

Intermediate Course

Study Material

(Modules 1 to 2)

PAPER 8A

Financial

Management

MODULE – 1



BOARD OF STUDIES
THE INSTITUTE OF CHARTERED ACCOUNTANTS OF INDIA

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BEFORE WE BEGIN...

The traditional role of a Chartered Accountant restricted to accounting and auditing, has now changed substantially and there has been a marked shift towards strategic decision making and entrepreneurial roles that add value beyond traditional financial reporting. The primary factors responsible for the change are the increasing business complexities on account of plethora of laws, borderless economies consequent to giant leap in e-commerce, emergence of new financial instruments, emphasis on corporate social responsibility, significant developments in information technology, to name a few. These factors necessitate an increase in the competence of Chartered Accountants to take up the role of not merely an accountant or auditor, but a global solution provider. Towards this end, the scheme of education and training is being continuously reviewed so that it is in sync with the requisites of the dynamic global business environment; the competence requirements are being continuously reviewed to enable aspiring chartered accountants to acquire the requisite professional competence to take on new roles.

Under the Revised Scheme of Education and Training, at the Intermediate Level, you are expected to not only acquire professional knowledge but also the ability to apply such knowledge in problem solving. The process of learning should also help you inculcate the requisite professional skills, i.e., the intellectual skills and communication skills, necessary for achieving the desired professional competence.

The entire syllabus has been divided into eleven chapters. The chapters have been grouped into two modules

Module-1 Consisting of Six chapters namely:

- Chapter-1: Scope and Objectives of Financial Management
- Chapter-2: Types of Financing
- Chapter-3: Financial Analysis and Planning-Ratio Analysis
- Chapter-4: Cost of Capital
- Chapter-5: Financing Decisions-Capital Structure
- Chapter-6: Financing Decisions-Leverages

Module-2 Consisting of four chapters namely:

- Chapter-7: Investment Decisions
- Chapter-8: Risk Analysis in Capital Budgeting
- Chapter-9: Dividend Decisions
- Chapter-10: Management of Working Capital

The content for each chapter at the Intermediate level has been structured in the following manner –

- 1. Learning Outcomes** – Learning outcomes which you need to demonstrate after learning each topic have been detailed in the first page of each chapter. Demonstration of these learning outcomes would help you to achieve the desired level of technical competence.
- 2. Chapter Overview** - As the name suggests, this chart/table would give a broad framework of the contents covered in the chapter.
- 3. Introduction** – A brief introduction is given at the beginning of each chapter, which would help you get a feel of the topic.
- 4. Content** - In each chapter, the topics have been covered following 'step by step' approach. The concepts are explained in student-friendly manner with the aid of Examples/illustrations/diagrams/flow charts as per requirement. These value additions would help you develop conceptual clarity and to get a good grasp of the topic. Diagrams and Flow charts would help you understand the concepts in a better manner. Illustrations would help you understand the application of concepts/provisions.
- 5. Illustration with answers** – Illustrations and examples have been included in the Study Material systematically, after discussion on each topic, so that application of the concept can be understood very clearly. This would also enable you to learn and sharpen your application skills and test your understanding.
- 6. Let us recapitulate** – A summary of the chapter is given at the end to help you revise what you have learnt. It would especially help you to revise the chapter(s) quickly the day before the examination.
- 7. Test your Knowledge** - This comprises of Multiple Choice Questions, Theoretical Questions and Practical Problems with solutions which test the breadth and depth of your understanding of the topic.
- 8. Skill specification Assessment** - An indicative skill specification Assessment Grid has been incorporated in the study material for better understanding of the

students. An effort has been made to arrange the questions/illustrations/exercise accordingly.

9. In this Study Material, formats of Financial Statements (i.e. Balance Sheet, Income Statements etc) and financial terms used are for illustrative purpose only. For appropriate format and applicability of various Standards, students are advised to refer the study material of appropriate subject (s).

Further the solutions/answers contained in the study material are may be based on certain assumptions and other logical alternative assumption/ approach/ presentation may be possible

Every effort has been made to make the Study Material error free, however if inadvertently any error is present and found by readers they may send it to us immediately, so that it can be rectified at our end.

In case you need any further clarification/ guidance, you may send your queries at; nnsengupta@icai.in.

Happy Reading and Best Wishes!

SKILL SPECIFICATION ASSESSMENT GRID

Skill Level	Manner of Assessment of Skills	Illustrative verbs used to construct learning outcomes
Level-I: Knowledge and Comprehension	Understanding or grasping ability (Defining, stating, enlisting, identifying, and explaining concepts / provisions/theories/principles relating to the relevant subject area.)	List – Preparing a list of State – Mentioning clearly or fully the details of. Define – Explaining the exact meaning of. Describe – Giving detailed narration of something or key features. Distinguish – Mentioning or highlighting the difference between. Explain – Making the meaning of. Identify – Recognizing something. Illustrate – Explaining something with the help of an example. and similar verbs Combination of verbs: Comprehend and Explain; Identify and explain and similar verbs.
Level-II: Application and Analysis	Applying and analyzing the concepts learned during the grasping level.	Application: Apply – Putting theoretical knowledge for

	<p>(Application: Applying concepts / provisions / theories / principles in problem solving in non-complex scenarios.)</p>	<p>practical purpose.</p> <p>Calculate – Arriving at some value by following numerical/ analytical procedures.</p> <p>Compute - Arriving at some value by following numerical/ analytical procedures.</p> <p>Determine- Ascertain or establish exactly by calculation or workings.</p> <p>Find/ Find out- Ascertain or establish exactly by calculation or workings.</p> <p>Demonstrate – Proving something with certainty using practical means.</p> <p>Prepare – Making something ready for any use.</p> <p>Reconcile – Making or proving consistency/ compatibility.</p> <p>Solve – Find an answer or solution to something</p> <p>Tabulate – Exhibiting the required information in a tabular form.</p> <p>Combination of verbs:</p> <p>Compare and contrast and similar verbs.</p>
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	<p>(Analysis: Applying, comparing and analysing concepts / provisions / theories / principles in problem) solving in moderately complex scenarios.)</p>	<p>Analysis:</p> <p>Analyze - Examining something in detail.</p> <p>Categorize - Arranging something in a predefined group or class or division.</p> <p>Compare - Examining the differences or similarities between.</p> <p>Construct - Building or compiling.</p> <p>Discuss - Writing about or examining in detail.</p> <p>Interpret – Translating in intelligible or familiar or understandable terms.</p> <p>Combination of verbs:</p> <p>Analyse and apply and similar verbs.</p>
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SYLLABUS

PAPER – 8 : FINANCIAL MANAGEMENT AND ECONOMICS FOR FINANCE

(One paper – Three hours – 100 Marks)

SECTION A : FINANCIAL MANAGEMENT (MARKS: 60)

Objective:

To develop an understanding of various aspects of Financial Management and acquire the ability to apply such knowledge in decision-making.

1. Financial Management and Financial Analysis

(i) Introduction to Financial Management Function

- a) Objective and scope of financial management
- b) Role and purpose
- c) Financial management environment
- d) Functions of finance executives in an organization
- e) Financial distress and insolvency.

(ii) Financial Analysis through Ratios

- a) Users of the financial analysis
- b) Sources of financial data for analysis
- c) Calculation and Interpretation of ratios:
 - Analysing liquidity
 - Analysing leverage
 - Analysing solvency
 - Analysing efficiency/ activity
 - Analysing profitability

- d) Limitations of ratio analysis

2. Financing Decisions

(i) Sources of Finance

- a) Different Sources of Finance, Characteristics of different types of long term debt and equity finance, Method of raising long term finance
- b) Different Sources of short term Finance
- c) Internal fund as a source of finance
- d) International sources of finance
- e) Other sources of finance- Lease Financing, Sale and lease back, Convertible debt, Venture capital, Grants etc.

(ii) Cost of Capital

- a) Significance of cost of capital
- b) Factors of cost of capital
- c) Measurement of costs of individual components of capital
- d) Weighted average cost of capital (WACC)
- e) Marginal cost of capital
- f) Effective Interest rate

(iii) Capital Structure Decisions

- a) Significance of capital structure
- b) Determinants of capital structure
- c) Capital structure planning and designing
- d) Designing of optimum capital structure
- e) Theories of Capital Structure and value of the firm- relevancy and Irrelevancy of capital structure.
- f) EBIT- EPS Analysis, Breakeven- EBIT Analysis.
- g) Under/ Over Capitalisation.

(iv) Leverages

- a) Types of Leverages- Operating, Financial and Combined

- b) Analysis of leverages

3. Capital Investment and Dividend Decisions

(i) Capital Investment Decisions

- a) Objective of capital investment decisions
- b) Methods of Investment appraisal:
 - Payback period, Discounted payback period
 - Accounting Rate of Return (ARR),
 - Net Present Value (NPV) - The meaning of NPV, Strengths and limitations of NPV method, The working capital adjustment in an NPV analysis, Capital rationing, Equivalent Annual Costs,
 - Internal Rate of return (IRR)- Limitations of the IRR method, Multiple IRRs,
 - Modified internal Rate of Return (MIRR)- Definition and explanation of MIRR, The process for calculating MIRR, Strengths of the MIRR approach.
 - Profitability Index

(ii) Adjustment of Risk and Uncertainty in Capital Budgeting Decision

- a) Probability Analysis
- b) Certainty Equivalent Method
- c) Risk Adjusted Discount Rate
- d) Scenario Analysis
- e) Sensitivity Analysis

(iii) Dividend Decisions

- a) Basics of Dividends
- b) Forms of dividend
- c) Determinants of dividend
- d) Relevancy and Irrelevancy of Dividend Policies- Traditional Approach, Walter's model, Gordon's model, Modigliani and Miller (MM) Hypothesis.

