has a present value of ₹ 481.8182 (₹530 *.909)(see present value table). The combined present value is ₹ 500.

Should a rate of return of 15 percent have been required, the purchase price would have been too high at ₹ 500. (the dividend of ₹20 and selling price of ₹530 remains constant). To achieve a 15% return, the value of the stock at the beginning of the year would have had to be

P_0 = (₹20/1.15) + (₹530/1.15)

= ₹17.39 + 460.87

= ₹ 478.26

An alternative approach would be to ask the question: at what price must we be able to sell the stock at the end of one year (if purchase price is ₹ 500 and the dividend is ₹ 20) in order to attain a rate of return of 15 percent?

₹ 500 = (₹20/1.15) + (P1/1.15)

₹ 500 = ₹17.39 + .87 P1

₹ 554.72 = P1 (selling price)

Now let us look at a multiple year holding period. In most cases dividends will grow from year to year. We can similarly add the present value of all dividends to be received over the holding period and the present value of the selling price of the stock to the end of the holding period to arrive at the present value of the stock.

To simplify, let us assume that dividends will grow at the constant rate into the indefinite future. Under this assumption the value of a share is

$$P_0 = \frac{D(1+g)}{(1+r)^1} + \frac{D(1+g)^2}{(1+r)^2} + \frac{D(1+g)^3}{(1+r)^3} + \ldots\ldots\ldots \frac{D(1+g)^n}{(1+r)^n}$$

where n approaches infinity, this equation reduces simply to

$$P_0 = \frac{D_1}{r-g}$$

This model states that the price of a share should be equal to next year's expected dividend divided by the difference between the appropriate discount rate for the share and its expected long term growth rate. Alternatively, this model can be stated in terms of the rate of return on an equity share as

$$r = (D_1/P_0) + g$$

Illustration: An investor is holding 1000 shares of Right Choice Ltd. The current rate of dividend paid by the company is ₹ 5/- per share. The long term growth rate is expected to be 10% and the expected rate of return is 19.62%. We need to find out the current market price of the share:

Solution

$$P_0 = \frac{D_0(1+g)}{r-g}$$

$$= \frac{5(1+0.10)}{.1962 - .10}$$

$$\frac{5 \times 1.1}{0.0962} = \frac{5.5}{0.0962} = ₹57.17$$

The real value or intrinsic value is valid for a given set of conditions. These conditionalities include the national and international economic situation, industry specific and company specific circumstances. The first three conditionalities are viewed from a macro perspective in order to even out the effect of minor happenings. The last conditionality is observed at the micro level because at this level, even relatively smaller happenings can disturb the demand supply equilibrium.

Fundamental analysis is a three level systematic process that analyse the overall external and internal environment of the company before placing a value on its shares. The three levels at which the analysis is carried out are the following:

   (a) Analysis of the economy

   (b) Industry Level Analysis

   (c) Company Analysis

We shall describe the analytical process at all these levels in greater details hereunder:

Analysis of the economy

Performance of a company is intimately related to the overall economic environment of the country because demand for products and services of the company would under normal circumstances be directly related to growth of the country's economy. If the country has an improving GDP growth rate, controlled inflation and increasing investment activity then chances are that the valuation of securities shall be liberal. The capital market is said to be in a bullish phase with share values shooting up across the board. As the economy is growing, the analyst expects almost every industry to do well.

On the other hand, if the GDP growth rate slackens, inflation is out of control and investment activity is stagmant or declining, the investor or the analyst will expect the performance of industries to slow down. Under such circumstances, valuation of securities tends to be conservative. The capital market enters a bearish phase and share values decline across to board.

Industry Level Analysis

Industry level analysis focuses on a particular industry rather than on the broader economy. In this analysis, the analyst has to look for the composition of the industry, its criticality vis-à-vis the national economy, its position along the industrial life cycle, entry and exit barriers. All these factors have a bearing upon the performance of the company.

Industry is a combination or group of units whose end products and services are similar. Having a common market, the participants in the industry group face similar problems and opportunities. To the extent that an industry loses or gains from certain happenings, the performance of the participants is sure to be similarly impacted. These happenings may be technological changes, shifts in consumer preferences, availability of substitutes etc. These changes also drive the life cycle of the industry.

The industry life cycle or the industry growth cycle can be divided into three major stages-pioneering stage, expansion stage and stagnation stage. The pioneering stage is related to sunrise status of the industry. It is the stage when technological development takes places. The products have been newly introduced in the market and they gain ready acceptance. The pioneering units in the industry make extraordinary profits and thus attract competition. As competition increases profitability in the industry comes under strain and less efficient firms are forced out of the market. At the end of the pioneering stage, selected leading companies remain in the industry.

In the expansion stage of the growth cycle the demand for the products increases but at a lower rate. There is less volatility in prices and production. Capital is easily available in plenty for these units. Due to retention of profits, internal accruals increase.

At the stagnation stage, the growth rate initially slows down, then stagnates and ultimately turns negative. There is no product innovation. External capital is hard to come by. Even the internal capital takes flight. This stage of the industry is most valuable during times of slow down in national economy.

Company Analysis

Armed with the economic and industry forecasts, the analyst looks at the company specific information. Company information is generated internally and externally. The principle source of internal information about a company is its financial statements. Quarterly and annual reports including the income statement, the balance sheet and cash flows must be screened to assure that the statements are correct, complete, consistent, and comparable. Many popular and widely circulated sources of information about the companies emanate from outside, or external sources. These sources provide supplements to company-generated information by overcoming some of its bias, such as public pronouncements by its officers. External information sources also provide certain kinds of information not found in the materials made available by companies themselves. There are traditional and modern techniques of company analysis.

Among the traditional techniques are forecasting expected dividends and earnings using price-earning ratios

which help us to determine whether a stock is fairly valued at a point in time. Such approaches allow us to evaluate an equity share for a short term horizon. Moreover, an approach combining the dividend discount model (with variable growth rates) and the concept of systematic risk can also be helpful in evaluating a stock for a longer term holding period. Among the modern methods are regression analysis, and the related tools of trend and correlation analysis, decision tree analysis and simulation. Modern methods have strengths of the traditional methods while attempting to overcoming their shortcomings.

TECHNICAL ANALYSIS

In the fundamental analysis, share prices are predicted on the basis of a three stage analysis. After the analysis has been completed, the deciding factors that emerge are the financial performance indicators like earnings and dividends of the company. The fundamentalist makes a judgement of the equity share value with a risk return framework based upon the earning power and the economic environment. However, in actual practice, it often happens that a share having sound fundamentals refuses to rise in value and vice versa. We would now examine an alternative approach to predict share price behavior. This approach is called the Technical Analysis. It is used in conjunction with fundamental analysis and not as its substitute.

Technical analysis assumes that market prices of securities are determined by the demand-supply equilibrium. The shifts in this equilibrium give rise to certain patterns of price and volume of trading which have a tendency to repeat themselves over a period of time. An analyst who is familiar with these patterns can predict the future behaviour of stock prices by noticing the formation of these patterns.

It is a science of predicting the share price movements from the past data about share price movements. These predictions are indicative and do not provide irrefutable declarations about future trends. In this type of analysis, no weightage is given to intangible items like investors' attitude, market sentiment, optimism, pessimism etc.

Technical analysis is based on the following assumptions:

– The inter-play of demand and supply determines the market value of shares.

– Supply and demand are governed by various factors – both rational and irrational.

– Stock values tend to move in trends that persist for a reasonable time.

– These trends change as a result of change in demand-supply equilibrium.

– Shifts in demand and supply can be detected in charts of market action.

– Chart patterns tend to repeat themselves and this repetition can be used to forecast future price movements.

– Markets behave in a random style.

– Markets discount every future event that has a bearing upon share values.

DOW JONES THEORY

It is one of the earliest theories of technical analysis. The theory was formulated by Charles H. Dow of Dow Jones & Co. who was the first editor of Wall street Journal of USA. According to this theory, share prices demonstrate a pattern over four to five years.

These patterns can be divided into three distinct cyclical trends- primary, secondary or intermediate and minor trends.

Primary Trends

The primary trend lasts from one to three years. Over this period, the markets exhibit definite upward or downward movement which is punctuated by shorter spans of trend reversal in the opposite directions. The trend reversal is called the secondary trend. Primary trend is indicative of the overall pattern of movement.

In Dow theory, the primary trend is the major trend of the market, which makes it the most important one to

determine. This is because the overriding trend is the one that affects the movements in stock prices. The primary trend will also impact the secondary and minor trends within the market.

If the primary trend is upward, it is called a bullish phase of the market. If the primary trend is downwards, it is called a bearish phase. Illustrations of bullish phase and bearish phase are given below:

Graph of Bullish Phase

PEAK

PRICE

TIME
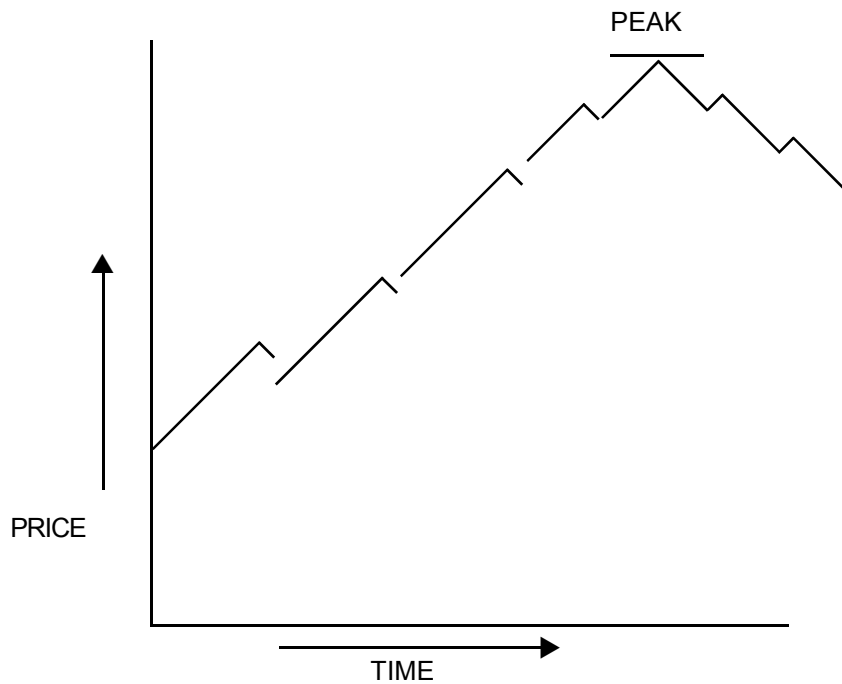
In a bullish phase, after each peak, there is a fall but the subsequent rise is higher than the previous one. The prices reach higher level with each rise. After the peak has been reached, the primary trend now turns to a bearish phase.

Graph of a Bearish Phase

PRICE

BOTTAM

TIME
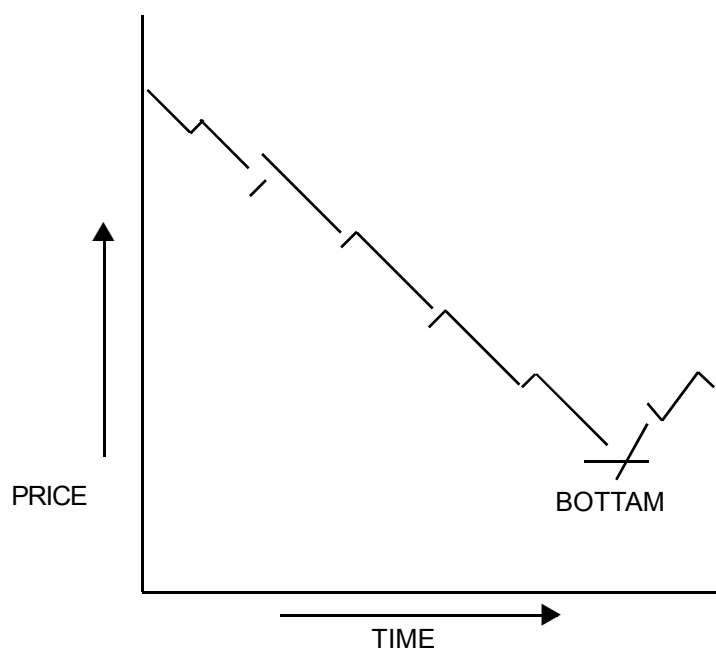
In a bearish phase, the overall trend is that of decline in share values. After each fall, there is slight rise but the subsequent fall is even sharper.

Secondary Trends

In Dow theory, a primary trend is the main direction in which the market is moving. Conversely, a secondary trend moves in the opposite direction of the primary trend, or as a correction to the primary trend.

For example, an upward primary trend will be composed of secondary downward trends. This is the movement from a consecutively higher high to a consecutively lower high. In a primary downward trend the secondary trend will be an upward move, or a rally. This is the movement from a consecutively lower low to a consecutively higher low.

In general, a secondary, or intermediate, trend typically lasts between three weeks and three months, while the retracement of the secondary trend generally ranges between one-third to two-thirds of the primary trend's movement.

Minor Trend

The last of the three trend types in Dow theory is the minor trend, which is defined as a market movement lasting less than three weeks. Minor trends are changes occurring every day within a narrow range. These trends are not decisive of any major movement. The minor trend is generally the corrective moves within a secondary move, or those moves that go against the direction of the secondary trend.

TOOLS OF TECHNICAL ANALYSIS

The two variables concerning groups of securities or individual securities that technicians watch are the behavior of prices and volume of trading contributing to and influenced by changing prices. Technical analysts use two major types of tools for their analysis. These are the charts and the price indicators.

1. TECHNICAL CHARTS

These are the plottings of prices and trading volumes on charts. The purpose of reading and analysing these charts is to determine the demand-supply equation at various levels and thus to predict the direction and extent of future movement of the prices. The charts are not infallible but because of their repeated accuracy, they have come to be accepted. In all the charts, a correlation exists between market price action and the volume of trading when the price increase is accompanied by a surge in trading volumes, it is a sure sign of strength. On the other hand, when the decline in share prices is accompanied by increased volumes, it is indicative of beginning of bearish trend.

There are four ways to construct a chart. These are the Line Chart, Bar Chart, Candle Stick Chart and Point & Figure Chart.

Line Chart

A Line chart is a style of chart that is created by connecting a series of data points together with a line. This is the most basic type of chart used in finance and it is generally created by connecting a series of past prices together with a line. Line charts are the most basic type of chart because it represents only the closing prices over a set period. The line is formed by connecting the closing prices for each period over the timeframe and the intra-period highs and lows of stock prices are ignored. This type of chart is useful for making broad analysis over a longer period of time.

Line Chart Example – Source: StockCharts.com

Bar Chart

Bar charts expand upon the line chart by adding the open, high, low, and close – or the daily price range, in other words – to the mix. The chart is made up of a series of vertical lines that represent the price range for a given period with a horizontal dash on each side that represents the open and closing prices. The opening price is the horizontal dash on the left side of the horizontal line and the closing price is located on the right side of the line. If the opening price is lower than the closing price, the line is often shaded black to represent a rising period. The opposite is true for a falling period, which is represented by a red shade.

Bar Chart Example – Source: StockCharts.com

Candlestick Charts

Like a bar chart, candlestick charts have a thin vertical line showing the price range for a given period that is shaded different colors based on whether the stock ended higher or lower. The difference is a wider bar or rectangle that represents the difference between the opening and closing prices.

Falling periods will typically have a red or black candlestick body, while rising periods will have a white or clear candlestick body. Days where the open and closing prices are the same will not have any wide body or rectangle at all.

Candlestick Example – Source: StockCharts.com

Point and Figure Charts

In this type of charts, emphasis is laid on charting price changes only and time and volume elements are ignored. The first step in drawing a figure and point chart is to put a X in the appropriate price column of a graph. Successive price increases are added vertically upwards in the same column as long as the uptrend continues. Once the price drops, the figures are moved to another column and Os are entered in downward series till the downward trend is reversed.

$SPX S&P 500 Large Cap Index INDX
13-Apr-2017, 16:00 ET, daily, O: 2,341.98, H: 2,348.26, L: 2,328.95, C: 2,328.95, V: 1765447936, Chg: -15.98 (-0.68%)
No recent chart pattern found
Scaling: Traditional [Reversal: 3]

(c) StockCharts.com
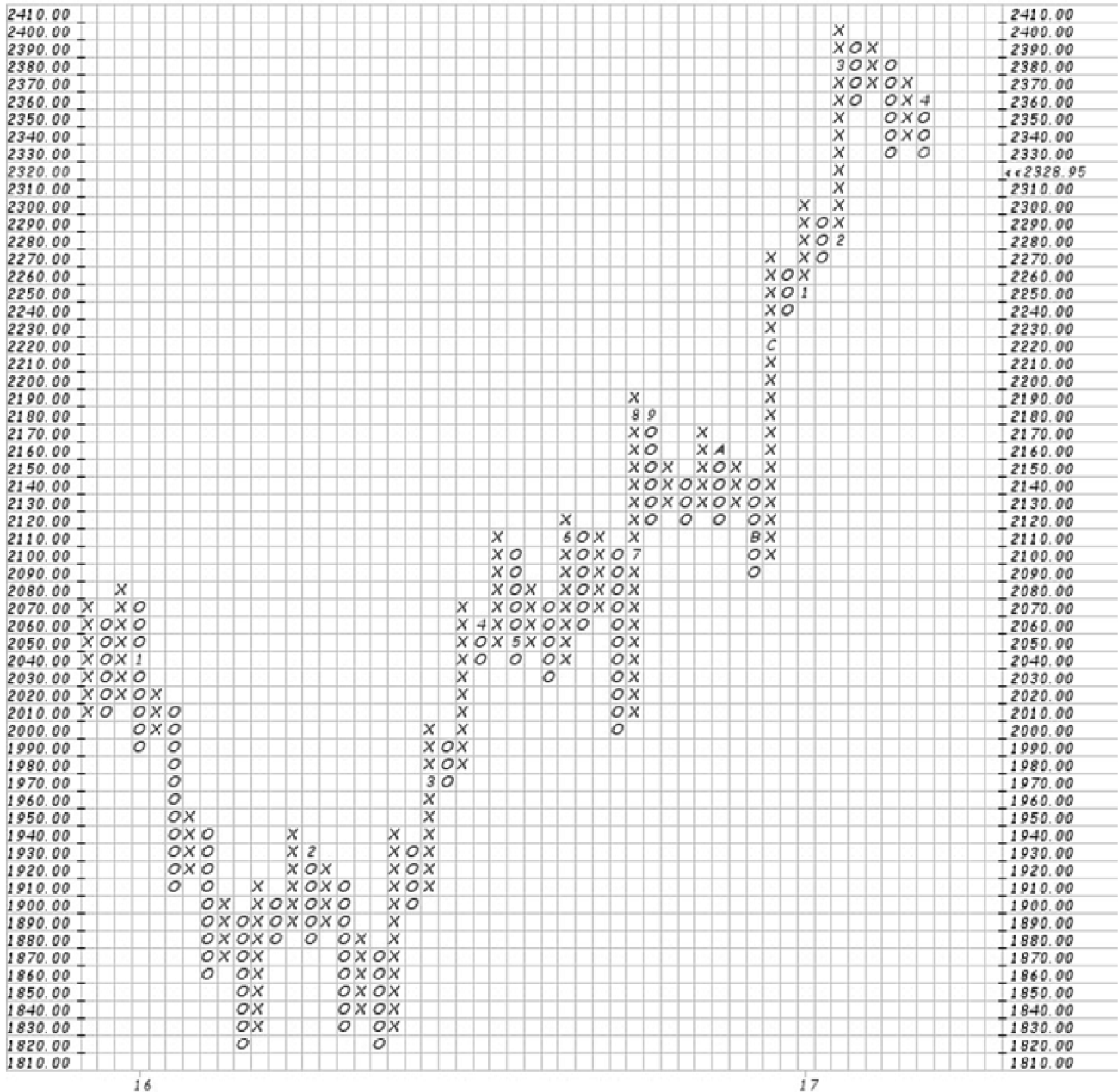
Point and Figure Chare Example – Source: StockCharts.com

Patterns created by charts

Once the charts have been constructed, analysts seek to locate certain indicators/patterns in the charts. The common patterns are being described below:

1. Support and resistance levels

A support level indicates the bottom which the share values are unable to pierce. After rising time and again, the

share price dips to a particular level and then starts rising again. At this level, the share gets buying support. A resistance level is that level after which the share price refuses to move up in repeated efforts. At this level, selling emerges. Support and resistance levels are valid for a particular time period. Once these levels are breached, beginning of a new bull or bear phase is signaled.
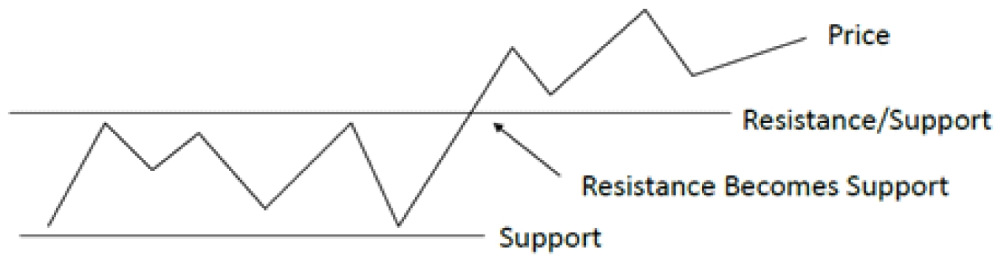
2. Heads and Shoulders configuration

In this type of chart configuration, a formation similar to heads and shoulders is created wherein the neckline acts as the resistance or support line. As the head and shoulder top is formed, a resistance level appears at the top of the head. The volumes start declining near the head top and reversal sets in. The volumes become heavy again and shrink near the neckline where another reversal of trend begins.

Head and Shoulders Top (HST) Pattern
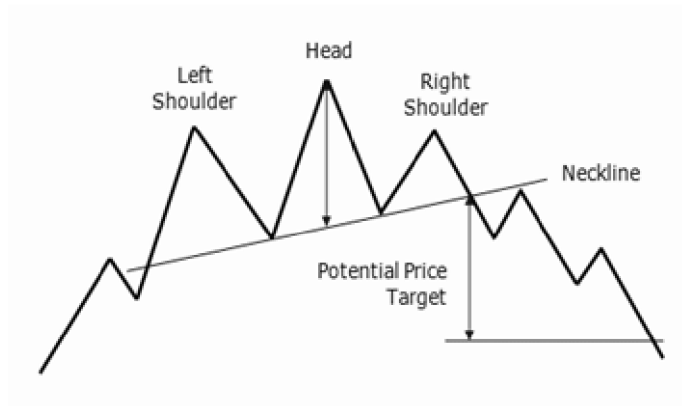
Inverse Head and Shoulder Top (IHST) Pattern
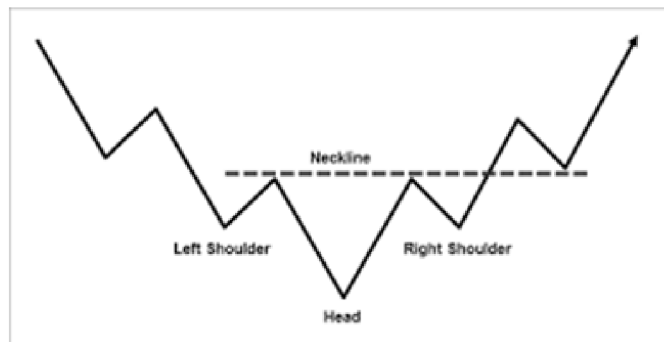
3. Triangle or coil formation

This pattern represents a pattern of uncertainty. Hence it is difficult to predict which way the price will break out.
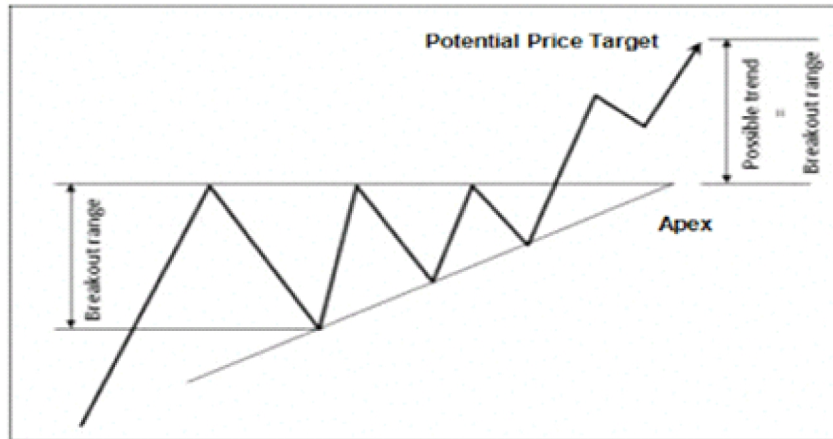
4. Double Top Formation

It represents a bearish development, signaling that the price is expected to fall.

5. Double bottom formation

It represents a bullish development, signaling that the price is expected to rise.
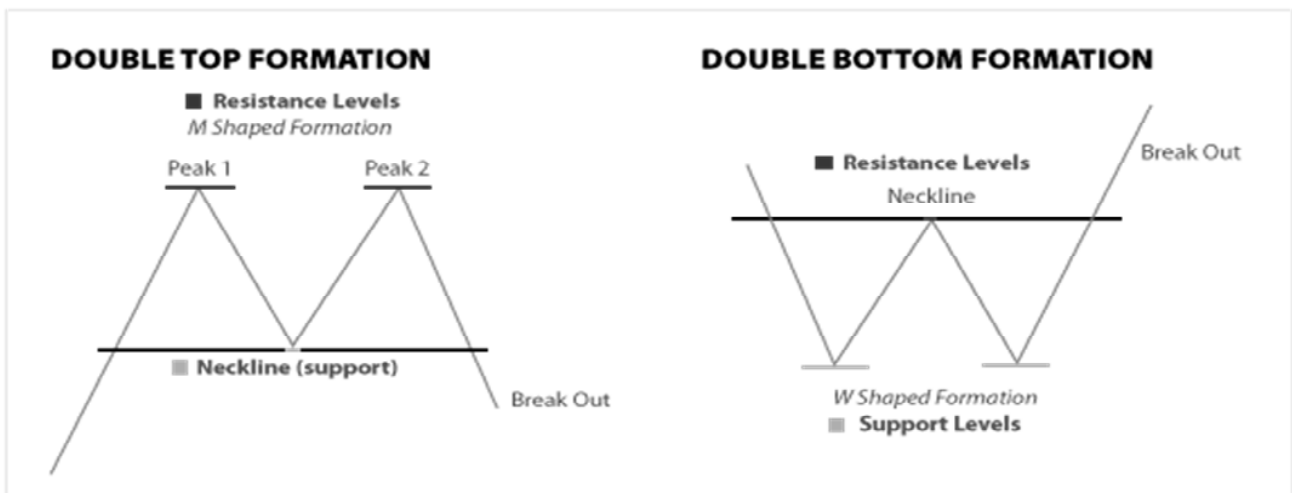
Limitations of charts

Interpretation of charts is prone to subjective analysis. This factor is a major cause of often contradictory analysis being derived from the same charts. Also the changes in charts are quite frequent in the short term perspective leading to a host of buy and sell recommendations which are not in the best interest of the investor. Another disadvantage is that decisions are made on the basis of chart alone and other factors are ignored.

2. TECHNICAL INDICATORS

Apart from the charts, technical analysts use a number of indicators generated from prices of stocks to finalise their recommendations. These indicators are often used in conjunction with charts. Some of the important indicators are the Advance Decline Ratio, the Market Breadth Index and Moving Averages.

(a) Advance-Decline Ratio

It is the ratio of the number of stocks that increase to the number of stocks that have declined. If the ratio is more than one, the trend is assumed to be bullish. If the ratio starts declining, a change of trend is signaled.

(b) Market Breadth Index

This index is a variation of the Advance-Decline Ratio. This index is computed by taking the difference between the number of stocks rising and the number of stocks falling. If during a month, 400 out of 1000 stocks in the market have risen and 300 have declined while 300 have remained unchanged, then market breadth would be calculated as = 2(400–300)/300. The figure of each time period is added to the previous period. If market breadth is increasing along with rise in stock indices, it confirms the bullish trend and vice cersa.

(c) Moving Averages

A moving average is the average of share values of a set of consecutive number of days. If we have to calculate 50 days moving average, we calculate the average for days 1–50. Then on day 51, we add the value of day 51 and deduct the value of day 1 and so on . Similarly, moving averages for 100 days, 200 days and 300 days can be calculated. Moving averages provide a benchmark for future valuation. If share value is below the moving average, it has scope for appreciation. If the value is above the moving average, the upside is limited in the near term.

ALTERNATIVE APPROACHES TO VALUATION

1. Random walk theory

In the Fundamental Analysis, factors such as economic influences, industry factors and particular company information are considered to form a judgement on share value. On the other hand, price and volume information is analysed in Technical Analysis to predict the future course of share values. There is another approach which negates both Fundamental and Technical analysis. This approach has been based upon the research aimed at testing whether successive price changes are independent in different forms of market efficiency.

According to the theory, share prices will rise and fall on the whims and fancies of manipulative individuals. As such, the movement in share values is absolutely random and there is no need to study the trends and movements prior to making investment decisions. No sure prediction can be made for further movement or trend of share prices based on the given prices as at a particular moment. The Random Walk Theory is inconsistent with technical analysis. Whereas, it states that successive price changes are independent, the technicians claim that they are dependent. But believing in random walk does not mean that one should not believe in analyzing stocks. The random walk hypothesis is entirely consistent with an upward and downward movement in price, as the hypothesis supports fundamental analysis and certainly does not attack it.

One of the advantages of this theory is that one is not bothered about good or bad judgement as shares are picked up without preference or evaluation. It is easier for believers in this theory to invest with confidence. The second advantage is that there is no risk of being ill informed while making a choice as no information is sought or concealed.

Random walk theory implies that short term price changes i.e day to day or week to week changes are random but it does not say anything about trends in the long run or how price levels are determined.

2. Efficient – Market Theory

Efficient Market Hypothesis accords supremacy to market forces. A market is treated as efficient when all known information is immediately discounted by all investors and reflected in share prices. In such a situation, the only price changes that occur are those resulting from new information. Since new information is generated on a random basis, the subsequent price changes also happen on a random basis. Major requirements for an efficient securities market are:

– Prices must be efficient so that new inventions and better products will cause a firms' securities prices to rise and motivate investors to buy the stocks.

– Information must be discussed freely and quickly across the nations so that all investors can react to the new information.

– Transaction costs such as brokerage on sale and purchase of securities are ignored.

– Taxes are assumed to have no noticeable effect on investment policy.

– Every investor has similar access to investible funds at the same terms and conditions.

– Investors are rational and make investments in the securities providing maximum yield.

Research studies devoted to test the random walk theory on Efficient Capital Market Hypothesis (ECMH) are put into three categories i.e.

(a) the strong form,

(b) the semi-strong form, and

(c) the weak form theory.
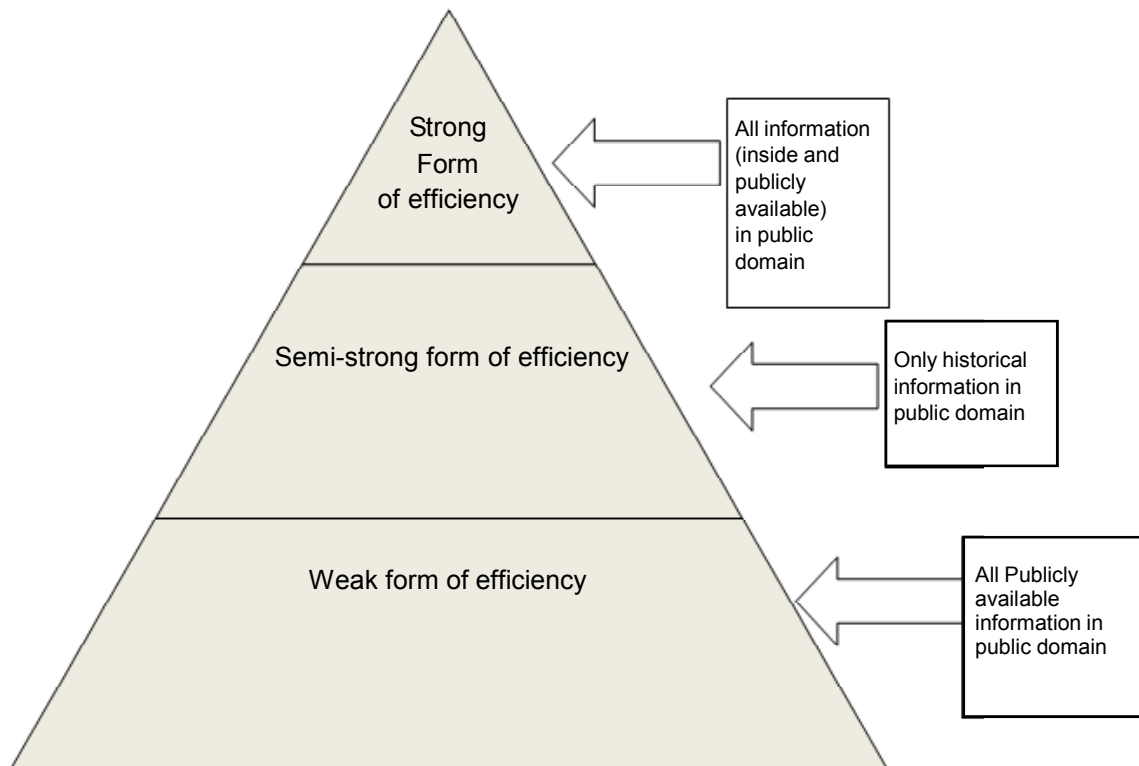
(a) The Strong Form of Efficiency: This test is concerned with whether two sets of individuals – one having inside information about the company and the other uninformed could generate random effect in price movement. The strong form holds that the prices reflect all information that is known. It contemplates that

even the corporate officials cannot benefit from the inside information of the company. The market is not only efficient but also perfect. The findings are that very few and negligible people are in such a privileged position to have inside information and may make above-average gains but they do not affect the normal functioning of the market.

(b) Semi-strong form of Efficiency: This hypothesis holds that security prices adjust rapidly to all publicly available information such as functional statements and reports and investment advisory reports, etc. All publicly available information, whether good or bad is fully reflected in security prices. The buyers and sellers will raise the price as soon as a favourable price of information is made available to the public; opposite will happen in case of unfavourable piece of information. The reaction is almost instantaneous, thus, printing to the greater efficiency of securities market.

(c) The Weak Form theory: This theory is an extension of the random walk theory. According to it, the current stock values fully reflect all the historical information. If this form is assumed to be correct, then both Fundamental and Technical Analysis lose their relevance. Study of the historical sequence of prices, can neither assist the investment analysts or investors to abnormally enhance their investment return nor improve their ability to select stocks. It means that knowledge of past patterns of stock prices does not aid investors to make a better choice. The theory states that stock prices exhibit a random behaviour.

In this way, if the markets are truly efficient, then the fundamentalist would be successful only when (1) he has inside information, or (2) he has superior ability to analyse publicly available information and gain insight into the future of the company. The empirical evidence of the random walk hypothesis rests primarily on statistical tests, such as runs test, correlation analysis and filter test. The results have been almost unanimously in support of the random walk hypothesis, the weak form of efficient market hypothesis.

LESSON ROUND-UP

- Investment may be defined as a conscious act on the part of a person that involves deployment of money in securities issued by firms with a view to obtain a target rate of return over a specified period of time.

- Investment is conscious act of deployment of money in securities issued by firms. Speculation also involves deployment of funds but is not backed by a conscious analysis of pros and cons.

- Investment is the employment of funds on assets with the aim of earning income or capital appreciation.

- Speculation also involves deployment of funds but it is not backed by a conscious analysis of pros and cons.

- Both gambling and betting are games of chance in which return is dependent upon a particular event happening.

- Risk in security analysis is generally associated with the possibility that the realized returns will be less than the returns that were expected.

- Risk can be classified under two main groups, viz., systematic risk and unsystematic risk.

- Return is the primary motivating force that drives investment. It represents the reward for undertaking investment.

- The main objective of security analysis is to appraise are intrinsic value of security.

- The Fundamental approach suggests that every stock has an intrinsic value which should be equal to the present value of the future stream of income from that stock discounted at an appropriate risk related rate of interest.

– Technical approach suggests that the price of a stock depends on supply and demand in the market place and has little relationship with its intrinsic value.

– Efficient Capital Market Hypothesis (ECMH) is based on the assumption that in efficient capital markets prices of traded securities always fully reflect all publicly available information concerning those securities.

– Performance of a company is intimately related to the overall economic environment of the country because demand for products and services of the company would under normal circumstances be directly related to growth of the country's economy.

– Industry level analysis focuses on a particular industry rather than on the broader economy.

– Dow Jones theory shows that share prices demonstrate a pattern over four to five years and these patterns can be divided into primary, secondary and minor trends.

– Charts and Indicators are two major tools of Technical Analysis.

SELF-TEST QUESTIONS

(These are meant for re-capitulation only. Answers to these questions are not to be submitted for evaluation)

1. What is security analysis? Why do we need to carry it out?

2. What are the various kinds of risks?

3. What are the various techniques of security analysis?

4. Describe some techniques of Technical analysis.

5. A Ltd has just declared a dividend of ₹10 per share. (Dividend ratio 100%)The ROE of the company is 20%, while EPS has been ₹40 per share. If the Investor required rate of return is 20%, then what should be the price per share?