4. Management of Working Capital

(i) Management of Working Capital

- a) The management of working capital- Liquidity and Profitability
- b) The Working capital financing decisions- Primary and Secondary Sources of Liquidity
- c) The working Capital Cycle (operating Cycle), Effectiveness of Working Capital based on its operating and cash conversion cycles
- d) Assessment of working capital requirement
- e) Management of Accounts Receivables (Debtors)
- f) Factoring and Forfaiting
- g) Management of Accounts Payables (Creditors)
- h) Management of Inventory
- i) Management of Cash, Treasury management
- j) Banking norms of working capital finance

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MODULE - 2

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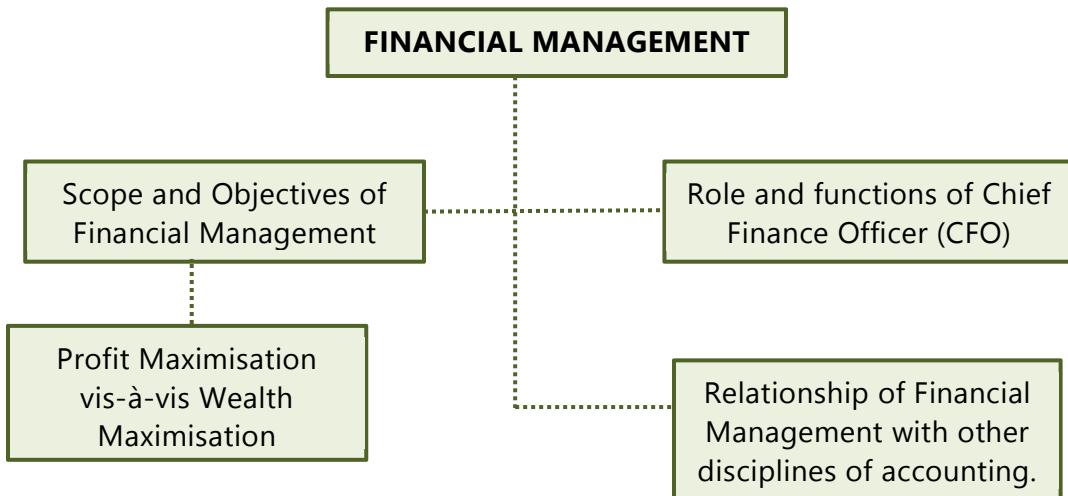
SCOPE AND OBJECTIVES OF FINANCIAL MANAGEMENT



LEARNING OUTCOMES

- State the meaning, importance and scope of financial management in an entity.
- Discuss Financing decision/functions
- Discuss the objectives of financial management; Profit maximisation vis-a-vis Wealth maximisation.
- Discuss Shareholders value maximising approach
- Examine the role and functions of Finance executives in an entity.
- Discuss Financial distress and insolvency
- Discuss Agency Cost and its Mitigation.
- Discuss Agency Problem and Agency Cost

CHAPTER OVERVIEW



1.1 INTRODUCTION

We will like to explain Financial Management by giving a very simple scenario. For the purpose of starting any new business/venture, an entrepreneur goes through the following stages of decision making:-

Stage 1	Stage 2	Stage 3	Stage 4
Decide which assets (premises, machinery, equipment etc.) to buy.	Determining what is total investment (since assets cost money) required for buying assets.	Apart from buying assets the entrepreneur would also need to determine how much cash he would need to run the daily operations (payment for raw material, salaries, wages etc.). In other words this is also defined as Working Capital requirement.	The next stage is to decide what all sources, does the entrepreneur need to tap to finance the total investment (assets and working capital). The sources could be Share Capital (Including Entrepreneur's own funds) or Borrowing from Banks or Investment from Financial Institutions etc.

While deciding how much to take from each source, the entrepreneur would keep in mind the cost of capital for each source (Interest/Dividend etc.). As an entrepreneur he would like to keep the cost of capital low.

Thus, financial management is concerned with **efficient acquisition (financing) and allocation** (investment in assets, working capital etc.) of funds with an objective to make profit (dividend) for owners. In other words, focus of financial management is to address three major financial decision areas namely, **investment, financing and dividend decisions**.

Any business enterprise requiring money and the 3 key questions being enquired into

1. Where to get the money from? **(Financing Decision)**
2. Where to invest the money? **(Investment Decision)**
3. How much to distribute amongst shareholders to keep them satisfied? **(Dividend Decision)**



1.2 MEANING OF FINANCIAL MANAGEMENT

Financial management is that **managerial activity which is concerned with planning and controlling of the firm's financial resources**. In other words it is concerned with acquiring, financing and managing assets to accomplish the overall goal of a business enterprise (mainly to maximise the shareholder's wealth).

In today's world where positive cash flow is more important than book profit, Financial Management can also be defined as planning for the future of a business enterprise to ensure a positive cash flow. Some experts also refer to financial management as the science of money management. It can be defined as

"Financial Management comprises of forecasting, planning, organizing, directing, co-ordinating and controlling of all activities relating to acquisition and application of the financial resources of an undertaking in keeping with its financial objective."

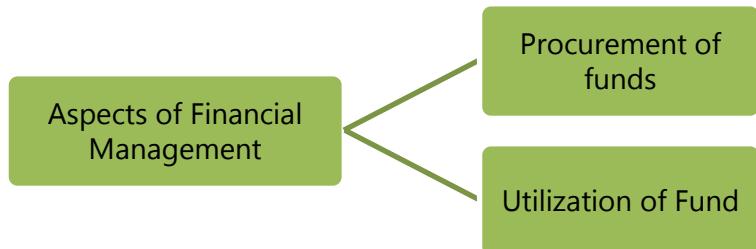
Another very elaborate definition given by Phillipatus is

"Financial Management is concerned with the managerial decisions that result in the acquisition and financing of short term and long term credits for the firm."

As such it deals with the situations that require selection of specific assets (or combination of assets), the selection of specific problem of size and growth of an

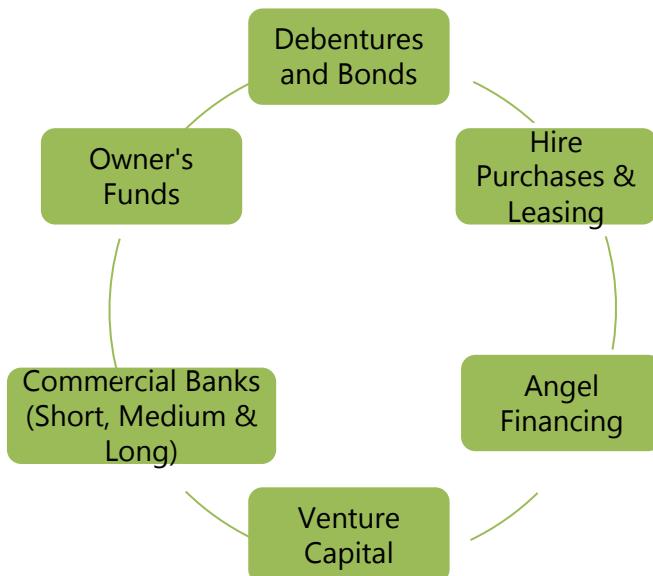
enterprise. The analysis of these decisions is based on the expected inflows and outflows of funds and their effect on managerial objectives.

There are two basic aspects of financial management viz., procurement of funds and an effective use of these funds to achieve business objectives.



1.2.1 Procurement of Funds

Since funds can be obtained from different sources therefore their procurement is always considered as a complex problem by business concerns. Some of the sources for funds for a business enterprise are:-



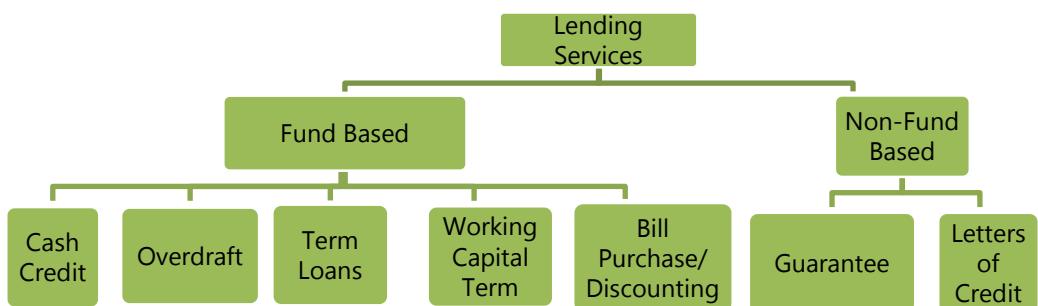
In a global competitive scenario it is not enough to depend on the available ways of raising finance but resource mobilization has to be undertaken through innovative ways on financial products which may meet the needs of investors. We are constantly seeing new and creative sources of funds which are helping the modern businesses to grow faster. For example trading in Carbon Credits is turning out to be another source of funding.

Funds procured from different sources have different characteristics in terms of risk, cost and control. The cost of funds should be at the minimum level for that a proper balancing of risk and control factors must be carried out.

Another key consideration in choosing the source of new business finance is to strike a balance between equity and debt to ensure the funding structure suits the business.

Let us discuss some of the sources of funds:

- (a) **Equity:** The funds raised by the issue of equity shares are the best from the risk point of view for the firm, since there is no question of repayment of equity capital except when the firm is under liquidation. From the cost point of view, however, equity capital is usually the most expensive source of funds. This is because the dividend expectations of shareholders are normally higher than prevalent interest rate and also because dividends are an appropriation of profit, not allowed as an expense under the Income Tax Act. Also the issue of new shares to public may dilute the control of the existing shareholders.
- (b) **Debentures:** Debentures as a source of funds are comparatively cheaper than the shares because of their tax advantage. The interest the company pays on a debenture is free of tax, unlike a dividend payment which is made from the taxed profits. However, even when times are hard, interest on debenture loans must be paid whereas dividends need not be. However, debentures entail a high degree of risk since they have to be repaid as per the terms of agreement. Also, the interest payment has to be made whether or not the company makes profits.
- (c) **Funding from Banks:** Commercial Banks play an important role in funding of the business enterprises. Apart from supporting businesses in their routine activities (deposits, payments etc.) they play an important role in meeting the long term and short term needs of a business enterprise. Different lending services provided by Commercial Banks are depicted as follows:-



(d) **International Funding:** Funding today is not limited to domestic market. With liberalization and globalization a business enterprise has options to raise capital from International markets also. Foreign Direct Investment (FDI) and Foreign Institutional Investors (FII) are two major routes for raising funds from foreign sources besides ADR's (American depository receipts) and GDR's (Global depository receipts). Obviously, the mechanism of procurement of funds has to be modified in the light of the requirements of foreign investors.

1.2.2 Effective Utilisation of Funds

The finance manager is also responsible for effective utilisation of funds. He has to point out situations where the funds are being kept idle or where proper use of funds is not being made. All the funds are procured at a certain cost and after entailing a certain amount of risk. If these funds are not utilised in the manner so that they generate an income higher than the cost of procuring them, there is no point in running the business. Hence, it is crucial to employ the funds properly and profitably. Some of the aspects of funds utilization are:-

(a) **Utilization for Fixed Assets:** The funds are to be invested in the manner so that the company can produce at its optimum level without endangering its financial solvency. For this, the finance manager would be required to possess sound knowledge of techniques of capital budgeting.

Capital budgeting (or investment appraisal) is the planning process used to determine whether a firm's long term investments such as new machinery, replacement machinery, new plants, new products, and research development projects would provide the desired return (profit).

(b) **Utilization for Working Capital:** The finance manager must also keep in view the need for adequate working capital and ensure that while the firms enjoy an optimum level of working capital they do not keep too much funds blocked in inventories, book debts, cash etc.



1.3 EVOLUTION OF FINANCIAL MANAGEMENT

Financial management evolved gradually over the past 50 years. The evolution of financial management is divided into three phases. Financial Management evolved as a separate field of study at the beginning of the century. The three stages of its evolution are:

The Traditional Phase: During this phase, financial management was considered necessary only during occasional events such as takeovers, mergers, expansion,

liquidation, etc. Also, when taking financial decisions in the organisation, the needs of outsiders (investment bankers, people who lend money to the business and other such people) to the business was kept in mind.

The Transitional Phase: During this phase, the day-to-day problems that financial managers faced were given importance. The general problems related to funds analysis, planning and control were given more attention in this phase.