(*Answer: ₹230 per share*)

6. The analysts are of view that company YZ Ltd equity share will give a return of 20% if the economy grows at a faster pace. If the economy stays at the same rate of growth as in present times, then the equity share is expected to give the return of 10% only. If the economic growth rate goes down the expected return of the share is only 5%. The analysts further estimate that the probability of good, status quo and recession of economy are:- 50%,30% &20%. What is the average return of YZ Ltd equity share?

(*Answer: 14%*)

Lesson 9
Portfolio Management

LESSON OUTLINE

– Meaning, Objectives; Portfolio Theory

– Traditional Approach; Fixed and Variable Income Securities

– Markowitz Portfolio Theory

– Modern Approach - CAPM Model

– Sharpe Single & Multi Index Model

– Arbitrage Pricing Theory (APT)

– Risk Adjusted Measure of Performance

– Economic Value Added

– LESSON ROUND UP

– SELF TEST QUESTIONS

LEARNING OBJECTIVES

Portfolio Management is the art and science of making decision about investment mix and policy matching investment to objectives, asset allocation and balancing risk against performance. It is an essential function of a finance manager. Keeping this important aspect in view, the topic of Portfolio Management has been included in the syllabus.

The object of the study is enable the students understand –

– Portfolio Management

– Portfolio Analysis

– Risk in Investment situation

– Markowitz Model

– Sharp Index Model

– Capital Asset Pricing Model

– Arbitrage Pricing Theory

– Economic value added.

"Portfolio construction is not a science, more an art and involves lots of judgment"

– Neil Woodford

"Waving different types stocks in your portfolio can enchance returns" –

– Kenneth Fisher

PORTFOLIO MANAGEMENT

The Investment process consists of two tasks. The first is security analysis which focuses on assessing the risk and return characteristics of the available investment alternatives. The second task is portfolio selection which involves choosing the best possible portfolio from the set of feasible portfolios.

Individual securities have risk-return characteristics of their own. In any case, given an estimate of return, the investor is always concerned about the probable downside price expectation or the risk. Portfolio, or combination of securities, helps in spreading this risk over many securities. The investors hope that if they hold different assets, even if one goes bad, the others will provide some protection from an extreme loss.

Portfolio management thus refers to managing efficiently the investment in the securities by diversifying the investments across industry lines or market types. The reasons are related to the inherent differences in the debt and equity markets, coupled with a notion that investment in companies in dissimilar industries would most likely do much better than the companies within the same industry.

However, there is disagreement over the "right" kind of diversification and the "right" reason. In the following paragraphs a formal, advanced notion of diversification conceived by Harry Markowitz will be introduced. Portfolio theory was originally proposed by Harry Markowitz in 1950s, and was the first formal attempt to quantify the risk of a portfolio and develop a methodology for determining the optimal portfolio. Markowitz assumed that investor attitudes towards portfolio depend exclusively upon (1) expected return and risk, and (2) quantification of risk. And risk is, by proxy, the statistical notion of variance, or standard deviation of return. Prior to the development of Portfolio theory, investors dealt with the concepts of return and risk somewhat loosely. Intuitively smart investors knew the benefit of diversification which is reflected in the traditional proverb "Do not put all your eggs in one basket". Harry Markowitz was the first person to show quantitatively why and how diversification reduces risk. In this chapter, we will discuss how investors can construct the best possible portfolios with the help of efficient diversification. It is based largely on the pioneering work of Harry Markowitz and further insights that evolved from his work.

PORTFOLIO ANALYSIS

While discussing Security Analysis, we had restricted our discussion to the behavior of value of individual equity securities. Portfolio Analysis seeks to analyze the pattern of returns emanating from a portfolio of securities, i.e. a number of securities that absorb a proportion of total amount of investment. Although holding two securities is probably less risky than a portfolio composed exclusively of less risky asset. How? This is done by finding two securities each of which tends to perform well whenever the other does poorly. This makes a reasonable return for the portfolio more certain as a whole, even if one of its components happens to be quite risky. For example, if you invest in two stocks, say, one in company engaged in sugar production and other, in a company engaged in cement production, you would be always able to get a reasonable return as cement is a highly cyclical industry and sugar is non cyclical. When cement industry will rise, the sugar industry will just perform below average but when cement industry will fall sugar industry will outperform.

We shall clarify the concept of Portfolio with the help of following illustration:

	Stock X	Stock Y
Return (%)	7 or 11	13 or 5
Probability	.5 each return	.5 each return
Expected return(%)	9*	9†
Variance (%)	4	16
Standard deviation(%)	2	4

*Expected return = (.5)(7) + (.5)(11) = 9

†Expected return = (.5)(13) + (.5)(5) = 9

It is clear that although X and Y have the same expected return, 9 percent, Y is riskier than X (standard deviation of 4 versus 2). Suppose that when X's return is high, Y's return is low, and vice versa. In other words, when the return on X is 11 percent, the return on Y is 5 percent; similarly, when the return on X is 7 percent, the return on Y is 13 percent. Question: Is a portfolio of some X and some Y in any way superior to an exclusive holding of X alone (has it less risk)?

Let us construct a portfolio consisting of two-thirds stock X and one-third stock Y. The average return of this average return of each security in the portfolio; that is;

$$R_p = \sum_{i=1}^{N} X_i R_i$$

where:

R_p = expected return to portfolio

X_i = proportion of total portfolio invested in security i

R_i = expected return to security i

N = total number of securities in portfolio

Therefore,

$$R_p = (^2/_3)(9) + (^1/_3)(9) = 9$$

But what will be the range of fluctuation of the portfolio? In periods when X is better as an investment, we have $R_p = (^2/_3)(11) + (^1/_3)(5) = 9$; and similarly, when Y turns out to be more remunerative, $R_p = (^2/_3)(7) + (^1/_3)(13) = 9$. Thus, by putting part of the money into the riskier stock, Y, we are able to reduce risk considerably from what it would have been if we had confined our purchases to the less risky stock, X. If we held only stock X, our expected return would be 9 percent, which could in reality be as low as 7 percent in bad periods or as much as 11 percent in good periods. The standard deviation is equal to 2 percent. Holding a mixture of two-thirds X and one-third Y, or expected and experienced return will always be 9 percent, with a standard deviation of zero. We can hardly quarrel with achieving the same expected return for less risk. In this case we have been able to eliminate risk altogether.

The above illustration indicates that it is better to spread out or diversify the investment in order to minimize the risk associated with investment in single securities. This fact is the essence of Portfolio Analysis.

Portfolio is a collection of securities belonging to a diverse set of industries. Management of a portfolio is considered to be a specialised activity because of the time and effort involved in tracking of each component of the portfolio. Portfolio management is a relatively new concept in security analysis. It gained prominence after World War II when it was realised that the instability of the securities market had put at stake fortunes of individuals, companies and governments. It was then discovered that investing in a basket of stocks maximised profits while minimising risks.

Risk in investment situation

We have seen in the above illustration that investment in securities X and Y has been fraught with risk because the return on investment has varied from one year to the other and obviously from any expected rate of return also that might have been fixed.

Risk means that the return on investment would be less than the expected rate. Risk is a combination of possibilities

because of which actual returns can be different or greatly different from expected returns. Thus risk can be high or low. In case we want to quantify how high or how low the risk in investment is going to be, we have to intimate the probability of various outcomes and their deviation from expected outcome.

The risk involved in individual securities can be measured by standard deviation or variance. When two securities are combined, we need to consider their interactive risk, or covariance. If the rates of return of two securities move together, we say their interactive risk or covariance is positive. If rates of return are independent, covariance is zero. Inverse movement results in covariance that is negative.

If the random variable pair (X, Y) can take on the values (xi, yi) for i = 1, ... , n, with equal probabilities 1/n, then the covariance can be equivalently written in terms of the means E (X) and E (Y) as:

$$COV_{xy} = \frac{1}{n}\sum_{i=1}^{n}[x_i - E(x)(y_i - E(y)]$$

Where the probabilities are equal and

COV_{xy} = covariance between x and y

x_i = return on security x

y_i = return on security y

E(X) = expected return to security x

E(Y) = expected return to security y

n = number of observations

Continuing with the above illustration,

	Return	Expected Return	Difference	Product
Stock X	7	9	-2	
Stock Y	13	9	4	-8
Stock X	11	9	2	
Stock Y	5	9	-4	
				-8

$$COV = \frac{1}{2}[(7 - 9)(13 - 9) + [(11 - 9)(5 - 9)]$$

$$= \frac{1}{2}[(-8) + (-8)] = \frac{-16}{2} = -8$$

Coefficient of Correlation

Covariance and correlation are conceptually analogous in the sense that both of them reflect the degree of comovements between two variables.

The coefficient of correlation is a measure designed to indicate the similarity or dissimilarity in the behavior of two variables. We define it as :

$$Cor_{(xy)} = r_{xy} = \frac{cov_{(xy)}}{\sigma x \sigma y}$$

where:

r_{xy} = coefficient of correlation of x and y

COV_{xy} = covariance between x and y

σ_x = standard deviation of x

σ_y = standard deviation of y

The coefficient of correlation is, essentially, the covariance taken not as an absolute value but relative to the standard deviations of the individual securities (variables). It indicates, in effect, how much x and y vary together as a proportion of their combined individual variations, measured by σ_x σ_y In our example, the coefficient of correlation is :

$$r_{xy} = (-) \ 8/[(2)(4)] = -8/8 = -1.0$$

If the coefficient of correlation between two securities is -1.0, then a perfect negative correlation exists (rxy cannot be less than -1.0). If the correlation coefficient is zero, then returns are said to be independent of one another. If the returns on two securities are perfectly correlated, the correlation coefficient will be +1.0, and perfect positive correlation is said to exist (r_{xy} cannot exceed +1.0).

Thus, correlation between two securities depends upon (1) the covariance between the two securities, and (2) the standard deviation of each security.

Calculation of Portfolio Risk

We have shown the effect of diversification on reducing risk. The key was not that two stocks provided twice as much diversification as one, but that by investing in securities with negative or low covariance among themselves, we could reduce the risk. Markowitz's efficient diversification involves combining securities with less than positive correlation in order to reduce risk in the portfolio without sacrificing any of the portfolio's return. In general, the lower the correlation of securities in the portfolio, the less risky the portfolio will be. This is true regardless of how risky the stocks of the portfolio are when analyzed in isolation. It is not enough to invest in many securities; it is necessary to have the right securities.

Let us conclude our two-security example in order to make some valid generalization. Then we can see what three-security and larger portfolios might be like. In considering a two-security portfolio, portfolio risk can be defined more formally now as:

$$\sigma_p = \sqrt{W_x^2 . \sigma_x^2 + W_y^2 . \sigma_y^2 + 2W_x W_y (r_{xy} \sigma_x \sigma_y)} \quad \text{Eq.9.1}$$

Where:

σ_p = portfolio standard deviation

w_x = percentage weightage of total portfolio value in stock X

w_y = percentage weightage of total portfolio value in stock Y

σ_x = standard deviation of stock X

σ_y = standard deviation of stock Y

r_{xy} = correlation coefficient of X and Y

Note: $r_{xy} \ \sigma_x \ \sigma_y = cov_{xy}$

Thus we now have the standard deviation of a portfolio of two securities. We are able to see that portfolio risk (σ_p) is sensitive to

(i) the proportions of funds devoted to each stock,

(ii) the standard deviation of each stock, and

(iii) the covariance between the two stocks.

If the stocks are independent of each other, the correlation coefficient is zero (r_{xy} = 0). Second, if r_{xy} is greater than zero, the standard deviation of the portfolio is greater than if r_{xy} = 0. Third, if r_{xy} is less than zero, the covariance term is negative, and portfolio standard deviation is less than it would be if rxy were greater than or equal to zero. Risk can be totally eliminated only if the third term is equal to the sum of the first two terms. This occurs only if (1) r_{xy} = -1.0, and (2) the percentage of the portfolio in stock X is set equal to $W_x = \sigma/(\sigma_x + \sigma_y)$.

To clarify these general statements, let us return to our earlier example of stocks X and Y. In our example, remember that

	Stock X	**Stock Y**
Expected return (%)	9	9
Standard deviation (%)	2	4

We calculated the covariance between the two stocks and found it to be -8. The coefficient of correlation was -1.0. The two securities were perfectly negatively correlated.

Changing the proportion of amount invested

What happens to portfolio risk as we change the total portfolio value invested in X and Y? Using Equation 9.1, we get:

Stock X (%)	Stock Y (%)	Portfolio Standard Deviation
100	0	2.0
80	20	0.8
66	34	0.0
20	80	2.8
0	100	4.0

Notice that portfolio risk can be brought down to zero by the skillful balancing of the proportions of the portfolio to each security. The preconditions were r_{xy} = -1.0 and the proportion of amount invested in X is $W_x = \sigma y/(\sigma_x + \sigma_y)$, or 4/(2 + 4) = .666.

Changing the Coefficient of Correlation

What effect would be there using x = $^2/_3$ and y = $^1/_3$ if the correlation coefficient between stocks X and Y had been other than -1.0? Using Equation 9.1 and various values for r_{xy}, we have

r_{xy}	Portfolio Standard Deviation
-0.5	1.34*
0.0	1.9
+0.5	2.3
+1.0	2.658

$$*\sigma_p = \sqrt{(.666)^2(2)^2 + (.334)(4)^2 + (2)(.666)(.334)(-5)(2)(4)}$$

$$= \sqrt{1.777 + 1.777 - (.444)(4)} = \sqrt{1.77} = 1.34$$

If no diversification effect had occurred, then the total risk of the two securities would have been the weighted sum of their individual standard deviations:

Total undiversified risk = (.666)(2) + (.334)(4) = 2.658

Since the undiversified risk is equal to the portfolio risk of perfectly positively correlated securities (r_{xy} = +1.0), we can see that favorable portfolio effects occur only when securities are not perfectly positively correlated.

Figure: 10.1 : Graphic illustration of the correlation between two securities
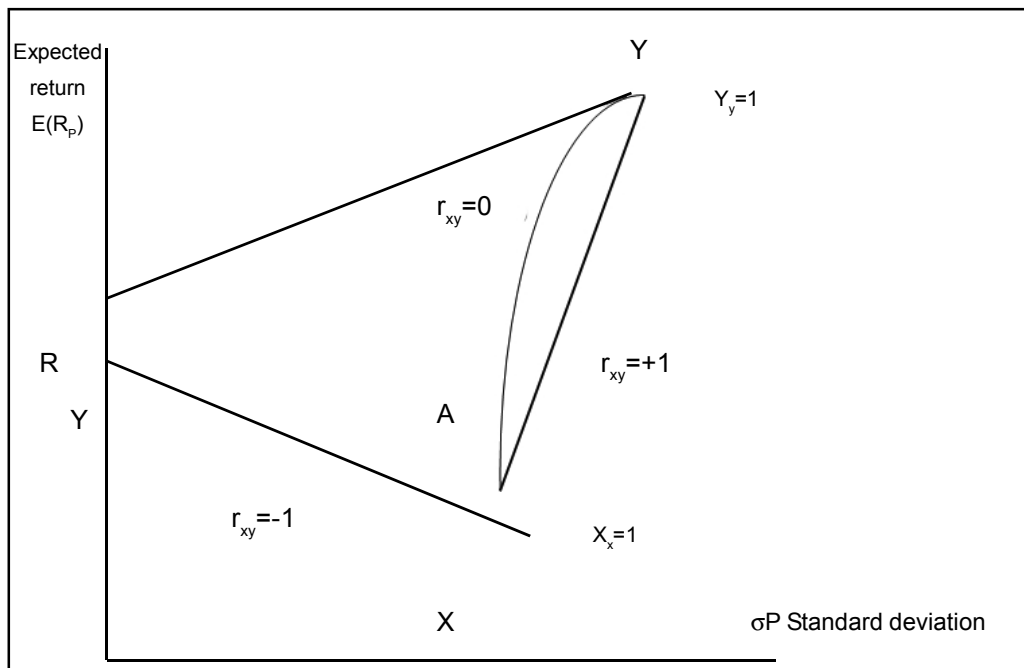
Line XY represent various combinations of X and Y. Point X has 100% holding of X and point Y has 100% holding of Y. The coefficient of correlation along XY is +1. It means that 100% holding of X is least risky and 100% holding of Y is most risky.

Segment XAY has zero correlation and line XR has –1 coefficient of correlation.

The crucial point of how to achieve the proper proportions of X and Y in reducing the risk to zero will be taken up in the Markowitz model. However, the general notion is clear. The risk of the portfolio is reduced by playing off one set of variations against another.

MARKOWITZ MODEL

Dr. Harry M. Markowitz is credited with developing the first modern portfolio analysis model. It provides a theoretical framework for analysis of risk-return choices. The concept of efficient portfolios has been enunciated in this model A portfolio is efficient when it yields highest return for a particular level of risk or minimizes risk for a specified level of expected return.

The Markowitz model makes the following assumptions regarding investor behaviour:

– Investors consider each investment alternative as being represented by a probability distribution of expected returns over some holding period.

- Investors maximize one period expected utility and possess utility curve, which demonstrates diminishing marginal utility of wealth.

- Individuals estimate risk on the basis of variability of expected returns.

- Investors base decisions solely on expected return and variance of returns only.

- At a given risk level, higher returns are preferred to lower returns. Similarly for a given level of expected returns, investors prefer less risk to more risk.

Simple Markowitz Portfolio Optimization

It is possible to develop a fairly simply decision rule for selecting an optimal portfolio for an investor that can take both risk and return into account. This is called a risk-adjusted return. For simplicity, it can be termed the utility of the portfolio for the investor in question. Utility is the expected return of the portfolio minus a risk penalty. This risk penalty depends on portfolio risk and the investor's risk tolerance.

The Risk Penalty

The more risk one must bear, the more undesirable is an additional unit of risk. Theoretically, and as a computational convenience, it can be assumed that twice the risk is four times as undesirable. The risk penalty is as follows:

Risk penalty = Risk squared/Risk tolerance

Risk squared is the variance of return of the portfolio. Risk tolerance is a number from zero through 100. The size of the risk tolerance number reflects the investor's willingness to bear more risk for more return. Low (high) tolerance indicates low (high) willingness. Risk penalty is less as tolerance is increased.

For example, if a portfolio's expected return is 13 percent, variance of return (risk squared) is 225 percent, and the investor's risk tolerance is 50. the risk penalty is 4.5 percent:

Risk penalty = 225%/50 = 4.5%

Since utility is expected return minus the risk penalty, we have

Utility = 13 – 4.5 = 8.5%

The optimal (best) portfolio for an investor would be the one from the opportunity set (efficient frontier) that maximizes utility.

Efficient Frontier
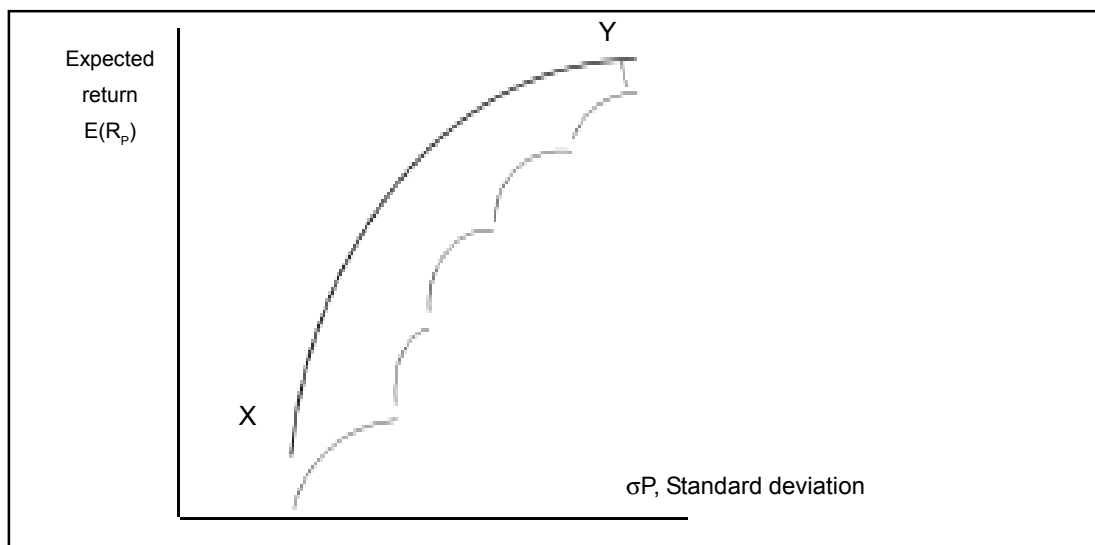
Standard Deviation

In the above graphic presentation, arc XY is the efficient frontier. All points on this arc provide a superior combination of risk and return to other combinations with the shaded area, which represent attemptable portfolios. Each portfolio has its own combination of risk and return. Investor's final choice out of the range depends on his taste.

Portfolio Optimization
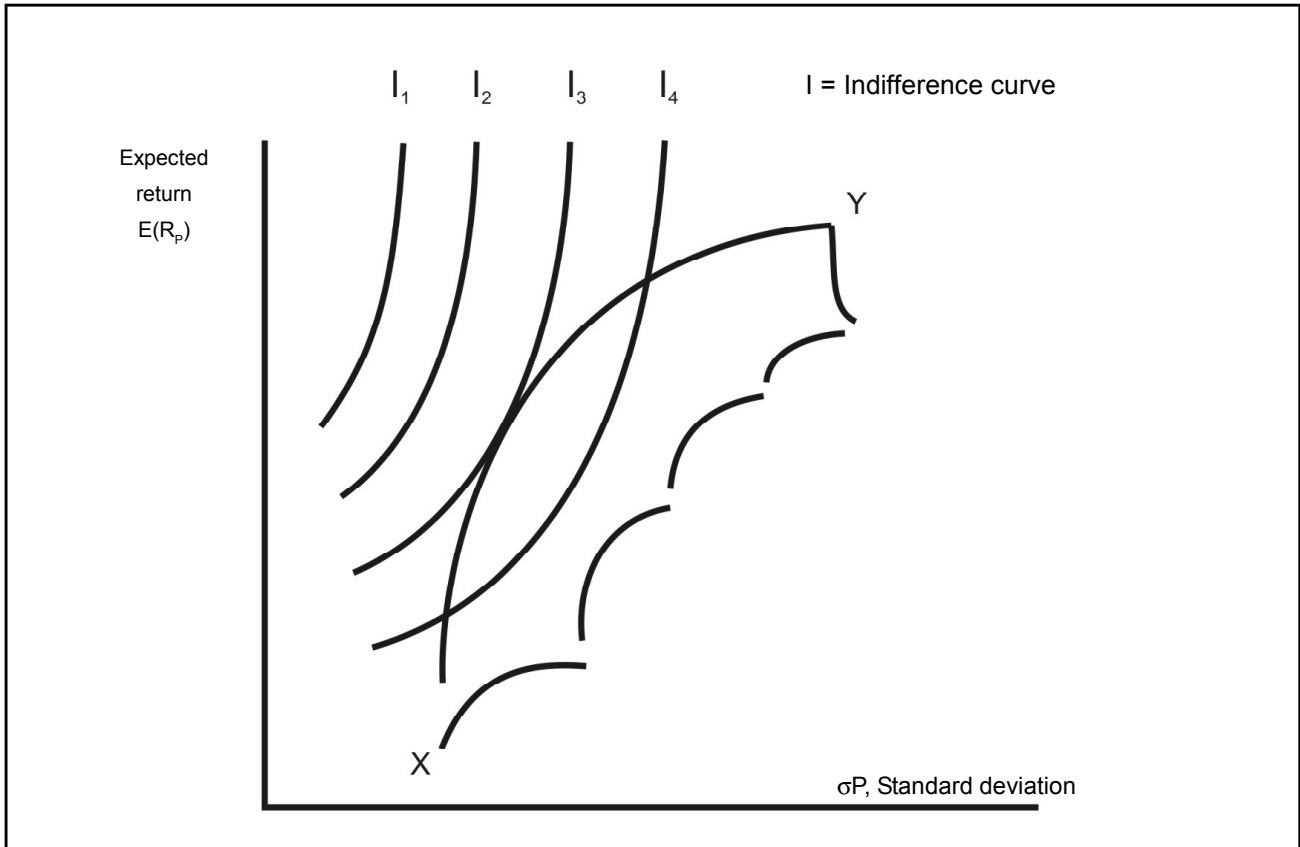
The investor has four indifference curves.

In I_1 to I_4, I_1 provides greatest satisfaction but since the efficient range touches only I_3 is the maximum that can be achieved.

Limitation of Markowitz Model

The Markowitz approach requires several inputs for portfolio analysis. These are expected return of the securities, variances of their return and co variances. Calculation of efficient portfolios is easy when the number of securities in the portfolio is two or three. As the number of securities in the portfolio increases, which indeed is the case in real life situations, the amount of calculations required to be done becomes enormous. Further, in the real world, portfolio analysts do not keep track of correlations between stocks of diverse industries. As such, correlating a security to a common index is much more convenient than correlating to a large number of individuals securities.

Secondly, the assumption that correlation in the values of two securities depends on the characteristics of these two securities alone is not valid. In fact movement in value of securities is affected by a variety of other factors. A stock index is more representative benchmark that incorporates the general economic conditions more authentically.

CAPITAL ASSET PRICING MODEL

The CAPM developed by William F Sharpe, John Linter and Jan Mossin establishes a linear relationship between the required rate of return of a security and its beta. Beta, as we know is the non-diversifiable risk in a portfolio. A portfolio's standard deviation is a good indicator of its risk. Thus if adding a stock to a portfolio increases its standard deviation, the stock adds to the risk of the portfolio. This risk is the un-diversified risk that can not be eliminated. Beta measures the relative risk associated with any individual portfolio as measured in relation to the risk of the market portfolio.

> Beta =   Non-diversifiable risk of asset or portfolio
>   Risk of market portfolio

Thus Beta is a measure of the non-diversifiable or systematic risk of an asset relative to that of the market portfolio. A beta of 1 indicates an asset of average risk. If beta is more than 1, then the stock is riskier than the market. On the other hand, if beta is less than one, market is riskier.

Recall that portfolio theory implied that each investor faced an efficient frontier. In general, the efficient frontier will differ among investors because of differences in expectations. When we introduce riskless borrowing and lending there are some significant changes involved. Lending is best thought of as an investment in a riskless security. This security might be a savings account, Treasury bills, or even high-grade commercial paper. Borrowing can be thought of as the use of margin. Borrowing and lending options transform the efficient frontier into a straight line. See Figure below for the standard efficient frontier ABCD. Assume that an investor can lend at the rate of $R_F = .05$, which represents the rate on Treasury bills.

Frontier with introduction of Lending
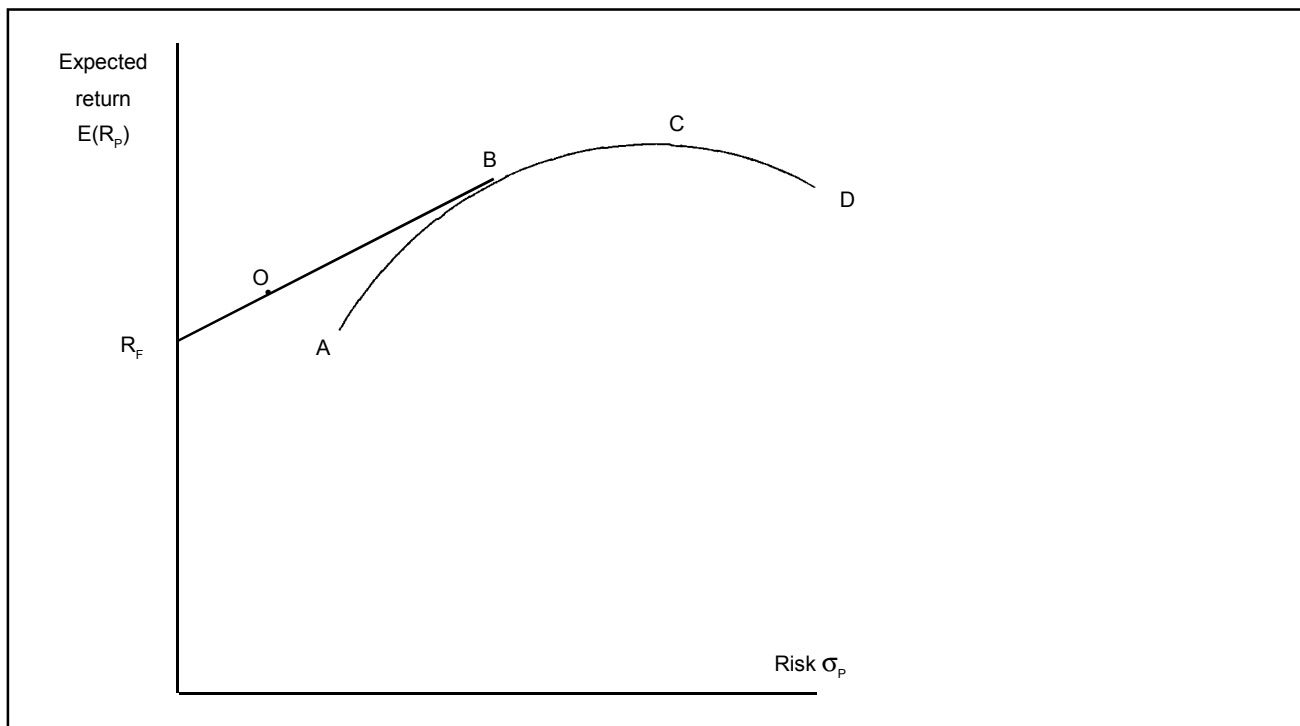
Hence the point R_F represents a risk-free investment ($R_F = .05; \sigma p = 0$). The investor could place all or part of his funds in this riskless asset. If he placed part of his funds in the risk-free asset and part in one of the portfolios of risky securities along the efficient frontier, what would happen? He could generate portfolios along the straight-line segment R_F B.

Let us examine the properties of a given portfolio along the straight-line segment R_F B. Consider point B on the original efficient frontier ABCD where, say, Rp = .10 and σp = .06. If we placed one-half of available funds in the riskless asset and one-half in the risky portfolio, B, the resulting combined risk-return measures for the mixed portfolio, O, can be found from Equation A and B:

$$R_p = XR_M + (1 - X)R_F \quad \text{(Equation A)}$$

where:

   Rp = expected return on portfolio

   X = percentage of funds invested in risky portfolio

   (1 – X) = percentage of funds invested in riskless asset

   R_M = expected return on risky portfolio

   R_F = expected return on riskless asset

and:

$$\sigma_p = X \, \sigma_M \quad \text{(Equation B)}$$

where:

   σ_p = expected standard deviation of the portfolio

   X = percentage of funds invested in risky portfolio

   σ_M = expected standard deviation on risky portfolio

For our example, the risk-return measures for portfolio M are:

$$R_p = (\frac{1}{2})\,(.10) + (\frac{1}{2})\,(.05) = .075$$

$$\sigma_p = (\frac{1}{2})\,(.06) + (\frac{1}{2})\,(.00) = .03$$

The result indicates that our return and risk have been reduced. All point between R_F and B can be similarly determined using equation (A) and (B). As stated, the locus of these points will be a straight line

Introduction of the possibility of borrowing funds will change the shape of our efficient frontier in equation 1 to the right of point B. In borrowing, we consider the possibilities associated with total funds invested being enlarged through trading on the equity.

Consider three cases. If we assume that X is the percentage of investment wealth or equity placed in the risky portfolio, then where X = 1, investment wealth is totally committed to the risky portfolio. Where X < 1, only a fraction of X is placed in the risky portfolio, and the remainder is lent at the rate R_F. The third case, X > 1, signifies that the investor is borrowing rather than lending. It may be easier to visualize this by rewriting Equation A as follows:

$$R_p = XR_M - (X - 1)\,R_F \quad \text{(Equation C)}$$

where all terms are as in Equation (A) and the term R_F is the borrowing rate. For simplicity, the borrowing rate and lending rate are assumed to be equal or 5 percent. The first component of Equation (C) is the gross return made possible because the borrowed funds, as well as the original wealth or equity, are invested in the risky portfolio. The second term refers to the cost of borrowing on a percentage basis. For example, X = 1.25 would indicate that the investor borrows an amount equal to 25 percent of his investment wealth. This is equivalent

to a margin requirement of 80 percent (X = 1/margin requirement). His net return on his investment wealth would become:

R_p = (1.25) (.10) – (0.25) (.05) = .1125

The associated risk would become:

σp = Xσ_p = (1.25) (.06) = .075

Hence the levered portfolio provides increased return with increased risk.

The introduction of borrowing and lending has given us an efficient frontier that is a straight line throughout. In Figure below, we show the new efficient frontier. Point M now represents the optimal combination of risky securities. The existence of this combination simplifies our problem of portfolio selection. The investor need only decide how much to borrow or lend. No other investments or combination of investments available is as efficient as point M. the decision to purchase M is the Investment decision. The decision to buy some riskless asset (lend) or to borrow (leverage the portfolio) is the financing decision.

Efficient Frontier with Borrowing and Lending
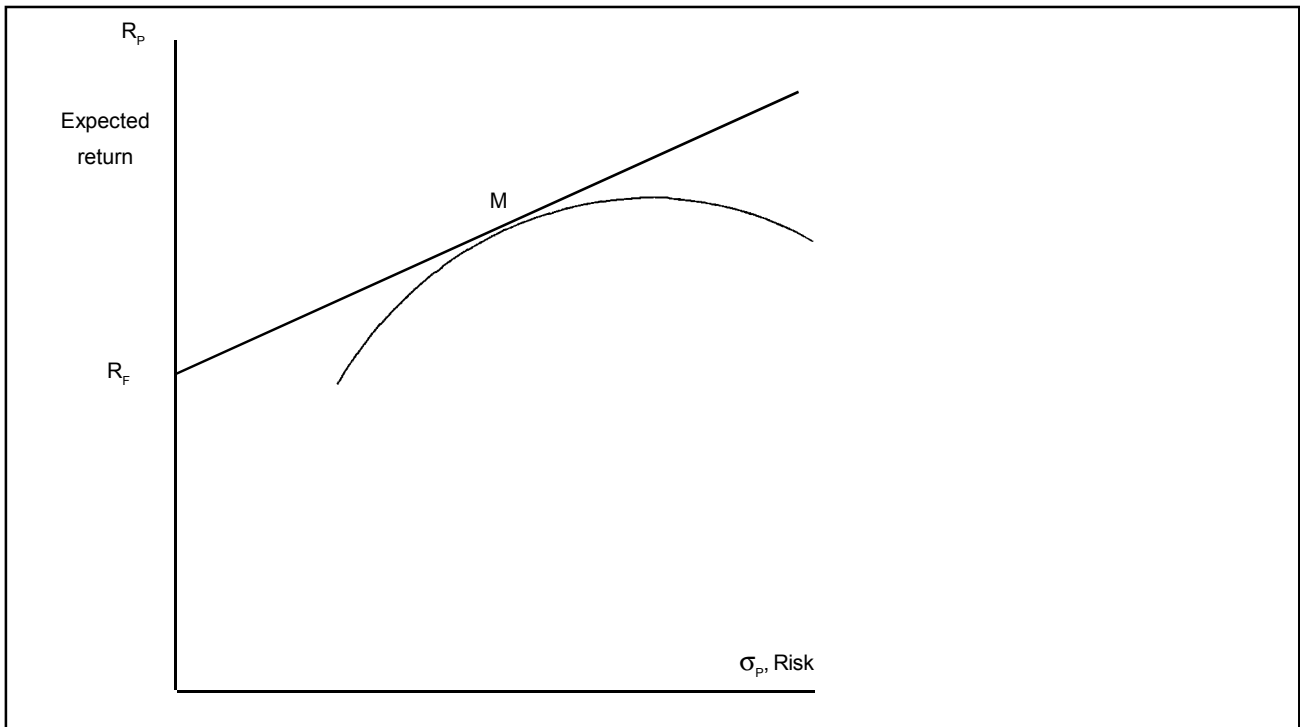
These conditions give rise to what has been referred to as the separation theorem. The theorem implies that all investors, conservative or aggressive, should hold the same mix of stocks from the efficient set. They should use borrowing or lending to attain their preferred risk class. This conclusion flies in the face of more traditional notions of selection of portfolios for conservative clients and others for investors who are more daring. This analysis suggests that both types of investors should hold identically risky portfolios. Desired risk levels are then achieved through combining portfolio M with lending and borrowing.

If all investors face similar expectations and the same lending and borrowing rate, they will face a diagram such as that in Figure above and, furthermore, all of the diagrams will be identical. The portfolio of assets held by any investor will be identical to the portfolio of risky assets held by any other investor. If all investors hold the same risky portfolio, then, in equilibrium, it must be the market portfolio (M). The market portfolio is a portfolio comprised of all risky assets. Each asset will be held in the proportion which the market value of the asset represents to the total market value of all risky assets. This is the key: All investors will hold combinations of only two portfolios, the market portfolio and a riskless security.

The straight line depicted in Figure above is referred to as the Capital Market Line. All investors will end up with portfolios somewhere along the capital market line and all efficient portfolios would lie along the capital market line. However, not all securities or portfolios lie along the capital market line. From the derivation of the efficient frontier we know that all portfolios, except those that are efficient, lie below the capital market line.

Observing the capital market line tells us something about the market price of risk. The equation of the capital market line (connecting the riskless asset with a risky portfolio) is

$$R_e = R_F + \frac{R_M - R_F}{\sigma_M} \sigma_e$$

where the subscript e denotes an efficient portfolio.

The term $(R_M - R_F)/\sigma M$ can be thought of as the extra return that can be gained by increasing the level of risk (standard deviation) on an efficient portfolio by one unit.

The entire second term on the right side of the equation is thus the market price of risk times the amount of risk in the portfolio. The expression R_F is the price of time. That is, it is the price paid for delaying consumption for one period. The expected return on an efficient portfolio is :

(Price of time) + (Price of risk) (Amount of risk)

Although this equation sets the return on an efficient portfolio, we need to go beyond to deal with returns on nonefficient portfolios or on individual securities.

Security Market Line

For well-diversified portfolios, nonsystematic risk tends to go to zero, and the only relevant risk is systematic risk measured by beta. Since we assume that investors are concerned only with expected return and risk, the only dimensions of a security that need be of concern are expected return and beta.

We have seen that all investments and all portfolios of investments lie along a straight line in the return-to-beta space. To determine this line we need only connect the intercept (beta of zero, or riskless security) and the market portfolio (beta of one and return of R_M). These two points identify the straight line shown in Figure below. The equation of a straight line is

$Ri = \alpha + b\beta i$

The first point on the line is the riskless asset with a beta of zero, so

$R_F = \alpha + b(0)$

$R_F = \alpha$

FIGURE The Security Market Line
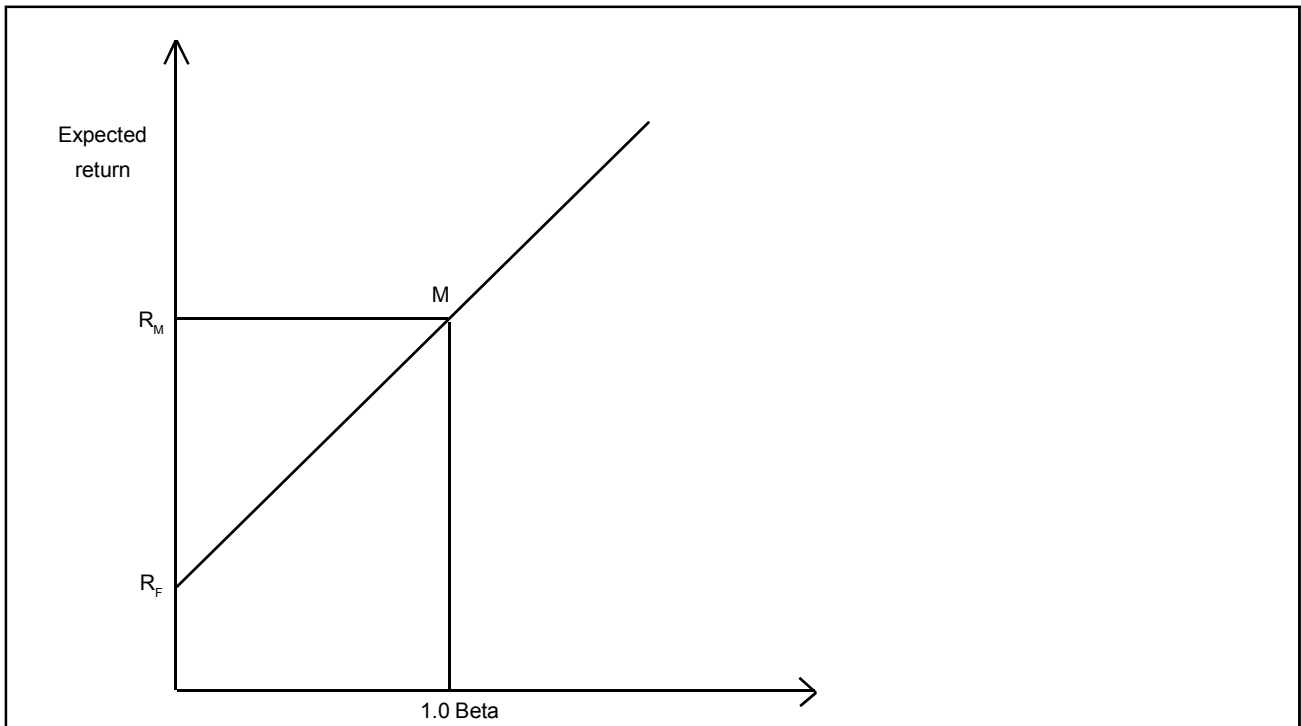
The second point on the line is the market portfolio with a beta of 1. Thus,

$R_M = \alpha + b(1)$

$R_M - \alpha = b$

$(R_M - R_F) = b$

Combining the two results gives us :

$R_i = R_F + \beta i \, (R_M - R_F)$

This is a key relationship. It is called the Security Market Line. It describes the expected return for all assets and portfolios of assets, efficient or not. The difference between the expected return on any two assets can be related simply to their difference in beta. The higher beta is for any security, the higher must be its expected return. The relationship between beta and expected return is linear.

Recall that the risk of any stock could be divided into systematic and unsystematic risk. Beta is an index of systematic risk. This equation suggests that systematic risk is the only important ingredient in determining expected returns. Unsystematic risk is of no consequence. It is not total variance of returns that affects returns, only that part of the variance in returns that cannot be eliminated by diversification.

The CAPM is based on a list of critical assumptions:

– 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.

– Investors make their investments decisions based on a single period horizon which is the immediate next time period.

- Transaction costs are either absent or so low that these can be ignored.

- Assets can be bought and sold in any desired unit.

- The investor is limited by his wealth and the price of the asset only.

- Taxes do not affect the choice of buying assets.

- All individuals assume that they can buy the 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 is equal to the required rate of return because the market is in equilibrium. The risk-less rate can be earned by investing in instruments like treasury bills. In addition to the risk free rate, investors also expect a premium over and above the risk free rate to compensate them for investing in risky assets since they are risk averse. Thus, the required rate of return for the investors becomes equal to the sum of Risk-free rate and the risk premium.

The risk premium can be calculated as the product of Beta and market risk premium, i.e. difference between expected rate of return and risk-free rate of return.

ARBITRAGE PRICING THEORY

The capital asset pricing model (CAPM) asserts that only a single number – a security's beta against the market – is required to measure risk. At the core of arbitrage pricing theory (APT) is the recognition that several systematic factors affect security return.

The returns on an individual stock will depend upon a variety of anticipated and unanticipated events. Anticipated events will be incorporated by investors into their expectations of returns on individual stocks and thus will be incorporated into market prices. Generally, however, most of the return ultimately realized will result from unanticipated events. Of course, change itself is anticipated, and investors know that the most unlikely occurrence of all would be the exact realization of the most probable future scenario. But even though we realize that some unforeseen events will occur, we do not know their direction or their magnitude. What we can know is the sensitivity of returns to these events.

Systematic factors are the major sources of risk in portfolio returns. Actual portfolio returns depend upon the same set of common factors, but this does not mean that all portfolios perform identically. Different portfolios have different sensitivities to these factors.

Because the systematic factors are primary sources of risk, it follows that they are the principal determinants of the expected, as well as the actual, returns on portfolios. It is possible to see that the actual return, R, on any security or portfolio may be broken down into three constituent parts, as follows:

(Z) $R = E + bf + e$

where:

E = expected return on the security

b = security's sensitivity to change in the systematic factor

f = the actual return on the systematic factor

e = returns on the unsystematic, idiosyncratic factors

Equation Z merely states that the actual return equals the expected return, plus factor sensitivity times factor movement, plus residual risk.

Empirical work suggests that a three-or-four-factor model adequately captures the influence of systematic factors on stock-market returns. Equation Z may thus be expanded to:

R = E + (b1) (f1) + (b2) (f2) + (b3) (f3) + (b4) (f4) + e

Each of the four middle terms in this equation is the product of the returns on a particular economic factor and the given stock's sensitivity to that factor. Suppose f3 is associated with labor productivity. As labor productivity unexpectedly increases, f3 is positive, and firms with high b3 would find their returns very high. The subtler rationale and higher mathematics of APT are left for development elsewhere.

What are these factors? They are the underlying economic forces that are the primary influences on the stock market. Research suggests that the most important factors are unanticipated inflation, changes in the expected level of industrial production, unanticipated shifts in risk premiums, and unanticipated movements in the shape of the term structure of interest rates.

The biggest problems in APT are factor identification and separating unanticipated from anticipated factor movements in the measurement of sensitivities. Any one stock is so influenced by idiosyncratic forces that it is very difficult to determine the precise relationship between its return and a given factor. Far more critical is the measurement of the b's. The b's measure the sensitivity of returns to unanticipated movements in the factors. By just looking at how a given stock relates to, say, movements in the money supply, we would be including the influence of both anticipated and unanticipated changes, when only the latter are relevant.

Empirical testing of APT is still in its infancy, and concrete results proving the APT or disproving the CAPM do not exist. For these reasons it is useful to regard CAPM and APT as different variants of the true equilibrium pricing model. Both are, therefore, useful in supplying intuition into the way security prices and equilibrium returns are established.

SHARPE SINGLE AND MULTI INDEX MODELS

Sharpe Index Model

One Simplification of CAPM formula was done by Sharpe (1963), who developed the Single-Index Model. The single-index model imposes restrictions on how security returns can covary. In particular, it is assumed that all covariance arises through an "index." As we will see, this leads to a dramatic reduction in complexity. Sharpe's model has since been extended to multi-index models, and leads to a more general theory called the Arbitrage Pricing Theory, developed by Ross (1976). Besides simplifying the covariance matrix, this approach is easily extended to take account of non-financial factors. In the multi-index model, for example, one of the indexes could easily be the rate of inflation.

Single-Index Model

The major assumption of Sharpe's single-index model is that all the covariation of security returns can be explained by a single factor. This factor is called the index, hence the name "single-index model."

According to the Sharpe single index model the return for each security can be given by the following equation:

$R_i = \alpha_i \, \beta_i \, R_m + e_i$

Where R_i = Expected return on a security

α_i = Alpha Coefficient

β_i = Beta Coefficient

R_M = Expected Return in market (an Index)

e = Error term with a mean of zero and a constant standard deviation.

Alpha Coefficient refers to the value of Y in the equation $Y = \alpha + \beta x$ when x = 0.

Beta Coefficient is the slope of the regression line and is a measure of the changes in value of the security relative to changes in values of the index.

A beta of +1.0 means that a 10% change in index value would result in a 10% change in the same direction in the security value. A beta of 0.5 means that a 10% change in index value would result in 5% change in the security value. A beta of – 1.0 means that the returns on the security are inversely related.

The equation given above can also be rearranged as shown below:

$R = \beta R_M + \alpha + e$

Here the component βR_M is the market related or systematic component of the return. The other component represents the unsystematic component. As is assumed to be near zero the unsystematic return is given by alpha only.

Multi-Index Model

The single index model is in fact an oversimplification. It assumes that stocks move together only because of a common co-movement with the market. Many researchers have found that there are influences other than the market that cause stocks to move together. Multi-index models attempt to identify and incorporate these non-market or extra-market factors that cause securities to move together also into the model. These extra-market factors are a set of economic factors that account for common movement in stock prices beyond that accounted for by the market index itself. Fundamental economic variables such as inflation, real economic growth, interest rates, exchange rates etc. would have a significant impact in determining security returns and hence, their co-movement.

A multi-index model augments the single index model by incorporating these extra market factors as additional independent variables. For example, a multi-index model incorporating the market effect and three extra-market effects takes the following form:

$$\bar{R}_i = \alpha_i + \beta_m R_m + \beta_1 R_1 + \beta_2 R_2 + \beta_3 R_3 + e_i$$

The model says that the return of an individual security is a function of four factors – the general market factor R_m and three extra-market factors R_1, R_2, R_3. The beta coefficients attached to the four factors have the same meaning as in the single index model. They measure the sensitivity of the stock return to these factors. The alpha parameter α_i and the residual term e_i also have the same meaning as in the single index model.

Calculation of return and risk of individual securities as well as portfolio return and variance follows the same pattern as in the single index model. These values can then be used as inputs for portfolio analysis and selection.

A multi-index model is an alternative to the single index model. However, it is more complex and requires more data estimates for its application. Both the single index model and the multi-index model have helped to make portfolio analysis more practical.

SIMPLE SHARPE PORTFOLIO OPTIMIZATION

The construction of an optimal portfolio is simplified if there is a single number that measures the desirability of including a stock in the optimal portfolio. If we accept the single index model (Sharpe), such a number exists. In this case, the desirability of any stock is directly related to its excess return-to-beta ratio.

$(R_i – R_F)/\beta_i$

where:

R_i = expected return on stock i

R_F = return on a riskless asset

β_i = expected change in the rate of return on stock i associated with a 1 percent change in the market return

If stocks are ranked by excess return to beta (from highest to lowest), the ranking represents the desirability of any stock's inclusion in a portfolio. The number of stocks selected depends on a unique cutoff rate such that all stocks with higher ratios of $(R_i – R_F)/ \beta i$ wil be included and all stocks with lower ratios excluded.

To determine which stocks are included in the optimum portfolio, the following steps are necessary:

1. Calculate the excess return-to-beta ratio for each stock under review and the rank from highest to lowest.

2. The optimum portfolio consists of investing in all stocks for which $(R_i – R_F)/ \beta i$ is greater than a particular cutoff point C.

Sharpe notes that proper diversification and the holding of a sufficient number of securities can reduce the unsystematic component of portfolio risk to zero by averaging out the unsystematic risk of individual stocks. What is left is systematic risk which, is determined by the market (index), cannot be eliminated through portfolio balancing. Thus, the Sharpe model attaches considerable significance to systematic risk and its most important measure, the beta coefficient (ß).

According to the model, the risk contribution to a portfolio of an individual stock can be measured by the stock's beta coefficient. The market index will have a beta coefficient of +1.0. A stock with a beta of, for example, +2.0 indicates that it contributes far more risk to a portfolio than a stock with, say,a beta of + .05. Stocks with negative betas are to be coveted, since they help reduce risk beyond the unsystematic level.

Since efficient portfolios eliminate unsystematic risk, the riskiness of such portfolios is determined exclusively by market movements. Risk in an efficient portfolio is measured by the portfolio beta. The beta for the portfolio is simply the weighted average of the betas of the component securities. For example, an optimal portfolio which has a beta of 1.35, suggests that it has a sensitivity above the + 1.0 attributed to the market. If this portfolio is properly diversified (proper number of stocks and elimination of unsystematic risk), it should move up or down about one-third more than the market. Such a high beta suggests an aggressive portfolio. Should the market move up over the holding period, this portfolio will be expected to advance substantially. However, a market decline should find this portfolio falling considerably in value.

In this way, establishing efficient portfolios (minimum risk for a given expected return) comprising broad classes of assets (e.g., stocks, bonds, real estate) lends itself to the mean-variance methodology suggested by Markowitz. Determining efficient portfolios within an asset class (e.g., stocks) can be achieved with the single index (beta) model proposed by Sharpe.

RISK ADJUSTED MEASURE OF PERFORMANCE

Does the choice of risk-adjusted performance measure matter? This is the question the current discussion in academic literature revolves around. Risk-adjusted performance measures are an important tool for investment decisions. Whenever an investor evaluates the performance of an investment he will not only be interested in the achieved absolute return but also in the risk-adjusted return – i.e. in the risk which had to be taken to realize the profit.

The first ratio to measure risk-adjusted return was the Sharpe Ratio introduced by William F. Sharpe in 1966. It has been one of the most referenced risk/return measures used in finance, and much of this popularity can be attributed to its simplicity. The ratio's credibility was boosted further when Professor Sharpe won a Nobel Memorial Prize in Economic Sciences in 1990 for his work on the capital asset pricing model (CAPM).

The Ratio Defined

Most people with a financial background can quickly comprehend how the Sharpe ratio is calculated and what it represents. The ratio describes how much excess return you are receiving for the extra volatility that you endure for holding a riskier asset. Remember, you always need to be properly compensated for the additional risk you take for not holding a risk-free asset.

$S(X) = (r_X - R_f)/StdDev(X)$

where

- – X is the investment
- – r_X is the average rate of return of x
- – R_f is the best available rate of return of a risk-free security (i.e. T-bills)
- – StdDev(X) is the standard deviation of x

Return (r_x)

The returns measured can be of any frequency (i.e. daily, weekly, monthly or annually), as long as they are normally distributed, as the returns can always be annualized. Herein lies the underlying weakness of the ratio - not all asset returns are normally distributed.

Abnormalities like kurtosis, fatter tails and higher peaks, or skewness on the distribution can be a problematic for the ratio, as standard deviation doesn't have the same effectiveness when these problems exist. Sometimes it can be downright dangerous to use this formula when returns are not normally distributed.

Risk-Free Rate of Return (r_f)

The risk-free rate of return is used to see if you are being properly compensated for the additional risk you are taking on with the risky asset. Traditionally, the risk-free rate of return is the shortest dated government T-bill. While this type of security will have the least volatility, some would argue that the risk-free security used should match the duration of the investment it is being compared against.

For example, equities are the longest duration asset available, so shouldn't they be compared with the longest duration risk-free asset available - government issued inflation-protected securities (IPS)?

Standard Deviation [StdDev(x)]

Now that we have calculated the excess return from subtracting the return of the risky asset from the risk-free rate of return, we need to divide this by the standard deviation of the risky asset being measured. As mentioned above, the higher the number, the better the investment looks from a risk/return perspective.

However, unless the standard deviation is very large, leverage may not affect the ratio. Both the numerator (return) and denominator (standard deviation) could be doubled with no problems. Only if the standard deviation gets too high do we start to see problems. For example, a stock that is leveraged 10 to 1 could easily see a price drop of 10%, which would translate to a 100% drop in the original capital and an early margin call.

Using the Sharpe Ratio

The Sharpe ratio is a risk-adjusted measure of return that is often used to evaluate the performance of a portfolio. The ratio helps to make the performance of one portfolio comparable to that of another portfolio by making an adjustment for risk.

For example, if manager A generates a return of 15% while manager B generates a return of 12%, it would

appear that manager A is a better performer. However, if manager A, who produced the 15% return, took much larger risks than manager B, it may actually be the case that manager B has a better risk-adjusted return.

To continue with the example, say that the risk free-rate is 5%, and manager A's portfolio has a standard deviation of 8%, while manager B's portfolio has a standard deviation of 5%. The Sharpe ratio for manager A would be 1.25 while manager B's ratio would be 1.4, which is better than manager A. Based on these calculations, manager B was able to generate a higher return on a risk-adjusted basis.

To give you some insight, a ratio of 1 or better is considered good, 2 and better is very good, and 3 and better is considered excellent.

The Sharpe ratio is quite simple, which lends to its popularity. It's broken down into just three components: asset return, risk-free return and standard deviation of return. After calculating the excess return, it's divided by the standard deviation of the risky asset to get its Sharpe ratio. The idea of the ratio is to see how much additional return you are receiving for the additional volatility of holding the risky asset over a risk-free asset - the higher the better.

ECONOMIC VALUE ADDED

Adam Smith, one of the fathers of classical economic thought, observed that firms and resource suppliers, seeking to further their own self-interest and operating within the framework of a highly competitive market system, will promote the interest of the public, as though guided by an "invisible hand. " (Smith, 1776)

The market mechanism of supply and demand communicates the wants of consumers to businesses and through businesses to resource suppliers. Competition forces business and resource suppliers to make appropriate responses. The impact of an increase in consumer demand for some product will raise that goods price. The resulting economic profits signal other producers that society wants more of the product. Competition simultaneously brings an expansion of output and a lower price.

Profits cause resources to move from lower valued to higher valued uses. Prices and sales are dictated by the consumer. In the quest for higher profits, businesses will take resources out of areas with lower than normal returns and put them into areas in which there is an expectation of high profits.

Profits allocate resources

The primary objective of any business is to create wealth for its owners. If nothing else the organization must provide a growth dividend to those who have invested expecting a value reward for their investment. As companies generate value and grow, society also benefits. The quest for value directs scarce resources to their most promising uses and most productive uses. The more effectively resources are employed and managed, the more active economic growth and the rate of improvement in our standard of living as a society. Although there are exceptions to the rule relating to the value of economic wealth, most of the time there is a distinct harmony between creating increased share value of an organization and enhancing the quality of life of people in society.

In most companies today the search for value is being challenged by a seriously out of date financial management system. Often, the wrong financial focus, cash strategies, operating goals, and valuation processes are emphasized. Managers are often rewarded for the wrong achievements and in many cases they are not rewarded for the efforts that lead to real value. Balance sheets are often just the result of accounting rules rather than the focus of value enhancement. These problems beg for approaches to financial focus that are completely different from current approaches. New approaches must start nothing less than an evolution in thinking in the process of economic evaluation. One of the focuses that have proved to be incorrect in the valuation of economic worth is earnings per share (EPS). EPS has long been the hallmark of executives that

appear in meetings of the shareholders, as the measure of their accomplishments. This, along with return on equity has long been thought of as the way to attract investment. There is nothing that points to EPS as anything more than a ratio that accounting has developed for management reporting. Many executives believe that the stock market wants earnings and that the future of the organization's stock depends on the current EPS, despite the fact that not one shred of convincing evidence to substantiate this claim has ever been produced. To satisfy the desire for reported profits, executives feel compelled to create earnings through creative accounting. Accounting tactics that could be employed to save taxes and increase value are avoided in favor of tactics that increase profit. Capital acquisitions are often not undertaken because they do not meet a hypothetical profit return. R&D and market expanding investments get only lip service. Often increased earnings growth is sustained by overzealous monetary support of businesses that are long past their value peak. We must ask then, what truly determines increased value in stock prices. Over and over again the evidence points to the cash flow of the organization, adjusted for time and risk that investors can expect to get back over the life of the business.

Economic Value Added (EVA) is a measurement tool that provides a clear picture of whether a business is creating or destroying shareholder wealth. EVA measures the firm's ability to earn more than the true cost of capital. EVA combines the concept of residual income with the idea that all capital has a cost, which means that it is a measure of the profit that remains after earning a required rate of return on capital. If a firm's earnings exceed the true cost of capital it is creating wealth for its shareholders.

Definition of Economic Value Added

A discussion on Economic Value Added has to begin with the origin of the concept. EVA is based on the work of Professors Franco Modigliani and Merton H. Miller. In October, 1961, these two finance professors published "Dividend Policy, Growth and the Valuation of Shares", in the Journal of Business. The ideas of free cash flow and the evaluation of business on a cash basis were developed in this article. These ideas were extended into the concept of EVA by Bennett Stewart and Joel Stern of Stern, Stewart & Company. Economic Value Added is defined as net operating profit after taxes and after the cost of capital. (Tully, 1993) Capital includes cash, inventory, and receivables (working capital), plus equipment, computers and real estate. The cost of capital is the rate of return required by the shareholders and lenders to finance the operations of the business. When revenue exceeds the cost of doing business and the cost of capital, the firm creates wealth for the shareholders.

EVA = Net Operating Profit – Taxes – Cost of Capital

Example

Say you made a ₹ 20,000 capital investment in your company. Your operating profit, after taxes, is ₹ 10,000. The opportunity cost of that investment is 10%.

In This case EVA would be Net Operating Profit after taxes – Cost of Capital

i.e. ₹ 10,000- 10% of ₹ 20,000 = ₹ 8,000.

The goal of EVA is to take into account the cost of capital invested in the company.

CASE STUDIES

Question No 1: The following table summarizes risk premiums for stocks relative to treasury bills and bonds, for different time periods:

Risk Premium for Equity

	Stocks - T. Bills		Stocks - T. Bonds	
	Arithmetic Average	Geometric Average	Arithmetic Average	Geometric Average
1926-2010	8.41%	6.41%	7.24%	5.50%
1962-2010	4.10%	2.95%	3.92%	3.25%
1981-2010	6.05%	5.38%	0.13%	0.19%

   A. What does this premium measure?

   B. Why is the geometric mean lower than the arithmetic mean for both bonds and bills?

   C. If you had to use a risk premium, would you use the most recent data (1981-2010), or would you use the longer periods? Explain your reasoning.

Solution 1

   A. It measures, on average, the premium earned by stocks over government securities. It is used as a measure of the expected risk premium in the future.

   B. The geometric mean allows for compounding, while the arithmetic mean does not. The compounding effect, in conjunction with the variability of returns, will lower the geometric mean relative to the arithmetic mean.

   C. The longer time period is most appropriate, because it covers more of the possible outcomes - crashes, booms, bull markets, bear markets. In contrast, a ten-year period can offer a slice of history that is not representative of all possible outcomes.

Question 2

You are an investor who is interested in the emerging markets of Asia. You are trying to value some stocks in Afghanistan, which does not have a long history of financial markets. During the last two years, the stock market has gone up 60% a year, while the government borrowing rate has been 15%, yielding an historical premium of 45%. Would you use this as your risk premium, looking into the future? If not, what would you base your estimate of the premium on?

Solution 2

Recent history is probably not an appropriate basis for estimating the premium, since this history can be skewed upward or downward by a couple of good or bad years. The premium should be based on the fundamentals driving the Afghanistan market, relative to other emerging and developed markets, and estimate a premium accordingly.

Question 3

The beta for Marathon Limited is 1.10. The current six-month treasury bill rate is 3.25%, while the thirty-year bond rate is 6.25%. Estimate the cost of equity for Marathon Limited, based upon

   (a) Using the treasury bill rate as your risk-free rate.

   (b) Using the treasury bond rate as your risk-free rate.

       (Use the premiums in the table in question 1, if necessary.)

Which one of these estimates would you use in valuation? Why?

Solution 3

CAPM: using T.Bill rate = 3.25% + 1.10 (8.41%) = 12.50%

CAPM: using T.Bond rate = 6.25% + 1.10 (5.50%) = 12.30%

The long-term bond rate should be used as the risk-free rate, because valuation is based upon a long time horizon.

* 8.41% is the arithmetic mean average premium earned by stocks over treasury bills between 1926 and 2010.

** 5.50% is the geometric mean average premium earned by stocks over treasury bonds between 1926 and 2010.

Question 4

You have been asked to estimate the beta of a high-technology firm which has three divisions with the following characteristics

Division	Beta	Market Value
Personal Computers	1.60	₹ 100 million
Software	2.00	₹ 150 million
Computer Mainframes	1.20	₹ 250 million

   A. What is the beta of the equity of the firm?

   B. What would happen to the beta of equity if the firm divested itself of its software business?

   C. If you were asked to value the software business for the divestiture, which beta would you use in your valuation?

Solution 5

   A. Beta = 1.60 * 100/500 + 2.00 * 150/500 + 1.20 * 250/500 = 1.52

   B. If they pay the cash out as a dividend: Beta = 1.60 * 100/350 + 1.20 * 250/350 = 1.31

      If they keep the cash in the firm: Beta = 1.60*100/500 + 0*150/500 + 1.20*250/500 = 0.92

   C. Use 2.00, the beta for the software division.

Question No 5

Dhanpat, an investor, is seeking the price to pay for a security, whose standard deviation is 5%. The correlation coefficient for the security with the market is 0.75 and the market standard deviation is 4%. The return from risk-free securities is 6% and from the market portfolio is 11%. Dhanpat knows that only by calculating the required rate of return, he can determine the price to pay for the security. What is the required rate of return on the security?

Solution:

Calculation of beta coefficient

Standard deviation	=	5%
Correlation coefficient	=	0.75
Market Standard Deviation	=	4%

Calculation of required rate of return on security –

R_f= 6%

R_m= 11%

E(R1) = Rf +ß[R_m − R_f]

= 6.0 + 0.9375 [11.00 − 6.00]

= 6.0 + 0.9375 x 5

= 6.0 + 4.6875

= 10.6875%

Question No. 6: The market portfolio has a historically based expected return of 0.10 and a standard deviation of 0.04 during a period when risk-free assets yielded 0.03. The 0.07 risk premium is thought to be constant through time. Riskless investments may now be purchased to yield 0.09. A security has a standard deviation of 0.08 and a co-efficient of correlation with the market portfolio is 0.85. The market portfolio is now expected to have a standard deviation of 0.04. You are required to find —

   (i) market's return-risk trade-off;

  (ii) security beta; and

 (iii) equilibrium required expected return of the security

Solution:

(i) Market's Return – Risk Tradeoff

$$= \frac{R_m - R_F}{\sigma}$$

Where,

R_m = Market rate of return, i.e. 0.10

R_F = Risk free return, i.e. 0.03

σ = Standard deviation 0.04

$$= \frac{0.10 - 0.03}{0.04} = 1.75$$

(ii) Security Beta :

$$\beta_1 = \frac{\sigma_s}{\sigma_m} \times r_m$$

Where,

ß1 = Beta factor of investment

σ_s = Standard deviation of investment in security, i.e. 0.08

r_m = Co-efficient of Correlation with market portfolio, i.e. 0.85

σ_m= Market portfolio standard deviation, i.e. 0.04

$$\beta_1 = \frac{0.08}{0.04} \times 0.85$$

= 1.7

(iii) Equilibrium required for expected rate of return on the security :

$E(R_1) = R_F + ß_1 (R_M - R_F)$

Where:

$E(R_1)$ = Expected rate of return on investment

σ_m = Riskless investment yield = 0.09

R_m = Expected return on market portfolio

$ß_1$ = Market sensitive index (Beta factor) of investment, i.e. 1.7

= 0.09 + 1.7 (0.10 – 0.03)

= 0.09 + 0.119

= 0.209

= 20.9%

LESSON ROUND-UP

– Portfolio management refers to managing efficiently the investment in the securities by professionals for both small investors and corporate investors who may not have the time and skills to arrive at sound investment decisions.

– Portfolio Analysis seeks to analyze the pattern of return emanating from a portfolio of securities.

– Risk means that the return on investment would be less than the expected rate. Risk is a combination of possibilities because of which actual returns can be slightly different or greatly different from expected returns.

– Portfolio theory was originally proposed by Harry Markowitz in 1950s, and was the first formal attempt to quantify the risk of a portfolio and develop a methodology for determining the optimal portfolio.

– As per Markowitz Model, a portfolio is efficient when it yields highest return for a particular level of risk or minimizes risk for a specified level of expected return.

– Covariance and correlation are conceptually analogous in the sense that both of them reflect the degree of comovements between two variables.

– According to Sharpe Index Model, return on a security is correlated to an index of securities or an index or an economic indicator like GDP or prices and the return for each security can be given by:

$R_i = \alpha_i + ß_i R_M + e_i$

– Capital Asset Pricing Model provides that if adding a stock to a portfolio increases its standard deviation, the stock adds to the risk of the portfolio. This risk is the un-diversified risk that can not be eliminated.

– Beta is the measure of the non- diversifiable or systematic risk of an aaet relative to that of the market portfolio.

Beta = $\dfrac{\text{Non- Diversifiable risk of asset or portfolio}}{\text{Risk of market portfolio}}$

– The equation of the capital market line (connecting the riskless asset with risky portfolio) is

$$R_e = R_f + \frac{(R_M - R_F)}{\sigma M} . \sigma_e$$

– A security market line describes the expected return for all assets and portfolios of assets, efficient or not.

– The sharpe ratio is a risk adjusted measure of return that is often used to evaluate the performance of a portfolio.

– EVA measures the firm's ability to earn more than the true cost of capital.

– EVA combines the concept of residual income with the idea that all capital has a cost, which means that it is a measure of the profit that remains after earning a required rate of return on capital.

SELF-TEST QUESTIONS

(These are meant for re-capitulation only. Answers to these questions are not to be submitted for evaluation)

1. What is Portfolio Analysis? Why do need to carry it out?

2. What is the expected return on the Portfolio of risky assets?

3. Describe the procedure developed by Markowitz for chosing optimal portfolio to risky assets.

4. What is an efficient portfolio?

5. Describe the Sharpe Index approach of Portfolio analysis.

6. Write a short note on expected return on a portfolio.

7. CAPM is a tool to workout cost of equity. Discuss.

8. Differentiate between:

 (i) 'Markowitz model' and 'Sharpe index model'.

(ii) Efficient Portfolio and Optimal Portfolio

9. Mohan has a portfolio of 6 securities, each with a market value of 10,000. The current beta of the portfolio is 1.30 and beta of the riskiest security is 1.80. Mohan wishes to reduce his portfolio beta to 1.15 by selling the riskiest security and replacing it with another security with a lower beta . What must be the beta of the replacement security?

10. Excel Ltd. is considering investing in a risky project which would be added to an existing portfolio of investment projects, also subject to risk. It envisages six possible states of the economy for which it has estimated probabilities and outcome as follows :

State of Economy	Probability	Return on Existing Portfolio	Return on Proposed Projects
1	0.1	12%	8%
2	0.2	14%	10%
3	0.2	15%	12%
4	0.3	16%	10%
5	0.1	18%	14%
6	0.1	20%	6%

You are required to determine whether the project should be accepted. The riskfree rate of return is 6%.

Lesson 10
PRACTICAL QUESTIONS AND CASE STUDIES

CAPITAL BUDGETING

Question No. 1

Following data in respect of two machines namely 'A' and 'B' are detailed below Depreciation has been charged on straight line basis and estimated life of both machines is five years.

(In ₹)

Item	Machine 'A'	Machine 'B'
Cost	56,125	56,125
Net income after depreciation and taxes:		
1st Year	3,375	11,375
2nd Year	5,375	9,375
3rd Year	7,375	7,375
4th Year	9,375	5,375
5th Year	11,375	3,375
	36,875	36,875

Find out –

(a) Average rate of return on 'A' and 'B' machines

(b) Which machine is better from the point of view of pay-back period and why?

(c) Calculate average rate of return when salvage value of machine 'A' turns out to be ₹ 3,000 and when 'B' machine has zero salvage value.

Answer to Question No. 1

(a) Average Rate of Return (ARR)

$$ARR = \frac{\text{Average net income after taxes}}{\text{Average investment}}$$

Average income of machine 'A' = $\dfrac{₹\,36,875}{5}$ = ₹ 7,375

Average income of machine 'B' = $\dfrac{₹\,36,875}{5}$ = ₹ 7,375

Average investment = $\dfrac{1}{2}$ (₹ 56,125) = ₹ 28,062.50

(Average investment of Machine A and Machine B is the same as the cost is same)

ARR for Machine A = $\dfrac{7,375}{28,062.50} \times 100 = 26.28\%$

$$\text{ARR for Machine B} = \frac{7,375}{28,062.50} \times 100 = 26.28\%$$

(b) From the Point of View of Pay-back Period

From this point of view, Machine B is better as the initial inflow is much higher compared to Machine A and hence Machine B provides large liquidity of funds.

(c) Average Rate of Return when Salvage Value of Machine A is ₹ 3,000

Average Investment = ₹ 3,000 + 1/2 (₹ 56,125 – ₹ 3,000)

= ₹ 3,000 + ₹ 26,563 (approximately)

= ₹ 29,563 (approximately)

$$\text{ARR} = \frac{\text{Average income}}{\text{Average investment}}$$

$$= \frac{7,375}{29,563} \times 100$$

= 24.95%

ARR of Machine A   = 24.95%

As Machine B does not have any salvage value, the ARR for Machine B will remain the same, i.e. 26.28% (as calculated in (a) above).

Question No. 2

A Company is contemplating to purchase a machine. Two machines A and B are available, each costing ₹ 5,00,000. In comparing the profitability of the machines, a discounted rate of 10% is to be used. Earnings after taxation are expected as follows:

Year	CASH FLOW	
	Machine 'A'(₹)	Machine 'B'(₹)
I	1,50,000	50,000
II	2,00,000	1,50,000
III	2,50,000	2,00,000
IV	1,50,000	3,00,000
V	1,00,000	2,00,000

Indicate which of the machines would be profitable using the following methods of ranking investments proposals:

(i) Pay back method

(ii) Net present value method

(iii) Post pay back profitability

(iv) Average rate of return.

This discount factor at 10% is:

1st year   —   .9091

2nd year   —   .8264

3rd year   —   .7513

4th year   —   .6830

5th year   —   .6209

Answer to Question No. 2

(I) PAY BACK METHOD:

Pay back period for Machine 'A'

Year	Cash Flow (₹)	
	Total	*Cumulative Cash flow*
I	1,50,000	1,50,000
II	2,00,000	3,50,000
III	2,50,000	5,50,000
Investment	5,00,000	

Total pay back period :   2 year $+ \left(\dfrac{1,50,000}{2,50,000} \right) \times 12$ = 2 years 7.2 months

Pay back period for Machine 'B'

Year	Cash Flow (₹)	
	Total	*Cumulative Cash flow*
I	50,000	50,000
II	1,50,000	2,00,000
III	2,00,000	4,00,000
IV	3,00,000	5,00,000
Investment	5,00,000	

Total pay back period :   3 year $+ \left(\dfrac{1,00,000}{3,00,000} \right) \times 12$ = 3 years 4 months

Rankings:	Machine 'A'	Machine 'B'
	I	II

(II) NET PRESENT VALUE METHOD:

Calculation of Present Values of Cash Flows

Year	Cash Flow (₹)		Discount Factor @10%	Present Value (₹)	
	Machine 'A'	*Machine 'B'*		*Machine 'A'*	*Machine 'B'*
I	1,50,000	50,000	0.9091	1,36,365	45,455
II	2,00,000	1,50,000	0.8264	1,65,280	1,23,960

III	2,50,000	2,00,000	0.7513	1,87,825	1,50,260
IV	1,50,000	3,00,000	0.6830	1,02,450	2,04,900
V	1,00,000	2,00,000	0.6209	62,090	1,24,180
	Total Present Value			6,54,010	6,48,755
	Initial Investment			5,00,000	5,00,000
	Net Present Value			1,54,010	1,48,755

	Machine 'A'	Machine 'B'
Ranking	I	II

(iii) Post Pay Back Profitability:

	Machine 'A' ₹	Machine 'B' ₹
Total Actual Cash Flows	8,50,000	9,00,000
Less: Initial Investment (Recovered during pay-back)	5,00,000	5,00,000
Post Pay back Profitability	3,50,000	4,00,000
Ranking	II	I

(iv) Return on Investment Method:

$$\text{Return on Investment*} = \frac{\text{Average Annual Cash Flow}}{\text{Initial Investment}} \times 10$$

	Machine 'A' ₹	Machine 'B' ₹
Total cash flows	8,50,000	9,00,000
(Less Depn. For 5 years)	5,00,000	5,00,000
Net earning after tax and depn.	3,50,000	4,00,000
Life of Machine (yrs)	5	5
Average earning per year	70,000	80,000
Initial cost	5,00,000	5,00,000
ARR	$\left(\dfrac{70,000}{5,00,000} \times 100\right)$ $= 14\%$	$\left(\dfrac{80,000}{5,00,000} \times 100\right)$ $= 16\%$
Ranking	II	I

Question No. 3

Following are the details of three project A, B and C

	A	B	C
Cost (₹)	50,000	70,000	70,000
Life	10 years	12 years	14 years
Estimated scrap (₹)	5,000	10,000	7,000
Annual Profit Less Taxation (₹)	5,000	6,000	5,500

Select the best one using

(i) Pay back period

(ii) Surplus life over pay back period

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

* Note: It may be calculated by using other methods also.