The Modern Phase: Modern phase is still going on. The scope of financial management has greatly increased now. It is important to carry out financial analysis for a company. This analysis helps in decision making. During this phase, many theories have been developed regarding efficient markets, capital budgeting, option pricing, valuation models and also in several other important fields in financial management.



1.4 FINANCE FUNCTIONS/ FINANCE DECISION

Value of a firm will depend on various finance functions/decisions. It can be expressed as :

$$V = f(I, F, D).$$

The finance functions are divided into long term and short term functions/decisions

Long term Finance Function Decisions.

- (a) **Investment decisions (I):** These decisions relate to the **selection of assets in which funds will be invested by a firm**. Funds procured from different sources have to be invested in various kinds of assets. Long term funds are used in a project for various fixed assets and also for current assets. The investment of funds in a project has to be made after careful assessment of the various projects through capital budgeting. A part of long term funds is also to be kept for financing the working capital requirements. Asset management policies are to be laid down regarding various items of current assets. The inventory policy would be determined by the production manager and the finance manager keeping in view the requirement of production and the future price estimates of raw materials and the availability of funds.
- (b) **Financing decisions (F):** These decisions relate to **acquiring the optimum finance** to meet financial objectives and seeing that fixed and working capital are

effectively managed. The financial manager needs to possess a good knowledge of the sources of available funds and their respective costs and needs to ensure that the company has a sound capital structure, i.e. a proper balance between equity capital and debt. Such managers also need to have a very clear understanding as to the difference between profit and cash flow, bearing in mind that profit is of little avail unless the organisation is adequately supported by cash to pay for assets and sustain the working capital cycle. Financing decisions also call for a good knowledge of evaluation of risk, e.g. excessive debt carried high risk for an organization's equity because of the priority rights of the lenders. A major area for risk-related decisions is in overseas trading, where an organisation is vulnerable to currency fluctuations, and the manager must be well aware of the various protective procedures such as hedging (it is a strategy designed to minimize, reduce or cancel out the risk in another investment) available to him. For example, someone who has a shop, takes care of the risk of the goods being destroyed by fire by hedging it via a fire insurance contract.

(c) **Dividend decisions(D):** These decisions relate to the **determination as to how much and how frequently cash can be paid out of the profits** of an organisation as income for its owners/shareholders. The owner of any profit-making organization looks for reward for his investment in two ways, the growth of the capital invested and the cash paid out as income; for a sole trader this income would be termed as drawings and for a limited liability company the term is *dividends*.

The dividend decision thus has two elements – the amount to be paid out and the amount to be retained to support the growth of the organisation, the latter being also a financing decision; the level and regular growth of dividends represent a significant factor in determining a profit-making company's market value, i.e. the value placed on its shares by the stock market.

All three types of decisions are interrelated, the first two pertaining to any kind of organisation while the third relates only to profit-making organisations, thus it can be seen that financial management is of vital importance at every level of business activity, from a sole trader to the largest multinational corporation.

Short- term Finance Decisions/Function.

Working capital Management (WCM): Generally short term decision are reduced to management of current asset and current liability (i.e., working capital Management)



1.5 IMPORTANCE OF FINANCIAL MANAGEMENT

Importance of Financial Management cannot be over-emphasized. It is, indeed, the key to successful business operations. Without proper administration of finance, no business enterprise can reach at its full potentials for growth and success. Money is to an enterprise, what oil is to an engine.

Financial management is all about planning investment, funding the investment, monitoring expenses against budget and managing gains from the investments. Financial management means management of all matters related to an organization's finances.

The best way to demonstrate the importance of good financial management is to describe some of the tasks that it involves:-

- ◆ **Taking care** not to over-invest in fixed assets
- ◆ **Balancing** cash-outflow with cash-inflows
- ◆ **Ensuring** that there is a sufficient level of short-term working capital
- ◆ **Setting** sales revenue targets that will deliver growth
- ◆ **Increasing** gross profit by setting the correct pricing for products or services
- ◆ **Controlling** the level of general and administrative expenses by finding more cost-efficient ways of running the day-to-day business operations, and
- ◆ **Tax planning** that will minimize the taxes a business has to pay.



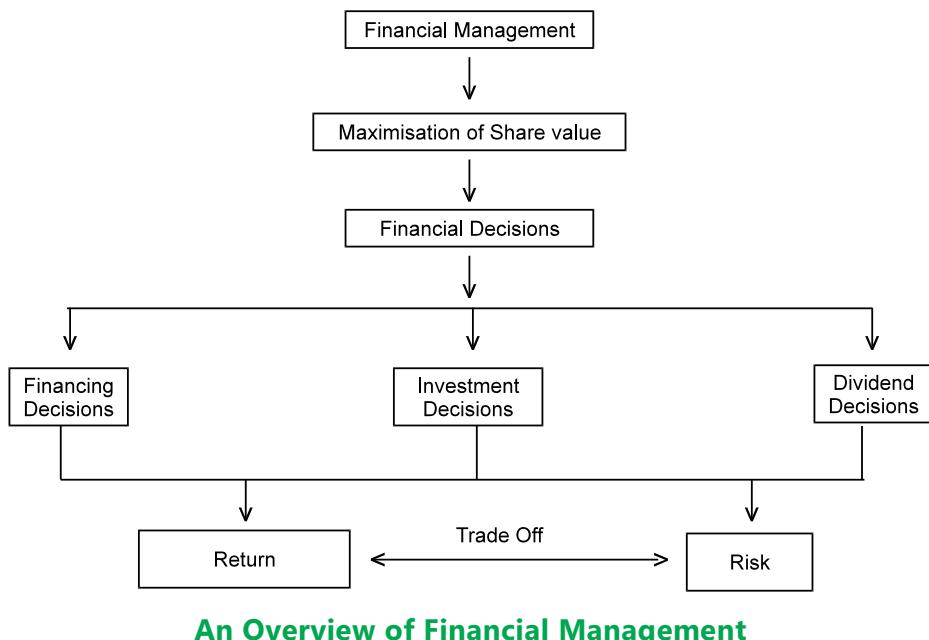
1.6 SCOPE OF FINANCIAL MANAGEMENT

As an integral part of the overall management, financial management is mainly concerned with acquisition and use of funds by an organization. Based on financial management guru Ezra Solomon's concept of financial management, following aspects are taken up in detail under the study of financial management:

- (a) **Determination** of size of the enterprise and determination of rate of growth.
- (b) **Determining** the composition of assets of the enterprise.
- (c) **Determining** the mix of enterprise's financing i.e. consideration of level of debt to equity, etc.
- (d) **Analysis, planning and control** of financial affairs of the enterprise.

The scope of financial management has undergone changes over the years. Until the middle of this century, its scope was limited to procurement of funds under major events in the life of the enterprise such as promotion, expansion, merger, etc. In the modern times, the financial management includes besides procurement of funds, the three different kinds of decisions as well namely investment, financing and dividend. All the three types of decisions would be dealt in detail during the course of this chapter.

The given figure depicts the overview of the scope and functions of financial management. It also gives the interrelation between the market value, financial decisions and risk return trade off. The finance manager, in a bid to maximize shareholders' wealth, should strive to maximize returns in relation to the given risk; he should seek courses of actions that avoid unnecessary risks. To ensure maximum return, funds flowing in and out of the firm should be constantly monitored to assure that they are safeguarded and properly utilized.



1.7 OBJECTIVES OF FINANCIAL MANAGEMENT

Efficient financial management requires the existence of some objectives or goals because judgment as to whether or not a financial decision is efficient must be made in the light of some objective. Although various objectives are possible but

we assume two objectives of financial management for elaborate discussion. These are:

1.7.1 Profit Maximisation

It has traditionally been argued that the primary objective of a company is to earn profit; hence the objective of financial management is also profit maximisation. This implies that the finance manager has to make his decisions in a manner so that the profits of the concern are maximised. Each alternative, therefore, is to be seen as to whether or not it gives maximum profit.

However, profit maximisation cannot be the sole objective of a company. It is at best a limited objective. If profit is given undue importance, a number of problems can arise. Some of these have been discussed below:

- (i) **The term profit is vague. It does not clarify what exactly it means.** It conveys a different meaning to different people. For example, profit may be in short term or long term period; it may be total profit or rate of profit etc.
- (ii) **Profit maximisation has to be attempted with a realisation of risks involved.** There is a direct relationship between risk and profit. Many risky propositions yield high profit. Higher the risk, higher is the possibility of profits. If profit maximisation is the only goal, then risk factor is altogether ignored. This implies that finance manager will accept highly risky proposals also, if they give high profits. In practice, however, risk is very important consideration and has to be balanced with the profit objective.
- (iii) **Profit maximisation as an objective does not take into account the time pattern of returns.** Proposal A may give a higher amount of profits as compared to proposal B, yet if the returns of proposal A begin to flow say 10 years later, proposal B may be preferred which may have lower overall profit but the returns flow is more early and quick.
- (iv) **Profit maximisation as an objective is too narrow.** It fails to take into account the social considerations as also the obligations to various interests of workers, consumers, society, as well as ethical trade practices. If these factors are ignored, a company cannot survive for long. Profit maximization at the cost of social and moral obligations is a short sighted policy.

1.7.2 Wealth / Value Maximisation

We will first like to define what is Wealth / Value Maximization Model. Shareholders wealth are the result of cost benefit analysis adjusted with their timing and risk i.e. time value of money.

So,

$$\text{Wealth} = \text{Present value of benefits} - \text{Present Value of Costs}$$

It is important that benefits measured by the finance manager are in terms of cash flow. Finance manager should emphasis on Cash flow for investment or financing decisions not on Accounting profit. The shareholder value maximization model holds that the primary goal of the firm is to maximize its market value and implies that business decisions should seek to increase the net present value of the economic profits of the firm. So for measuring and maximising shareholders wealth finance manager should follow:

- ◆ **Cash Flow approach not Accounting Profit**
- ◆ **Cost benefit analysis**
- ◆ **Application of time value of money.**

How do we measure the value/wealth of a firm?

According to Van Horne, "Value of a firm is represented by the market price of the company's common stock. The market price of a firm's stock represents the focal judgment of all market participants as to what the value of the particular firm is. It takes into account present and prospective future earnings per share, the timing and risk of these earnings, the dividend policy of the firm and many other factors that bear upon the market price of the stock. The market price serves as a performance index or report card of the firm's progress. It indicates how well management is doing on behalf of stockholders."

Stockholders hire managers to run their firms for them.....

Because stockholders have absolute power to hire and fire managers.

Managers set aside their interest and maximise stock prices...

Because markets are efficient.

Stockholders wealth is maximised....

Because lenders are fully protected from shareholders

Firm value is maximised....

Because there are no costs created for society.