Answer to Question No. 3

(a) Under pay-back method, the project which has the shortest pay-back period is selected. The pay-back period is the length of time required for recovering the initial investment out of the annual cash flow. In our question, the following are the pay-back periods of projects A, B and C.

Project A 50,000/5,000 = 10 years

Project B 70,000/6,000 = 11.66 years

Project C 70,000/5,500 = 12.73 years

(b) From the above, one can simply say that, on the basis of surplus life over pay-back period, Project C is the best because, C has the longest surplus life of 1.27 years. (14 – 12.73). However, to be more scientific, the scrap value should be taken into account in this case, because if the full life is alowed to be run the scrap value will be realised. One way to do this would be to deduct scrap value from initial cost and calculate the time period required to cover this cost. The difference between the life of the project and the time required to cover this cost may then be taken to represent the surplus life. On this basis, the surplus life of our projects are:

Project A: 10 years — (45,000/5,000) years = 1 year

Project B: 12 years — (60,000/6,000) years = 2 years

Project C: 14 years — (63,000/5,500) years = 2.55 years

So, Project 'C' is the best one.

(c) In our question, time value of money has been ignored. As such, the calculation of surplus cash flow, thus becomes easier. The scrap value may be deducted from the initial cost to derive the actual cost. On this basis, the surplus cash flows from each project after the life of each project is over, are:

	A	B	C
	₹	₹	₹
Total cash flow: (Life x Annual Cash Flow)	50,000	72,000	77,000
Less: Initial cost: (Cost – Estimated Scrap Value)	45,000	60,000	63,000
Surplus	5,000	12,000	14,000

However, in order to select the best project we must see the highest rate of cash flow:

For Project A, the rate of surplus cash flow is 1.1 per cent per annum.

For Project B, the rate of surplus cash flow is 1.7 per cent per annum.

For Project B, the rate of surplus cash flow is 1.6 per cent per annum.

On the above basis, Project B yields the highest rate of surplus cash flow per annum and is the best.

Alternative Solution

Calculation of Depreciation

	A	*B*	*C*
Cost (₹)	50,000	70,000	70,000
Less: Scrap (₹)	5,000	10,000	7,000
	45,000	60,000	63,000
Life (years)	10	12	14
Depreciation p.a. (₹)	4,500	5,000	4,500

Pay Back Period:

Projects	A (₹)	B (₹)	C (₹)
Profits less Taxation	5,000	6,000	5,500
Depreciation	4,500	5,000	4,500
CFAT but before Depriciation	9,500	11,000	10,000
Pay Back Period	$\dfrac{50,000}{9,500}$ = 5.3 years	$\dfrac{70,000}{11,000}$ = 6.4 years	$\dfrac{70,000}{10,000}$ = 7 years
Rank	I	II	III
Life	10 years	12 years	14 years
Profitable Period (Life – Pay Back Period)	4.7 years	5.8 Years	7 years
Rank	III	II	I
Cash Flows over the profitable period Profitable period * CFATBD	₹ 44,650	₹ 63,800	₹ 70,000
Estimated Scrap	5,000	10,000	7,000
Surplus Cash Flow	49,650	73,800	77,000
Rank	III	II	I

Question No. 4

The particulars relating to two alternative Capital Projects are furnished below:

	PROJECT X *4 years*	PROJECT Y *6 years*
Life of Project		
Estimated Cash Outflow (₹ in lakhs)	15	15
Estimated Cash Inflow (₹ in lakhs)		
1st Year	8	7
2nd Year	10	8
3rd Year	7	8
4th Year	3	6
5th Year	—	5
6th Year	—	4

Compute internal rate of return of Project X and Y and state which project you could recommend. You may use the present value tables given below:

PRESENT VALUE OF Re. 1

After	20%	25%	30%	35%	40%	45%	50%
1st	0.833	0.800	0.769	0.741	0.714	0.690	0.677
2nd	0.694	0.640	0.592	0.549	0.510	0.476	0.444
3rd	0.579	0.512	0.455	0.406	0.364	0.328	0.296
4th	0.482	0.410	0.350	0.301	0.260	0.226	0.198
5th	0.402	0.328	0.269	0.223	0.186	0.156	0.132
6th	0.335	0.262	0.207	0.165	0.133	0.108	0.088

Answer to Question No. 4

OUTFLOW: ₹ 15,00,000

Project X

Years	Cash Inflow	Discount Factor @ 25%	Present Value (₹)	Discount Factor @30%	Present Value (₹)
1st Year	8,00,000	.800	6,40,000	.769	6,15,200
2nd Year	10,00,000	.640	6,40,000	.592	5,92,000
3rd Year	7,00,000	.512	3,58,400	.455	3,18,500
4th Year	3,00,000	.410	1,23,000	.350	1,05,000
	Inflow	**Discount Factor @ 35%**		**Discount Factor @ 40%**	
1st Year	8,00,000	.741	5,92,800	.714	5,71,200
2nd Year	10,00,000	.549	5,49,000	.510	5,10,000

3rd Year	7,00,000	.406	1,84,200	.364	2,54,800
4th Year	3,00,000	.301	96,300	.260	78,000
			15,16,300		14,14,000

PV required 15,00,000

PV at 35%   15,16,300

PV at 40%   14,14,000

Difference in Rate = 5%

Difference in inflow at 35% and 40% = 1,02,300

$$\text{IRR} = 35\% + \frac{16,300}{1,02,300} \times 5 = 35.8\%$$

Project Y   *OUT FLOW: ₹ 15,00,000*

Years	Cash Inflow	Discount Factor @ 30%	Present Value (₹)	Discount Factor @ 40%	Present Value (₹)
1	2	3	4	5	6
1	7,00,000	.741	5,18,700	.714	4,99,900
2	8,00,000	.549	4,39,200	.51	4,08,000
3	8,00,000	.406	3,24,800	.364	2,91,200
4	6,00,000	.301	1,80,600	.26	1,56,000
5	5,00,000	.223	1,11,500	.186	93,000
6	4,00,000	.165	66,000	.133	53,000
	Total		16,40,800		15,01,200
		Discount Factor @ 45%			
1	7,00,000	.69	4,83,000		
2	8,00,000	.476	3,80,800		
3	8,00,000	.328	2,62,400		
4	6,00,000	.226	1,35,600		
5	5,00,000	.156	78,000		
6	4,00,000	.106	43,200		
			13,83,000		

PV required: ₹15,00,000

PV at 40%: ₹15,01,200

PV at 45%: ₹ 13,83,000

Difference in Rate = 5%

Difference in inflow at 40% and 45% = 1,18,200

$$\text{IRR} = 40\% + \frac{1,200}{1,18,200} \times 5 \qquad = 40 + .05 = 40.05\%$$

The profitability statement of project X shows that at 35 per cent, trial cash inflows are marginally greater and therefore 35 per cent is the rate of return which equates the present value of inflows with outflows. After employing the interpolation techniques the true rate in case of project 'X' comes to be 35.8%. The profitability of project 'Y' shows that the rate of return is 40%. Using the rate of return method project 'Y' yields a rate of return of 40.05 per cent while project 'X' yields 35.8%. On this basis Project 'Y' is recommended.

Question No. 5

A company is faced with the Question of choosing between two mutually exclusive projects. Project A requires a cash outlay of ₹ 1,00,000 and cash running expenses of ₹ 35,000 per year. On the other hand, Project B will cost ₹ 1,50,000 and require cash running expenses of ₹ 20,000 per year. Both the projects have a eight-year life. Project A has a ₹ 4,000 salvage value and Project B has a ₹ 14,000 salvage value. The company's tax rate is 50% and rate of return is 10%. Assume depreciation on straight line basis. Which project should be accepted. Present value of Re. 1 at the end of each year at 10% for 8 years is equal to ₹ 5.335 and present value of Re. 1 at the end of 8th year at 10% is equal to Re. 0.467.

Answer to Question No. 5

	Project A	*Project B*	*Differential cash flow (B-A)*	*Differential net cash flow (B-A)*
	₹	₹	₹	₹
Cash Outlay	1,00,000	1,50,000	50,000	50,000
Cash running expenses before taxes	35,000	20,000	+15,000	—
Tax saving (@ 50%) on expenses	17,500	10,000	7,500	7,500
Net savings depreciation	12,000	17,000	+ 5,000	
Tax savings on depreciation	6,000	8,500	2,500	2,500
Net savings				10,000
Salvage (at the end of 8 years)	4,000	14,000	10,000	10,000

Thus, if Project B is chosen it would require an additional outlay of ₹ 50,000 but would save in terms of cash inflows ₹ 10,000 each year for eight years. This project should be accepted if it has a positive net present value at a 10% discount rate.

		₹
PV of ₹ 10,000 each for eight years @ 10% (10,000 x 5.335)		53,350
PV of ₹ 10,000 at the end of eight years @ 10% (10,000 x .467)		4,670
		58,020
Less: Cash outlay		50,000
Net present value		8,020

As Project B will offer whatever Project A offers and also helps in generating an additional net present value of ₹ 8,020 it should be preferred to Project A.

Question No. 6

The Klein & Co. is contemplating either of two mutually exclusive projects. The data with respect to each are

given below. The initial investment for both is equal to their depreciable value. Both will be depreciated straight line over a five-year life.

	Project A	Project B
	(₹)	(₹)
Initial Investment	1,00,000	1,40,000
Year		
Profits after taxes		
1	10,000	25,000
2	15,000	25,000
3	20,000	25,000
4	25,000	25,000
5	35,000	25,000

(i) Calculate the 'net present value' and 'benefit-cost ratio' for each project.

(ii) Evaluate the acceptability of each project on the basis of above mentioned two techniques.

(iii) Select the best project, using NPV and benefit cost ratios and comment on the resulting rankings.

(iv) Assume that the Klein Co. has an 11% cost of capital.

(v) The following data relates to discounting factor:

Year	Discounting factor at 11%
1	.901
2	.812
3	.731
4	.659
5	.593

and discounting factor for present value of an annuity discounted at 11% for five years is 3.696.

Answer to Question No. 6

(i) The NPV for project A can be calculated as follows:

Year	Cash inflow after tax but adding back depreciation (₹)	Present value interest factor at 11%	Present value (₹)
1	30,000	.901	27,030
2	35,000	.812	28,420
3	40,000	.731	29,240
4	45,000	.659	29,655
5	55,000	.593	2,515
		Total	1,46,600

For Project A, question provides data regarding profits after taxes. To obtain cash inflow, therefore, we have to add depreciation amount. Total project investment is ₹ 1,00,000. Life of the project is 5 years and it is depreciated at straight line method. Therefore, depreciation amount would be ₹ 20,000 each year which should be added to

PAT to obtain CI (Cash Inflow).

Similarly, for project B, the depreciation amount would be ₹ 28,000 per year, which should be added to PAT for obtaining Cash Inflow.

PV for inflow	:	(3.696) x (53,000)	=	₹ 1,95,888
NPV of Project B	=	1,95,888 – 1,40,000	=	₹ 55,888
NPV of Project A	=	1,46,960 – 1,40,000	=	₹ 46,960

Benefit Cost Ratio

The benefit-cost ratio (B/C) can easily be determined by dividing the present value of inflow by the initial investment in each case.

Project A   B/C   = $\frac{1,46,960}{1,00,000}$ = 1.47

Project B   B/C   = $\frac{1,95,888}{1,40,000}$ = 1.40

(ii) On the basis of both NPV and B/C ratios, both projects are acceptable because their NPVs are greater than zero and their B/Cs are greater than one respectively.

(iii) On the basis of NPV, project B is preferable to project A. On the basis of B/C ratios, project A is preferable to project B. If the firm is operating under capital rationing the B/C ratio approach would be best (i.e. project A preferred), while if the firm has unlimited funds, the NPV approach is best (i.e. project B preferred).

Question No. 7

M/s Lalvani & Co. has ₹ 2,00,000 to invest. The following proposal are under consideration. The cost of capital for the company is estimated to be 15 per cent.

Project	*Initial Outlay ₹*	*Annual Cash Flow ₹*	*Life of Project (Years)*
A	1,00,000	25,000	10
B	70,000	20,000	8
C	30,000	6,000	20
D	50,000	15,000	10
E	50,000	12,000	20

Rank the above projects on the basis of–

  (i) Pay-back method

 (ii) NPV method

(iii) Profitability index method

Present value of annuity of Re. 1 received in steady steam discount at the rate of 15%

8 years	=	4.6586
10 years	=	5.1790
20 years	=	*6.3345*

Answer to Question No. 7

The ranking of various project under the various methods are shown below:

(i) Pay-Back Method:

Pay back period = $\dfrac{\text{Initial Investment}}{\text{Annual cash flows}}$

The project with the lowest pay-back period is to be ranked first.

Project	Initial Investment ₹	Annual Cash Flow ₹	Pay-back period(in years)	Ranking
A	1,00,000	25,000	4	3
B	70,000	20,000	3.5	2
C	30,000	6,000	5	5
D	50,000	15,000	3.33	1
E	50,000	12,000	4.17	4

(ii) Net Present Value Method: The project with the highest N.P.V. is to be ranked first.

Project	Initial investment (₹)	Annual Cash Flow (₹)	Life in years	PV Factor at 15%	PV₹	NPV (₹)	Ranking
A	1,00,000	25,000	10	5.1790	1,29,475	29,475	1
B	70,000	20,000	8	4.6586	93,172	23,172	4
C	30,000	6,000	20	6.3345	38,007	8,007	5
D	50,000	15,000	10	5.1790	77,685	27,685	2
E	50,000	12,000	20	6.3345	76,014	26,014	3

(iii) Profitability Index Method: The project which shows the highest profitability index is to be ranked first.

Profitability Index = $\dfrac{\text{Total Present Value of Cash flows}}{\text{Initial Investment}}$

Project	Initial investment (₹)	Annual Cash Flow (₹)	Life in years	PV Factor at 15%	PV(₹)	Profit-ability Index	Ranking
A	1,00,000	25,000	10	5.1790	1,29,475	1.29	4
B	70,000	20,000	8	4.6586	93,172	1.33	3
C	30,000	6,000	20	6.3345	38,007	1.27	5
D	50,000	15,000	10	5.1790	77,685	1.55	1
E	50,000	12,000	20	6.3345	76,014	1.52	2

Question No. 8

Mohan & Co. is considering the purchase of a machine. Two machines X and Y each costing ₹ 50,000 are available. Earnings after taxation are expected to be as under:

Year	Machine X(₹)	Machine Y(₹)	Discount factorat 10%
1st	15,000	5,000	.9091
2nd	20,000	15,000	.8264
3rd	25,000	20,000	.7513
4th	15,000	30,000	.6830
5th	10,000	20,000	.6209

Estimate the two alternatives according to–

  (i) Payback method;

 (ii) Return on investment method;

 (iii) Net present value method – a discount rate of 10% is to be used.

Answer to Question No. 8

(i) Payback method:

Year	Earning Machine X(₹)	Earning Machine Y(₹)	Cumulative Earning Machine X (₹)	Cumulative Earning Machine Y (₹)
1st	15,000	5,000	15,000	5,000
2nd	20,000	15,000	35,000	20,000
3rd	25,000	20,000	60,000	40,000
4th	15,000	30,000	75,000	70,000
5th	10,000	20,000	85,000	90,000

Pay back period for Machine X $\quad = \quad$ 2 years + $\dfrac{15,000}{25,000} \times 12$ year

$\qquad\qquad\qquad\qquad\qquad\qquad = \quad$ 2 years 7 months 6 days.

Pay back period for Machine Y $\quad = \quad$ 3 years + $\dfrac{10,000}{30,000} \times 12$ year

$\qquad\qquad\qquad\qquad\qquad\qquad = \quad$ 3 years 4 months

(ii) Return on Investment Method:

PARTICULARS	MACHINE – X	MACHINE – Y
Total of Cash flows	₹ 85,000	₹ 90,000
Average Annual Cash flows	₹ 85,000/5	₹ 90,000/5
	= ₹ 17,000	= ₹ 18,000
Annual Depreciation (₹ 50,000/5)	₹ 10,000	₹ 10,000
Annual Net Savings	₹ 17,000 – 10,000	₹ 18,000 – 10,000
	= ₹ 7,000	= ₹ 8,000
Average Investment	₹ 50,000/2	₹ 50,000/2
	= ₹ 25,000	= ₹ 25,000

Return on Investment	$=$	$\dfrac{\text{Annual Net Savings}}{\text{Average Investment}} \times 100$	
	$=$	$\dfrac{7,000 \times 100}{25,000}$:	$= \dfrac{8,000 \times 100}{25,000}$
	$=$	28%	$=$ 32%

Note: In this case, Net cash flows after depreciation have been calculated for arriving at the ROI. The question can be solved with gross cash flows also.

(iii) Net present value method

Calculation of Present Value of Cash Flows

Year	Discount factor at 10%	Machine X		Machine Y	
		Cash flow	P.V.	Cash flow	P.V.
		₹	₹	₹	₹
1	.9091	15,000	13,636	5,000	4,545
2	.8264	20,000	16,528	15,000	12,396
3	.7513	25,000	18,782	20,000	15,026
4	.6832	15,000	10,245	30,000	20,490
5	.6209	10,000	6,209	20,000	12,418
		85,000	65,400	90,000	64,875

Net Present Value = Present value – Initial Investment

Net Present Value of Machine X = ₹ 65,400 – ₹ 50,000

= ₹ 15,400

Net Present Value of Machine Y = ₹ 64,875 – ₹ 50,000

= ₹ 14,875

It is evident from the above calculations that machine X would be preferred under the pay-back method and Net Present Value Method while machine Y would be preferred under the return on investment method. But NPV method is more scientific and therefore investment in Machine X will be more profitable while taking the time value of cash inflows into consideration.

Question No. 9

Calculation the payback period, accounting rate of return, net present value and internal rate of return for the following investment:

Year	Cashflow (₹)
0	(30,000)
1	4,000
2	10,000
3	20,000
4	11,000

The discount rate for discounted cashflow (DCF) calculation is 12 per cent. Accounting profits are the same as cashflow except that the initial expenditure should be depreciated over 4 years; there is no resale value at year 4.

Answer to Question No. 9

Calculation of Pay Back Period

Year (₹)	Cashflow Inflow (₹)	Cumulative Cash
0	(30,000)	—
1	4,000	4,000
2	10,000	14,000
3	20,000	34,000
4	11,000	45,000

Pay back period = 2 years + (16/20 x 12) = 2.8 years (app.)

Accounting Rate of Return

Annual depreciation   = 30,000/4 = ₹ 7,500

Accounting profits/(losses) =

	In ₹	(₹)
Year 1	4,000 – 7,500	=(3,500)
Year 2	10,000 – 7,500	=2,500
Year 3	20,000 – 7,500	=12,500
Year 4	11,000 – 7,500	= 3,500
		15,000

Average profits $= \dfrac{₹15,000}{4}$ = ₹ 3,750

ARR $= \dfrac{₹3,750 \times 100}{₹30,000}$ = 12.5%

Net Present value

Year	Cashflow(₹)	DF@12%	PV (₹)
0	(30,000)	1.0	(30,000)
1	4,000	0.8929	3,572
2	10,000	0.7972	7,972
3	20,000	0.7118	14,236
4	11,000	0.6355	6,991
NPV			2,771

Internal Role of return

Discount at 16% and use linear interpolation:

Year	Cashflow (₹)	DF@16%	PV (₹)
0	(30,000)	1.0	(30,000)
1	4,000	0.8621	3,448
2	10,000	0.7432	7,432
3	20,000	0.6407	12,814
4	11,000	0.5523	6,075
			NPV = ₹ (231)

$$\text{IRR} = 12\% + \left(\frac{2,771}{2771 + 231} \times 4\% \right) = 15.7\%$$

Question No. 10

The management of a company has two alternative projects under consideration. Project A requires a capital outlay of ₹ 1,20,000 but Project B needs ₹ 1,80,000. Both are estimated to provide a cash flow for five years: A – ₹ 40,000 per year and B – ₹ 58,000 per year. The cost of capital is 10%. Show which of the two projects is preferable from the viewpoint of (i) Net Present Value; and (ii) Internal rate of Return.

Answer to Question No. 10

(i) Determination of NPV

Years	CFAT Project in ₹		P.V. Factor	Total P.V. in ₹	
	A	B		A	B
1—5	40,000	58,000	3.791	₹ 1,51,640	2,19,878
Less: Cash Outlay				1,20,000	1,80,000
Net Present Value				31,640	39,878

In the above case, Project B is preferable as its NPV is more than that of A.

(ii) Determination of IRR

$$\text{Payback Period} = \frac{1,20,000}{40,000} = 3 \text{ years (Project A)}$$

$$= \frac{1,80,000}{58,000} = 3.1034 \text{ (Project B)}$$

Annuity Table indicates that closest factor to 3.0 against five years are 3.058 (19%) and 2.991 (20%).

By interpolation, we get

$$\text{IRR}_A = r_1 + \frac{(PV_{CFAT} - PV_C) \times 1}{PV}$$

$$= 19 + \frac{(1,22,320 - 1,20,000)}{2680} \times 1$$

$$= 19 + 0.86$$

= 19.86%

In case of Project B, Annuity Table indicates that closest factor to 3.0134 against five years are 3.127 (18%) and 3.058 (19%). By interpolation, we get

$$IRR_B = 18 + \frac{(1,81,366 - 1,80,000)}{4,002} \times 1$$

$$= 18 + \frac{(1,366)}{(4,002)} \times 1$$

= 18 + 0.34 = 18.34%

So project A is preferable as its IRR is greater that of B.

Question No. 11

Andhra Pradesh Udyog is considering a new automatic blender. The new blender would last for 10 years and would be depreciated to zero over the 10 year period. The old blender would also last for 10 more years and would be depreciated to zero over the same 10 year period. The old blender has a book value of ₹ 20,000 but could be sold for ₹ 30,000 (the original cost was ₹ 40,000). The new blender would cost ₹ 1,00,000. It would reduce labour expense by ₹ 12,000 a year. The company is subject to a 50% tax rate on regular income and a 30% tax rate on capital gains. Their cost of capital is 8%. There is no investment tax credit in effect.

You are required to –

(a) Identify all the relevant cash flows for this replacement decision.

(b) Compute the present value, net present value and profitability index.

(c) Find out whether this is an attractive project?

Answer to Question No. 11

(a) Tax on the sale of the old machine:

Original cost	₹ 40,000
Sale Price	₹ 30,000
Book value	₹ 20,000
Profit	₹ 10,000
Tax	50% of ₹ 10,000 = 5,000

After tax cash receipts from sale of old machine:

Sale Price	₹ 30,000
Taxes on sale	5,000
After-tax cash receipts	₹ 25,000

Net cash flow to replace old machine with new:

Cost of new machine	₹ 100,000	
After-tax receipt from sale of old machine	₹ 25,000	
Net cash flow to replace old machine with new	₹ 75,000	
Depreciation on new machine	= 1,00,000/10 =	₹ 10,000
Depreciation on old machine	= 20,000/10 =	₹ 2,000

	Book Value in ₹	Cash flow in ₹
Annual labour savings	12,000	12,000
Increased depreciation (₹ 10,000 – ₹ 2,000)		8,000
Increased earnings before tax		4,000
Increased tax	2,000	2,000
Increased earnings after tax		2,000
Increased after-tax cash flow		10,000

(b) Calculation of present value at 8% discount rate are tabulated below:

Year	Cash flow	Present value factor	Present value
1-10	₹ 10,000	6.710	₹ 67,100

Present value	=	₹ 67,100	
Net present value	=	₹ 67,100 – ₹ 75,000	= (–) ₹ 7,900
Profitability Index	=	₹ 67,100/₹ 75,000	= .895

(c) Since the net present value is negative and profitability index is less than one, the project is not an attractive project.

Question No. 12

A most profitable company in the country is faced with the prospect of having to replace a large stamping machine. Two machines currently being marketed will do the job satisfactorily. The Zenith Stamping machine costs ₹ 100,000 and will require cash running expenses of ₹ 40,000 per year. The Godrej Stamping machine costs ₹ 150,000 but running expenses are only expected to be ₹ 30,000 per year. Both machines have a ten-year useful life with no salvage value and would be depreciated on a straightline basis.

(a) If the company pays a 50% tax rate and has 10% after-tax required rate or return, which machine should it purchase?

(b) *Would your answer be different if the required rate of return were 8%?*

Answer to Question No. 12

	Godrej	Zenith	Differential
	₹	₹	₹
Initial outlay	₹ 1,50,000	₹ 1,00,000	₹50,000
Operating expenses	30,000	40,000	10,000
Depreciation	15,000	10,000	5,000
Expenses savings-depreciation			5,000
Tax on the above			2,500
Cash flow			7,500
(Expenses savings of ₹ 10,000 - tax)			
Present value of Re. 1 received each year for 10 year	=	5.6502	
	7,500 x 5.65	=	42,376

Since the present value of the incremental cash flow benefits ₹ 42,376 is less than the differential cash outlay of ₹ 50,000, the additional cost of the Godrej machine cannot be justified. Thus, the Zenith machine should be purchased.

(b) Present value of Cash flow at 8% for 10 year = ₹ 7,500 x 6.7101 = ₹ 50,336

Since the present value of incremental benefits, ₹ 50,336 now exceeds ₹ 50,000 the Godrej machine should be purchases.

Question No. 13

Saroj & co. is considering purchase of a machine that will enable production to increase by 2.5% (from 40,000 units to 50,000 units). The machine costs Re. 1 lakh and has a useful life of 10 years with a salvage value of 5%. The company is eligible for investment allowance of 25%. There will be increased requirement of working capital to the extent of ₹ 20,000. The following additional information is also furnished to you :

Variable cost (per unit) — ₹ 5

Fixed cost (per annum) — ₹ 1,00,000

The variable costs will remain the same but the fixed costs will increase by the amount of depreciation on the new machine. The current selling price is ₹ 10 per unit, which may have to be brought down by 50 paise in order to sell the entire production of 50,000 units.

The company adopts straight line method of depreciation, tax rate is 50% and the minimum required rate of return is 15%. P.V. factors at 15%.

   (i) Present value of an annuity of Re. 1 at the end of 9 years   = 4.772

   (ii) Present value of Re. 1 receivable at the end of the 10 years   = 0.247

Discuss if it would be advisable for the company to purchase the machine.

Answer to Question No. 13

1. Cash Outflows (Period):

	₹
Cost of new machine	1,00,000
Working capital increase	20,000
Tax saving on account of investment allowance* i.e. (25% of ₹ 1 lakhs x 50%)	(12,500)
Net cash outlay	1,07,500

*This could also be considered at year 1 end.

2. Cash inflows (year to year 9):

	Existing	Proposed
	₹	₹
Revenues:		
40,000 units @ ₹ 10	4,00,000	
50,000 units @ ₹ 9.50		4,75,000
Variable cost		
40,000 units @ ₹ 5	2,00,000	

50,000 units @ ₹ 5	_____	2,50,000
Contribution margin	2,00,000	2,50,000
Fixed cost	1,00,000	**1,09,500
Surplus	1,00,000	1,15,500
Excess marginal contribution		15,500
Less: Tax @ 50%		7,750

Incremental Cash Flow from year 1 to 9 after tax (including depreciation)₹ 7,750 + ₹ 9,500

$$= ₹ 17,250$$

3. Cash Inflow (10th year):

	₹
Annual incremental cash flow	17,250
Working capital recovered	20,000
5% salvage value of machine	5,000
	42,250

4. Present value of Cash Flows:

Year	Cash flow (₹)	P.V. at 15%	Total P.V (₹)
1-9	17,250	4.772	82,317.00
10	42,250	0.247	10,435.75
		Total	92,752.75
	P.V. of outlays		1,07,500.75
	Net Present Value		(14,747.25)

The machine yields negative P.V. of (₹14,747.25) and hence should not be procured. Therefore, it would not be advisable for the company to purchase the machine.

Note: Depreciation $= \dfrac{\text{Cost - Salvage Value}}{\text{Useful life}}$

$$= \frac{\text{Rs. } 1,00,000 \text{ - Rs. } 5,000}{10} = \text{Rs. } 9,500 \text{ p.a.}$$

Fixed cost = ₹ 1,00,000 + ₹ 9,500 = ₹ 1,09,500.

Question No. 14

Rama manufacturing company must choose between constructing a large or small factory to produce a new line of products. The large plant would be needed if the future brings a high demand for new products. But the large plant would have a net cash inflows below the ₹ 20,00,000 outlay, if demand for the product is medium or low. The present value of cash inflows are ₹ 28,00,000 with high demand, ₹ 18,00,000 with medium demand and ₹ 12,00,000 with low demand. The smaller plant produces a lower return if demand is high but has positive net present values at medium demand for the products. It would cost ₹ 4,00,000 as a cash outlay and would

return a present value inflow of ₹ 6,40,000 with high demand, ₹ 5,40,000 with medium demand and ₹ 3,60,000 with low demand. What is the net present value (NPV) of each alternative if there is 40% chance of high demand and 20% chance of low demand.

Answer to Question No. 14

Capital outlay for large project – ₹ 20,00,000

Probabilities of demand for products	*Present value of cash inflow* (₹)	*Expected Return* (₹)
1	2	3 = 1 x 2
High demand (.40)	28,00,000	11,20,000
Medium demand (.40)	18,00,000	7,20,000
Low demand (.20)	12,00,000	2,40,000
Total Expected Return		20,80,000
Less: Capital outlay		20,00,000
NPV		80,000

Capital outlay for small project – ₹ 4,00,000

Probabilities of demand for products	*Present value of cash inflow* (₹)	*Expected Return* (₹)
1	2	3 = 1 x 2
High demand (.40)	6,40,000	2,56,000
Medium demand (.40)	5,40,000	2,16,000
Low demand (.20)	3,60,000	72,000
Total Expected Return		5,44,000
Less: Capital outlay		4,00,000
NPV		1,44,000

From the above it is clear that the small factory is a better investment on NPV basis.

Question No. 15

A product is currently being manufactured on a machine that has a book value of ₹ 30,000. The machine was originally purchased for ₹ 60,000 ten years ago. The per unit costs of the product are: Direct labour ₹ 8.00; direct materials ₹ 10.00; variable overheads ₹ 5.00; fixed overheads ₹ 5.00; and total is ₹ 28.00. In the past year 6,000 units were produced and sold for ₹ 50.00 per unit. It is expected that the old machine can be used indefinitely in the future.

An equipment manufacturer has offered to accept the old machine at ₹ 20,000, a trade-in for a new version. The purchase price of the new machine is ₹ 1,00,000. The projected per unit costs associated with the new machine are: direct labour ₹ 4.00; direct materials ₹ 7.00; variable overheads ₹ 4.00; fixed overheads ₹ 7.00; and total is ₹ 22.00.

The management also expects that, if the new machine is purchased, the new working capital requirement of the company would be less by ₹ 10,000. The fixed overheads costs are allocations from other departments plus the depreciation of the equipment. The new machine has an expected life of ten years with no salvage value; the straight line method of depreciation is employed by the company. It is also expected that the future demand of

the product would remain at 6,000 units per year. Should the new equipment be acquired? Corporate tax is @ 50%.

Notes:

(i) Present value of annuity of Re. 1.00 at 10% rate of discount for 9 years is 5.759.

(ii) *Present value of Re. 1.00 at 10% rate of discount, received at the end of 10th year is 0.386.*

Answer to Question No. 15

Determination of Cash Outflows t = 0

			₹	₹
Cost of new machine				1,00,000
Less :	(i)	Sale value of old machine	20,000	
	(ii)	Tax saving due to direct loss on the sale of old machine @ 50% on ₹ 10,000 (i.e. 30,000 – 20,000)	5,000	
	(iii)	Release of working capital	10,000	35,000
Net cash outflows				65,000

Calculation of Cash Inflows:

		₹	₹
I.	Cost saving after tax:		
	Cost saving: 6,000 x 8*	48,000	
	Less: Tax @ 50%	24,000	24,000
II.	Tax saving on additional depreciation		
	Depreciation on new machine	10,000	
	Less: Depreciation on old machine	3,000	
	Additional Depreciation	7,000	
	Tax saving @ 50% on ₹ 7,000		3,500
	Cash inflows after tax i.e. CFAT (t = 1 to 10)		27,500

Determination of Net Present Value:

Year	CFAT (A)	PV factor at 10% (B)	Total P.V. (A x B) (₹)
1–10	₹ 27,500	x 6.145 = (5.759 + 0.386)	1,68,987.50
Less: Present value of cash outlay			65,000.00
			1,03,987.50

Since NPV > 0 therefore, the new equipment should be acquired.

*Variable cost (i.e. cost saving per unit):

	₹
Old machine	23
Less: New machine	(–) 15
	8

Question No. 16

Apollo Ltd. manufactures a special chemical for sale at ₹ 30 per kg. The variable cost of manufacture is ₹ 15 per kg. Fixed cost excluding depreciation is ₹ 2,50,000. Apollo Ltd. is currently operating at 50% capacity. It can produce a maximum of 1,00,000 kgs. at full capacity.

The production manager suggests that if the existing machines are replaced, the company can achieve maximum capacity in the next 5 years gradually increasing the production by 10% a year.

The finance manager estimates that for each 10% increase in capacity, the additional increase in fixed cost will be ₹ 50,000. The existing machines with a current book value of ₹ 10,00,000 and remaining useful life of 5 years can be disposed of for ₹ 5,00,000. The vice-president (finance) is willing to replace the existing machines provided the NPV on replacement is ₹ 4,53,000 at 15% cost of capital.

(a) You are required to compute the total value of machines necessary for replacement. For computations, you may assume the following:

(i) All the assets are in the same block. Depreciation will be on straight line basis and the same is allowed for tax purposes.

(ii) There will be no salvage value for the new machines. The entire cost of the assets will be depreciated over a five year period.

(iii) Tax rate is 46%.

(iv) Cash inflows will accrue at the end of the year.

(v) Replacement outflow will be at the beginning of the year (year 0).

(b) On the basis of data given above, the managing director feels that the replacement, if carried out, would at least yield a post-tax return of 15% in three years provided the capacity build up is 60%, 80% and 100% respectively. Do you agree? Give reasons.