Societal wealth is maximised...

$$\text{Value of a firm (V)} = \text{Number of Shares (N)} \times \text{Market price of shares (MP)}$$

Or

$$V = \text{Value of equity (V}_e\text{)} + \text{Value of debt (V}_d\text{)}$$

Why Wealth Maximization Works? Before we answer this question it is important to first understand and know what other goals a business enterprise may have. Some of the other goals a business enterprise may follow are:-

- ◆ Achieving a higher growth rate
- ◆ Attaining a larger market share
- ◆ Gaining leadership in the market in terms of products and technology
- ◆ Promoting employee welfare
- ◆ Increasing customer satisfaction
- ◆ Improving community life, supporting education and research, solving societal problems, etc.

Though, the above goals are important but the primary goal remains to be wealth maximization, as it is critical for the very existence of the business enterprise. If this goal is not met, public/institutions would lose confidence in the enterprise and will not invest further in the growth of the organization. If the growth of the organization is restricted than the other goals like community welfare will not get fulfilled.



1.8 CONFLICTS IN PROFIT VERSUS VALUE MAXIMISATION PRINCIPLE

In any company, the management is the decision taking authority. As a normal tendency the management may pursue its own personal goals (profit maximization). But in an organization where there is a significant outside participation (shareholding, lenders etc.), the management may not be able to exclusively pursue its personal goals due to the constant supervision of the various stakeholders of the company-employees, creditors, customers, government, etc.

Every entity associated with the company will evaluate the performance of the management from the fulfilment of its own objective. The survival of the management will be threatened if the objective of any of the entities remains unfulfilled.

The wealth maximization objective is generally in accord with the interests of the various groups such as owners, employees, creditors and society, and thus, it may be consistent with the management objective of survival.

Owing to limitation (timing, social consideration etc.) in profit maximization, in today's real world situations which is uncertain and multi-period in nature, wealth maximization is a better objective. Where the time period is short and degree of uncertainty is not great, wealth maximization and profit maximization amount to essentially the same.

The table below highlights some of the advantages and disadvantages of both profit maximization and wealth maximization goals:-

Goal	Objective	Advantages	Disadvantages
Profit Maximization	Large amount of profits	(i) Easy to calculate profits (ii) Easy to determine	(i) Emphasizes the short term gains (ii) Ignores risk or

		the link between financial decisions and profits.	uncertainty (iii) Ignores the timing of returns (iv) Requires immediate resources.
Shareholders Wealth Maximisation	Highest market value of shares.	(i) Emphasizes the long term gains (ii) Recognises risk or uncertainty (iii) Recognises the timing of returns (iv) Considers shareholders' return.	(i) Offers no clear relationship between financial decisions and share price. (ii) Can lead to management anxiety and frustration.

Example: Profit maximization can be achieved in the short term at the expense of the long term goal, that is, wealth maximization. For example, a costly investment may experience losses in the short term but yield substantial profits in the long term. Also, a firm that wants to show a short term profit may, for example, postpone major repairs or replacement, although such postponement is likely to hurt its long term profitability.

Following illustration can be taken to understand why wealth maximization is a preferred objective than profit maximization.

ILLUSTRATION 1

Profit maximization does not consider risk or uncertainty, whereas wealth maximization considers both risk and uncertainty. Suppose there are two products, X and Y, and their projected earnings over the next 5 years are as shown below:

Year	Product X (₹)	Product Y (₹)
1.	10,000	11,000
2.	10,000	11,000
3.	10,000	11,000
4.	10,000	11,000
5.	10,000	11,000
	50,000	55,000

A profit maximization approach would favour product Y over product X. However, if product Y is more risky than product X, then the decision is not as straightforward as the figures seem to indicate. It is important to realize that a trade-off exists between risk and return. Stockholders expect greater returns from investments of higher risk and vice-versa. To choose product Y, stockholders would demand a sufficiently large return to compensate for the comparatively greater level of risk.



1.9 ROLE OF FINANCE EXECUTIVE

Modern financial management has come a long way from the traditional corporate finance. As the economy is opening up and global resources are being tapped, the opportunities available to finance managers virtually have no limits.

A new era has ushered during the recent years for chief financial officers in different organisation to finance executive is known in different name, however their role and functions are similar. His role assumes significance in the present day context of liberalization, deregulation and globalisation.

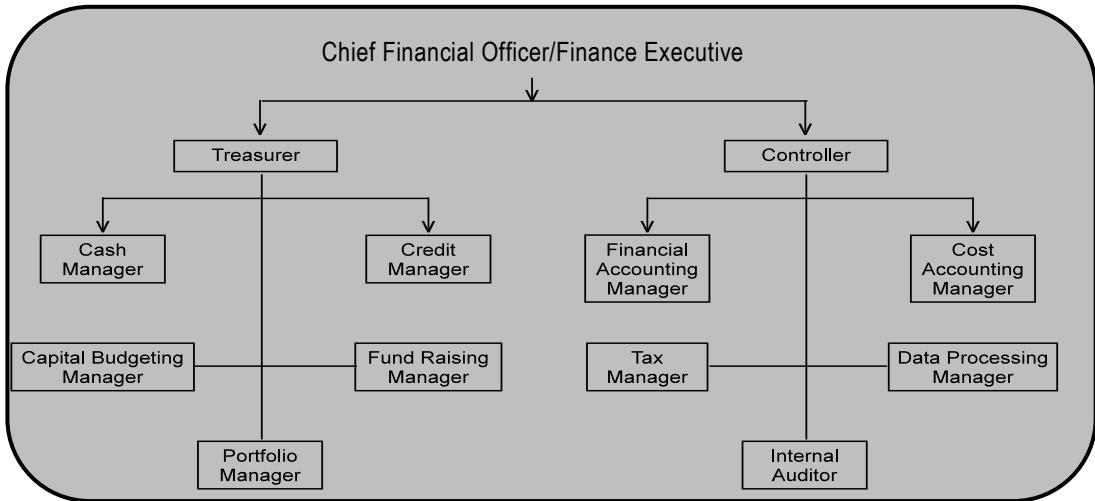
Changing Role of the Finance Executive

"Today's CFO team is expected to add value well beyond the traditional roles of cost management, controls and acting as the conscience of the organisation. These roles are challenging enough, but today's CFO is expected to work in collaboration, by serving as the integration hub for key business processes, as a catalyst for change including business transformation, and as a consultant or trusted business advisor in helping to create sustainable growth." Jeff Thomson, IMA President and CEO

To sum it up, the finance executive of an organisation plays an important role in the company's goals, policies, and financial success. His responsibilities include:

- (a) **Financial analysis and planning:** Determining the proper amount of funds to employ in the firm, i.e. designating the size of the firm and its rate of growth.
- (b) **Investment decisions:** The efficient allocation of funds to specific assets.
- (c) **Financing and capital structure decisions:** Raising funds on favourable terms as possible i.e. determining the composition of liabilities.
- (d) **Management of financial resources** (such as working capital).
- (e) **Risk management:** Protecting assets.

The figure below shows how the finance function in a large organization may be organized.



Organisation of Finance Function

1.9.1 Role of Finance executive in today's World vis-a-vis in the past

Today, the role of chief financial officer, or CFO, is no longer confined to accounting, financial reporting and risk management. It's about being a strategic business partner of the chief executive officer, or CEO. Some of the key differences that highlight the changing role of a CFO are as follows:-

What a CFO used to do?	What a CFO now does?
Budgeting Forecasting Accounting Treasury (cash management) Preparing internal financial reports for management. Preparing quarterly, annual filings for investors. Tax filing Tracking accounts payable and accounts receivable. Travel and entertainment expense management.	Budgeting Forecasting Managing M&As Profitability analysis (for example, by customer or product) Pricing analysis Decisions about outsourcing Overseeing the IT function. Overseeing the HR function. Strategic planning (sometimes overseeing this function). Regulatory compliance. Risk management.



1.10 FINANCIAL DISTRESS AND INSOLVENCY

There are various factors like price of the product/ service, demand, price of inputs e.g. raw material, labour etc., which is to be managed by an organisation on a continuous basis. Proportion of debt also need to be managed by an organisation very delicately. Higher debt requires higher interest and if the cash inflow is not sufficient then it will put lot of pressure to the organisation. Both short term and long term creditors will put stress to the firm. If all the above factors are not well managed by the firm, it can create situation known as distress, so financial distress is a position where Cash inflows of a firm are inadequate to meet all its current obligations.

Now if distress continues for a long period of time, firm may have to sell its asset, even many times at a lower price. Further when revenue is inadequate to revive the situation, firm will not be able to meet its obligations and become insolvent. So, **insolvency basically means inability of a firm to repay various debts and is a result of continuous financial distress.**



1.11 RELATIONSHIP OF FINANCIAL MANAGEMENT WITH RELATED DISCIPLINES

As an integral part of the overall management, financial management is not a totally independent area. It draws heavily on related disciplines and areas of study namely economics, accounting, production, marketing and quantitative methods. Even though these disciplines are inter-related, there are key differences among them. Some of the relationships are being discussed below:

1.11.1 Financial Management and Accounting

The relationship between financial management and accounting are closely related to the extent that accounting is an important input in financial decision making. In other words, accounting is a necessary input into the financial management function.

Financial accounting generates information relating to operations of the organisation. The outcome of accounting is the financial statements such as balance sheet, income statement, and the statement of changes in financial position. The information contained in these statements and reports helps the financial managers in gauging the past performance and future directions of the organisation.

Though financial management and accounting are closely related, still they differ in the treatment of funds and also with regards to decision making. Some of the differences are:-

Treatment of Funds

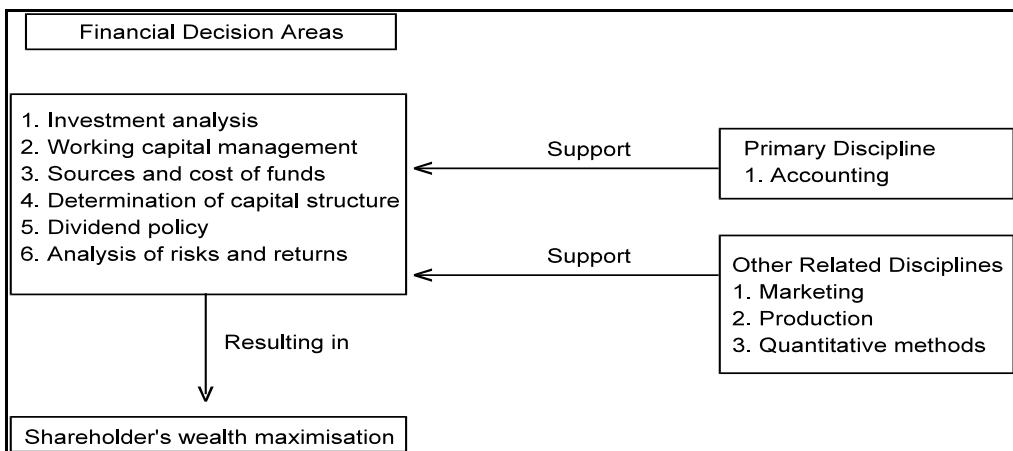
In accounting, the measurement of funds is based on the accrual principle i.e. revenue is recognised at the point of sale and not when collected and expenses are recognised when they are incurred rather than when actually paid. The accrual based accounting data do not reflect fully the financial conditions of the organisation. An organisation which has earned profit (sales less expenses) may be said to be profitable in the accounting sense but it may not be able to meet its current obligations due to shortage of liquidity as a result of say, uncollectible receivables. Such an organisation will not survive regardless of its levels of profits. Whereas, the treatment of funds in financial management is based on cash flows. The revenues are recognised only when cash is actually received (i.e. cash inflow) and expenses are recognised on actual payment (i.e. cash outflow). This is so because the finance manager is concerned with maintaining solvency of the organisation by providing the cash flows necessary to satisfy its obligations and acquiring and financing the assets needed to achieve the goals of the organisation. Thus, cash flow based returns help financial managers to avoid insolvency and achieve desired financial goals.