	Year 1	Year 2	Year 3	Year 4	Year 5
Present value factor at 15%	0.87	0.76	0.66	0.57	0.50
Present value annuity factor at 15%	0.87	1.63	2.29	2.86	3.36

Answer to Question No. 16

(a) Determination of total replacement value of machines

Incremental cash outflows:

Cost of replacement of new machines	= ₹ X
Less: Disposal value of existing machines	= ₹ 5,00,000
Cash outflows required	= (X − ₹ 5,00,000)

Determination of cash flows after tax (CFAT) and Net Present Value (NPV) (excluding depreciation)

	Years				
	1	2	3	4	5
Increase Production and sales (kg) ...(I)	10,000	20,000	30,000	40,000	50,000
Contribution per unit (Sales Price – Variable Cost) i.e. ₹ 30 – ₹ 15) ...(II)	15	15	15	15	15
Incremental Contribution (I x II) ...(III)	1,50,000	3,00,000	4,50,000	6,00,000	7,50,000
Incremental fixed cost ...(IV)	50,000	1,00,000	1,50,000	2,00,000	2,50,000
Incremental profits (III – IV) ...(V)	1,00,000	2,00,000	3,00,000	4,00,000	5,00,000
Less: Taxes @ 46% (VI)	46,000	92,000	1,38,000	1,84,000	2,30,000
Earnings after taxes ...(V – VI)	54,000	1,08,000	1,62,000	2,16,000	2,70,000
PV Factor	0.87	0.76	0.66	0.57	0.50
Total Present Value (₹)	46,980	82,080	1,06,920	1,23,120	1,35,000
Total Present Value for 5 years (T = 1 – 5) ₹ 4,94,100 ..(A)					

Base for Incremental Depreciation

	₹
Current book value of existing machine	10,00,000
Add: Cost of new machines	X
Less: Sale proceeds of existing machine	5,00,000
Depreciation base of new machine	X + 5,00,000
Less: Depreciation base of existing machine	10,00,000
Base for Incremental Depreciation	X – 5,00,000

Calculation of Present Value of tax savings on Incremental Depreciation for years 1–5

Incremental Depreciation per year $= X – 5,00,000 / 5$

$= 0.20 X – 1,00,000$

Tax Rate $= 0.46$

Present Value Factor of annuity for 5 years $= 3.36$

Present Value of tax savings on Incremental Depreciation for years 1 – 5 = Incremental Depreciation per year ´

Tax rate ₹ PV of annuity for 5 years

$$= 0.20X – 1,00,000) \times 0.46 \times 3.36$$

$$= 0.30912X – ₹ 1,54,560 \quad ...(B)$$

Total Present Value

$$= (A) + (B)$$

$$= ₹ 4,94,100 + 0.30912X – ₹ 1,54,560$$

$$= ₹ 3,39,540 + 0.30912X$$

Net present value = Present value of cash flows after tax – Present value of outflows

₹ 4,53,000	$= ₹ 3,39,540 + 0.30912X – (X – ₹ 5,00,000)$
₹ 4,53,000	$= ₹ 3,39,540 + 0.30912X – X + ₹ 5,00,000$
0.69088X	$= ₹ 3,39,540 + ₹ 5,00,000 – ₹ 4,53,000$

$$X = \frac{3,86,540}{0.69088} = ₹ 5,59,489$$

Total value of machines required for replacement is ₹ 5,59,489

(b) Financial evaluation whether replacement would yield post-tax return of 15% in 3 years

	1	2	3
Increased Capacity (%)	10%	30%	50%
Increased sales	₹ 10,000	₹ 30,000	₹ 50,000
Contribution (Sales – V.C.)			
i.e. (₹ 30 – ₹ 15)	₹ 15	₹ 15	₹ 15
Incremental Contribution	₹ 1,50,000	₹ 4,50,000	₹ 7,50,000
Less: Incremental fixed cost	₹ 50,000	₹ 1,50,000	₹ 2,50,000
	₹ 1,00,000	₹ 3,00,000	₹ 5,00,000

Less: Incremental Depreciation

$$\frac{(Rs.\ 5,00,000 + 5,59,489 – 10,00,000)}{5\ years} = \frac{Rs.59,489}{5}$$

	1	2	3
	₹ 11,898	₹ 11,898	₹ 11,898
Earnings before taxes	₹ 88,102	₹ 2,88,102	₹ 4,88,102
Less: Taxes (0.46)	₹ 40,527	₹ 1,32,527	₹ 2,24,527
Earnings after taxes	₹ 47,575	₹ 1,55,575	₹ 2,63,575
Cash flow after tax			
(Earnings after tax +			
Deprecation)	₹ 59,473	₹ 1,67,473	₹ 2,75,473
Present Value Factor at 15%	0.87	0.76	0.66
Present Value	₹ 51,742	₹ 1,27,279	₹ 1,81,812

Total Present Value	= ₹ 3,60,833
Less: Incremental Cash Outflows	= ₹ 59,489
Net Present Value	₹ 3,01,344

Hence, the assessment of the managing director is correct as the Net Present Value is positive.

Question No. 17

The management of Rohit Ltd. is considering the replacement of machine which has current written down value of ₹25,00,000 and a present sale value of ₹8,00,000. The machine is still usable for 5 years, but will have no scrap value at the end of 5 years.

A new machine having a useful life of 5 years and scrap value of ₹ 1,00,00,000 at the end of this is available for ₹ 10,00,000. The installation of the new machine, it is estimated, would result in saving of ₹ 20,00,000 per annum in operating cost at the present level of production. The capacity of new machine is more than that of old, and since sales are no Question, utilisation of additional capacity would bring in an additional contribution of ₹ 25,00,000 per annum (after meeting incremental costs of production and sale). This machine would be depreciated @ 25 per cent on written down basis.

The company has other assets in the block. Current income tax is 35 per cent. Considering the company's estimated cost of capital, it will not pay to purchase the new machine unless the net savings are 20% or more, on the added investment. Should the company replace the existing machine?

Answer to Question No. 17

	(₹)
Existing Machine	
Current Written Down Value of Machine	25,00,000
Present Sale Value of Machine	8,00,000
Life of Machine	5 years
Scrap Value after 5 years	0
New Machine	
Scrap Value	10,00,000
Cost Price	1,00,00,000
Life of Machine	5 years

Calculation of Cash Flows for 5 years

(₹)

	1	2	3	4	5
Saving in Operating Cost	20,00,000	20,00,000	20,00,000	20,00,000	20,00,000
Contribution	25,00,000	25,00,000	25,00,000	25,00,000	25,00,000
EBIT	45,00,000	45,00,000	45,00,000	45,00,000	45,00,000
Incremental Depreciation	16,75,000	12,56,250	9,42,187	7,06,641	5,29,980
EBIT	28,25,000	32,43,750	35,57,813	37,93,359	39,70,020
Less Tax (@ 35%)	9,88,750	11,35,313	12,45,235	13,27,676	13,89,507

PAT	18,36,250	21,08,438	23,12,578	24,65,683	25,80,513
PV factor @ 20%	0.8353	0.6944	0.5787	0.4823	0.4019
NPV	15,30,147	14,64,099	13,38,289	11,89,199	10,37,108
Total PV					65,58,842.3

As the Net Present cash inflow in negative, it is not advisable to purchase the machine.

Old Machine Cost   =   ₹ 25,00,000

New Machine Cost   =   ₹ 1,00,00,000 – ₹ 8,00,000

Sale Value of Machine   =   ₹ 92,00,000

Calculation of Incremental Depreciation

(₹)

Year	Old machine	New machine	Incremental Depreciation
1	625000	2300000	16,75,000
2	468750	1725000	12,56,250
3	351563	1293750	9,42,187
4	263672	970313	7,06,641
5	197754	727734	5,29,980

Question No. 18

Strong Enterprises Ltd. is a manufacturer of high quality running shoes. Ms. Dazling, President, is considering computerising the company's ordering, inventory and billing procedures. She estimates that the annual savings from computerisation include a reduction of ten clerical employees with annual salaries of ₹15,000 each, ₹8,000 from reduced production delays caused by raw materials inventory Questions, ₹12,000 from lost sales due to inventory stockouts and ₹3,000 associated with timely billing procedures. The purchase price of the system is ₹2,00,000 and installation costs are ₹50,000. These outlays will be capitalised (depreciated) on a straight-line basis to a zero book salvage value which is also its market value at the end of five years. Operation of the new system requires two computer specialists with annual salaries of ₹40,000 per person. Also annual maintenance and operating cash expenses of ₹12,000 are estimated to be required. The company's tax rate is 40% and its required rate of return (cost of capital) for this project is 12%.

You are required to –

  (a) find the project's initial net cash outlay.

  (b) find the project's after tax profit and cash flows over its 5-year life.

  (c) evaluate the project using Net Present Value (NPV) method.

  (d) evaluate the project using Profitability Index (PI) method.

  (e) calculate the project's payback period.

  (f) find the project's cash flows and NPV [parts (a) through [(c)] assuming that system can be sold for ₹25,000 at the end of five years even though the book salvage value will be zero.

  (g) find the project's cash flows and NPV [parts (a) through (c)] assuming that the book salvage value of depreciation purposes is ₹20,000 even though the machine is worthless in terms of its resale value.

NOTE:

(i) Present value of annuity of Re. 1 at 12% rate of discount for 5 years in 3.605.

(ii) *Present value of Re. 1 at 12% rate of discount, received at the end of 5 years is 0.567.*

Answer to Question No. 18

(a) Project's Initial cash outlay

	₹
Cost	2,00,000
Installation Expenses	50,000
Total Net Cash Outlay	2,50,000

(b) Project's after tax profit and cash inflows over its 5-year life

Savings	₹	₹
Reduction in clericals salaries	1,50,000	
Reduction in production delays	8,000	
Reduction in lost sales	12,000	
Gains due to timely production	3,000	1,73,000
Less: Expenses		
Depreciation	50,000	
Addl. employee's cost	80,000	
Maintenance cost	12,000	1,42,000
Profit before Tax		31,000
Less: Tax (40%)		12,400
Profit after Tax		18,600

Cash inflow = PAT + Depreciation

= ₹ 18,600 + ₹ 50,000 = ₹ 68,600

The cash flow is the same for the years 1 to 5.

(c) Evaluation of the Profit by using NPV Method

Years	Cash inflow after tax (₹)	PV of Annuity of Re. 1 at 12% for five years	=	Total present value (₹)
(1 to 5)	68,600	3.605		2,47,303
		Less: total Initial Cash Outlay		2,50,000
		NPV	=	(– ₹ 2,697)

Since NPV is negative, the project is unviable.

(d) Evaluation of the Project by using PI Method

Profitability Index (PI) = PV of cash inflows/Initial outlay

= 2,47,303/2,50,000 = 0.989

Since PI is less than 1.0, the project is unviable.

(e) Calculation of the Projects' Payback Period

Year	Net cash inflow (₹)	Cumulative cash inflow (₹)
1	68,600	68,600
2	68,600	137,200
3	68,600	205,800
4	68,600	274,400
5	68,600	343,000

Payback period = 3 years + (₹ 2,50,000 – ₹ 2,05,800)
                                        ─────────────────────
                                                 68,600

Therefore, the payback period is 3.64 years.

(f) Calculation of cash flows and NPV assuming when the system can be sold for ₹ 25,000 at the end of 5 years.

In case the project has a salvage of ₹ 25,000 at the end of five years, present value of the after tax salvage amount is required to be added to the current NPV.

Post tax salvage value in year 5 = ₹ 15,000.

Present value of ₹ 15,000 discounted at 12% is (₹ 15000 × 0.567) = ₹ 8,505 Previous NPV of the projects is – ₹ 2697. [see above] New NPV is ₹ 8,505 – ₹ 2,697 = ₹ 5,808, Since NPV > 0, the project is viable.

(g) Project's cash flow and NPV assuming that book salvage value for depreciation purposes is ₹ 20,000.

Depreciation = ₹ 2,50,000 – ₹ 20,000/5 = ₹ 46,000 per year

Cash flow for the years 1 to 5 are ₹ 67,000*.

In year 5, the firm get an additional tax credit on ₹ 20,000 book value, which is ₹ 8,000, the NPV of this additional tax credit and new cash flow is – ₹ 3,929**. Since NPV is negative the project is not viable.

₹

Working*

Saving [see (b) above]		1,73,000
Less : Expenses		
Depreciation	₹ 46,000	
Addl. employee's cost	₹ 80,000	
Maintenance cost	₹ 12,000	1,38,000
Profit before tax		35,000
Tax (40%)		14,000
Profit after tax		21,000

Cash inflow = PAT + Depreciation = ₹ 21,000 + ₹ 46,000 = ₹ 67,000.

Working**

Years	Cash inflow (₹)	PV factor at 12%	Total present value (₹)
(1 to 5)	67,000	3.805 (Annuity)	2,41,535
Add. Tax Credit in 5th year	8,000	0.567	4,536
Total PV of cash inflow			2,46,071
Less: Total initial cash outlay			2,50,000
NPV			(– ₹ 3,929)

Question No. 19

P. Ltd. has a machine having an additional life of 5 years, which costs ₹10,00,000 and has a book value of ₹4,00,000. A new machine costing ₹20,00,000 is available. Though its capacity is the same as that of the old machine, it will mean a saving in variable costs to the extent of ₹7,00,000 per annum. The life of the machine will be 5 years at the end of which it will have a scrap value of ₹2,00,000. The rate of income-tax is 46% and P Ltd.'s policy is not to make an investment if the yield is less than 12% per annum. The old machine, if sold today, will realise ₹1,00,000; it will have no salvage value if sold at the end of 5th year. Advise P. Ltd. whether or not the old machine should be replaced. (Present value of Re. 1 receivable annually for 5 years at 12% = 3.605, present value of Re. 1 receivable at the end of 5 years at 12% per annum = 0.567). Capital gain is tax free. Ignore income-tax savings on depreciation as well as on loss due to sale of existing machine.

Answer to Question No. 19

Net Cash Outlay on New Machine

	₹
Purchase Price	20,00,000
Less: Realisation from sale of old machine	1,00,000
Net Initial Investment	19,00,000
Cash Inflows	
Annual saving in variable cost as a	
Result of purchase of New Machine	7,00,000
Tax = 46%	
Annual Saving in variable cost after tax = ₹ 7,00,000 (1 – 0.46) =	3,78,000
Present value for cash inflows annually	
for 5 years @12% per annum = 3,78,000 x 3.605 =	13,62,690
PV of Salvage value (2,00,000 x 0.567)	
at the end of 5 years @ 12% per annum	1,13,400
Total PV of Cash Inflows	14,76,090
Less: Initial Investment	19,00,000
Net Present Value	–4,23,910

Since NPV of new machine is negative, it is not profitable for the company to go for new machine. Therefore, the company should continue with the old machine.

Question No. 20

Norton Engineering company is considering the replacement of existing machine by a new one. The written down value of the existing machine is ₹ 1,50,000 and its cash salvage value is ₹ 40,000. The removal of this machine could cost ₹ 10,000 by way of labour charges etc. The purchase price of the new machine is ₹ 40 lakhs and its expected life is 10 years. The company follows straight line depreciation without considering scrap value. The other expenses associated with the new machine are carriage inward and installation charges ₹ 30,000, cost of training workers to handle the new machine ₹ 10,000, additional working capital ₹ 20,000 (which is assumed to be received back by sale of scraps in last year) and the fees paid to a consultant for his advice to buy a new machine ₹ 20,000. The annual savings (before tax) from the new machine would amount to ₹ 4,00,000. The income tax rate is 40%. The company's required rate of return is 12%. Should the company replace the existing machine?

Note: Present value of Re. 1 at 12% discount rate are as follows:

Year	1	2	3	4	5	6	7	8	9	10
P.V.	.893	.797	.712	.636	.567	.507	.452	.404	.361	.322

Answer to Question No. 20

Present Value of Cash Outflow:

		₹
Purchase Price of a new machine		40,00,000
Carriage inward for installation		30,000
Cost of Training to workers		10,000
Fees Paid to consultant		20,000
Total Investment on new machine		40,60,000
Add: Working capital		20,000
		40,80,000
Less: Cash inflow at the start cash salvage value of old machine	40,000	
Less: Removal charges	10,000	30,000
Less: Tax benefit on the loss of old machine (40%)		48,000
		78,000
Total cash outflow		40,02,000
Annual Cash Inflow (New Machine):		
Annual saving before tax		4,00,000
Less: Tax at 40%		1,60,000
Annual Saving after tax		2,40,000
Add: Depreciation (₹ 40,60,000 ÷ 10)		4,06,000
Annual Cash inflow		6,46,000

Statement Showing NPV of Cash Flows

	Cash inflows	PV Factor 12%	Present value
	(₹)		(₹)
Annual Cash inflow for 10 years	6,46,000	5.650	36,49,900
Working capital received back after 10 years	20,000	0.322	6,440
Total Present Value of Cash-inflow in 10 years			36,56,340
Present value of cash outflows in 1st year			40,02,000
		NPV =	(3,45,660)

Recommendation: Since NPV is negative by ₹ 3,45,660, the company is advised not to buy the new machine.

		₹
@Written down value of the old machine		1,50,000
Salvage Value	40,000	
Less: Removal Charges	10,000	30,000
Loss on Salvaging the machine		1,20,000
Tax benefit due to loss on old machine (40%)		48,000

Note: Tax benefit has been presumed to have been realised at zero year. In practical life, tax benefit will be realised at the year-end over and if this presumption is taken then ₹ 48,000 will have to be discounted by the factor 0.893.

Question No. 21

A firm has an investment proposal, requiring an outlay of ₹ 40,000. The investment proposal is expected to have 2 years' economic life with no salvage value. In year-1, there is a 0.4 probability that cash flow after tax (CFAT) will be ₹ 25,000 and 0.6 probability that CFAT will be ₹ 30,000. The probabilities assigned to CFAT for the year-2 are as follows:

If CFAT = ₹ 25,000		*If CFAT = ₹ 30,000*	
Amount	*Probability*	*Amount*	*Probability*
(₹)		(₹)	
12,000	0.2	20,000	0.4
16,000	0.3	25,000	0.5
22,000	0.5	30,000	0.1

The firm uses a 10% discount rate for this type of investment.

You are required to –

  (i) Present the above information in the form of a decision tree.

 (ii) Find out the NPV under (a) the worst outcome; and (b) under the best outcome.

 (iii) *Find out the profitability or otherwise of the above investment proposal.*

Answer to Question No. 21

(i) Decision Tree

| Probability Year 1 | Probability Year 2 | | Path No. | | Joint profitability |
| | | | | | Year 1 & Year 2 |

		0.2	12000	1 0.08
0.4	₹ 25000	0.3	16000	2 0.12
		0.5	22000	3 0.20
Cash Outlay				
₹ 40,000				
		0.4	20000	4 0.24
0.6	₹ 30000	0.5	25000	5 0.30
		0.1	30000	6 0.06
				1.00
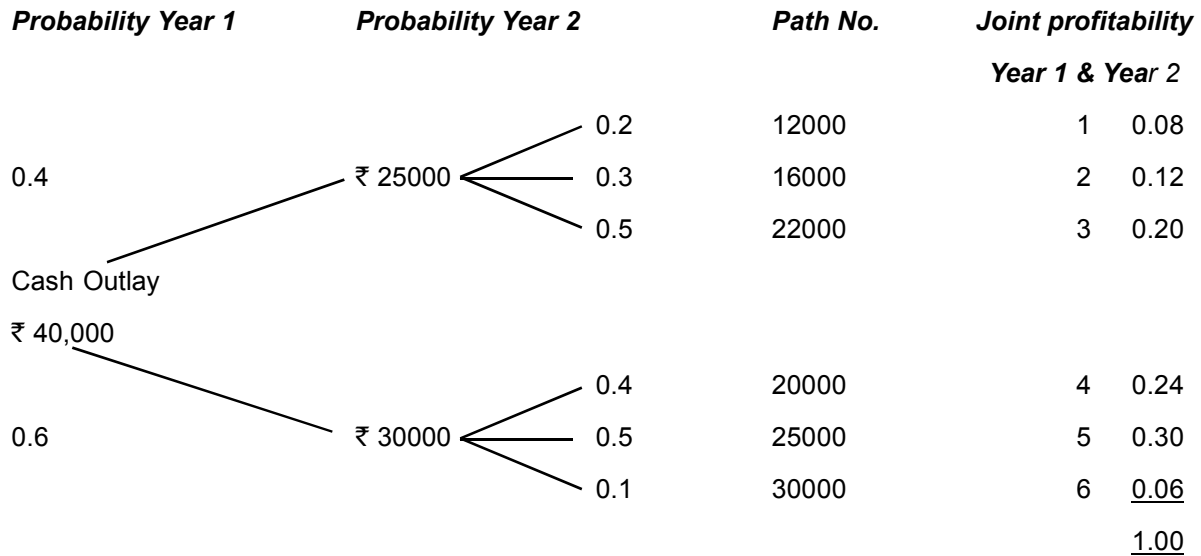
The Decision Tree given above shows that there are six possible outcomes each represented by a path.

(ii) The Net Present Value (NPV) of each path at 10% discount rate is given below:

Path	(Cash inflow year 1 x Discount factor year 1)(a) ₹	(Cash inflow year 2 x Discount factor year 2)(b) ₹	Total Cash inflow (c) = (a)+(b) ₹	Cash Outflow (d) ₹	Net present value(e) =(c)–(d) ₹
1.	(25,000 x 0.909) = 22,725	(12,000 x 0.826) = 9,912	32,637	40,000	–7,363
2.	(25,000 x 0.909) = 22,725	(16,000 x 0.826) = 13,216	35,941	40,000	–4,059
3.	(25,000 x 0.909) = 22,725	(22,000 x 0.826) = 18,172	40,897	40,000	897
4.	(30,000 x 0.909) = 22,270	(20,000 x 0.826) = 16,520	43,790	40,000	3,790
5.	(30,000 x 0.909) = 22,270	(25,000 x 0.826) = 20,650	47,920	40,000	7,920
6.	(30,000 x 0.909) = 22,270	(30,000 x 0.826) = 24,780	52,050	40,000	12,050

    (a) If the worst outcome is realized, the Net Present Value which the project will yield in ₹ 7,363 (negative).

    (b) The best outcome will be path 6 when Net Present Value is highest i.e. ₹ 12,050 (Positive).

(iii) Statement showing the Expected Net Present Value

Path	NPV @ 10% (a) ₹	Joint Probability (b) ₹	Expected PV(a) x (b) ₹
1	–7,363	0.08	–589.04
2	–4,059	0.12	–487.08
3	897	0.20	179.40
4	3,790	0.24	909.60

5	7,920	0.30	2,376.00
6	12,050	0.06	723.00
		1.00	**3,111.88**

Yes, the project will be accepted since the Expected Net Present Value is positive.

Question No. 22

A product is currently manufactured on a machine that is not fully depreciated for tax purposes and has book value of ₹ 80,000. It was purchased for ₹ 2,40,000 twenty years ago. The costs of the product are as follows:

	Unit Cost
	(₹)
Direct labour	28.00
Indirect labour	14.00
Other variable overhead	10.50
Fixed overhead	17.50
	70.00

In the past year 10,000 units were produced. It is expected that with suitable repairs the old machine can be used indefinitely in future. The repairs are expected to average ₹ 75,000 per year.

An equipment manufacturer has offered to accept the old machine as trade-in for a new equipment. The new machine would cost ₹ 5,20,000 before allowing for ₹ 1,00,000 for the old equipment. The project costs associated with the new machine are follows:

	Unit Cost
	(₹)
Direct labour	14.00
Indirect labour	21.00
Other variable overhead	7.00
Fixed overhead	22.75
	64.75

The fixed overhead costs are allocations for other departments plus the depreciation of the equipment.

The old machine can be sold now for ₹ 60,000 in the open market. The new machine has an expected life of 10 years and salvage value of ₹ 20,000 at that time. The current corporate income tax rate is assumed to be 50%. For tax purpose cost of the new machine and the book value of the old machine may be depreciated in 10 years. The minimum required rate is 10%. It is expected that the future demand of the product will stay at 10,000 units per year. The present value of an annuity of Re. 1 for 9 years @ 10% discount factor is = 5.759. The present value of Re. 1 received at the end of 10th year @ 10% discount factor is = 0.386.

Should the new equipment be purchased? (Assume no capital gain taxes).

Answer to Question No. 22

Net Cash outlay on New Machine

	₹	₹
Purchase Price		5,20,000
Less: Trade in value		1,00,000
		4,20,000
Depreciation:		
New Machine		50,000
Old Machine		8,000
Differential Depreciation per annum		42,000
Annual Cash Savings from New Machine		
Variable Cost of product on new machine (A)		4,20,000
(10,000 units x ₹ 42)		
Variable cost of product on old machine (B)		5,25,000
(10,000 units x ₹ 52.50) + Annual Repair		75,000
		6,00,000
Differential savings (₹ 6,00,000 – ₹ 4,20,000) per annum		1,80,000
Taxable Saving (₹ 1,80,000 – ₹ 42,000)		1,38,000
Less: Tax @ 50%		69,000
Income after tax		69,000
Add: Depreciation (Difference)		42,000
Cash flow per annum for 9 years		1,11,000
Cash flow for 10th year ₹ 1,11,000 + ₹ 20,000 salvage value		1,31,000
Present value of 1,11,000 annuity for 9 years		
(₹ 1,11,000 x 5.759)		6,39,249
Present value of ₹ 1,31,000 at the end of 10th year		
(₹ 1,31,000 x 0.386)		50,566
Present value of Total cash Inflow		6,89,815
Less: Cash outlay		4,20,000
Net Present Value		2,69,815

Recommendation: Since NPV is positive, new equipment should be purchased.

COST OF CAPITAL

Question No. 23

In considering the most desirable capital structure for a company, the following estimates of the cost of debt and equity capital (after tax) have been made at various levels of debt-equity mix:

Debt as percentage of total capital employed	Cost of debt (%)	Cost of equity (%)
1	2	3
0	7.0	15.0
10	7.0	15.0
20	7.0	15.5
30	7.5	16.0
40	8.0	17.0
50	8.5	19.0
60	9.5	20.0

You are required to determine the optimal debt-equity mix for the company by calculating composite cost of capital.

Answer to Question No. 23

Composite Cost of Capital

Debt as % of total capital	Cost of debt %	Cost of equity %	Composite Cost of capital %	
0	7.0	15.0	(7 x 0) + (15 x 1)	= 15.0
10	7.0	15.0	(7 x 0.10) + (15 x 0.9)	= 14.20
20	7.0	15.5	(7 x 0.20) + (15.5 x 0.80)	= 13.80
30	7.5	16.0	(7.5 x 0.30) + (16 x 0.70)	= 13.45
40	8.0	17.0	(8 x 0.40) + (17 x 0.60)	= 13.40
50	8.5	19.0	(8.5 x 0.50) + (19 x 0.50)	= 13.75
60	9.5	20.0	(9.5 x 0.60) + (20 x 0.40)	= 13.70

The optimal debt-equity mix for the company on the basis of composite cost of capital = 40 % debt

= 60 % Equity

When the composite cost of capital will be least i.e. 13.40.

Question No. 24

M/s Robert Cement Corporation has a financial structure of 30% debt and 70% equity. The company is considering various investment proposals costing less than ₹ 30 lakhs.

The corporation does not want to disturb its present capital structure.

The cost of raising the debt and equity are as follows:

Project Cost	Cost of debt	Cost of equity
Upto ₹ 5 lakhs	9%	13%
Above ₹ 5 lakhs and upto ₹ 20 lakhs	10%	14%
Above ₹ 20 lakhs and upto ₹ 40 lakhs	11%	15%
Above ₹ 40 lakhs and upto ₹ 1 crore	12%	15.5%

Assuming the tax rate of 50% you are required to calculate:

(i) Cost of capital of two projects A and B whose funds requirements are ₹ 8 lakhs and ₹ 21 lakhs respectively, and

(ii) If a project is expected to give after tax return of 11% determine under what conditions it would be acceptable.

Answer to Question No. 24

(i) Calculation of Weighted Average Cost of Capital

Project Financing		Prop. of capital structure	Cost before tax (%)	Cost after tax of Capital	Weighted cost of various sources of capital	Weighted cost of capital
Upto ₹ 5 lakhs	Debt	0.30	9.00	4.50	1.35	
Equity	Equity	0.70	13.00	13.00	9.10	**10.45**
Above ₹ 5 lakhs and upto ₹ 20 lakhs	Debt	0.30	10.00	5.00	1.50	
Equity	Equity	0.70	14.00	14.00	9.80	**11.30**
Above ₹ 20 lakhs and upto ₹ 40 lakhs	Debt	0.30	11.00	5.50	1.65	
Equity	Equity	0.70	15.00	15.00	10.50	**12.15**
Above ₹ 40 lakhs and upto ₹ 1 Crore	Debt	0.30	12.00	6.00	1.80	
Equity	Equity	0.70	15.50	15.50	10.85	**12.65**

(i) Project A costs ₹ 8 lakhs. In the above table one can see that Project A lies in the range of ₹ 5 lakhs and ₹ 20 lakhs. So the weighted average cost of capital for this amount to the company will be 11.30 per cent. Similarly, for the project B which requires ₹ 21 lakhs and lies in the range of ₹ 20 lakhs and ₹ 40 lakhs the weighted average cost of capital will be 12.15 per cent.

(ii) A company may accept a project which is expected to give after tax return of 11% if project cost is below ₹ 5 lakhs. The project which requires above ₹ 5 lakhs may not be accepted by the company because the expected rate of return on the project is low as against its cost of capital and thus acceptance of project will adversely affect the value of share of the company.

Question No. 25

Following are the details regarding capital structure of a company.

	Book value	Market value	Specific cost
(₹)	(₹)	(%)	
Debentures	80,000	76,000	5
Preference Capital	20,000	22,000	8
Equity Capital	1,20,000	2,40,000	13
Retained Earnings	40,000	—	9
	2,60,000	3,38,000	

You are required to calculate the weighted average cost of capital using (i) book value as weights (ii) market value as weights. Can you imagine a situation where weighted average cost of capital would be the same using either of the weights?

Answer to Question No. 25

(i) Calculation of the weighted average cost of capital using book value weights:

Source of Capital	Amount of Book value (W) (₹)	Specific Cost (X)(%)	Total cost (XW) (₹)
Debentures	80,000	5	4,000
Preference Capital	20,000	8	1,600
Equity Capital	1,20,000	13	15,600
Retained Earning	40,000	9	3,600
	2,60,000		24,800

Weighted average cost of capital $(Ko) = \dfrac{\Sigma XW}{\Sigma W}$

$= \dfrac{\text{Total Costs}}{\text{Total Capital}} \times 100$

$\dfrac{\text{Rs. 24,800}}{\text{Rs. 2,60,000}} \times 100 = 9.54\%$ Approximately

(ii) Calculation of the weighted average cost of capital using market value as weights:

Source of Capital	Market value (W)(Rs)	Specific Cost (X)(%)	Total cost (WX)(₹)
Debentures	76,000	5	3,800
Preference Capital	22,000	8	1,760
Equity Capital	1,80,000	13	23,400
Retained Earning	60,000	9	5,400
	3,38,000		34,360

$Ko = \dfrac{\text{Rs. 34,360}}{\text{Rs. 3,38,000}} \times 100$

$= 10.17\%$

In our question the market value of equity share and retained earnings is ₹ 2,40,000 as against their book value ₹ 1,60,000. In relative term we can say that every equity funds of rupees 2 at book value have market value of ₹ 3/- (₹ 2,40,000/₹ 1,60,000). On basis of this criteria, we may calculate the value of retained earning and that of equity shares as under.

Value of retained earnings = ₹ 40,000 × $\frac{3}{2}$ = ₹ 60,000

Value of Equity Share = ₹ 1,20,000 × $\frac{3}{2}$ = ₹ 18,0,000

The weighted average cost of capital computed on the basis of market value weight is higher than the weighted average cost of capital computed on the basis of book value weights as in our Question. Because market value of equity capital is higher than its book value.

The weighted average cost of capital would be the same under book value weights and market value weights provided there is no difference in value of securities under both the cases.

Question No. 26

The Novex company has the following capital structure on 31st March, 2013

	₹
Ordinary shares (4,00,000 shares)	80,00,000
10% Preference shares	20,00,000
14% Debentures	60,00,000
	1,60,00,000

The share of the company sells for ₹ 20. It is expected that company will pay next year a dividend of ₹ 2 per share which will grow at 7 per cent forever. Assume a 40 per cent tax rate.

You are required to:

(a) Compute a weighted average cost of capital based on existing capital structure.

(b) Compute the new weighted average cost of capital if the company raises an additional ₹ 40 lakh debt by issuing 15 per cent debenture. This would result in increasing the expected dividend to ₹ 3 and leave the growth rate unchanged, but the price of share will fall to ₹ 15 per share.

(c) Compute the cost of capital if in (b) above growth rate increases to 10 per cent.

Answer to Question No. 26

(a) Weighted Average Cost of Capital – Existing Capital Structure

	Amount cost	After-tax cost (%)	Weights	Weighted cost (%)
Ordinary Shares	80,00,000	0.17	* 0.500	0.0850
10% Preference Shares	20,00,000	0.10	0.125	0.0125
14% Debentures	60,00,000	0.084	0.375	0.0315
Total	1,60,00,000			0.1290
Weighted Average Cost of Capital (WACC)				or 12.9%

*Cost of Ordinary Share $\qquad (K_e) = \dfrac{D_1}{P_0} + g$

$$= \dfrac{Rs.\,2}{Rs.\,20} + 0.07$$

$$= 0.10 + 0.07 = 0.17$$

(b) Weighted Average Cost of Capital—New Capital Structure

Scripts	Amount (₹)	After-tax cost	Weights (%)	Weighted cost (%)
Ordinary shares	80,00,000	0.27	** 0.40	0.108
10% Preference shares	20,00,000	0.10	0.10	0.010
14% Debentures	60,00,000	0.084	0.30	0.025
15% Debentures	40,00,000	0.09	0.20	0.018
Total	2,00,00,000			0.161
Weighted Average Cost of Capital (WACC)				or 16.1%

**Cost of ordinary share $\qquad (K_e) = \dfrac{D_1}{P_0} + g$

$$= \dfrac{Rs.\,3}{Rs.\,15} + 0.07$$

$$= 0.20 + 0.07 = 0.27$$

(c) Weighted Average Cost of Capital—Changed Growth Rate

Scripts	Amount (₹)	After-tax cost	Weights (%)	Weighted cost (%)
Ordinary shares	80,00,000	0.30	*** 0.40	0.120
10% Preference shares	20,00,000	0.10	0.10	0.010
14% Debentures	60,00,000	0.084	0.30	0.025
15% Debentures	40,00,000	0.09	0.20	0.018
Total	2,00,00,000			0.173
Weighted Average Cost of Capital (WACC)				or 17.3%

***Cost of ordinary share $\qquad (K_e) = \dfrac{D_1}{P_0} + g$

$$= \dfrac{Rs.\,3}{Rs.\,15} + 0.10$$

$$= 0.20 + 0.10 = 0.30$$

Note: The book value weights have been used to calculate WACC in the above cases.

MANAGEMENT OF WORKING CAPITAL

Question No. 27

From the given information for Ajanta manufacturing company, prepare an estimate of the requirement of working capital.

Production	90,000 units
Selling Price per unit	₹ 5/-
Raw Materials	60% of selling price
Direct Wages	10% of selling price
Overheads	20% of selling price
Materials in hand	2 months requirements
Production time	1 month
Finished goods in stores	3 months
Credit for material	2 months
Credit allowed to customers	3 months
Average cash balance	₹ 30,000/-

Wages and overheads are paid at the beginning of the month following. In production all the required materials are charged in the initial stage and wages and overheads accrue evenly.

Answer to Question No. 27

Calculation of Working Capital Requirement

	Amount in ₹	Amount in ₹
***Current assets* (level of production 90,000 units)**		
Current Assets:		
Materials (90,000 x ₹ 3 x 2/12)		45,000
Work in Progress:		
Materials (90,000 x ₹ 3 x 1/12)	22,500	
Labour (90,000 x ₹ 0.50 x 1/12 x 1/2)	1,875	
Overheads (90,000 x Re. 1 x 1/12 x 1/2)	3,750	28,125
Finished goods (90,000 x 90% x ₹ 5 x 3/12)		1,01,250
Debtors (90,000 x ₹ 5 x 3/12)		1,12,500
Cash		30,000
Total Current Assets (A)		3,16,875
Less: Current Liabilities		
Creditors (90,000 x ₹ 3 x 2/12)	45,000	
Outstanding wages (90,000 x Re. 0.50 x 1/12)	3,750	
Outstanding Overheads (90,000 x Re. 1 x 1/12)	7,500	
Total Current Liabilities (B)		56,250
Estimated Working Capital Requirements (A–B)		2,60,625

Question No. 28

The Management of Apollo Ltd. Has called for a statement showing the working capital needed to finance a level of activity of 6,00,000 units of output for the year. The cost structure for the company's product, for the above mentioned level is given as under:

	Cost per unit (₹)
Raw materials	20
Direct labour	5
Overheads	15
Total cost	40
Profit	10
Selling price	50

Past trends indicate that raw materials are in stock on an average for two months.

Work in progress will approximate to half a months production. Finished goods remain in warehouse on an average for a month. Supplier of a materials extend a months credit.

Two months credit is normally allowed to debtors. A minimum cash balance of ₹ 60,000 is expected to be maintained. The production pattern is assumed to be even during the year. Prepare the statement of working capital determination.

Answer to Question No. 28

Statement showing Cost & Profit

	Per unit (₹)	Amount for 6,00,000 Units of output (₹)
Raw materials	20.00	1,20,00,000
Direct labour	5.00	30,00,000
Overheads	15.00	90,00,000
Total cost	40.00	2,40,00,000
Profit	10.00	60,00,000
Sales	50.00	3,00,00,000

Calculation of working capital requirement

	₹
Raw materials (stock for two months) $=\dfrac{2}{12}\times 1,20,00,000$	20,00,000
Work in progress 1/2 months production i.e. 1/2 month total cost $=\dfrac{1}{24}\times 2,40,00,000$	10,00,000
Finished goods remain in warehouse for one month	
Total inventory one month's total cost $=\dfrac{1}{12}\times 2,40,00,000$	20,00,000

		50,00,000

Debtor balances – 2 months sales $= \dfrac{2}{12} \times 3{,}00{,}00{,}000$ 50,00,000

Cash balance (minimum as given in the question)   60,000

Total current assets   1,00,60,000

Less: Creditors $= \dfrac{1}{12} \times 1{,}20{,}00{,}000$ 10,00,000

Working capital required   90,60,000

Question No. 29

M/s Kataria & Co. have approached their banker for their working capital requirement who have agreed to sanction the same by retaining the margins as under:

Raw material	15%
Stock in Progress	30%
Finished goods	20%
Debtors	10%

From the following projections for 2017-18 you are required to work out:

(a) the working capital required by the company; and

(b) the working capital limits likely to be approved by bankers.

Estimates for 2017-18	₹
Annual Sales	16,80,000
Cost of production	14,40,000
Raw material Purchases	8,15,000
Monthly Expenditure	45,000
Anticipated opening stock of raw materials	1,80,000
Anticipated closing stock of raw materials	1,55,000

Inventory Norms:

Raw material	2 months
Work in Progress	15 days
Finished goods	1 months

The firm enjoy a credit of 15 days on its purchases and allows 1 month credit on its supplies. On sales orders, the company has received an advance of ₹ 25,000. State your assumption if any.