Decision – making

The purpose of accounting is to collect and present financial data of the past, present and future operations of the organization. The financial manager uses these data for financial decision making. It is not that the financial managers cannot collect data or accountants cannot make decisions, but the chief focus of an accountant is to collect data and present the data while the financial manager's primary responsibility relates to financial planning, controlling and decision making. Thus, in a way it can be stated that financial management begins where accounting ends.

1.11.2 Financial Management and Other Related Disciplines

For its day to day decision making process, financial management also draws on other related disciplines such as marketing, production and quantitative methods apart from accounting. For instance, financial managers should consider the impact of new product development and promotion plans made in marketing area since their plans will require capital outlays and have an impact on the projected cash flows. Likewise, changes in the production process may require capital expenditures which the financial managers must evaluate and finance. Finally, the tools and techniques of analysis developed in the quantitative methods discipline are helpful in analyzing complex financial management problems.



Impact of Other Disciplines on Financial Management

The above figure depicts the relationship between financial management and supportive disciplines. The marketing, production and quantitative methods are, thus, only indirectly related to day to day decision making by financial managers and are supportive in nature while accounting is the primary discipline on which the financial manager draws considerably. Even economics can also be considered as one of the major disciplines which help the financial manager to gain knowledge of what goes on in the world outside the business.



1.12 AGENCY PROBLEM AND AGENCY COST

Though in a sole proprietorship firm, partnership etc., owners participate in management but in corporates, owners are not active in management so, there is a separation between owner/ shareholders and managers. In theory managers should act in the best interest of shareholders however in reality, managers may try to maximise their individual goal like salary, perks etc., so there is a **principal agent relationship between managers and owners, which is known as Agency Problem**. In a nutshell, Agency Problem is the chances that managers may place personal goals ahead of the goal of owners. Agency Problem leads to Agency Cost. Agency cost is the additional cost borne by the shareholders to monitor the manager and control their behaviour so as to maximise shareholders wealth. Generally, Agency Costs are of four types (i) monitoring (ii) bonding (iii) opportunity (iv) structuring

Addressing the agency problem

The agency problem arises if manager's interests are not aligned to the interests of the debt

lender and equity investors. The agency problem of debt lender would be addressed by imposing negative covenants i.e. the managers cannot borrow beyond a point. This is one of the most important concepts of modern day finance and the application of this would be applied in the Credit Risk Management of Bank, Fund Raising, Valuing distressed companies.

Agency problem between the managers and shareholders can be addressed if the interests of

the managers are aligned to the interests of the share- holders. It is easier said than done.

However, following efforts have been made to address these issues:

- ◆ Managerial compensation is linked to profit of the company to some extent and also with the long term objectives of the company.
- ◆ Employee is also designed to address the issue with the underlying assumption that maximisation of the stock price is the objective of the investors.
- ◆ Effecting monitoring can be done.

SUMMARY

- ◆ Financial Management is concerned with efficient acquisition (financing) and allocation (investment in assets, working capital etc) of funds.
- ◆ In the modern times, the financial management includes besides procurement of funds, the three different kinds of decisions as well namely investment, financing and dividend.
- ◆ Out of the two objectives, profit maximization and wealth maximization, in today's real world situations which is uncertain and multi-period in nature, wealth maximization is a better objective.
- ◆ Today the role of chief financial officer, or CFO, is no longer confined to accounting, financial reporting and risk management. It's about being a strategic business partner of the chief executive officer.
- ◆ The relationship between financial management and accounting are closely related to the extent that accounting is an important input in financial decision making.
- ◆ Managers may work against the interest of the shareholders and try to fulfill their own objectives. This is known as agency problem.

TEST YOUR KNOWLEDGE

MCQs based Questions

1. Management of all matters related to an organisation's finances is called:
 - (a) Cash inflows and outflows
 - (b) Allocation of resources
 - (c) Financial management
 - (d) Finance.
2. Which of the following is not an element of financial management?
 - (a) Allocation of resources
 - (b) Financial Planning
 - (c) Financial Decision-making
 - (d) Financial control.
3. The most important goal of financial management is:
 - (a) Profit maximisation
 - (b) Matching income and expenditure
 - (c) Using business assets effectively
 - (d) Wealth maximisation.
4. To achieve wealth maximization, the finance manager has to take careful decision in respect of:
 - (a) Investment
 - (b) Financing
 - (c) Dividend
 - (d) All the above.
5. Early in the history of finance, an important issue was:
 - (a) Liquidity
 - (b) Technology
 - (c) Capital structure

(d) Financing options.

6. Which of the following are microeconomic variables that help define and explain the discipline of finance?

- Risk and return
- Capital structure
- Inflation
- All of the above.

Theoretical Questions

- DISCUSS the two main aspects of the finance function?
- DISCUSS three main considerations in procuring funds?
- EXPLAIN "Wealth maximisation" and "Profit maximisation" objectives of financial management.
- DISCUSS the role of a chief financial officer.
- In recent years, there have been a number of environmental, pollution and other regulations imposed on businesses. In view of these changes, is maximisation of shareholder wealth still a realistic objective? EXPLAIN.

ANSWERS/ SOLUTIONS

Answers to the MCQs based Questions

1. (c) 2. (d) 3. (d) 4. (d) 5. (a) 6. (d)

Answers to the Theoretical Questions

- Please refer paragraph no. 1.4
- Please refer paragraph no. 1.2.1
- Please refer paragraph no. 1.7
- Please refer paragraph no. 1.9
- Please refer paragraph no. 1.8

TYPES OF FINANCING



LEARNING OUTCOMES

- Describe the different sources of finance available to a business, both internal and external.
- Discuss the various long term, medium term and short term sources of finance.
- Discuss in detail some of the important sources of finance, this would include Venture Capital financing, Lease financing and financing of export trade by banks.
- Discuss the concept of Securitization.
- Discuss the financing in the International market by understanding various financial instruments prevalent in the international market.

CHAPTER OVERVIEW

Equity Share Capital

Preference Share Capital

Retained Earnings

Debentures/ Bonds

Loans from Financial Institution

Others

Sources of Finance



2.1 FINANCIAL NEEDS AND SOURCES OF FINANCE OF A BUSINESS

Financial Needs of a Business

Business enterprises need funds to meet their different types of requirements. All the financial needs of a business may be grouped into the following three categories:

(i) Long-term financial needs: Such needs generally refer to those requirements of funds which are for a period exceeding **5-10 years**. All investments in plant, machinery, land, buildings, etc., are considered as long term financial needs. Funds required to finance permanent or hard core working capital should also be procured from long term sources.

(ii) Medium- term financial needs: Such requirements refer to those funds which are required for a period exceeding one year but not exceeding 5 years. For example, if a company resorts to extensive publicity and advertisement campaign then such type of expenses may be written off over a period of **3 to 5 years**. These are called deferred revenue expenses and funds required for these are classified in the category of medium term financial needs.

(iii) Short- term financial needs: Such type of financial needs arises to finance current assets such as stock, debtors, cash, etc. Investment in these assets is known as meeting of working capital requirements of the concern. The main characteristic of short term financial needs is that they arise for a short period of time not exceeding the accounting period. i.e., **one year**.

Basic Principle for Funding Various Needs: The basic principle for meeting the short term financial needs of a concern is that such needs should be met from short term sources, and medium term financial needs from medium term sources and long term financial needs from long term sources. Accordingly, the method of raising funds is to be decided with reference to the period for which funds are required.

General rule for financing of different assets would take place. These rules can be changed depending on the nature of borrower i.e. depending on the borrower's level of operation.

Purpose	Type of Borrowing	Borrower nature
Non-Current Asset	Equity; Long Term Loan	Start up; Small and Medium Enterprises (SMEs), Mid corporates; Large corporates.
Current Asset	Long term loan; Short Term loan	Medium term loan for SMEs
Non -Current Asset	Short term loan	Large Corporates

Besides, the stage of development of the business and nature of business would also decide the type of borrowing. Generally, it can be as follows:

Stage	Nature of Business	Sources of Fund
Early stage	High Uncertainty	Equity ; mainly Angel fund
	High to moderate Uncertainty	Equity; Venture capital ; Debt
Growth Stage	Moderate to Low Uncertainty	Debt; Venture Capital; Private Equity
Stable stage	Low Uncertainty	Debt

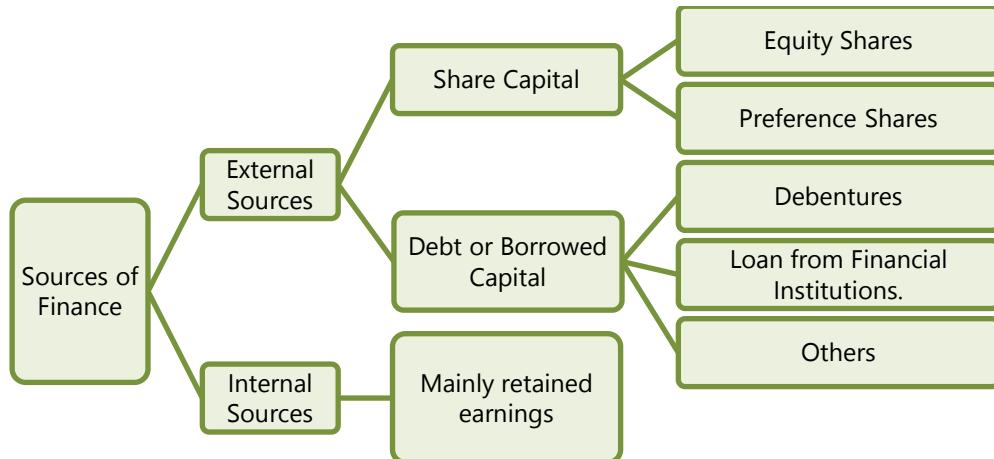


2.2 CLASSIFICATION OF FINANCIAL SOURCES

There are mainly two ways of classifying various financial sources (i) Based on basic Sources (ii) Based on Maturity of repayment period