Answer to Question No. 29

Calculation of Monthly consumption of raw materials, monthly sales and monthly cost of production

Raw materials

Opening Stock + Purchases (₹ 8,15,000 + ₹ 1,80,000)	=	₹ 9,95,000
Less closing stock	=	₹ 1,55,000
Annual Consumption	=	₹ 8,40,000
Monthly Consumption = $\dfrac{Rs.8,40,000}{12}$	=	₹ 70,000
Monthly Sales $\dfrac{Annual\ Sales}{12} = \dfrac{Rs.16,80,000}{12}$	=	₹ 1,40,000
Monthly Cost of Production $\dfrac{Cost\ of\ Production\ per\ year}{12} = \dfrac{Rs.14,40,000}{12}$	=	₹ 1,20,000

Calculation of Working capital required by Kataria & Co.

	₹
1. Raw materials — 2 months consumption	1,40,000
2. Work in Progress — 15 days Cost of Production	60,000
3. Finished Goods — 1 month Cost of Production	1,20,000
4. Sundry debtor — 1 month sales	1,40,000
5. Expenses for — 1 month	45,000
	5,05,000

Less : (i) Creditors 15 days purchases $\left(\dfrac{8,15,000}{12} \times \dfrac{1}{2}\right)$	= 33,959	
(ii) Advance received on sales order	= 25,000	58,959
Working capital required by the company		4,46,041

Working capital limits set by bankers

1. Raw materials — 2 months' consumption	1,40,000	
Less: 15% margin	21,000	1,19,000
2. Work in progress — 15 days' cost of production	60,000	
Less: 30% margin	18,000	42,000
3. Finished goods — 1 month cost of production	1,20,000	
Less: 20% margin	24,000	96,000
4. Sundry Debtors — 1 month sales	1,40,000	
Less: 10% margin	14,000	1,26,000
5. For expenses		Nil
Total limit likely to be approved by bank		3,83,000

Question No. 30

A company is floated to manufacture a new chemical called 'moin'. Currently 'moin' is imported in India at a landed cost of ₹ 8,500 per tonne. The following data have been collected regarding the project:

    (i) Investment:

Land	= ₹ 1 lakh
Building	= ₹ 8 lakhs
Plant and machinery	= ₹ 12 lakhs

    (ii) Cost of production:

Imported raw material	= ₹ 6,50,000
Indigenous raw material	= ₹ 6,26,000
Salaries and wages	= ₹ 1,35,000
Repairs and maintenance:	5% on plant cost; and 2% on building cost
Depreciation:	7% on plant; and 2-1/2% on building
Administrative expenses	= ₹ 50,000
Steam requirement	= ₹ 7,000 tonnes at ₹ 16 per tone
Power	= ₹ 60,000
Packing drums	= ₹ 30 each per 500 kgs.

    (iii) Working capital requirements:

Imported raw material stock	— 6 months
Local raw material stock	— 3 months
Packing material stock	— 3 months
Finished product stock	— 1 month
Credit to customers	— 1 month
Credit from suppliers	— 1 month
Cash expenses	— 1 month

    (iv) Expected production — 250 M/T per annum.

        (a) Calculate the total capital needed for the project.

        (b) Assuming that the entire production can be sold at the imported price, calculate the percentage yield on the investment and profit on sales.

        (c) Also calculate the rate of cash generation per annum before taxation.

Answer to Question No. 30

Working:

Forecast Operating Statement	₹
Raw materials — imported	6,50,000
Raw materials — local	6,26,000
Packing material — 500 drums @ ₹ 30/- each	15,000
Salaries and wages	1,35,000
Repair and Maintenance: Plant	60,000
Building	16,000
Administrative expenses	50,000
Steam requirement	1,12,000
Power	60,000
Depreciation: Plant	84,000
Building	20,000
Total Cost	18,28,000

Production 250 M/T	
Cost per tonne (₹ 18,28,000 – 250)	7,312
Selling price	8,500
Profit	1,188
Total profit per annum	2,97,000
Investment	**₹ in lakh**
Fixed Assets	1.00
Land	8.00
Building	12.00
Total	21.00

(a) Working Capital

   (i) Total Capital needed for the project
   Investment in fixed Assets:

	(*Amt. in ₹*)	(*Amt. in ₹*)
Land	1,00,000	
Building	8,00,000	
P & M	12,00,050	21,00,000
Investment in working capital		
Imported Raw Material	(6,50,000 x 6/12)	3,25,000
Local Raw Material	(6,26,000 x 3/12)	1,56,000
Packing Drums Stock	(15,000 x 3/12)	3,750

Debtors (₹ 8,500 x 250)	(21,25,000 x 1/12)	1,77,083
Finish Goods Stock	(18,28,000 x 1/12)	1,52,333
Cash exp.	(4,48,000 x 1/12)	37,334
		8,52,000

Creditors

Import	₹ 6,50,000		
Local	₹ 6,26,000	(12,76,000 x 1/12)	1,06,333
Working Capital			₹ 7,45,667

Total Capital Required = Fixed Capital + Working Capital

(₹ 21,00,000 + ₹ 7,45,667)   = ₹ 28,45,667

(b) It has been assumed that no credit is available in respect of imported raw material.

(a) Total Capital requirement   *₹/lakh*

Investment	21.00
Working Capital	7.97
	28.97

(b) Percentage yield on total investment = $\dfrac{2,97,000 \times 100}{\text{Rs. }28,97,000}$ = Rs. 10.25%

Profit on sales: $\dfrac{\text{Rs. }1,188}{\text{Rs. }8,500} \times 100$ = 13.97%

(c) Cash generation per annum: Profit + Depreciation

₹ 2.97 lakhs + ₹ 1.04 lakhs

= ₹ 4.01 lakhs

Question No. 31

PQR company is currently selling 2,00,000 units of its product @ ₹ 50 each. At the current level of production the cost per unit is ₹ 45, variable cost per unit is ₹ 40. The company is currently extending one month credit. The company is thinking of extending credit period to two months in the expectation that sales will increase by 20 per cent. If the required rate of return on firms investment is 25 per cent, is the new credit policy desirable for the company?

Answer to Question No. 31

Calculation of total cost at new Sales Level

	₹
Cost at present level of sales (2,00,000 x ₹ 45)	90,00,000
Cost of increased sales (2,00,000 x 20%) x 40	16,00,000
Cost of Sales of 2,40,000 units	1,06,00,000
Average cost per unit of sales at the new level of Sales is = $\dfrac{1,06,00,000}{2,40,000}$	44.16

Calculation of Profitability and required rate of return	
Profitability on additional sales [40,000 x (₹ 50 – ₹ 40)]	4,00,000
Present average investment in receivables = ₹ 90,00,000/12	7,50,000
Average investment in receivable after change in credit policy (₹ 1,06,00,000/6)	17,66,666
Additional investment in receivables (₹ 17,66,666 – ₹ 7,50,000)	10,16,666
Required rate of return on additional investment (₹ 10,16,666 x .25)	2,54,166

From above it is clear that the new credit policy is acceptable to the company because profit on account of additional sales is expected to increase by ₹ 4,00,000 as against the required rate of return of ₹ 2,54,166 on the additional investment in receivable.

Assumptions :   (1)   All sales are on credit sales.

                     (2)   Fixed cost do not change.

Question No. 32

Compute 'maximum bank borrowings' permissible under Method I, Method II and Method III of Tandon Committee norms from the following figures and comment on each method:

		₹ *(lakhs)*		₹ *(lakhs)*
Current Liabilities:			**Current Assets:**	
Creditors for purchases	400		Raw Materials	800
Other current liabiltiies	200	600	Work-in-process	80
Bank borrowings inclu bills discounted discounted with bankers	200		Finished goods	360
			Receivables including billswith bankers	800
			Other current assets	40
		1,400		1,480

Assume core current assets are ₹ 380 lakhs.

Answer to Question No. 32

Maximum bank borrowings permissible under different methods of Tandon Committee norms

Method I	**(₹ in lakhs)**
Total current assets	1480
Less: Current liabilities other than bank borrowings	600
Working capital gap	880
Less: Borrower's contribution of 25% of above from Long term sources	220
Maximum bank borrowings permissible	660
Excess borrowings (₹ 800 lakhs – ₹ 660 lakhs)	140
Method II	
Total current assets	1480

Less: Borrower's contribution of 25% of above from Long term sources	370
Less: Current liabilities other than bank borrowings	600
Maximum bank borrowings permissible	510
Excess borrowings (₹ 800 lakhs – ₹ 510 lakhs)	290
Method III	
Total current assets	1480
Less: Core current assets (100% Contribution)	380
Real current assets	1100
Less: Borrower's contribution of 25% of above from Long term sources	275
	825
Less: Current liabilities other than bank borrowings	600
Maximum bank borrowings permissible	225
Excess borrowings (₹ 800 lakhs – ₹ 225 lakhs)	575

Comments

Method I: According to Method I prescribed by Tandon Committee the maximum permissible limit of bank borrowings for the Company are ₹ 660 lakhs whereas actual bank borrowings are of ₹ 800 lakhs. Thus, there is excess amount of bank borrowing to the tune of ₹ 140 lakhs which may be converted into term loan to be paid out gradually.

Method II: According Method II, the Company has to get ₹ 290 lakhs converted into term loan to be phased out gradually.

Method III: As per Method III, excess borrowings of the Company from bank are ₹ 575 lakhs. Under this method, the borrower has to finance core current assets also from the long-term sources. Till the time the borrower is able to arrange for long-term funds, bank may convert the excess amount of borrowings into term loan to be phased out in future.

Question No. 33

X Public Limited Company has obtained the following data concerning the average working capital cycle for other components in the same industry.

	Day
Raw material stock turnover	20
Credit received	(40)
Work in progress turnover	15
Finished goods stock turnover	40
Debtors' collection period	60
	95

Using the following information, you are required to calculate the current working capital cycle for X Public Limited Co. and briefly comment on it.

	₹ ('000)
Sales	3,000
Cost of sales	2,100
Purchases	600
Average raw material stock	80
Average work-in-progress	85
Average finished goods stock	180
Average creditors	90
Average debtors	*350*

Answer to Question No. 33

Working capital cycle for X Public Ltd. Co. can be calculated in the following manner—

Raw material stock $= \dfrac{\text{Average raw material stock}}{\text{Purchases}} \times 365$

$= \dfrac{80}{600} \times 365 = 49$ days approx.

Less: Creditors $= \dfrac{\text{Average creditors}}{\text{Purchases}}$

$= \dfrac{90}{60} \times 365 = (55)$ days

Work in progress $= \dfrac{\text{Average work in Progress}}{\text{Cost of goods sold}} \times 365$

$= \dfrac{85}{2100} \times 365 = 15$ days

Finished goods stock $= \dfrac{\text{Average finished goods stock}}{\text{Cost of goods sold}} \times 365$

$= \dfrac{180}{2100} \times 365 = 31$ days

Debtors $= \dfrac{\text{Average debtors}}{\text{Sales}} \times 365$

$= \dfrac{350}{3000} \times 365 = 43$ days

Working capital cycle is 83 days = 49 − 55 + 15 + 31 + 43

Comments

Overall, the working capital cycle is below the industry average, indicating a lower investment in current assets. However, the following point should be noted about the individual elements of working capital:

(a) The stock of raw material is considerably higher than the average. The stock control procedures should be reviewed since these could possibly be reduced.

(b) The value of creditors is also above average. This indicates that X Ltd. Company is delaying the payment of creditors beyond the credit period. Although this is an additional source of finance, it may result in a higher cost of raw materials.

(c) The finished goods stock is below average. This may be due to high demand for the firm's goods or to efficient stock control. A low finished goods stock can be however, reduce sales since it can cause delivery delays.

(d) Debts are collected more quickly than average. The Company may employ good credit control procedures or may offer cash discount for early payment. This can, however, be done at the expense of profitability.

Question No. 34

Calculate the amount of working capital requirements for Jolly & Co. Ltd. from the following information :

	₹ (per unit)
Raw materials	160
Direct labour	60
Over heads	120
Total cost	340
Profit	60
Selling price	400

Raw materials are held in stock on an average for one month. Materials are in process on an average for half-a-month. Finished goods are in stock on an average for one month.

Credit allowed by suppliers is one month and credit allowed to debtors is two months. Time leg in payment of wages is 1-1/2 weeks. Time leg in payment of overhead expenses is one month. One fourth of the finished goods is sold against cash.

Cash in hand and at bank is expected to be ₹ 50,000 ; and expected level of production amounts to 1,04,000 units.

You may assume that production is carried on evenly throughout the year, wages is equivalent to a month.

Answer to Question No. 34

Total value method

Working:

1. ***Raw material inventory:*** Total cost of materials for the whole year (Fifty two weeks) is ₹ 1,66,40,000. The monthly (four weeks) consumption would be ₹ 12,80,000. Raw material requirement is for one month, hence raw materials in stock would be ₹ 12,80,000.

2. ***Debtors:*** The average credit sales (per week) is ₹ 6,00,000. Therefore, a sum of ₹ 48,00,000 is the amount of sundry debtors.

3. ***Creditors:*** Suppliers allow a one month credit period. Hence the average amount of creditors is ₹ 12,80,000. Besides wages and overhead payable are:

   Wages (1-1/2 weeks) = ₹ 1,80,000

   Overheads (4 weeks) = ₹ 9,60,000

4. ***Work-in-process:***

	₹
(i) Raw materials in WIP	6,40,000
(ii) Labour cost (it is given in the question that labour and overheads accrue evenly throughout the year or month. Thus on the first day of month it would be zero, and on the last day of the month the WIP includes one month's labour cost on an average it is equivalent to 1 week labour cost).	1,20,000
(iii) Overhead (for 1 weeks as explained above)	2,40,000
Total WIP	10,00,000

5. Finished goods inventory:

	₹
One month cost of raw material	12,80,000
Labour	4,80,000
Overhead	9,60,000
	27,20,000

Working capital requirements :

Current Assets (A):	₹	₹
Raw materials inventory	12,80,000	
Debtors	48,00,000	
Work-in-process	10,00,000	
Finished goods inventory	27,20,000	
Cash	50,000	98,50,000
Current liabilities (B):		
Creditors	12,80,000	
Wages payable	1,80,000	
Overheads payable	9,60,000	24,20,000
		74,30,000

Alternate Cash Cost Method

Working capital requirements:

Current Assets	
Raw materials inventory	12,80,000
*Debtors	40,80,000
Work-in-progress	10,00,000
Finished goods inventory	27,20,000
Cash	50,000
Total	**91,30,000**

Current Liabilities:	
Creditors	12,80,000
Wages payable	1,80,000
Overhead payable	9,60,000
Estimated Working Capital requirement (Balancing figure)	67,10,000
Total	**91,30,000**

*Debtors: The average credit sales (per week) is ₹ 5,10,000 (1,500 units x ₹340).

Question No. 35

In order to increase sales from the normal level of ₹ 2.4 lakhs per annum, the marketing manager submits a proposal for liberalising credit policy as under :

Normal sales	₹ 2.4 lakhs
Normal credit period	30 days

Proposed increase in credit period beyond normal 30 days	Relevant increase over normal sales (₹)
15 days	12,000
30 days	18,000
45 days	21,000
60 days	24,000

The P.V. ratios of the company is 33-1/3%

The company expects a pre-tax return of 20% on investment. Evaluate the above four alternatives and advise the management. (Assume 360 days a year)

Answer to Question No. 35

Evaluation of Alternative

(₹ in lakhs)

	Existing Credit Policy	Proposed Credit Policy			
1	*2*	*3*	*4*	*5*	*6*
(i) Credit period days	30	45	60	75	90
(ii) Credit period year	1/12	1/8	1/6	1/4.8	1/4
(iii) Sales	2.4	2.52	2.58	2.61	2.64
(iv) Contribution					
(Sales x P/V ratio)	0.8	0.84	0.86	0.87	0.88
(v) Increase in contribution					

overexisting (a)	—	0.04	0.06	0.07	0.08
(vi) Debtors balances	0.2	0.315	0.43	0.54375	0.66
(Sales x Credit period)					
(vii) Required pre tax return on investment	0.04	0.063	0.086	0.10875	0.132
(viii) Increase in return on investment over existing (b)	—	0.023	0.046	0.06875	0.092
(ix) Excess (a – b)	—	0.017	0.014	0.00125	(0.012)

It will be seen from the above calculation that there is maximum return when the credit period is for 45 days. There is an excess of contribution over increase in return on investment. Therefore management is advised to extend the credit period to 45 days.

Note: Investment in debtors could be calculated on variable cost basis also.

Question No. 36

Taxes Manufacturing Company Ltd., is to start production on 1st January, 2012. The prime cost of a unit is expected to be ₹ 40 out of which ₹ 16 is for materials and ₹ 24 for labour. In addition variable expenses per unit are expected to be ₹ 8, and fixed expenses per month ₹ 30,000. Payment for materials is to be made in the month following the purchase. One-third of sales will be for cash and the rest on credit for settlement in the following month. Expenses are payable in the month in which they are incurred.

The selling price is fixed at ₹ 80 per units manufactured and sold are expected to be as under :

January	900	April	2,100
February	1,200	May	2,100
March	1,800	June	2,400

Draw up a statement showing requirements of working capital from month to month, ignoring the question of stocks.

Answer to Question No. 36

Statement showing requirements of Working Capital (Jan. to June 2012)

	January ₹	February ₹	March ₹	April ₹	May ₹	June ₹
Requirements:						
Wages	21,600	28,800	43,200	50,400	50,400	57,600
Materials	—	14,400	19,200	28,800	33,600	33,600
Expenses:						
Fixed	30,000	30,000	30,000	30,000	30,000	30,000
Variable	7,200	9,600	14,400	16,800	16,800	19,200
Total (i)	58,800	82,800	1,06,800	1,26,000	1,30,800	1,40,000
Receipts:						

Cash sales	24,000	32,000	48,000	56,000	56,000	64,000
Sundry Debtors						
(Credit Sales)	—	48,000	64,000	96,000	1,12,000	1,12,000
Total (ii)	24,000	80,000	1,12,000	1,52,000	1,68,000	1,76,000
Cash required:						
[(i)—(ii)]	34,800	2,800	—	—	—	—
Surplus (ii)—(i)	—	—	5,200	26,000	37,200	35,600
Cumulative requirement	34,800	37,600	32,400	6,400	—	—
Cumulative Surplus	—	—	—	—	30,800	66,400

Question No. 37

Estalla Garment Co. Ltd. is a famous manufacturer and exporter of garments to the European countries. The finance manager of the company is preparing its working capital forecast for the next year. After carefully screening all the documents, he collected the following information:

Production during the previous year was 15,00,000 units. The same level of activity is intended to be maintained during the current year.

The expected ratios of cost to selling price are:

Raw materials	40%
Direct wages	20%
Overheads	20%

The raw materials ordinarily remain in stores for 3 months before production. Every unit of production remains in the process for 2 months and is assumed to be consisting of 100% raw material, wages and overheads. Finished goods remain in warehouse for 3 months. Credit allowed by the creditors is 4 months from the date of the delivery of raw material and credit given to debtors is 3 months from the date of dispatch.

The estimated balance of cash to be held: ₹ 2,00,000

Lag in payment of wages: $\frac{1}{2}$ month

Lag in payment of expenses: $\frac{1}{2}$ month

Selling price is ₹ 10 per unit. Both production and sales are in a regular cycle. You are required to make a provision of 10% for contingency (except cash). Relevant assumptions may be made.

You have recently joined the company as an assistant finance manager. The job of preparing the forecast statement has been given to you. You are required to prepare the forecast statement. The finance manager is particularly interested in applying the quantitative techniques for forecasting the working capital needs of the company. You are also required to explain the approach in the brief note to be prepared by you.

Answer to Question No. 37

Forecast statement of Working Capital Requirement of Estalla Garment Co. Ltd.

A. Current Assets

	₹
(i) Debtors $\left(1,50,00,000 \times \dfrac{80}{100} \times \dfrac{3}{12}\right)$	30,00,000
(ii) Finished goods $\left(1,50,00,000 \times \dfrac{80}{100} \times \dfrac{3}{12}\right)$	30,00,000
(iii) Work-in-progress $\left(1,50,00,000 \times \dfrac{80}{100} \times \dfrac{2}{12}\right)$	20,00,000
(iv) Raw materials $\left(1,50,00,000 \times \dfrac{40}{100} \times \dfrac{3}{12}\right)$	15,00,000
Total Current Assets (A)	95,00,000

B. Current Liabilities

	₹
(i) Creditors $\left(1,50,00,000 \times \dfrac{40}{100} \times \dfrac{4}{12}\right)$	20,00,000
(ii) Wages $\left(1,50,00,000 \times \dfrac{20}{100} \times \dfrac{1}{24}\right)$	1,25,000
(iii) Expenses $\left(1,50,00,000 \times \dfrac{20}{100} \times \dfrac{1}{24}\right)$	1,25,000
Total Current Liabilities (B)	22,50,000

	₹
Excess of current assets over current liabilities (A – B)	72,50,000
Add: Provision of 10% contingency	7,25,000
	79,75,000
Add: Balance of Cash available	2,00,000
Forecast of Working Capital Requirement	81,75,000

Working Notes:

Total sales of the company for the current year:

Total sales	=	Number of units sold x Price per unit
Total sales	=	15,00,000 x ₹ 10
	=	₹ 1,50,00,000

Assumptions:

(i) All sales are made on credit basis.

(ii) The working capital blocked in debtors, finished goods and work-in-progress is taken at cost i.e. 80% of selling price.

NOTE

Dated: 2.1.2013

From: Assistant Finance Manager   To: Finance Manager

Sir,

This has reference to your direction to prepare a brief note on application of quantitative techniques for forecasting the working capital. In this connection, I hereby submit as under:

Apart from the estimation of working capital, as per operating cycle method, the following quantitative techniques are also used for estimating the working capital needs of the company:

(i) *Regression analysis method:* The regression analysis method is very useful statistical technique of forecasting working capital requirements. In the sphere of working capital management, it helps in making projections after establishing the average relationship in the past years between sales and the working capital and its various components. The analysis can be carried out through the graphic portrayals (scatter diagram) or through mathematical formulae. The relationship between sales and working capital may be simple and direct indicating complete linearity between the two or may be complex in differing degrees involving simple linear regression and multiple regression situations. This method is suitable for simple as well as complex situations.

(ii) *Percent-of-sales method:* It is a traditional and simple method of determining the level of working capital and its components. In this method, working capital is determined on the basis of past experience. If over the years, the relationship between sales and working capital is found to be stable, then this relationship may be taken as base for determining the working capital for future. This method is simple, easy to understand and useful in forecasting of working capital. However, this method is criticised on the assumption of linear relationship, between sales and working capital. Therefore, this method is not universally applicable.

Submitted please.

XYZ

(Assistant Finance Manager)

Question No. 38

A dealer having annual sales of ₹ 50 lakh extends 30 days credit period to its debtors. The variable cost is estimated at 80% on sales and fixed costs are ₹ 6,00,000. The dealer intends to change the credit policy for which the following information is given:

Credit Policy Period (Days)	Average Collection (₹ in lakhs)	Annual Sales
A	45	56
B	60	60
C	75	62

Rate of return (pre-tax) required on investment is 20%.

You are required to assess the most profitable policy with the help of incremental approach. Calculations may be restricted to two decimal places.

Answer to Question No. 38

Evaluation of Proposed Credit Policies

Amount in lakhs (₹)

Credit Policy	Present	A	B	C
Period (days)	30	45	60	75
Annual Sales	50	56	60	62
Variable Cost (80% on sales)	40	44.8	48	49.6
Fixed Cost	6	6	6	6
Total Cost	46	50.8	54	55.6
Profit (Annual Sales-Total Cost)	4.00	5.20	6.00	6.40
Incremental Profit (A)	—	1.20	2.00	2.40..(A)
Average Investment in Debtors				
46 x 30/365	3.78			
50.8 x 45/365		6.26		
54 x 60/365			8.88	
55.6 x 75/365				11.42
Incremental Investment in Debtors as compared to present level	—	2.48	5.10	7.64
Required Return:				
20% of incremental investment (B)	—	0.50	1.02	1.53
Excess return i.e. (A – B)	—	0.70	0.98	0.87

Policy B having Average Collection Period 60 day's yields the maximum profit and thus is most profitable.

Question No. 39

On 1st January, 2018, the Board of directors of Dowell Co. Ltd. wishes to know the amount of working capital that will be required to meet the programme of activity; they have planned for the year. The following information is available:

(i) Issued and paid-up capital ₹ 2,00,000.

(ii) 5% Debentures (secured on assets) ₹ 50,000.

(iii) Fixed assets valued at ₹ 1,25,000 on 31.12.2013.

(iv) Production during the previous year was 60,000 units. It is planned that this level of activity should be maintained during the present year.

(v) The expected ratios of cost to selling price are – raw materials 60%, direct wages 10% and overheads 20%.

(vi) Raw materials are expected to remain in stores for an average of two months before these are issued for production.

(vii) Each unit of production is expected to be in process for one month.

(viii) Finished goods will stay in warehouse for approximately three months.

(ix) Creditors allow credit for 2 months from the date of delivery of raw materials.

(x) Credit allowed to debtors is 3 months from the date of dispatch.

(xi) Selling price per unit is ₹ 5.

(xii) There is a regular production and sales cycle.

Prepare:

(a) working capital requirement forecast; and

(b) *an estimated profit and loss account and balance sheet at the end of the year.*

Answer to Question No. 39

(a) Forecast of Working Capital Requirements – of Dowell Co. Ltd.

	Holding Periods	₹
Current Assets:		
Raw Material	2 months	30,000
Work-in-progress	1 month	18,750
Finished goods	3 months	67,500
Debtors	3 months	75,000
Total Current Assets		1,91,250
Less: Current Liabilities – Creditors	2 months	30,000
Net Working Capital (CA – CL)		1,61,250

(b)(i)

Dowell Company Limited
Estimated Profit and Loss Account
for the year ending 31st December, 2018

	₹	₹
Sales 60,000 units @ ₹5		3,00,000
Less: Cost of Sales:		
Raw material @ 60%	1,80,000	
Direct Wages @ 10%	30,000	
Overheads @ 20%	60,000	2,70,000
Gross profit		30,000
Less: Debenture Interest @ 5% on 50,000		2,500
Net Profit		27,500

(ii)

Dowell Company Limited

Estimated Balance Sheet

for the end of 31st December, 2018

Liabilities	₹	Assets	₹
Share Capital	2,00,000	Fixed Assets	1,25,000
Reserve & Surplus	8,750	*Current Assets:*	
(balance figure)		Raw material	30,000
Profit & Loss A/c		Work-in-progress	18,750
(Profit for the year)	27,500	Finished goods	67,500
5% Debentures	50,000	Debtors (equivalent	
Creditors	30,000	to 3 months sales)	75,000
	3,16,250		3,16,250

Working Notes:

(i) Computation of Cost and Sales:

		Per unit	Total 60,000 units
		₹	₹
Selling price		5.00	3,00,000
Cost of Sales:			
Raw material		3.00	1,80,000
Direct Wages		0.50	30,000
Overheads		1.00	60,000
		4.50	2,70,000

(ii) Stock of Raw material:

2 month's consumption $\left(\dfrac{1,80,000 \times 2}{12}\right)$ = ₹ 30,000

(iii) Work in progress (1 month's production):

Raw Material $\left(\text{Rs. } \dfrac{1,80,000}{12}\right)$ = ₹ 15,000

Direct Wages* $\left(\dfrac{30,000}{12} \times \dfrac{1}{2}\right)$ = ₹ 1,250

Overheads* $\left(\dfrac{60,000}{12} \times \dfrac{1}{2}\right)$ = ₹ 2,500 ₹ 18,750

*Presumed to accrue evenly during the period

(iv) Finished goods (3 months' production)

$$\frac{₹2,70,000 \times 3}{12} = ₹ 67,500$$

(v) Debtors (3 months cost of sales)

$$\frac{₹3,00,000 \times 3}{12} = ₹ 75,000$$

(vi) Creditors (2 months consumption of raw materials)

$$\frac{₹1,80,000 \times 2}{12} = ₹ 30,000$$

Question No. 40

Prepare working capital forecast and projected profit and loss account and balance sheet from the following information:

	₹
Issued equity share capital	50,00,000
Preference share capital	15,00,000
Fixed assets	30,66,667

Production during the previous year was 10,00,000 units which is expected to be maintained during the current year. The expected ratios of cost to selling price are?

Raw material	40%
Direct wages	20%
Overheads	20%

Raw material ordinarily remains in stock for 3 months before production. Every unit of production remains in process for 2 months. Finished goods remain in stock for 3 months. Creditors allow 3 months for payment and debtors are allowed 4 months credit. Estimated minimum cash to be held will be half a month. The selling price will be ₹ 8 per unit. The production is in continuous process and sales are in regular cycle.

Answer to Question No. 40

Total Production	:	10,00,000 units
Sale Rate	:	₹ 8/unit
Cost per unit of:		
Raw Material	=	₹ 8 x 40% = ₹ 3.20
Wages	=	₹ 8 x 20% = ₹ 1.60
Overheads	=	₹ 8 x 20% = ₹ 1.60

Current Assets

		(₹)
Cash		2,00,000
Raw Material 10,00,000 x ₹ 3.20 x 3m/12		8,00,000
Work-in-Progress 10,0,000 x [₹ 3.20 + ₹ 0.80 + ₹ 0.80] x 2/12		8,00,000
Finished Goods 10,00,000 x ₹ 6.40 x 3/12		16,00,000
Debtors 10,00,000 x ₹ 8 x 4/12		<u>26,66,667</u>
	Total :	60,66,667
Current Liabilities		
Creditors 10,00,000 x ₹ 3.20 x 3/12	8,00,000	
Wages 10,00,000 x ₹ 1.60 x 1/24	66,667	
Overheads 10,00,000 x ₹ 1.60 / 1/24	<u>66,667</u>	<u>9,33,334</u>
Working Capital required		<u>51,33,333</u>

It is assume that there is a lag of 1/2 months in payment of basis and overhead

Profit Statement		*(₹)*
Sales		80,00,000
Less:		
Raw Material	32,00,000	
Wages	16,00,000	
Wages	<u>16,00,000</u>	<u>64,00,000</u>
Profit		<u>16,00,000</u>

Balance Sheet as on…………………

Liabilities	₹	*Assets*	₹
Capital	50,00,000	Fixed	30,66,667
Prof. Share Capital	15,00,000	Raw Material	8,00,000
Profit: Previous Years		Work-in-Progress	8,00,000
(Balance figure)	1,00,000	Finished Goods	16,00,000
Current Year	16,00,000	Debtors	26,66,667
Creditors	8,00,000	Cash	2,00,000
Wages Payable	66,667		
Overheads Payable	<u>66,667</u>		<u> </u>
	<u>91,33,334</u>		<u>91,33,334</u>

Question No. 41

The present credit terms of P Company are 1/10 net 30. Its annual sales are Rs. 80 lakhs, its average collection period is 20 days. Its variable cost and average total costs to sales are 0.85 and 0.95 respectively and its cost of capital is 10 per cent. The proportion of sales on which customers currently take discount is 0.5. P company is considering relaxing its discount terms to 2/10 net 30. Such relaxation is expected to increase sales by Rs. 5 lakhs, reduce the average collection period to 14 days and increase the proportion of discount sales to 0.8. What will be the effect of relaxing the discount policy on company's profit? Take year as 360 days.

Answer to Question No. 41

Evaluation of effect of relaxing the discount policy on company's profit

A. Incremental Revenue

Rs.

Increase in contribution (Rs. 5,00,000 × 15%)
75,000

Reduction in investment in receivable × cost of capital

Present: $\left[\dfrac{\text{Rs. 80 lacs} \times 0.95 \times 20\,\text{days}}{360\,\text{days}}\right] = \text{Rs. } 4,22,222$

Proposed: $\left[\dfrac{(\text{Rs. 80 lacs} \times 0.95 + \text{Rs. 5 lacs} \times 0.85) \times 14\,\text{days}}{360\,\text{days}}\right] = \text{Rs. } 3,12,083$

Reduction in investment in receivable Rs. 1,10,139 (Rs.4,22,222 – Rs. 3,12,083)

Cost of savings on investment in receivable (Rs. 1,10,139 × 10%) $\underline{11,014}$
$\underline{86,014}$

B. Incremental Cost

Increase in discount

Present: (Rs. 80 lacs × 1% × 0.5)	= Rs. 40,000
Proposed : (Rs. 85 lacs × 2% × 0.8)	= Rs. 1,36,000
Net increase in discount	= Rs. 96,000

C. Net effect on profits (A–B)   = Rs. 86,014 – Rs. 96,000

= (–) Rs. 9,986

Since, the proposed discount policy will reduce the profits of the company to the extent of Rs. 9,986. Therefore, it is not advisable for the company to relax the present discount policy.

Question No. 42

Radiance Garments Ltd. manufacturers readymade garments and sells them on credit basis through a network of dealers. Its present sale is Rs. 60 lakh per annum with 20 days credit period. The company is contemplating an increase in the credit period with a view to increasing sales. Present variable costs are 70% of sales and the total fixed costs Rs. 8 lakh per annum. The company expects pre-tax return on investment @ 25%. Some other details are given as under:

Proposed Credit Policy	Average Collection Period (days)	Expected Annual Sales (Rs. Lakh)
I	30	65
II	40	70
III	50	74
IV	60	75

Required: Which credit policy should the company adopt? Present your answer in a tabular form. Assume 360-days a year. Calculations should be made upto two digits after decimal.

Answer to Question No. 42

Statement showing Evaluation of the Proposed Credit Policies

(Amount Rs. In Lakhs)

Credit policies

			Proposed		
	Present	I	II	III	IV
Average Collection Period (days)	(20 days)	(30 days)	(40 days)	(50 days)	(60 days)
Sales (Annual)	60.00	65.00	70.00	74.00	75.00
Less: Variable cost (70% of sales)	42.00	45.50	49.00	51.80	52.50
Contribution	18.00	19.50	21.00	22.20	22.50
Less: Fixed Costs	8.00	8.00	8.00	8.00	8.00
Profit	10.00	11.50	13.00	14.20	14.50
Increase in profit compared to present profit: (A)	-	1.50	3.00	4.20	4.50
Investments in debtors (Variable cost+ Fixed cost)	50.00	53.50	57.00	59.80	60.50
Debtors turnover (360 days/Average collection period)	18	12	9	7.2	6
Average investment in debtors (Investment in debtors/ Debtors turnover)	2.78	4.46	6.33	8.3	10.08
Additional investment in debtors compared to present level	-	1.68	3.55	5.52	7.30
Required return on additional investment (25%) : (B)	-	0.42	0.89	1.38	1.83
Incremental profit: (A)–(B)	-	1.08	2.11	2.82	2.67

Decision: The company should adopt the credit policy III (with collection period of 50 days) as it yields a maximum profit to the company.

Question No. 43

A bank is analysing the receivables of Jackson Company in order to identify acceptable collateral for a short-term loan. The company's credit policy is 2/10 net 30. The bank lends 80 percent on accounts where customers are not currently overdue and where the average payment period does not exceed 10 days past the net period.

A schedule of Jackson's receivables has been prepared. How much will the bank lend on pledge of receivables, if the bank uses a 10 per cent allowance for cash discount and returns?

Account	Amount Rs.	Days Outstanding in days	Average Payment Period historically
74	25,000	15	20
91	9,000	45	60
107	11,500	22	24
108	2,300	9	10
114	18,000	50	45
116	29,000	16	10
123	14,000	27	48
	1,08,800		

Answer to Question No. 43

Analysis of the receivables of Jackson Company by the bank in order to identify acceptable collateral for a short-term loan:

(i) The Jackson Company's credit policy is 2/10 net 30.

The bank lends 80 per cent on accounts where customers are not currently overdue and where the average payment period does not exceed 10 days past the net period i.e. thirty days. From the schedule of receivables of Jackson Company Account No. 91 and Account No. 114 are currently overdue and for Account No. 123 the average payment period exceeds 40 days. Hence Account Nos. 91, 114 and 123 are eliminated. Therefore, the selected Accounts are Account Nos. 74, 107, 108 and 116.

(ii) **Statement showing the calculation of the amount which the bank will lend on a pledge of receivables if the bank uses a 10 per cent allowances for cash discount and returns**

Account No.	Amount (Rs.) (a)	90 per cent of amount (Rs.) (b)=90% of (a)	80% of amount (Rs.) (c)=80% of (b)
74	25,000	22,500	18,000
107	11,500	10,350	8280
108	2,300	2,070	1,656
116	29,000	26,100	20,880
		Total loan amount	48,816

Question No. 44

The credit manager of XYZ Ltd. is reappraising the company's credit policy. The company sells the products on terms of net 30. Cost of goods sold is 85% of sales and fixed costs are further 5% of sales. XYZ classifies its customers on a scale of 1 to 4. During the past five years, the experience was as under:

Classification	Default as a percentage of sales	Average collection period-in days for non-defaulting accounts
1	0	45
2	2	42
3	10	40
4	20	80

The average rate of interest is 15%. What conclusions do you draw about the company's Credit Policy? What other factors should be taken into account before changing the present policy? Discuss.

Answer to Question No. 44

Since the amount of revenue generated from each category of customer is not given in the question. Let us consider Rs. 100 as the amount of revenue generated from each type of customer. Therefore, Rs. 100 shall be taken as the basis for reappraisal of Company's credit policy.