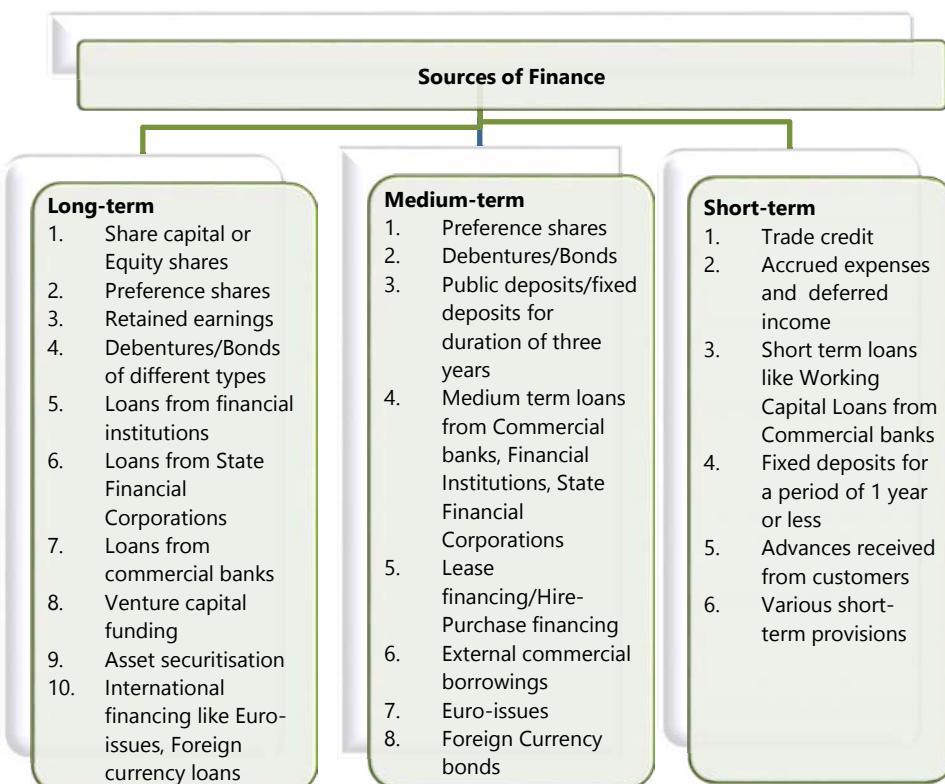
2.2.1. Sources of Finance based on Basic Sources

Based on basic sources of finance, types of financing can be classified as below:



2.2.2 Sources of Finance based on Maturity of Payment.

Sources of finance based on maturity of payment can be classified as below:





2.3 LONG-TERM SOURCES OF FINANCE

There are different sources of funds available to meet long term financial needs of the business. These sources may be broadly classified into:

- ◆ **Share capital** (both equity and preference) &
- ◆ **Debt** (including debentures, long term borrowings or other debt instruments).

The different sources of long-term finance can now be discussed:

2.3.1 Owners Capital or Equity Capital:

A public limited company may raise funds from promoters or from the investing public by way of owner's capital or equity capital by issuing ordinary equity shares. Some of the characteristics of Owners/Equity Share Capital are:-

- ◆ It is a source of permanent capital. The holders of such share capital in the company are called equity shareholders or ordinary shareholders.
- ◆ Equity shareholders are practically owners of the company as they undertake the highest risk.
- ◆ Equity shareholders are entitled to dividends after the income claims of other stakeholders are satisfied. The dividend payable to them is an appropriation of profits and not a charge against profits.
- ◆ In the event of winding up, ordinary shareholders can exercise their claim on assets after the claims of the other suppliers of capital have been met.
- ◆ The cost of ordinary shares is usually the highest. This is due to the fact that such shareholders expect a higher rate of return (as their risk is the highest) on their investment as compared to other suppliers of long-term funds.
- ◆ Ordinary share capital also provides a security to other suppliers of funds. Any institution giving loan to a company would make sure the debt-equity ratio is comfortable to cover the debt. There can be various types of equity shares like New issue, Rights issue, Bonus Shares, Sweat Equity.

Advantages of raising funds by issue of equity shares are:

- (i) It is a permanent source of finance. Since such shares are not redeemable, the company has no liability for cash outflows associated with its redemption.
- (ii) Equity capital increases the company's financial base and thus helps further the borrowing powers of the company.

- (iii) The company is not obliged legally to pay dividends. Hence in times of uncertainties or when the company is not performing well, dividend payments can be reduced or even suspended.
- (iv) The company can make further issue of share capital by making a right issue.

Disadvantages of raising funds by issue of equity shares are:

Apart from the above mentioned advantages, equity capital has some disadvantages to the company when compared with other sources of finance. These are as follows:

- (i) The cost of ordinary shares is higher because dividends are not tax deductible and also the floatation costs of such issues are higher.
- (ii) Investors find ordinary shares riskier because of uncertain dividend payments and capital gains.
- (iii) The issue of new equity shares reduces the earning per share of the existing shareholders until and unless the profits are proportionately increased.
- (iv) The issue of new equity shares can also reduce the ownership and control of the existing shareholders.

2.3.2 Preference Share Capital

These are a special kind of shares; the holders of such shares enjoy priority, both as regards to the payment of a fixed amount of dividend and also towards repayment of capital on winding up of the company. Some of the characteristics of Preference Share Capital are:-

- ◆ Long-term funds from preference shares can be raised through a public issue of shares.
- ◆ Such shares are normally cumulative, *i.e.*, the dividend payable in a year of loss gets carried over to the next year till there are adequate profits to pay the cumulative dividends.
- ◆ The rate of dividend on preference shares is normally higher than the rate of interest on debentures, loans etc.
- ◆ Most of preference shares these days carry a stipulation of period and the funds have to be repaid at the end of a stipulated period.
- ◆ Preference share capital is a hybrid form of financing which imbibes within itself some characteristics of equity capital and some attributes of debt capital.

It is similar to equity because preference dividend, like equity dividend is not a tax deductible payment. It resembles debt capital because the rate of preference dividend is fixed.

- ◆ Cumulative Convertible Preference Shares (CCPs) may also be offered, under which the shares would carry a cumulative dividend of specified limit for a period of say three years after which the shares are converted into equity shares. These shares are attractive for projects with a long gestation period.
- ◆ Preference share capital may be redeemed at a pre decided future date or at an earlier stage inter alia out of the profits of the company. This enables the promoters to withdraw their capital from the company which is now self-sufficient, and the withdrawn capital may be reinvested in other profitable ventures.

Various types of Preference shares can be as below:

Sl. No.	Type of Preference Shares	Salient Features
1	Cumulative	Arrear Dividend will accumulative
2	Non-cumulative	No right to arrear dividend
3	Redeemable	Redemption should be done
4	Participating	Participate also in the surplus of firm
5	Non- Participating	Over fixed rate of Dividend
6	Convertible	Option of Convert into equity Shares

Advantages and disadvantages of raising funds by issue of preference shares are:

- (i) No dilution in EPS on enlarged capital base - If equity is issued it reduces EPS, thus affecting the market perception about the company.
- (ii) There is leveraging advantage as it bears a fixed charge. Non-payment of preference dividends does not force company into liquidity.
- (iii) There is no risk of takeover as the preference shareholders do not have voting rights except in case where dividend arrears exist.

- (iv) The preference dividends are fixed and pre-decided. Hence preference shareholders do not participate in surplus profits as the ordinary shareholders.
- (v) Preference capital can be redeemed after a specified period.

The following are the disadvantages of the preference shares:

- (i) One of the major disadvantages of preference shares is that preference dividend is not tax deductible and so does not provide a tax shield to the company. Hence a preference share is costlier to the company than debt e.g. debenture.
- (ii) Preference dividends are cumulative in nature. This means that although these dividends may be omitted, they shall need to be paid later. Also, if these dividends are not paid, no dividend can be paid to ordinary shareholders. The non-payment of dividend to ordinary shareholders could seriously impair the reputation of the company concerned.

Difference between Equity share and Preference are as follows:

Sl. No.	Basis of Distinction	Equity Share	Preference Share
1	Preference dividend	Equity Dividend is paid after preference dividend.	Payment of preference dividend is preferred over equity dividend
2	Rate of dividend	Fluctuating	Fixed
3	Convertibility	Not convertible	Convertible
4	Voting rights	Equity shareholders enjoy voting rights	They do not have voting rights

2.3.3 Retained Earnings

Long-term funds may also be provided by **accumulating the profits of the company and by ploughing them back into business**. Such funds belong to the ordinary shareholders and increase the net worth of the company. A public limited company must plough back a reasonable amount of profit every year keeping in view the legal requirements in this regard and its own expansion plans. Such funds also entail almost no risk. Further, control of present owners is also not diluted by retaining profits.

2.3.4 Debentures

Loans can be raised from public by issuing debentures or bonds by public limited companies. Some of the characteristics of Debentures are:-

Debentures are normally issued in different denominations ranging from ₹100 to ₹1,000 and carry different rates of interest.

- ◆ Normally, debentures are issued on the basis of a debenture trust deed which lists the terms and conditions on which the debentures are floated.
- ◆ Debentures are either secured or unsecured.
- ◆ May or may not be listed on the stock exchange.
- ◆ The cost of capital raised through debentures is quite low since the interest payable on debentures can be charged as an expense before tax.
- ◆ From the investors' point of view, debentures offer a more attractive prospect than the preference shares since interest on debentures is payable whether or not the company makes profits.
- ◆ Debentures are thus instruments for raising long-term debt capital.
- ◆ The period of maturity normally varies from 3 to 10 years and may also increase for projects having high gestation period.

Debentures can be divided into the following three categories based on their convertibility:

- (i) **Non-convertible debentures** – These types of debentures do not have any feature of conversion and are repayable on maturity.
- (ii) **Fully convertible debentures** – Such debentures are converted into equity shares as per the terms of issue in relation to price and the time of conversion. Interest rates on such debentures are generally less than the non-convertible debentures because of their carrying the attractive feature of getting themselves converted into shares.
- (iii) **Partly convertible debentures** – Those debentures which carry features of both convertible and non-convertible debentures belong to this category. The investor has the advantage of having both the features in one debenture.

Other types of Debentures with their features are as follows:

Sl. No.	Type of Debenture	Salient Feature
1	Bearer	Transferable like negotiable instruments
2	Registered	Interest payable to registered person
3	Mortgage	Secured by a charge on Asset(s)

4	Naked or simple	Unsecured
5	Redeemable	Repaid after a certain period
6	Non-Redeemable	Not repayable

Advantages of raising finance by issue of debentures are:

- (i) The cost of debentures is much lower than the cost of preference or equity capital as the interest is tax-deductible. Also, investors consider debenture investment safer than equity or preferred investment and, hence, may require a lower return on debenture investment.
- (ii) Debenture financing does not result in dilution of control.
- (iii) In a period of rising prices, debenture issue is advantageous. The fixed monetary outgo decreases in real terms as the price level increases.

The disadvantages of debenture financing are:

- (i) Debenture interest and capital repayment are obligatory payments.
- (ii) The protective covenants associated with a debenture issue may be restrictive.
- (iii) Debenture financing enhances the financial risk associated with the firm.
- (iv) Since debentures need to be paid during maturity, a large amount of cash outflow is needed at that time.

Public issue of debentures and private placement to mutual funds now require that the issue be rated by a credit rating agency like CRISIL (Credit Rating and Information Services of India Ltd.). The credit rating is given after evaluating factors like track record of the company, profitability, debt servicing capacity, credit worthiness and the perceived risk of lending.

Difference between Preference Shares and Debentures:

Basis of difference	Preference shares	Debentures
Ownership	Preference Share Capital is a special kind of share	Debenture is a type of loan which can be raised from the public
Payment of Dividend /Interest	its holders enjoy priority both as regard to the payment of a fixed amount of dividend and also	It carries fixed percentage of interest.

	towards repayment of capital in case of winding up of a company	
Nature	Preference shares are a hybrid form of financing with some characteristic of equity shares and some attributes of Debt Capital.	Debentures are instrument for raising long term capital with a period of maturity.

2.3.5 Bond

Bond is fixed income security created to raise fund. Bonds can be raised through Public Issue and through Private Placement.

Types of Bond

Based on call Bond can be divided as

(i) Callable bonds and (ii) Puttable bonds

(i) Callable bonds: A callable bond has a call option which gives the issuer the right to redeem the bond before maturity at a predetermined price known as the call price (Generally at a premium).

(ii) Puttable bonds: Puttable bonds give the investor a put option (i.e. the right to sell the bond) back to the company before maturity.

Various Bonds with their salient feature are as follow:

(i) Foreign Bonds

Sl. No.	Name of Bond	Salient Feature
1	Foreign Currency Convertible Bond (FCCB)	<ul style="list-style-type: none"> This bond comes at a very low rate of interest. The advantage to the issuer is that the issuer can get foreign currency at a very low cost. The risk is that in case the bond has to be redeemed on the date of maturity, the issuer has to make the payment and at that time the issuer may not have the money.
2	Plain Vanilla	<ul style="list-style-type: none"> The issuer would pay the principal amount

	Bond	<p>along with the interest rate.</p> <ul style="list-style-type: none"> • This type of bond would not have any options. • This bond can be issued in the form of discounted bond or can be issued in the form of coupon bearing bond.
3	Convertible Floating Rate Notes (FRN)	<ul style="list-style-type: none"> • A convertible FRN with an option for the holder to convert it into longer term debt security with a specified coupon • It protects an investor against falling interest rate • The long- term debt security can be sold in the market and the investor can earn profit • Capital gain is not applicable to FRN
4	Drop Lock Bond	<ul style="list-style-type: none"> • A Floating Rate Note with a normal floating rate • The floating rate bond would be automatically converted into fixed rate bond if interest rate falls below a predetermined level • The new fixed rate stays till the drop lock bond reaches its maturity • The difference between the convertible floating rate note and drop lock bond is that the former is long option holder structure and the later one is the short option structure
5	Variable Rate Demand Obligations	<ul style="list-style-type: none"> • A normal floating rate note with a nominal maturity • The holder of the floating rate note can sell the obligation back to the trustee at: At par, Plus accrued interest • It gives the investor an option to exit, so more liquid than the normal FRN
6	Yield Curve Note (YCN)	<ul style="list-style-type: none"> • A structured debt security • Yield increases when prevailing interest rate

		<p>declines</p> <ul style="list-style-type: none"> • Yield decreases when prevailing interest rate increases • This is used to hedge the interest rate • This works like inverse floater
7.	Yankee Bond	<ul style="list-style-type: none"> • Bonds denominated in dollars • Bonds issued by non- US banks and non- US corporations • Bonds are issued in USA • Bonds are to be registered in SEC (Securities and Exchange Commission) • Bonds are issued in tranches • Time taken can be up to 14 weeks • Interest rate is dollar LIBOR (London Interbank Offered Rate)
8.	Euro Bond	<ul style="list-style-type: none"> • Bonds issued or traded in a country using a currency other than the one in which the bond is denominated. This means that the bond uses a certain currency, but operates outside the jurisdiction of the Central Bank that issues that currency • Eurobonds are issued by multinational corporations, for example, a British company may issue a Eurobond in Germany, denominating it in U.S. dollars • It is important to note that the term has nothing to do with the euro, and the prefix "euro-" is used more generally to refer to deposit outside the jurisdiction of the domestic central bank
9.	Samurai Bond	<ul style="list-style-type: none"> • Denominated in Japanese Yen JPY • Issued in Tokyo • Issuer Non- Japanese Company • Regulations : Japanese

		<ul style="list-style-type: none"> • Purpose : Access of capital available in Japanese market • Issue proceeds can be used to fund Japanese operation • Issue proceeds can be used to fund a company's local opportunities. • It can also be used to hedge foreign exchange risk
10.	Bulldog Bond	<ul style="list-style-type: none"> • Denominated in Bulldog Pound Sterling/Great Britain Pound (GBP) • Issued in London • Issuer Non- UK Company • Regulations: Great Britain • Purpose: Access of capital available in UK market • Issue proceeds can be used to fund UK operation • Issue proceeds can be used to fund a company's local opportunities

(ii) Indian Bonds

Sl. No.	Name of Bond	Salient Feature
1.	Masala Bond	<p>Masala (means spice) bond is an Indian name used for Rupee denominated bond that Indian corporate borrowers can sell to investors in overseas markets.</p> <ul style="list-style-type: none"> • These bonds are issued outside India but denominated in Indian Rupees. • NTPC raised ₹ 2,000 crore via masala bonds for its capital expenditure in the year 2016.
2.	Municipal Bonds	<p>Municipal bonds are used to finance urban infrastructure are increasingly evident in India.</p> <ul style="list-style-type: none"> • Ahmedabad Municipal Corporation issued a first historical Municipal Bond in Asia to raise

		₹100 crore from the capital market for part financing a water supply project.
3.	Government or Treasury Bonds	Government or Treasury bonds are bonds issued by Government of India, Reserve Bank of India, any state Government or any other Government department.

Some other bonds are included in other source of Financing (para 2.8)

2.3.6 Loans from Financial Institutions:

(i) Financial Institution: National

Sl. No.	Name of the Financial Institution	Year of Establishment	Remarks
1	Industrial Finance Corporation of India (IFCI)	1918	Converted into a public Company
2	State Financial Corporations (SFCs)	1951	-
3	Industrial Development Bank of India (IDBI)	1954	Converted into Bank
4	National Industrial Development Corporation (NIDC)	1954	-
5	Industrial Credit and Investment Corporation of India (ICICI)	1955	Converted into Bank and Privatised)
6	Life Insurance Corporation of India (LIC)	1956	-
7.	Unit Trust of India (UTI)	1964	-
8	Industrial Reconstruction Bank of India (IRBI)	1971	-

(ii) Financial Institution: International Institutions

Sl. No.	Name of the Financial Institution	Year of Establishment
1	The World Bank/ International Bank for Reconstruction and Development (IBRD)	1944
2	The International Finance Corporation (IFC)	1956
3	Asian Development Bank (ADB)	1966

2.3.7 Loans from Commercial Banks

The primary role of the commercial banks is to cater to the short term requirements of industry. Of late, however, banks have started taking an interest in long term financing of industries in several ways.

- (a) The banks provide long term loans for the purpose of expansion or setting up of new units. Their repayment is usually scheduled over a long period of time. The liquidity of such loans is said to depend on the anticipated income of the borrowers.
- (b) As part of the long term funding for a company, the banks also fund the long term working capital requirement (it is also called WCTL i.e. working capital term loan). It is funding of that portion of working capital which is always required (the minimum level) and is not impacted by seasonal requirement of the company.

Bridge Finance: Bridge finance refers to loans taken by a company normally from commercial banks for a **short period because of pending disbursement of loans sanctioned by financial institutions**. Though it is of short term nature but since it is an important step in the facilitation of long term loan, therefore it is being discussed along with the long term sources of funds. Normally, it takes time for financial institutions to disburse loans to companies. However, once the loans are approved by the term lending institutions, companies, in order not to lose further time in starting their projects, arrange short term loans from commercial banks. The bridge loans are repaid/ adjusted out of the term loans as and when disbursed by the concerned institutions. Bridge loans are normally secured by hypothecating movable assets, personal guarantees and demand promissory notes. Generally, the rate of interest on bridge finance is higher as compared with that on term loans.

Having discussed funding from share capital (equity/preference), raising of debt from financial institutions and banks, we will now discuss some other important sources of long term finance.



2.4. VENTURE CAPITAL FINANCING

2.4.1 Meaning of Venture Capital Financing

The venture capital financing refers to financing of new high risky venture promoted by qualified entrepreneurs who lack experience and funds to give shape to their ideas. In broad sense, under venture capital financing venture capitalist make investment to purchase equity or debt securities from inexperienced entrepreneurs who undertake highly risky ventures with a potential of success.

2.4.2 Characteristics of Virtual Capital Financing

Some of the characteristics of Venture Capital Funding are:-

- ◆ It is basically an equity finance in new companies.
- ◆ It can be viewed as a long term investment in growth-oriented small/medium firms.
- ◆ Apart from providing funds, the investor also provides support in form of sales strategy, business networking and management expertise, enabling the growth of the entrepreneur.

2.4.3 Methods of Venture Capital Financing

Some common methods of venture capital financing are as follows:

- (i) **Equity financing:** The venture capital undertakings generally require funds for a longer period but may not be able to provide returns to the investors during the initial stages. Therefore, the venture capital finance is generally provided by way of equity share capital. The equity contribution of venture capital firm does not exceed 49% of the total equity capital of venture capital undertakings so that the effective control and ownership remains with the entrepreneur.
- (ii) **Conditional loan:** A conditional loan is repayable in the form of a royalty after the venture is able to generate sales. No interest is paid on such loans. In India venture capital financiers charge royalty ranging between 2 and 15 per cent; actual rate depends on other factors of the venture such as gestation period, cash flow patterns, risk and other factors of the enterprise. Some Venture capital financiers give a choice to the enterprise of paying a high rate of interest (which could be well above 20 per cent) instead of royalty on sales once it becomes commercially sound.

- (iii) **Income note:** It is a hybrid security which combines the features of both conventional loan and conditional loan. The entrepreneur has to pay both interest and royalty on sales but at substantially low rates. IDBI's VCF provides funding equal to 80 – 87.50% of the projects cost for commercial application of indigenous technology.
- (iv) **Participating debenture:** Such security carries charges in three phases — in the start up phase no interest is charged, next stage a low rate of interest is charged up to a particular level of operation, after that, a high rate of interest is required to be paid.



2.5 DEBT SECURITISATION

Meaning of Debt Securitisation

Securitisation is a **process in which illiquid assets are pooled** into marketable securities that can be sold to investors. The process leads to the creation of financial instruments that represent ownership interest in, or are secured by a segregated income producing asset or pool of assets. These assets are generally secured by personal or real property such as automobiles, real estate, or equipment loans but in some cases are unsecured.

Example of Debt Securitisation:

A finance company has issued a large number of car loans. It desires to raise further cash so as to be in a position to issue more loans. One way to achieve this goal is by selling all the existing loans, however, in the absence of a liquid secondary market for individual car loans, this may not be feasible. Instead, the company pools a large number of these loans and sells interest in the pool to investors. This process helps the company to raise finances and get the loans off its Balance Sheet. These finances shall help the company disburse further loans. Similarly, the process is beneficial to the investors as it creates a liquid investment in a diversified pool of auto loans, which may be an attractive option to other fixed income instruments. The whole process is carried out in such a way that the ultimate debtors- the car owners – may not be aware of the transaction. They shall continue making payments the way they were doing before, however, these payments shall reach the new investors instead of the company they (the car owners) had financed their car from.