Classification	Gross profit @ 15%* (Rs.)	Bed debts (Rs.)	Interest Cost (Refer to Working note)(Rs.)	Total Cost (Rs.)	Net effect (Rs.)	Strategy
(i)	(ii)	(iii)	(iv)=(ii)+(iii)	(v)=(i)-(iv)		
1	15	Nil	1.57	1.57	13.43	Accept
2	15	2	1.47	3.47	11.53	Accept
3	15	10	1.40	11.40	3.60	Accept
4	15	20	2.80	22.80	(7.80)	Reject

It is given the cost of goods sold is 85%. Therefore Gross Profit is 15% of sales.

The reappraisal of company's credit policy indicates that the company either follows a lenient credit policy or it is inefficient in collection of debts. Even though the company sells its products on terms of net 30 days, it allows average collection period for more than 30 to all categories of its customers. The net effect i.e. Gross Profit less Total Cost is favourable in respect of categories 1, 2 and 3 therefore these customers shall be taken into fold. For the customers covered in category 4 the net effect is unfavourable i.e. total cost is more than the gross profit. The company should try to reduce bad debt % for this category of customers at least by 7.8% (i.e. at 12.20%). If the company is able to do so, the company can allow the credit period of 80 days for at least increasing the market share.

The other factors to be taken into consideration before changing the present policy includes (i) past performance of the customers and (ii) their credit worthiness.

The information so required may be outsourced as well as insourced.

Working Note:

Computation of interest cost

Interest Cost= $\dfrac{\text{Average rate of interest} \times \text{Cost of goods sold} \times \text{Average collection period in days for non-defaulting accounts}}{365 \text{ days}}$

For Category 1= $\dfrac{15\% \times \text{Rs.}\,85 \times 45\,\text{days}}{365\,\text{days}}$ = Rs. 1.57

For Category 2= $\dfrac{15\% \times \text{Rs.}\,85 \times 42\,\text{days}}{365\,\text{days}}$ = Rs. 1.47

For Category 3 = $\dfrac{15\% \times \text{Rs.}\,85 \times 40\,\text{days}}{365\,\text{days}}$ = Rs. 1.40

For Category 4 = $\dfrac{15\% \times \text{Rs.}\,85 \times 80\,\text{days}}{365\,\text{days}}$ = Rs. 2.80

Question No. 45

A company has prepared the following projections for a year:

Sales	21,000 units
Selling Price per unit	Rs. 40
Variable Costs per unit	Rs. 25
Total Costs per unit	Rs. 35
Credit period allowed	One month

The Company proposes to increase the credit period allowed to its customers from one month to two months. It is envisaged that the change in the policy as above will increase the sales by 8%. The company desires a return of 25% on its investment.

You are required to examine and advise whether the proposed Credit Policy should be implemented or not.

Answer to Question No. 45

Computation of contribution and extra funds blockage if the credit period allowed to customers is increased from one month to two months

Increase in sales units	1,680
(8% × 21,000 units)	
Contribution per unit (Rs.)	15
Total contribution on increased sales units (Rs.) : (A)	25,200
(Rs.1,680 units × Rs.15)	
Total cost (Rs.)	7,35,000
21,000 units × Rs.35	
Additional variable cost of 1,680 units (Rs.)	42,000
(1,680 units × Rs.25)	
Total cost (Rs.)	7,77,000
Funds blocked for 2 months (Rs.)	1,29,500
(Rs.7,77,000 /12 months)× 2 month	
Less: Present blockage of funds for 1 month (Rs.)	61,250
(Rs.7,35,000 / 12 months) × 1 month	
Extra blockage of funds (Rs.) due to change in credit policy	68,250

$$\text{Return} = \frac{\text{Contribution on increased sales}}{\text{Extra funds blockage}} \times 100$$
(due to change in credit policy)

$$= \frac{\text{Rs. 25,200}}{\text{Rs. 68,250}} \times 100 = 36.92\%$$

Advise: The return due to a change in the credit policy comes to 36.92%, which is more than the desired return of 25%. Hence, the proposal of increasing the credit period from one month to two months should be accepted.

PORTFOLIO MANAGEMENT

Question No. 46

During a 5 year period, the relevant results for the aggregate market are that the rf (risk-free rate) is 8 percent and the rm (return on market) is 14 percent. For that period, the results of four portfolio managers are as follows:

Portfolio Manager	Average Return (%)	Beta
A	13	0.80
B	14	1.05
C	17	1.25
D	13	0.90

Using CAPM model you are required to (a) Calculate the expected rate of return for each portfolio manager and compare the actual returns with the expected returns. (b) Based upon your calculations, select the manager with the best performance.

Answer to Question No. 46

(a) Use the CAMP equation :

The expected rates of return are as follows :

Portfolio Manager	Average Return (%)	Expected Return (%)	Actual Return (%)	Difference between Actual and Expected Returns (%)
A	13	rA = 8% + 0.80 (14% − 8%) = 12.8	13	+ 0.2
B	14	rB = 8% + 1.05 (14% − 8%) = 14.3	14	− 0.3
C	17	rC = 8% + 1.25 (14% − 8%) = 15.5	17	+ 1.5
D	13	rD = 8% + 0.90 (14% − 8%) = 13.4	13	− 0.4

(b) Portfolio Managers A and C did better than expected, since A exceeded the expected return by 1.56 percent (0.2% − 12.8%) and C bettered the expected return by 9.68 percent (1.5% − 15.5%). C therefore showed the best performance.

Note: Average return is the actual return.

Question No. 47

From the following information, calculate the expected rate of return of a portfolio:

Risk Free rate of interest	12%
Expected return of market portfolio	18%
Standard deviation of an asset	2.8%
Market standard deviation	2.3%
Co-relation co-efficient of portfolio with market	0.8%

Answer to Question No. 47

Calculation of Expected Rate of Return of a Portfolio

Expected Rate of Return of a portfolio can be worked by using following formula:

$R_e + R_f + \beta_j(R_m - R_f)$ ...(1)

Where R_e stands for expected rate of return of a portfolio

R_f = Risk free rate of interest or return

R_m =   Expected return of market portfolio

β_j =   Beta co-efficient of Security j.

Since in the question, information on β_j is not given, it is essential to find it. The formula to calculate β_j is

$$\frac{r_{sm} \times \sigma_s}{\sigma_m} \quad ...(2)$$

Where r_{sm} —   Stands for correlation co-efficient of portfolio with market

σ_s —   Standard deviation of an asset

σ_m —   Market standard deviation

By substituting the available information in above formula, (2) we may get

$$\beta = \frac{0.80 \times 0.028}{0.023}$$

= 0.97

Now we may get expected rate of return by substituting available information in equation (1)

Re   = 12 + 0.97 (18 – 12)

= 17.82 per cent

Question No. 48

The following information is available in respect of Security-X and Security-Y:

Security	b	Expected Rate of Return
X	1.8	22.00%
Y	1.6	20.40%

Rate of return of market portfolio is 15.3%.

If risk-free rate of return is 7%, are these securities correctly priced? What would be the risk-free rate of return, if they are correctly period?

Answer to Question No. 48

If the two Securities X and Y are correctly priced, then the returns required, based on their levels of systematic risk and calculated from the CAPM, will be the same as their expected returns given. So, the required return can be ascertained with the help of CAPM equation as follows:

Security X   = $I_{RF} + (R_M - IRF)$ b

$$= \quad 7\% + (15.3\% - 7\%)\ 1.8$$

$$= \quad 7\% + (8.3\% \times 1.8)$$

$$= \quad 7\% + 14.94\%$$

$$= \quad 21.94\%$$

This is less than the expected return of Security X i.e. 22%. Therefore, Security A is not correctly priced.

Security Y $= I_{RF} + (R_M - IRF)\ \beta$

$$= \quad 7\% + (15.3\% - 7\%)\ 1.6$$

$$= \quad 7\% + (8.3\% \times 1.6)$$

$$= \quad 7\% + 13.28\%$$

$$= \quad 20.28\%$$

Return of 20.28% is less than the expected return of 20.40%. Therefore, Security Y is not correctly priced.

In case, both securities are correctly priced, then they must offer same Reward to Risk Ratio. The risk free rate would have to be such that:

$$(22\% - I_{RF}) \div 1.8 \quad = \quad (20.4\% - I_{RF}) \div 1.6$$

$$(.22\% - I_{RF}) \times 1.6 \quad = \quad (.204 - I_{RF}) \times 1.8$$

$$.352 - 1.6\ I_{RF} \quad = \quad .3672 - 1.8\ I_{RF}$$

$$.2\ I_{RF} \quad = \quad 0.152$$

$$I_{RF} \quad = \quad 7.6\%$$

So, both securities would have correctly priced if the risk free rate is 7.6%.

LEASING

Question No. 49

XYZ Ltd. Is considering to acquire an additional computer to supplement its time-share computer services to its clients. It has two options –

(i) To purchase the computer for ₹ 22,00,000.

(ii) To lease the computer for 3 years from a leasing company for ₹ 5,00,000 as annual lease rent plus 10% of gross time-share service revenue. The agreement also requires an additional payment of ₹ 6,00,000 at the end of the third year. Lease rent are payable at the year end, and the computer reverts to the lessor after the contract period.

The company estimates that the computer under review now will be worth ₹ 10 lakhs at the end of the third year. Forecast revenues are –

Year	₹
1	22,50,000
2	25,00,000
3	27,50,000

Annual operating costs (excluding depreciation/lease rent of computer) are estimated at ₹ 9,00,000 with an additional ₹ 1,00,000 for start-up and training costs at the beginning of the first year. These costs are to be borne by the lessee. XYZ Ltd. Will borrow at 16% interest to finance the acquisition of the computer; repayments are to be made according to the following schedule:

Year-end	Principal (₹)	Interest (₹)	Total (₹)
1	5,00,000	3,52,000	8,52,000
2	8,50,000	2,72,000	11,22,000
3	8,50,000	1,36,000	9,86,000

The company uses the straight line method to depreciate its assets and pays 50% tax on its income.

The management of XYZ Ltd. Approaches you, as a company secretary, for advice. Which alternative would you recommend and why?

Note: Present value factor at 8% and 16% rate of discount:

Year	8%	16%
1	0.926	0.862
2	0.857	0.743
3	0.794	0.641

Answer to Question No. 49

Present Value of Cash Outflows under Leasing Alternative

Year	Payment under lease contract (₹)				Tax Shield @ 50% on lease	Net cash outflows	PV factor at 8%	Total PV
	Lease Rent	10% of gross revenue	Lump-sum payment	Total payment				
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)		(₹)
1.	5,00,000	2,25,000	—	7,25,000	3,62,500	3,62,500	0.926	3,35,675
2.	5,00,000	2,50,000	—	7,50,000	3,75,000	3,75,000	0.857	3,21,375
3.	5,00,000	2,75,000	6,00,000	13,75,000	6,87,500	6,87,500	0.794	5,45,875
								12,02,925

Present Value of Cash Outflows under Buying/Borrowing Alternative

Year end	Instalment Payment			Tax advantage on		Net cash outflows Depreci-ation	PV factor at 8%	Total PV
	Principal	Interest @16%	Total	Interest Payment				
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)		(₹)
1.	5,00,000	3,52,000	8,52,000	1,76,000	2,00,000	4,76,000	0.926	4,40,776
2.	8,50,000	2,72,000	11,22,000	1,36,000	2,00,000	7,86,000	0.857	6,73,602
3.	8,50,000	1,36,000	9,86,000	68,000	2,00,000	7,18,000	0.794	5,70,092
		Salvage value				(10,00,000)	0.794	(7,94,000)
Total								**8,90,470**

Recommendation: Since the Present value of cash outflows under borrowing/buying alternative ₹ 8,90,470 is

less than Present value of cash outflow under lease alternative i.e. ₹ 12,02,925. Therefore, the Company is advised to buy the computer.

*Depreciation for 3 years = (₹ 22,00,000 – ₹ 10,00,000) = ₹ 12,00,000. Effective rate of interest or discount = 16% (1 – .50) = 8%.

NOTE: Since the annual operating costs and training costs are same under both the alternatives, so it is not included in the calculations of cash outflows.

Question No. 50

The Controller of Mahindra Electronic Corporation of India has been analysing the firm's policy regarding computers, which are now being leased on a yearly basis on rental amounting to ₹ 2,00,000 per year. The computer can be bought for ₹ 10,00,000. The purchase would be financed by 16% loan repayable in 4 equal annual instalments.

On account of rapid technological progress in the computer industry, it is suggested that a 4 year economic life should be used, instead of 10 years physical life. It is estimated that the computer could be sold for ₹ 4,00,000 at the end of 4 years.

The company uses the straight line method of depreciation. Corporate tax rate is 50%.

You are required to:

(a) Comment on whether the equipment should be bought or leased?

(b) Analyse the financial viability from the point of view of the lessor, assuming 14% cost of capital.

(c) Determine the minimum lease rent at which the lessor would break-even.

(d) Determine the lease rent which will yield on IRR of 16% to the lessor.

Answer to Question No. 50

(a) Present value of cash outflows under Leasing alternative

Year	Lease Rent after Taxes (₹)	PV factor at 8%	Total Present Value (₹)
1 – 4	1,00,000	3.312	3,31,200

Cash outflows under Buying alternative

Year end	Loan at the beginning of the year in ₹	Loan Instalment in ₹	Interest on Loan in ₹	Principal Repayment of the year in ₹	Principal outstanding at the end in ₹
1	10,00,000	3,57,398	1,60,000	1,97,398	8,02,602
2	8,02,602	3,57,398	1,28,416	2,28,982	5,73,620
3	5,73,620	3,57,398	91,779	2,65,619	3,08,001
4	3,08,001	3,57,398	49,397	3,08,001	—

*(₹ 10,00,000 / 2.798) Present value factor of annuity of Re. 1 at 16% for 4 years.

Present value of cash outflows under Buying alternative

Year	Loan Instalment	Tax advantage		Net Cash on	PV factor Outflows	Total PV at 8%
		Payment of Interest	Depre-ciation			
1	3,57,398	80,000	75,000	2,02,398	0.926	1,87,421
2	3,57,398	64,208	75,000	2,18,190	0.857	1,86,989
3	3,57,398	45,890	75,000	2,36,508	0.794	1,87,787

4	3,57,398	24,699	75,000	2,57,699	0.735	1,89,409
			Salvage value	(4,00,000)	0.735	(2,94,000)
						4,57,606

Recommendation: It may be noted from the above workings that leasing option is financially superior as against buying alternative because present value of cash outflow under leasing option is lower.

(b) (i) *Viability from the lesser's point of view. at 14% cost of capital*

Determination of CFAT

Lease rent received	2,00,000
Less: Depreciation	1,50,000
Earning before tax	50,000
Less: Taxes (50%)	25,000
Earning after tax	25,000
Add: Depreciation	1,50,000
CFAT	1,75,000

(ii) *Determination of NPV*

Year	CFAT (₹)	PV Factor at 14%	Total PV (₹)
1-4	1,75,000	2.914	5,09,950
4	4,00,000	0.592	2,36,800
			7,46,750
Less: Cost of computer			10,00,000
			(2,53,250)

Recommendation: The proposal is not financially viable to the lessor.

(c) *Lease rent at which lessor would break even:*

	₹
Cost of computers	10,00,000
Less: PV of salvage price of computer	2,36,800
Net cost to be covered	7,63,200
CFAT (Desired) (7,63,200 ÷ 2.914*)	2,61,908
Less: Depreciation	1,50,000
Earning after taxes	1,11,908
Add: Taxes @ 50%	1,11,908
Earning before tax	2,23,816
Add: Depreciation	1,50,000
Lease rent at which lessor would break-even	3,73,816

* Annuity factor at 14% for four years.

(d) *Lease rent to yield 16% IRR*

$$₹\,10,00,000 = \sum_{t=1}^{4} \frac{X}{(1+0.16)^4} + \frac{Rs.\,4,00,000}{(1+0.16)^4}$$

Where X = CFAT

$$Þ\ ₹\,10,00,000 - \frac{Rs.\,4,00,000}{(1.16)^4} = \sum_{t=1}^{4} \frac{X}{(1+0.16)^4}$$

Substituting (i) PV factor of annuity of Re. 1 at 16% for 4 years is 2.798 and

(ii) PV factor of Re. 1 at 16% in 4 years is 0.552.

₹ 10,00,000 – ₹ 4,00,000 x .552 = 2.798X

₹ 10,00,000 – ₹ 2,20,800 = 2.798X

$$₹\ \frac{779200}{2.798} = X$$

X = ₹ 2,78,485

	₹
CFAT desired	2,78,485
Less: Depreciation	1,50,000
Earning after taxes	1,28,485
Add: Taxes @ 50%	1,28,485
Earning before taxes	2,56,970
Add: Depreciation	1,50,000
Lease Rent Desired	4,06,970

Question No. 51

ABC Ltd. is considering to acquire an additional sophisticated computer to supplement its time-share computer services to its clients. It has two options:

 (i) To purchase the computer for ₹ 44,00,000.

 (ii) To lease the computer for 3 years from a leasing company for ₹ 10,00,000 as annual lease rent plus 10% of gross time share service revenue. The agreement also requires an additional payment of ₹ 12,00,000 at the end of the third year. Lease rents are payable at the year end, and the computer reverts back to the lessor after the contract period.

The company estimates that the computer under review now will be worth ₹ 20 lakhs at the end of the third year.

Year	₹
1	45,00,000
2	50,00,000
3	55,00,000

Annual operating costs (excluding depreciation/lease rent of computer) are estimated at ₹ 18,00,000 with an

additional cost of ₹ 2,00,000 for start-up and training at the beginning of the first year. These costs are to be borne by the lessee. ABC Ltd. will borrow 16% interest to finance the acquisition of the computer and the repayments are to be made according to the following schedule:

Year-end	Principal (₹)	Interest (₹)	Total (₹)
1	10,00,000	7,04,000	17,04,000
2	17,00,000	5,44,000	22,44,000
3	17,00,000	2,72,000	19,72,000

The company uses the straight line method to depreciate its assets and pays 50% tax on its income.

The management of ABC Ltd. approaches you, as a Company Secretary-cum-Finance Manager, for advice. Which alternative would you recommend and why?

Note: Present value factor at 8% and 16% rate of discount:

Year	8%		16%
1	0.926		0.862
2	0.857		0.743
3	0.794		0.641

Answer to Question No. 51

Present Value of Cash Outflows under Leasing Alternative

Year	Payment under lease contract (₹)				Tax Shield @ 50% on lease	Net cash outflows	PV factor at 8%	Total PV
	Lease Rent	10% of gross revenue	Lump-sum payment	Total payment				
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)		(₹)
1	10,00,000	4,50,000	—	14,50,000	7,25,000	7,25,000	0.926	6,71,350
2	10,00,000	5,00,000	—	15,00,000	7,50,000	7,50,000	0.857	6,42,750
3	10,00,000	5,50,000	12,00,000	27,50,000	13,75,000	13,75,000	0.794	10,91,750
							PV	24,05,850

Present Value of Cash Outflows under Buying/Borrowing Alternative

Year end	Instalment Payment			Tax advantage on		Net cash outflows	PV factor at 8%	Total PV
	Principal	Interest @16%	Total	Interest payment		Depreci-ation		
	(₹)	(₹)	(₹)	(₹)	(₹)	(₹)		(₹)
1	10,00,000	7,04,000	17,04,000	3,52,000	4,00,000	9,52,000	0.926	8,81,552
2	17,00,000	5,44,000	22,44,000	2,72,000	4,00,000	15,72,000	0.857	13,47,204
3	17,00,000	2,72,000	19,72,000	1,36,000	4,00,000	14,36,000	0.794	11,40,184
		Salvage Value		(20,00,000)	0.794	(15,88,000)		
							PV	17,80,940

Recommendations: Since the Present value of cash outflows under borrowing/buying alternative ₹ 17,80,940 is less than Present value of cash outflow under lease alternative i.e. ₹ 24,05,580. Therefore, the Company is advised to buy the computer.

Depreciation for 3 years   = (₹ 44,00,000 – ₹ 20,00,000)

                                              = ₹ 24,00,000 / 3 = ₹ 8,00,000.

Effective rate of interest or discount = 16% (1 – .50) = 8%.

Note: Since the annual operating costs and training costs are same under both the alternatives, these are not considered in the calculation of cash outflows.

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FINANCIAL DECISIONS

</div>

Question No. 52

Sales and earnings before interest and taxes for the XYZ Company during 2012, were ₹ 17,50,000 and ₹ 4,50,000, respectively. During 2012, interest expense was ₹ 4,000 and preferred dividends were ₹ 10,000. These fixed charges are expected to continue during 2013. An expansion is planned, which will require ₹ 1,75,000 and is expected to increase EBIT by ₹ 1,00,000 to ₹ 5,50,000.

The firm is considering the following financing alternatives:

(a) Issue 5,000 shares of common stock to net the firm ₹ 35 per share. The firm currently has 40,000 shares of common stock outstanding.

(b) Issue ₹ 1,75,000 of fifteen-year bonds at 8%. Sinking fund payments on these bonds will commence in 2012.

(c) Issue ₹ 1,75,000 of 8.5% preferred stock.

Assume a 50% income tax rate.

(i) Calculate the EPS for 2013 at the expected earnings before interest and taxes level of ₹ 5,50,000 of each financing alternative.

(ii) Calculate the equivalency level of earnings before interest and taxes between the debt and common stock alternatives.

(iii) Calculate the equivalency level of earnings before interest and taxes between the preferred stock and common stock alternatives.

Answer to Question No. 52

(i) Determination of EPS at EBIT of ₹ 5,50,000

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Financial Plans

</div>

	(a) Equity shares	(b) Bonds	(c) Preference shares
	(₹)	(₹)	(₹)
EBIT	5,50,000	5,50,000	5,50,000
Less: interest	4,000	18,000	4,000
Taxable income	5,46,000	5,32,000	5,46,000
Less: Taxes 50%	2,73,000	2,66,000	2,73,00
Income after taxes	2,73,000	2,66,000	2,73,000

Less: Dividend on preference shares	10,000	10,000	24,875
Earnings available for equityholders	2,63,000	2,56,000	2,48,125
Number of equity shares	45,000	40,000	40,000
EPS	₹ 5.84	₹ 6.40	₹ 6.20

(ii) Equivalency level of earnings between equity and debt plan

$$\frac{(X - I_1)(1 - t) - P_1}{N_1} = \frac{(X - I_1 - I_2)(I - t)P_1}{N_2}$$

where   I = Interest, t = tax rate

           P = Dividend to Preference Share holders.

or $$\frac{(X - \text{Rs. } 4,000)0.5 - \text{Rs. } 10,000}{45,000} = \frac{(X - \text{Rs. } 4,000 - \text{Rs. } 14,000)0.5 - \text{Rs. } 10,000}{40,000}$$

or $$\frac{0.5X - \text{Rs. } 2,000 - \text{Rs. } 10,000}{45,000} = \frac{0.5X - \text{Rs. } 9,000 - \text{Rs. } 10,000}{45,000}$$

or $$\frac{0.5X - \text{Rs. } 12,000}{45,000} = \frac{0.5X - \text{Rs. } 19,000}{40,000}$$

Multiplying each side of the equation by 3,60,000

8(0.5X – ₹ 12,000)	=	9(0.5X – ₹ 19,000)
4X – ₹ 96,000	=	4.5X – ₹ 1,71,000
75,000	=	0.5X
₹ 1,50,000	=	X (EBIT)

Verification table

	Equity plan (₹)	*Debt plan* (₹)
EBIT	1,50,000	1,50,000
Less: Interest	4,000	18,000
Taxable earnings	1,46,000	1,32,000
Less: Taxes 50%	73,000	66,000
Earnings after taxes	73,000	66,000
Less: Preference dividends	10,000	10,000
Earnings for equity holders	63,000	56,000
Number of equity shares	45,000	40,000
EPS	₹ 1.40	₹ 1.40

(iii) Equivalency level between the preferred stock and common stock alternatives

$$\frac{(X-I_1)(1-t)-P_1-P_2}{N_1} = \frac{(X-I_1)(I-t)-P_1}{N_2}$$

or

$$\frac{(X-\text{Rs. }4,000)0.5-\text{Rs. }24,875}{40,000} = \frac{(X-\text{Rs. }4,000)(0.5)-\text{Rs. }10,000}{45,000}$$

or

$$\frac{0.5X-\text{Rs. }2,000-\text{Rs. }24,875}{40,000} = \frac{0.5X-\text{Rs. }2,000-\text{Rs. }10,000}{45,000}$$

Multiplying both sides of the equation by 3,60,000

$9(0.5X - ₹26,875)$	=	$8(0.5X - ₹12,000)$
$4.5X - ₹2,41,875$	=	$4X - ₹96,000$
$0.5X$	=	$₹1,45,875$
X	=	$₹2,91,750$

Question No. 53

The balance sheet of XYZ Company is given as under:

Liabilities	₹	Assets	₹
Equity Capital		Net fixed assets	2,25,000
(₹ 10 per share)	90,000	Current Assets	75,000
10% long term debt	1,20,000		
Retained earning	30,000		
Current liabilities	60,000		
	3,00,000		3,00,000

The Company's total assets turnover ratio is 3.00, its fixed operating cost is ₹1,50,000 and its variable operating cost ratio is 50%. The income tax rate is 50%.

You are required to

(a) Calculate different type of leverages for the company.

(b) *Determine the likely level of EBIT if EPS is (i) Re. 1 (ii) ₹ 2 (iii) Re. 0*

Answer to Question No. 53

Income Statement of XYZ Company

Sales Turnover ratio $= \dfrac{\text{Sales}}{\text{Total Assets}}$

Let sales of the Company be X, then $3 = \left\{\dfrac{X}{3,00,000}\right\}$ or		₹ 9,00,000
Less: Variable Cost (50% of sales)	₹ 4,50,000	
Less: Fixed Assets	₹ 1,50,000	₹ 6,00,000
Earning before Interest and Taxes (EBIT)		₹ 3,00,000
Less: Interest (10% of ₹ 1,20,000)		₹ 12,000

Earning before Taxes (EBT)	₹ 2,88,000
Less: Taxes (50% of Income)	₹ 1,44,000
Earning after Taxes (EAT)	₹ 1,44,000

Leverages

(a)(i) operating leverages
$$= \frac{\text{Contribution}}{\text{EBIT}}$$

$$= \frac{\text{Rs. }9,00,000 - \text{Rs. }4,50,000}{\text{Rs.}3,00,000}$$

$$= \frac{₹4,50,000}{₹3,00,000} = 1.50$$

(a)(ii) financial leverage
$$= \frac{\text{EBIT}}{\text{EBT}}$$

$$= \frac{₹3,00,000}{₹2,88,000} = 1.04$$

(a)(iii) combined leverage = operating leverage x financial leverage

$$= \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{EBT}}$$

Combined leverage = 1.50 x 1.04 = 1.56

$$\text{EPS} = \frac{(\text{EBIT} - \text{I})(1 - t)}{N}$$

where   I   stands for interest

           t   stands for taxes

           N   stands for number of shares

(b)(i) If EPS = Re. 1

$$\text{Re. 1} = \frac{(\text{EBIT} - ₹12,000)(1 - .50)}{9,000}$$

₹ 9,000	= (EBIT – ₹ 12,000) (.50)
₹ 9,000	= .5 EBIT – ₹ 6,000
.5EBIT	= ₹ 9,000 + ₹ 6,000
.5EBIT	= ₹ 15,000
EBIT	= ₹ 15,000 x 2 = ₹ 30,000

(b)(ii) If EPS = ₹ 2

$$₹ 2 = \frac{(\text{EBIT} - ₹12,000)(1 - .5)}{9,000}$$

₹ 18,000 = .5 EBIT – ₹ 6,000

.5EBIT	= ₹ 18,000 + ₹ 6,000
.5EBIT	= ₹ 24,000
EBIT	= ₹ 48,000

(b)(iii) If EPS = Re. 0

$$\text{Re. } 0 = \frac{(\text{EBIT} - ₹12,000)(1 - .5)}{9,000}$$

.5EBIT – 6,000	= 0
.5EBIT	= ₹ 6,000
EBIT	= ₹ 12,000

Question No. 54

X & Co. needs ₹ 10,00,000 for construction of a new plant for which it has three financing plans. The company wants to maximise EPS. Currently, the equity share is selling for ₹ 30 per share. The EBIT resulting from the plant operations are expected to run about ₹ 1,80,000 per year. The company's marginal tax rate is 50%. Money can be borrowed at the rates indicated as under:

Upto ₹ 1,00,000 at 10%

Over ₹ 1,00,000 and upto ₹ 5,00,000 at 14%

Over ₹ 5,00,000 at 18%

If fund is excess of ₹ 5,00,000 are borrowed, the company anticipates a drop in the price of equity to ₹ 25 per share. The three financing plans are as follows:

Plan-A – Use ₹ 1,00,000 debt

Plan-B – Use ₹ 3,00,000 debt

Plan-C – Use ₹ 6,00,000 debt

You are required to determine the EPS for these three plans and indicate the financial plan which will result in the highest EPS.

Answer to Question No. 54

Calculation of EPS under different plans			
	Plan - A	*Plan - B*	*Plan - C*
EBIT (₹)	1,80,000	1,80,000	1,80,000
Interest (₹)	10,000	38,000	84,000
EBT (₹)	1,70,000	1,42,000	96,000
Taxes (50%)	85,000	71,000	48,000
EAT	85,000	71,000	48,000
No. of shares	30,000	23,333	16,000
EPS (₹)	2.83	3.04	3.00

From the above it is clear that plan B gives highest earning per share i.e. ₹ 3.04 for the Company.

Question No. 55

Sales and earnings before interest and taxes for the XYZ Ltd., during current year were ₹ 35,00,000 and ₹ 9,00,000, respectively. During the year interest expense was ₹ 8,000, and preference dividends were ₹ 10,000. These fixed charges are expected to continue for the next year.

An expansion is planned, which will require ₹ 3,50,000 and is expected to increase EBIT by ₹ 2,00,000 to ₹ 11,00,000.

The firm is considering the following financing alternatives:

   (a) Issue 10,000 shares of common stock to net the firm ₹ 35 per share. The firm currently has 80,000 shares of common stock outstanding.

   (b) Issue ₹ 3,50,000 of fifteen-year bonds at 15%. Sinking fund payments on these bonds will commence after 15 years.

   (c) Issue ₹ 3,50,000 of 14% preference share.

Assume a 50% income tax rate:

   (i) Calculate the EPS at the expected earnings before interest and taxes level of ₹ 11,00,000 for each financing alternative.

   (ii) Calculate the equivalency level of earnings before interest and taxes between the debt and common stock alternatives.

   (iii) *Calculate the equivalency level of earnings before interest and taxes between the preference share and common stock alternatives.*

Answer to Question No. 55

(i) Determination of EPS at EBIT Level of ₹ 11,00,000

	Financing Plan		
	(a) *Equity* *Shares*	*(b)* *Bond* *Shares*	*(c)* *Preference*
	₹	₹	₹
EBIT	11,00,000	11,00,000	11,00,000
Less: Interest	8,000	60,500	8,000
Taxable Income	10,92,000	10,39,500	10,92,000
Less: Taxes 50%	5,46,000	5,19,750	5,46,000
Income after taxes	5,46,000	5,19,750	5,46,000
Less: Dividend on Preference Shares	10,000	10,000	59,000
Earning available for equity holders	5,36,000	5,09,750	4,87,000
Number of Equity shares	90,000	80,000	80,000
EPS (₹)	5.96	6.37	6.09

(ii) Equivalency Level of Earnings between Equity and Debt Plan

$$\frac{(X - I_1)\,(1 - t) - P_1}{N_1} = \frac{(X - I_1 - I_2)\,(1 - t) - P_1}{N_2}$$

OR

$$\frac{(X - Rs.\,8,000)\,0.5 - Rs.\,10,000}{90,000} = \frac{(X - Rs.\,8,000 - Rs.\,52,500)\,0.5 - Rs.\,10,000}{80,000}$$

$$\frac{0.5X - Rs.\,4,000 - Rs.\,10,000}{90,000} = \frac{0.5X - Rs.\,30,250 - Rs.\,10,000}{80,000}$$

The above equation can be simplified as under:

    $8\,(0.5X - ₹\,14,000) = 9\,(0.5X - ₹\,40,250)$

    $4X - ₹\,1,12,000 = 4.5X - ₹\,3,62,250$

    $4X - 4.5X - ₹\,3,62,250 + ₹\,1,12,000$

    $-0.5X = -2,50,250$

    $X = ₹\,5,00,500$

Verification Table

	Equity Plan (₹)	Debt Plan (₹)
EBIT	5,00,500	5,00,500
Less: Interest	8,000	60,500
	4,92,500	4,40,000
Less: Taxes (50%)	2,46,250	2,20,000
EAT	2,46,250	2,20,000
Less: Pref. Dividend	10,000	10,000
Earnings for Equityholders	2,36,250	2,10,000
No. of Equity shares	90,000	80,000
EPS (₹)	2.625	2.625

(iii) Equivalency level between the Preferred stock and common stock alternatives

$$\frac{(X - I_1)\,(1 - t) - P_1 - P_2}{N_1} = \frac{(X - I_1)\,(1 - t) - P_1}{N_2}$$

OR

$$\frac{(X - Rs.\,8,000)\,0.5 - Rs.\,10,000 - Rs.\,49,000}{80,000} = \frac{(X - Rs.\,8,000)\,0.5 - Rs.\,10,000}{90,000}$$

$$= \frac{0.5X - Rs.\,4,000 - Rs.\,59,000}{80,000} = \frac{0.5X - Rs.\,4,000 - Rs.\,10,000}{90,000}$$

OR

$$\Rightarrow \frac{0.5X - Rs.\,63,000}{80,000} = \frac{0.5X - Rs.\,14,000}{90,000}$$

By simplifying the above, we get:

þ   9 (0.5X – ₹ 63,000) = 8 (0.5X – ₹ 14,000)

þ   4.5X – ₹ 5,67,000 = 4X – ₹ 1,12,000

þ   4.5X – 4X = ₹ 5,67,000 – ₹ 1,12,000

         0.5X = ₹ 4,55,000

$$X = \frac{₹\,4,55,000}{.5} = ₹\,9,10,000$$

Question No. 56

Two companies – P Ltd. and Q Ltd. belong to the equivalent risk group. The two companies are identical in every respect except that Q Ltd. is levered, while P Ltd. is unlevered. The outstanding amount of debt of the levered company is ₹6,00,000 in 10% debentures. The other information for the two companies are as follows:

	P Ltd.	*Q Ltd.*
Net operating income (EBIT) (₹)	1,50,000	1,50,000
Interest (₹)	—	60,000
Earnings to equity-holders (₹)	1,50,000	90,000
Equity capitalization rate, ke	0.15	0.20
Market value of equity (₹)	10,00,000	4,50,000
Market value of debt (₹)	—	6,00,000
Total value of firm (₹)	10,00,000	10,50,000
Overall capitalization rate, ko = EBIT/V	15.0%	14.3%
Debt-equity ratio	0	1.33

An investor owns 5% equity shares of Q Ltd. Show the process and the amount by which he could reduce his outlay through use of the arbitrage process. Is there any limit to the 'process'?

Answer to Question No. 56

Investor's current position (in Company Q)

Dividend income (5% of ₹ 90,000)   =   ₹ 4,500

Market value of Investment (5% of ₹ 4,50,000)   =   ₹ 22,500

He sells his holdings in company Q for ₹ 22,500 and creates a personal leverage by borrowing ₹ 30,000 (5% of ₹ 6,00,000). The total amount with him is ₹ 52,500. He purchases 5% equity holdings of the Company P for ₹50,000 as the total value of the firm is ₹ 10,00,000. Further, his position with respect to income would be as follows:

	Company P	*Company Q*
Dividends (5% of profit)	₹ 7,500	₹ 4,500
Less: Interest (10% of ₹ 30,000)	3,000	—
Net Income	4,500	4,500

The investor, thus, can save an amount of ₹ 2,500 through the use of leverage and still continue to earn the same earnings of ₹ 4,500 as before.

There are limits to the arbitrage process and it will come to an end when the market values of both the companies are same.

Question No. 57

XYZ Corporation has plans for expansion which calls for 50% increase in assets. The alternatives before the corporation are issue of equity shares or debt at 14%. Its balance sheet and profit and loss accounts are as given below:

Balance sheet as at 31st December, 2012

Liabilities	₹ *(in lakhs)*	*Assets*	₹ *(in lakhs)*
12% debentures	25	Total assets	200
Ordinary shares –			
10 lakhs shares of			
₹ 10 each	100		
General reserve	75		—
	200		200

Profit & loss account for the year ending 31st December, 2012

	₹ *(in lakhs)*
Sales	750
Less: Total cost excluding interest	675
EBIT	75
Less: Interest on debentures	3
EBT	72
Less: Taxes	36
EAT	36
Earning per share (EPS) ₹ 36,00,000 ÷ 10,00,000	3.60
P/E ratio	5 times
Market price	18.00

If the corporation finances the expansion with debt, the incremental financing charges will be at 14% and P/E ratio is expected to be at 4 times. If the expansion is through equity, the P/E ratio will remain at 5 times. The company expects that its new issues will be subscribed to at a premium of 25%.

With the above information determine the following:

(i) If the EBIT is 10% of sales, calculate EPS at sales levels of ₹ 4 crores, ₹8 crores and ₹ 10 crores.

(ii) After expansion determine at what level of EBIT, EPS would remain the same, whether new funds are raised by equity or debt.

(iii) Using P/E ratios calculate the market value per share at each sales level for both debt and equity financing.

Answer to Question No. 57

(i) Determination of EPS at various sales levels under Debt and Equity Financing of ₹ 100 lakhs:

Sales	Sales Level					
	₹ 4 crores		₹ 8 crores		₹ 10 crores	
						₹ in lakh
	Equity	*Debt 14%*	*Equity*	*Debt 14%*	*Equity*	*Debt 14%*
EBIT at 10%	40	40	80	80	100	100
Less: Interest	3	17 (3+14)	3	17 (3+14)	3	17 (3+14)
EBT	37	23	77	63	97	83
Less: Tax @ 50%	18.5	11.5	38.5	31.5	48.5	41.5
EAT	18.5	11.5	38.5	31.5	48.5	41.5
*No. of equity shares in lakhs	18	10	18	10	18	10
EPS (₹)	1.03	1.15	2.14	3.15	2.00	4.15

*Existing Shares   10,00,000

New issue = $\left(\dfrac{\text{Rs.}10,00,000 \times 10}{12.5} \right)$

(if equity financing is resorted)   (since shares are sold at a premium of 25%)

(ii) Let 'A' be the EBIT level at which EPS would be the same:

$$\frac{(A - I_1) \times .5}{18} = \frac{(A - I_1 - I_2) \times .5}{10} = EBIT$$

Where I_1, is interest when additional funds are raised through equity and I_2 is incremental interest charges if financing is through debt.

i.e. $\dfrac{(A - 3) \times .5}{18} = \dfrac{(A - 3 - 14) \times .5}{10}$

$\dfrac{5A - 1.5}{18} = \dfrac{.5A - 8.5}{10}$

By cross multiplication, we may get

10 (.5A – 1.5)	=	18 (.5A – 8.5)
5A – 15	=	9A – 153
–4A	=	–138
4A	=	138
A	=	138/4
A	=	34.5

So solving for A, we get the EBIT as ₹ 34.5 lakhs.

Question No. 58

Triplex Company Limited is considering an expansion programme which is expected to cost ₹ 10,00,000. The company can finance it either through debt or through equity. Its current financing pattern is given as below:

	₹
Equity Capital (50,000 shares @ ₹ 10 each)	5,00,000
Reserves and Surplus	2,00,000
Debt (10%)	3,00,000
Total	**10,00,000**

The latest income statement reveals the following information:

	₹
Sales	64,00,000
Less: Total costs	59,00,000
EBIT	5,00,000
Less: Interest	30,000
EBT	4,70,000
Less: Income-tax @ 50%	2,35,000
EAT	2,35,000

The expansion programme is expected to generate additional sales of –

₹ 16,00,000 with a return of 15% on sale, before interest and taxes. If the expansion is financed through debt, the rate of new debt will be 12% and the price earning ratio will be 4 times. If the expansion programme is financed through equity shares i.e. the new shares can be sold at a price of ₹ 40 and the price to earning ratio will be 5 times. Which form of financing should the company choose if the objective of financial management in the company is maximisation of shareholders wealth.

Answer to Question No. 58

Statement Showing the Comparative Analysis of Alternative Financial Plan

	Financial Plans	
	I	*II*
	Debt Issue	*Equity Issue*
	(₹)	*(₹)*
Earnings Before Interest and Taxes (EBIT)		
(₹ 5,00,000 + 15% of 16,00,000)	7,40,000	7,40,000
Less: Interest	1,50,000	30,000
Earnings Before Taxes (EBT)	5,90,000	7,10,000
Less: Taxes @ 50%	2,95,000	3,55,000
Earnings After Taxes	2,95,000	3,55,000

No. of shares	50,000	75,000
EPS (EAT/No. of shares)	5.90	4.73
Price-Earning Ratio	4 times	5 times
Market value of share	5.90 x 4	4.73 x 5
(EPS P/E ratio)	= ₹ 23.60	= ₹ 23.65

Decision: Though there is a marginal difference in the market value of shares under alternative financial plans but in view of higher EPS (₹ 5.90) and debt equity ratio with in acceptable norm, i.e., 2.1; Financial Plan I may be accepted.

DIVIDEND DECISIONS

Question No. 59

From the given details regarding three companies, you are required to (i) calculate the value of an equity share of each of these companies when dividend pay-out ratio is (a) 20% (b) 50% (c) 0% and (d) 100% (ii) Comment on the results drawn.

A Ltd.	*B Ltd.*	*C Ltd.*
R = 15%	R = 10%	R = 8%
K_e = 10%	K_e = 10%	K_e = 10%
E = ₹ 10	E = ₹ 10	E = ₹ 10

Answer to Question No. 59

According to J. Walter, the price of a equity share in a company with no debt or taxes may determined by the following equations.

$$P = \frac{D + \dfrac{r}{K_e}(E - D)}{K_e}$$

Where P = Price per share

D = Cash dividend per share

E = Earnings per share

r = Operating return on assets or internal rate of return

K_e = Cost of equity capital or capitalisation rate.

Using the above mentioned formula, the price or value of an equity share can be calculated as under:

	A Ltd.	**B Ltd.**	**C Ltd.**
(i) When dividend pay out ratio is 20%	$= \dfrac{2 + \dfrac{15\%(10-2)}{10\%}}{10\%}$ $= \dfrac{2 + \dfrac{(.15)(8)}{.10}}{.10}$ $= ₹\ 140$	$= \dfrac{2 + \dfrac{10\%(10-2)}{10\%}}{10\%}$ $= \dfrac{2 + 8}{.10}$ $= ₹\ 100$	$= \dfrac{2 + \dfrac{8\%(10-2)}{10\%}}{10\%}$ $= \dfrac{2 + \dfrac{.08 \times 8}{.10}}{.10}$ $= ₹\ 84$

(ii) When dividend pay out ratio is 50%	$= \dfrac{5 + \dfrac{.15(10-5)}{.10}}{.10}$ $= ₹ 125$	$= \dfrac{5 + \dfrac{.10(10-5)}{.10}}{.10}$ $= ₹ 100$	$= \dfrac{5 + \dfrac{.08(10-5)}{.10}}{.10}$ $= ₹ 90$
(iii) When dividend pay out ratio is 0%	$= \dfrac{0 + \dfrac{.15(10-0)}{.10}}{.10}$ $= ₹ 150$	$= \dfrac{0 + \dfrac{.10(10-0)}{.10}}{.10}$ $= ₹ 100$	$= \dfrac{0 + \dfrac{.08(10-0)}{.10}}{.10}$ $= ₹ 80$
(iv) When dividend pay out ratio is 100%	$= \dfrac{10 + \dfrac{.15(10-10)}{.10}}{.10}$ $= ₹ 100$	$= \dfrac{10 + \dfrac{.10(10-10)}{.10}}{.10}$ $= ₹ 100$	$= \dfrac{10 + \dfrac{.08(10-10)}{.10}}{.10}$ $= ₹ 100$

Comments

1. Firm A is a growth firm because its internal rate of return (r = 15%) is greater than the cost of capital (K_e = 8%). This firm may re-invest its retained earnings at a rate which is higher than the rate expected by share holders. Firm A will maximise its share value when dividend pay out ratio is 0%. At this ratio, the value of share is ₹ 150. The market price of share increases as dividend pay out ratio declines and reverse otherwise. So optimum pay out ratio for growth firm A is zero.

2. Firm B is the normal firm because for this firm r = K_e (i.e. 10%). The dividend pay out ratio for the firm is irrelevant as it does not affect the market price of its share. It is same i.e. ₹ 100 at different level of dividend pay out ratios.

3. Firm C is declining firm because the rate of return (i.e. 8%) on the investment for this firms is lower than the cost of capital (i.e. 10%). Investors of this firm would like earnings to be distributed to them so that they may either spend it or invest it elsewhere to get a rate higher than earned by this firm. The optimum pay out ratio for this firm is 100% because at this ratio market price of its share is maximum i.e. ₹ 100.

Question No. 60

Bajaj Auto Ltd. has outstanding 1,20,000 shares selling at ₹ 20 per share. The company hopes to make a net income of ₹ 3,50,000 during the year ending on March 2013. The company is thinking of paying a dividend of ₹ 2 per share at the end of current year. The capitalisation rate for risk class of this firm has been estimated to be 15%. Assuming no taxes, answer questions listed below on the basis of the Modigliani Miller dividend Valuation Model:

(a) What will be the price of share at the end of March 31, 2013.

    (i) If the dividend is paid and

    (ii) If the dividend is not paid.

(b) *How many new shares must the company issue if the dividend is paid and company needs ₹ 7,40,000 for an approved investment expenditure during the year.*

Answer to Question No. 60

(i) Price of the share if the dividend is paid

$$P_o = \frac{D_1 + P_1}{(1 + K_e)}$$

Where P_o stands for prevailing market price of shares.

        D_1 stands for dividend to be received at the end of period.

        K_e stands for the cost of equity capital.

        P_1 stands for market price of share at the end of period one.

$$₹\,20 = \frac{₹2 + P_1}{(1 + 0.15)}$$

₹ 20 (1 + 0.15) =   (₹ 2 + P_1)

₹ 20 (1.15)   =   ₹ 2 + P_1

P_1 = ₹ 23 – ₹ 2 =   ₹ 21.

(ii) Price of the share if dividends is not paid.

$$₹\,20 = \frac{0 + P_1}{(1 + .15)}$$

$$₹\,20 = \frac{0 + P_1}{(1.15)}$$

P_1 = ₹ 20 (1.15)

P_1 = ₹ 23

(iii) Number of new equity to be issued

$$\Delta N = \frac{I - (E - ND_1)}{P_1}$$

$$\Delta N = \frac{Rs.\ 7,40,000 - (Rs.\ 3,50,000 - 1,20,000 \times Rs.\ 2)}{Rs.\ 21}$$

$$= \frac{Rs.\ 7,40,000 - (Rs.\ 3,50,000 - 2,40,000)}{Rs.\ 21}$$

$$= \frac{Rs.\ 7,40,000 - Rs.\ 1,10,000}{Rs.\ 21}$$

$$= \frac{Rs.\ 6,30,000}{Rs.\ 21}$$

= 30,000 shares.

Question No. 61

From the given information for Alpha & Company you are required to:

    (i) Find out whether the firms dividend pay-out ratio is optimal according to Walters formula. The firm was starting a year before with equity capital of ₹ 40 lakhs.

Earnings of the firm	₹ 4,00,000
Dividend paid	₹ 3,20,000
Price earning ratio	12.5
Number of share outstanding	40,000 @ ₹ 100 each.

    (ii) Will the Company change its dividend policy if P/E ratio is 8 instead of 12.5?

Answer to Question No. 61

According to J. Walter, the price of share may be find out by using the following formula:

$$P = \frac{D + (E - D)\dfrac{r}{Ke}}{Ke}$$

P	—	stands for price per equity shares.
D	—	stands for dividend per share.
E	—	stands for earnings per share.
Ke	—	stands for cost of capital.
r	—	stands for internal rate of return on investments.
(E–D)	—	stands for retained earnings per share

Substitute the information in above formula we may get

$$P = \frac{8 + \dfrac{10\%}{8\%}(10 - 8)}{8\%}$$

$$P = \frac{8 + \dfrac{.10}{.08}(2)}{.08}$$

$$P = \frac{8 + \dfrac{20}{8}}{8/100}$$

$$P = \frac{\dfrac{64 + 20}{8}}{8/100}$$

$$P = \frac{84}{8} \times \frac{100}{8} = \frac{8400}{64}$$

$$P = \frac{2100}{16}$$

P = 131.25

Working Notes

Ke is the reciprocal of 1/12.5% = 8%

$$\text{EPS} = \frac{\text{Total Earnings of the firm}}{\text{Number of shares}} = \frac{₹4,00,000}{₹40,000} = \text{Rs. } 10.00$$

$$\text{D} = \frac{\text{Amount of Dividend Paid}}{\text{Number of Shares}} = \frac{₹3,20,000}{₹40,000} = \text{Rs. } 8$$

$$r = \frac{\text{Total Earnings of the firm}}{\text{Total Equity Capital of the firm}} = \frac{₹4,00,000}{₹40,00,000} \times 100 = 10\%$$

At present, the firm pay out ratio which is 80% is not optimal. The zero dividend pay out ratio is considered maximum because at this point the price of share would be maximum.

It is evident from the following calculations.

$$P = \frac{0 + \dfrac{10\%}{8\%}(10 - 0)}{8\%}$$

$$= \frac{0 + \dfrac{.10}{.08}(10)}{.08}$$

$$= \frac{0 + 1.25 \times 10}{.08}$$

$$= \frac{12.5}{8} \times 100$$

$$= ₹ 156.25$$

(ii) The firm will change its dividend policy if P/E ratio is 8. It is because at this level of P/E ratio, the value of Cost of Capital (Ke = 12.5%) is greater than that of internal rate of return of investment (r = 10%). The optimum dividend policy for company in this case is to go for 100% dividend pay out ratio. Since Ke > r, 100% dividend pay out ratio would maximise the value of share.

Question No. 62

Consider a common stock whose dividends are expected to grow at a 25 percent rate for 2 years, after which the growth rate is expected to fall to 5 percent. The dividend paid last period was ₹ 2. The investor desires a 12 per cent return. You are required to find the value of this stock.

Answer to Question No. 62

Compute the dividends during the supernormal growth period and find their present value. Assuming D_0. is ₹ 2, g is 15 per cent, and r is 12 percent :

$$D_1 = D_0 (1 + g) = ₹ 2 (1 + 0.25) = ₹ 2.50$$

$$D_2 = D_0 (1 + g)^2 = ₹ 2 (1.563) = ₹ 3.125 \text{ or}$$

$$D_2 = D_1 (1 + g) = ₹ 2.50 (1.25) = ₹ 3.125$$

$$\text{PV of dividends} = \frac{D_1}{(1 + r)^1} + \frac{D_2}{(1 + r)^2} = \frac{₹ 2.50}{(1 + 0.12)^1} + \frac{₹ 3.125}{(1 + 0.12)^2}$$

$$= ₹ \, 2.50 \, (PVIF \, 12\%, \, 1) + ₹ \, 3.125 \, (PVIF \, 12\%, \, .2)$$

$$= ₹ \, 2.50 \, (0.8929) + ₹ \, 3.125 \, (0.7972)$$

$$= ₹ \, 2.23 + ₹ \, 2.49 = ₹ \, 4.72.$$

Find the price of the stock at the end of the supernormal growth period. The dividend for the third year

$D_3 = D_2 \, (1 + g)$, where g = 5%

$= ₹ \, 3.125 \, (1 + 0.05) = ₹ \, 3.28$

The price of the stock is therefore :

$$P_2 = \frac{D_3}{r - g} = \frac{Rs. \, 3.28}{0.12 - 0.05} = Rs. \, 46.86$$

PV of stock price $= ₹ \, 46.86 \, (PVIF \, 12\% \, .2)$

$$= ₹ \, 46.86 \, (0.7972) = ₹ \, 37.36.$$

Add the two PV figures obtained above to find the value of the stock

$P_0 = ₹ \, 4.72 + ₹ \, 37.36 = ₹ \, 42.08$

Question No. 63

Harish Engineering company has a cost of equity capital 15%. The current market value of the firm is ₹ 60,00,000 @ ₹ 30 per share. Assume value for I (New Investment) ₹ 18,00,000, E (Earnings) ₹ 10,00,000 and total dividends (D) ₹ 6,00,000. You are required to show that under the MM assumptions the payment of dividend does not affect the value of the firm.

Answer to Question No. 63

(a) Price of a share when dividend is declared

$$P_0 = \frac{D_1 + P_1}{(1 + K_e)}$$

Where

P_0 = Price of share at time period 0.

D_1 = Dividend to be received at the end of time period 1.

P_1 = Price of share at the end of time period 1.

K_e = Cost of capital.

Substituting the values in the above formula, we may get

$$₹ \, 30 = \frac{₹ \, 3 + P_1}{1.15}$$

$P_1 = ₹ \, 30 \times 1.15 - ₹ \, 3 = ₹ \, 31.50$

Price of a share when dividend is not declared

$$₹ \, 30 = \frac{P_1}{1 + .15} = \frac{P_1}{1.15} \quad \text{or } P_1 = ₹ \, 34.50$$

Amount of New-Financing

(i) When dividend is declared

I – (E – nD1)

Where I = New Investment, E = Earnings of the Firm during the period

n = The Number of shares outstanding at the beginning of the year

D_1 = Dividend paid to the shareholder at the end of time period 1.

Substituting the value in above equation, we may get

= ₹ 18,00,000 – (₹ 10,00,000 – ₹ 6,00,000)

= ₹ 14,00,000

$$\Delta n = \frac{Rs.\,14,00,000}{Rs.\,31.50}$$

(Here D n = The change in the number of shares outstanding during the year)

(ii) When dividend is not declared

= I – E

= ₹ 18,00,000 – ₹ 10,00,000

= ₹ 8,00,000

New shares to be issued are

$$\Delta n = \frac{Rs.\,8,00,000}{Rs.\,34.50}$$

(b) (i) Value of Firm (V) when dividend is declared:

$$V = \frac{1}{(1-K_e)}[nD_1 + (n+\Delta n)P_1 - I + E - nD_1]$$

$$= \frac{₹\,6,00,000 + \left(2,00,000 + \dfrac{14,00,000}{31.50}\right) \times ₹\,31.50 - ₹.18,00,000 + ₹\,10,00,000 - Rs.\,6,00,000}{1.15}$$

$$= \frac{₹\,6,00,000 + \left(\dfrac{63,00,000 + 14,00,000}{31.50}\right) \times ₹.31.50 - ₹\,14,00,000}{1.15}$$

$$= \frac{₹\,6,00,000 + ₹\,77,00,000 - ₹\,14,00,000}{1.15} = \frac{₹\,69,00,000}{1.15}$$

= ₹ 60,00,000

(ii) Value of Firm (V) when dividend is not declared:

$$V = \frac{1}{(1+K_e)}[(n+\Delta n)P_1 - I + E]$$

$$= \frac{\left[2,00,000 + \dfrac{8,00,000}{34.5}\right] \times ₹\,34.50 - ₹\,18,00,000 + ₹.10,00,000}{1.15}$$

$$= \frac{\dfrac{[\text{₹ }69,00,000 + \text{₹}8,00,000]}{34.5} \times 34.5 - \text{₹ }8,00,000}{1.15}$$

$$= \frac{\text{₹ }77,00,000 - \text{₹ }8,00,000}{1.15} = \frac{\text{₹ }69,00,000}{1.15}$$

= ₹ 60,00,000

Thus, it is clear from above that under MM Hypothesis dividend payment does not affect the value of the firm.

Question No. 64

The shares of XYZ is presently at ₹ 50 and the company is currently paying dividend of ₹ 4 per share with a growth rate expected at 8 per cent per annum. It plans to raise fresh equity share capital. The merchant banker has suggested that an underprice of Rupee 1 is necessary, in pricing the new issue besides involving a cost of 50 paise per share on miscellaneous expenses. You are required to find out the cost of existing equity shares as well as the new equity given that the dividend rate and growth rate are not expected to change.

Answer to Question No. 64

Current Price Share	*Current Dividend Payment*	*Annual Growth Rate*
P_o = ₹ 50	D_o = 4	g = 8%

F = ₹ 0.50 + ₹ 1 = ₹ 1.50

$$K_{new} = \frac{D_1}{(P_o - F)} + g = \frac{4\,(1.080)}{(50 - 1.50)} + 0.08 = 16.91\%$$

Question No. 65

The earning per share of a company is ₹ 10. Its has an internal rate of return of 15 percent and the capitalization rate of risk class is 12.5 percent. If Walter's model is used:

   (i) What should be the optimum pay out ratio of the firm?

  (ii) What should be the price of share at this pay out?

 (iii) How shall the price of share be affected if different pay out were employed?

Answer to Question No. 65

According to Walter Model –

Market Price per share = $\dfrac{DPS + (r/K_e)(EPS - DPS)}{K_e}$

Where, DPS = Dividend per share, EPS = Earning per share, r = return on Investment and K_e = Capitalization rate.

   (i) If r/K_e > 1, the value of the share of a firm will increase as EPS increases under this type of firm situation the has ample opportunities for investment and growth. The price of the share would be maximum when the firm retains all its earnings. Thus, the optimum payout ratio in this case is zero.

  (ii) When the optimum payout is zero, the price of the share of the firm is as under:

$$P = \frac{0 + (0.15 / 0.125)(10 - 0)}{0.125} = \frac{12}{0.125} = Rs.\,96$$

(iii) If the firm, under the condition $r/K_e > 1$, chooses a payout other than zero, the price of the share will fall. Suppose the firm has a payout of 20 per cent, the price of the share will be:

$$P = \frac{2 + (0.15 / 0.125)(10 - 2)}{0.125} = \frac{2 + (1.2)(8)}{0.125} = \frac{2 + 9.6}{0.125} = \frac{11.60}{0.125} = Rs.\,92.80$$

Question No. 66

A closely-held toys manufacturing company has been following a dividend policy, which can maximise the market value of the company as per Walter's Model. Accordingly, each year at dividend time, the capital budget is reviewed in conjunction with the earnings for the period and alternative investment opportunities for the shareholders. In the current year, the company reports net profits of ₹ 10,00,000. It is estimated that the company can earn ₹ 2,50,000 if such profits are retained. The investors have alternative investment opportunities that will yield them 12%. The company has 1,00,000 shares outstanding. What would be the dividend payout ratio of the company, if it wishes to maximise the wealth of the shareholders?

Answer to Question No. 66

Divident Payout (DP) ratio of the company should be zero for miximising the wealth of shareholders. At this ratio, market price of the share would be the maximum as shown by the following calculation:

$P = [D + (r/K_e)\,(E - D)]/K_e$

$R = (₹\ 2,50,000/₹\ 10,00,000) \times 100 = 25\%$

$E = ₹\ 10,00,000/1,00,000 = ₹\ 10$

$P = [0 + 0.25/0.12\ (₹\ 10 - 0)]/0.12$

$= (2.083 \times 10)/0.12$

$= 20.83/0.12$

$= ₹\ 173.58$

TABLE 1 : PRESENT VALUE OF RUPEE ONE

RATE	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR	YEAR
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
5%	0.9524	0.9070	0.8638	0.8227	0.7835	0.7462	0.7107	0.6768	0.6446	0.6139	0.5847	0.5568	0.5303	0.5051	0.4810
6%	0.9534	0.8900	0.8396	0.7921	0.7473	0.7050	0.6651	0.6274	0.5919	0.5584	0.5268	0.4970	0.4688	0.4423	0.4173
7%	0.9346	0.8734	0.8163	0.7629	0.7130	0.6663	0.6227	0.5820	0.5439	0.5083	0.4751	0.4440	0.4150	0.3878	0.3624
8%	0.9259	0.8573	0.7938	0.7350	0.6806	0.6302	0.5835	0.5403	0.5002	0.4632	0.4289	0.3971	0.3677	0.3405	0.3152
9%	0.9174	0.8417	0.7722	0.7084	0.6499	0.5963	0.5470	0.5019	0.4604	0.4224	0.3875	0.3555	0.3262	0.2992	0.2745
10%	0.9091	0.8264	0.7513	0.6830	0.6209	0.5645	0.5132	0.4665	0.4241	0.3855	0.3505	0.3186	0.2897	0.2633	0.2394
11%	0.9009	0.8116	0.7312	0.6587	0.5935	0.5346	0.4817	0.4339	0.3909	0.3522	0.3173	0.2858	0.2575	0.2320	0.2090
12%	0.8929	0.7972	0.7118	0.6355	0.5674	0.5066	0.4523	0.4039	0.3606	0.3220	0.2875	0.2567	0.2292	0.2046	0.1827
13%	0.8850	0.7831	0.6931	0.6133	0.5428	0.4803	0.4251	0.3762	0.3329	0.2946	0.2607	0.2307	0.2042	0.1807	0.1599
14%	0.8772	0.7695	0.6750	0.5921	0.5194	0.4556	0.3996	0.3506	0.3075	0.2697	0.2366	0.2076	0.1821	0.1597	0.1401
15%	0.8696	0.7561	0.6575	0.5718	0.4972	0.4323	0.3759	0.3269	0.2843	0.2472	0.2149	0.1869	0.1625	0.1413	0.1229
16%	0.8621	0.7432	0.6407	0.5523	0.4761	0.4104	0.3538	0.3050	0.2630	0.2267	0.1954	0.1685	0.1452	0.1252	0.1079
17%	0.8547	0.7305	0.6244	0.5337	0.4561	0.3898	0.3332	0.2848	0.2434	0.2080	0.1778	0.1520	0.1299	0.1110	0.0949
18%	0.8475	0.7182	0.6086	0.5158	0.4371	0.3704	0.3139	0.2660	0.2255	0.1911	0.1619	0.1372	0.1163	0.0985	0.0835
19%	0.8403	0.7062	0.5934	0.4987	0.4190	0.3521	0.2959	0.2487	0.2090	0.1756	0.1476	0.1240	0.1042	0.0876	0.0736
20%	0.8333	0.6944	0.5787	0.4823	0.4019	0.3349	0.2791	0.2326	0.1938	0.1615	0.1346	0.1122	0.0935	0.0779	0.0649
21%	0.8264	0.6830	0.5645	0.4665	0.3855	0.3186	0.2633	0.2176	0.1799	0.1486	0.1228	0.1015	0.0839	0.0693	0.0573
22%	0.8197	0.6719	0.5507	0.4514	0.3700	0.3033	0.2486	0.2038	0.1670	0.1369	0.1122	0.0920	0.0754	0.0618	0.0507
23%	0.8130	0.6610	0.5374	0.4369	0.3552	0.2888	0.2348	0.1909	0.1552	0.1262	0.1026	0.0834	0.0678	0.0551	0.0448
24%	0.8065	0.6504	0.5245	0.4230	0.3411	0.2751	0.2218	0.1789	0.1443	0.1164	0.0938	0.0757	0.0610	0.0492	0.0397
25%	0.8000	0.6400	0.5120	0.4096	0.3277	0.2621	0.2097	0.1678	0.1342	0.1074	0.0859	0.0687	0.0550	0.0440	0.0352

TABLE 2 : PRESENT VALUE OF AN ANNUITY OF RUPEE ONE

RATE	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15
5%	0.9524	1.8594	2.7232	3.5460	4.3295	5.0757	5.7864	6.4632	7.1078	7.7217	8.3064	8.8633	9.3936	9.8986	10.3797
6%	0.9434	1.8334	2.6730	3.4651	4.2124	4.9173	5.5824	6.2098	6.8017	7.3601	7.8869	8.3838	8.8527	9.2950	9.7122
7%	0.9346	1.8080	2.6243	3.3872	4.1002	4.7665	5.3893	5.9713	6.5152	7.0236	7.4987	7.9427	8.3577	8.7455	9.1079
8%	0.9259	1.7833	2.5771	3.3121	3.9927	4.6229	5.2064	5.7466	6.2469	6.7101	7.1390	7.5361	7.9038	8.2442	8.5595
9%	0.9174	1.7591	2.5313	3.2397	3.8897	4.4859	5.0330	5.5348	5.9952	6.4177	6.8052	7.1607	7.4869	7.7862	8.0607
10%	0.9091	1.7355	2.4869	3.1699	3.7908	4.3553	4.8684	5.3349	5.7590	6.1446	6.4951	6.8137	7.1034	7.3667	7.6061
11%	0.9009	1.7125	2.4437	3.1024	3.6959	4.2305	4.7122	5.1461	5.5370	5.8892	6.2065	6.4924	6.7499	6.9819	7.1909
12%	0.8929	1.6901	2.4018	3.0373	3.6048	4.1114	4.5638	4.9676	5.3282	5.6502	5.9377	6.1944	6.4235	6.6282	6.8109
13%	0.8850	1.6681	2.3612	2.9745	3.5172	3.9975	4.4226	4.7988	5.1317	5.4262	5.6869	5.9176	6.1218	6.3025	6.4624
14%	0.8772	1.6467	2.3216	2.9137	3.4331	3.8887	4.2883	4.6389	4.9464	5.2161	5.4527	5.6603	5.8424	6.0021	6.1422
15%	0.8696	1.6257	2.2832	2.8550	3.3522	3.7845	4.1604	4.4873	4.7716	5.0188	5.2337	5.4206	5.5831	5.7245	5.8474
16%	0.8621	1.6052	2.2459	2.7982	3.2743	3.6847	4.0386	4.3436	4.6065	4.8332	5.0286	5.1971	5.3423	5.4675	5.5755
17%	0.8547	1.5852	2.2096	2.7432	3.1993	3.5892	3.9224	4.2072	4.4506	4.6586	4.8364	4.9884	5.1183	5.2293	5.3242
18%	0.8475	1.5656	2.1743	2.6901	3.1272	3.4976	3.8115	4.0776	4.3030	4.4941	4.6560	4.7932	4.9095	5.0081	5.0916
19%	0.8403	1.5465	2.1399	2.6386	3.0576	3.4098	3.7057	3.9544	4.1633	4.3389	4.4865	4.6105	4.7147	4.8023	4.8759
20%	0.8333	1.5278	2.1065	2.5887	2.9906	3.3255	3.6046	3.8372	4.0310	4.1925	4.3271	4.4392	4.5327	4.6106	4.6755
21%	0.8264	1.5095	2.0739	2.5404	2.9260	3.2446	3.5079	3.7256	3.9054	4.0541	4.1769	4.2784	4.3624	4.4317	4.4890
22%	0.8197	1.4915	2.0422	2.4936	2.8636	3.1669	3.4155	3.6193	3.7863	3.9232	4.0354	4.1274	4.2028	4.2646	4.3152
23%	0.8130	1.4740	2.0114	2.4483	2.8035	3.0923	3.3270	3.5179	3.6731	3.7993	3.9018	3.9852	4.0530	4.1082	4.1530
24%	0.8065	1.4568	1.9813	2.4043	2.7454	3.0205	3.2423	3.4212	3.5655	3.6819	3.7757	3.8514	3.9124	3.9616	4.0013
25%	0.8000	1.4400	1.9520	2.3616	2.6893	2.9514	3.1611	3.3289	3.4631	3.5705	3.6564	3.7251	3.7801	3.8241	3.8593

EXECUTIVE PROGRAMME

FINANCIAL AND STRATEGIC MANAGEMENT

EP-F&SM

TEST PAPER

A Guide to CS Students

To enable the students in achieving their goal to become successful professionals, Institute has prepared a booklet 'A Guide to CS Students" providing the subject specific guidance on different papers and subjects contained in the ICSI curriculum. The booklet is available on ICSI website and students may down load from *http://www.icsi.edu/Portals/0/AGUIDETOCSSTUDENTS.pdf*

WARNING

It is brought to the notice of all students that use of any malpractice in Examination is misconduct as provided in the explanation to Regulation 27 and accordingly the registration of such students is liable to be cancelled or terminated. The text of regulation 27 is reproduced below for information:

"27. Suspension and cancellation of examination results or registration

In the event of any misconduct by a registered student or a candidate enrolled for any examination conducted by the Institute, the Council or the Committee concerned may suo motu or on receipt of a complaint, if it is satisfied that, the misconduct is proved after such investigation as it may deem necessary and after giving such student or candidate an opportunity to state his case, suspend or debar the person from appearing in any one or more examinations, cancel his examination result, or studentship registration, or debar him from future registration as a student, as the case may be.

Explanation - Misconduct for the purpose of this regulation shall mean and include behaviour in a disorderly manner in relation to the Institute or in or near an Examination premises/centre, breach of any regulation, condition, guideline or direction laid down by the Institute, malpractices with regard to postal or oral tuition or resorting to or attempting to resort to unfair means in connection with the writing of any examination conducted by the Institute".

EXECUTIVE PROGRAMME

FINANCIAL AND STRATEGIC MANAGEMENT

TEST PAPER

(This Test Paper is for recapitulating and practice for the students. Students need not submit responses/ answers to this test paper to the Institute.)

Time Allowed : 3 Hours   *Maximum Marks : 100*

Attempt All Questions

Part I: Financial Management (60 Marks)

1. Comment on the following:

   a) The goal of profit maximisation does not provide us with an operationally useful criterion.

   b) Working capital management is nothing more than deciding about level, structure and financing of current assets.

   c) According to Bird in hand argument, distant dividends are discounted at a higher rate than near dividends.

   d) The Financial aspect of Project appraisal encompasses various measure of financial viability.

   (*4 marks each*)

Attempt all parts of either Q. No. 2 or Q. No. 2A

2. (a) Saya Ltd. was started a year back with paid-up equity capital of Rs.40 lakh. Other details are as under:

Earnings of the year :	Rs.4,00,000
Dividend paid :	Rs.3,20,000
Price-earnings ratio :	12.5
Number of shares :	40,000

   You are required to find out whether company's dividend payout ratio is optimal using Walter's Model, giving reasons. (*4 marks*)

   (b) Heritage Enterprises is considering the possibility of manufacturing a particular component which at present is being bought from outside. The manufacture of the component would call for an investment of Rs.7,50,000 in a new machine besides an additional investment of Rs.50,000 in working capital. The life of the machine would be 10 years with a salvage value of Rs.50,000. The estimated savings (before tax) would be Rs.1,80,000 per annum. The income-tax rate is 50%. The company's required rate of return is 10%. Depreciation is provided on straight line basis. Suggest the firm whether this investment be made or not. Show your workings. (*4 marks*)

   (c) Civitech Enterprises Ltd. purchases 2,000 units of a particular item per year at a unit cost of Rs. 20. The ordering cost is Rs. 50 per order and the inventory carrying cost is 25%.

      1) Determine the optimal order quantity and minimum total cost including purchase cost.

      2) If a 3% discount is offered by the supplier for purchases in a lot of 1,000 or more, should the firm accept the offer ? (*4 marks*)

OR

2A. (i) Calculate the market sensitivity index and the expected return on the portfolio from the following data:

Standard deviation of an asset	2.5%
Market standard deviation	2%
Risk-free rate of return	13%
Expected return on market portfolio	15%
Correlation coefficient of portfolio with market	0.8

What will be the expected return on the portfolio if portfolio beta is 0.5 and the risk- free return is 10%.

(4 marks)

(ii) The following information is related to Zion Ltd. :

	Rs.
Sales	4,00,000
Less : Variable expenses 35%	1,40,000
Contribution	2,60,000
Less : Fixed expenses	1,80,000
EBIT	80,000
Less: Interest	10,000
Taxable income	70,000

You are required to submit the following to management of the company:

(a) What percentage will taxable income increase, if the sales increase by 6% ? Use combined leverage.

(b) What percentage will EBIT increase, if there is a 10% increase in sales? Use operating leverage.

(c) What percentage will taxable income increase, if EBIT increases by 6%? Use financial leverage.

(4 marks)

(iii) The company is considering various investment proposals costing less than Rs. 30 lakh. The corporation does not want to disturb its present capital structure. The cost of raising the debt and equity are as follows:

Project Cost	Cost of debt	Cost of equity
Upto Rs. 5 lakh	9%	13%
Above Rs. 5 lakh and upto Rs. 20 lakh	10%	14%
Above Rs. 20 lakh and upto Rs. 40 lakh	11%	15%

If tax rate is 30%, you are required to calculate the cost of capital of two Projects A and B whose funds requirements are Rs. 8 lakh and Rs. 21 lakh respectively. *(4 marks)*

3. Differentiate between the following:

a) 'Financial risk' and 'business risk'

b) 'Financial leverage' and 'Operating leverage'

c) 'Investment' and 'Speculation' *(4 marks each)*

4. (a) SNM Ltd. sells goods at a uniform rate of gross profit of 20% on sales including depreciation as part of cost of production. Its annual figures for the current year are as under:

	Rs.
Sales (at 2 months' credit)	24,00,000
Materials consumed (suppliers' credit 2 months)	6,00,000
Wages paid (monthly at the beginning of the subsequent month)	4,80,000
Manufacturing expenses (cash expenses are paid – one month in arrear)	6,00,000
Administration expenses (cash expenses are paid – one month in arrear)	1,50,000
Sales promotion expenses (paid quarterly in advance)	75,000

The company keeps one month stock each of raw materials and finished goods. A minimum cash balance of Rs. 80,000 is always kept. The company wants to adopt a 10% safety margin in the maintenance of working capital. The company has no work-in-progress. Find out the requirement of working capital of the company on cash cost basis. (*10 marks*)

(b) Sam Electronics wants to take up a new project involving manufacture of an electronic device which has good market prospects. Further details are given below :

(*Rs. in lakhs*)

(i) Cost of the project (as estimated) :

– Land (to be incurred at the beginning of the year 1)	2.00
– Buildings (to be incurred at the end of the year 1)	3.00
– Machinery (to be incurred at the end of the year 2)	10.00
– Working capital (margin money) (to be incurred at the beginning of the year 3)	5.00
	20.00

(ii) The project will go into production from the beginning of year 3 and will be operational for a period of 5 years. The annual working results are estimated as follows :

(*Rs. in lakhs*)

Sales	24
Variable cost	8
Fixed cost (excluding depreciation)	5
Depreciation of assets	2

(iii) At the end of the operational period, it is expected that the fixed assets can be sold for Rs. 5 lakh (without any profit).

(iv) Cost of capital of the firm is 10%. Applicable tax rate is 33.33% inclusive of surcharge and education cess, etc.

You are required to evaluate the proposal using the net present value approach and advise the firm.

(*10 marks*)

Part II : Strategic Management (40 Marks)

Will be available shortly