2.6 LEASE FINANCING

Leasing is a general contract between the owner and user of the asset over a specified period of time. The asset is purchased initially by the lessor (leasing company) and thereafter leased to the user (lessee company) which pays a specified rent at periodical intervals. Thus, leasing is an alternative to the purchase of an asset out of own or borrowed funds. Moreover, lease finance can be arranged much faster as compared to term loans from financial institutions.

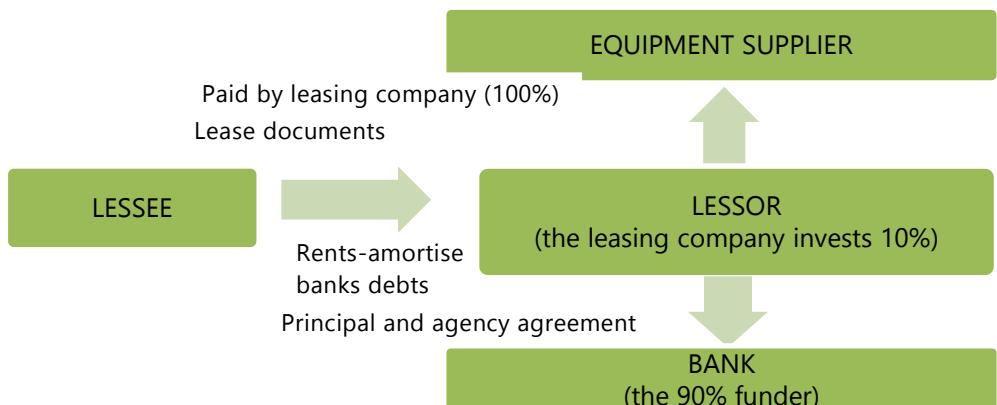
2.6.1 Types of Lease Contracts: Broadly lease contracts can be divided into following two categories:

(a) Operating Lease (b) Finance Lease.

(a) Operating Lease: A lease is classified as an operating lease if it does not secure for the lessor the recovery of capital outlay plus a return on the funds invested during the lease term. Normally, these are callable lease and are cancelable with proper notice.

The term of this type of lease is shorter than the asset's economic life. The leasee is obliged to make payment until the lease expiration, which approaches useful life of the asset.

An operating lease is particularly attractive to companies that continually update or replace equipment and want to use equipment without ownership, but also want to return equipment at lease end and avoid technological obsolescence.



(b) Finance Lease: In contrast to an operating lease, a financial lease is longer term in nature and non-cancelable. In general term, a finance lease can be regarded as any leasing arrangement that is to finance the use of equipment for the major parts of its useful life. The lessee has the right to use the equipment while the lessor retains legal title. It is also called capital lease, at it is nothing but a loan in disguise.

Thus it can be said, a contract involving payments over an obligatory period of specified sums sufficient in total to amortise the capital outlay of the lessor and give some profit.

Comparison between Financial Lease and Operating Lease

Finance Lease		Operating Lease
1.	The risk and reward incident to ownership are passed on to the lessee. The lessor only remains the legal owner of the asset.	The lessee is only provided the use of the asset for a certain time. Risk incident to ownership belong wholly to the lessor.
2.	The lessee bears the risk of obsolescence.	The lessor bears the risk of obsolescence.
3.	The lessor is interested in his rentals and not in the asset. He must get his principal back along with interest. Therefore, the lease is non-cancellable by either party.	As the lessor does not have difficulty in leasing the same asset to other willing lessor, the lease is kept cancelable by the lessor.
4.	The lessor enters into the transaction only as financier. He does not bear the cost of repairs, maintenance or operations.	Usually, the lessor bears cost of repairs, maintenance or operations.
5.	The lease is usually full payout, that is, the single lease repays the cost of the asset together with the interest.	The lease is usually non-payout, since the lessor expects to lease the same asset over and over again to several users.

2.6.2 Other Types of Leases

(a) Sales and Lease Back : Under this type of lease, the owner of an asset sells the asset to a party (the buyer), who in turn leases back the same asset to the owner in consideration of a lease rentals. Under this arrangement, the asset is

not physically exchanged but it all happen in records only. The main advantage of this method is that the lessee can satisfy himself completely regarding the quality of an asset and after possession of the asset convert the sale into a lease agreement.

Under this transaction, the seller assumes the role of lessee and the buyer assumes the role of a lessor. The seller gets the agreed selling price and the buyer gets the lease rentals.

- (b) **Leveraged Lease** : Under this lease, a third party is involved beside lessor and lessee. The lessor borrows a part of the purchase cost (say 80%) of the asset from the third party i.e., lender and asset so purchased is held as security against the loan. The lender is paid off from the lease rentals directly by the lessee and the surplus after meeting the claims of the lender goes to the lessor. The lessor is entitled to claim depreciation allowance.
- (c) **Sales-aid Lease** : Under this lease contract, the lessor enters into a tie up with a manufacturer for marketing the latter's product through his own leasing operations, it is called a sales-aid lease. In consideration of the aid in sales, the manufacturers may grant either credit or a commission to the lessor. Thus, the lessor earns from both sources i.e. from lessee as well as the manufacturer.
- (d) **Close-ended and Open-ended Leases** : In the close-ended lease, the assets get transferred to the lessor at the end of lease, the risk of obsolescence, residual value etc., remain with the lessor being the legal owner of the asset. In the open-ended lease, the lessee has the option of purchasing the asset at the end of the lease period.

In recent years, leasing has become a popular source of financing in India. From the lessee's point of view, leasing has the attraction of eliminating immediate cash outflow, and the lease rentals can be deducted for computing the total income under the Income tax Act. As against this, buying has the advantages of depreciation allowance (including additional depreciation) and interest on borrowed capital being tax-deductible. Thus, an evaluation of the two alternatives is to be made in order to take a decision. Practical problems for lease financing are covered at Final level in paper of Strategic Financial Management.



2.7 SHORT TERM SOURCES OF FINANCE

There are various sources available to meet short- term needs of finance. The different sources are discussed below:

(i) **Trade Credit:** It represents credit granted by suppliers of goods, etc., as an incident of sale. The usual duration of such credit is 15 to 90 days. It generates automatically in the course of business and is common to almost all business operations. It can be in the form of an 'open account' or 'bills payable'.

Trade credit is preferred as a source of finance because it is without any explicit cost and till a business is a going concern it keeps on rotating. Another very important characteristic of trade credit is that it enhances automatically with the increase in the volume of business.

(ii) **Accrued Expenses and Deferred Income:** Accrued expenses represent liabilities which a company has to pay for the services which it has already received like wages, taxes, interest and dividends. Such expenses arise out of the day-to-day activities of the company and hence represent a spontaneous source of finance.

Deferred income, on the other hand, reflects the amount of funds received by a company in lieu of goods and services to be provided in the future. Since these receipts increase a company's liquidity, they are also considered to be an important source of spontaneous finance.

(iii) **Advances from Customers:** Manufacturers and contractors engaged in producing or constructing costly goods involving considerable length of manufacturing or construction time usually demand advance money from their customers at the time of accepting their orders for executing their contracts or supplying the goods. This is a cost free source of finance and really useful.

(iv) **Commercial Paper:** A Commercial Paper is an unsecured money market instrument issued in the form of a promissory note. The Reserve Bank of India introduced the commercial paper scheme in the year 1989 with a view to enabling highly rated corporate borrowers to diversify their sources of short-term borrowings and to provide an additional instrument to investors. Subsequently, in addition to the Corporate, Primary Dealers and All India Financial Institutions have also been allowed to issue Commercial Papers. Commercial papers are issued in denominations of ₹ 5 lakhs or multiples thereof and the interest rate is generally linked to the yield on the one-year government bond.

All eligible issuers are required to get the credit rating from Credit Rating Information Services of India Ltd, (CRISIL), or the Investment Information and Credit Rating Agency of India Ltd (ICRA) or the Credit Analysis and Research Ltd (CARE) or the FITCH Ratings India Pvt. Ltd or any such other credit rating agency as is specified by the Reserve Bank of India.

- (v) **Treasury Bills:** Treasury bills are a class of Central Government Securities. Treasury bills, commonly referred to as T-Bills are issued by Government of India to meet short term borrowing requirements with maturities ranging between 14 to 364 days.
- (vi) **Certificates of Deposit (CD):** A certificate of deposit (CD) is basically a savings certificate with a fixed maturity date of not less than 15 days up to a maximum of one year.
- (vii) **Bank Advances:** Banks receive deposits from public for different periods at varying rates of interest. These funds are invested and lent in such a manner that when required, they may be called back. Lending results in gross revenues out of which costs, such as interest on deposits, administrative costs, etc., are met and a reasonable profit is made. A bank's lending policy is not merely profit motivated but has to also keep in mind the socio- economic development of the country.

Some of the facilities provided by banks are

- (a) **Short Term Loans:** In a loan account, the entire advance is disbursed at one time either in cash or by transfer to the current account of the borrower. It is a single advance and given against securities like shares, government securities, life insurance policies and fixed deposit receipts, etc. Except by way of interest and other charges no further adjustments are made in this account. Repayment under the loan account may be the full amount or by way of schedule of repayments agreed upon as in case of term loans.
- (b) **Overdraft:** Under this facility, customers are allowed to withdraw in excess of credit balance standing in their Current Account. A fixed limit is, therefore, granted to the borrower within which the borrower is allowed to overdraw his account. Though overdrafts are repayable on demand, they generally continue for long periods by annual renewals of the limits. This is a convenient arrangement for the borrower as he is in a position to avail of the limit sanctioned, according to his requirements. Interest is charged on daily balances.

Since these accounts are operative like cash credit and current accounts, cheque books are provided.

(c) **Clean Overdrafts:** Request for clean advances are entertained only from parties which are financially sound and reputed for their integrity. The bank has to rely upon the personal security of the borrowers. Therefore, while entertaining proposals for clean advances; banks exercise a good deal of restraint since they have no backing of any tangible security. If the parties are already enjoying secured advance facilities, this may be a point in favor and may be taken into account while screening such proposals. The turnover in the account, satisfactory dealings for considerable period and reputation in the market are some of the factors which the bank will normally see. As a safeguard, banks take guarantees from other persons who are credit worthy before granting this facility. A clean advance is generally granted for a short period and must not be continued for long.

(d) **Cash Credits:** Cash Credit is an arrangement under which a customer is allowed an advance up to certain limit against credit granted by bank. Under this arrangement, a customer need not borrow the entire amount of advance at one time; he can only draw to the extent of his requirements and deposit his surplus funds in his account. Interest is not charged on the full amount of the advance but on the amount actually availed of by him.

Generally cash credit limits are sanctioned against the security of tradable goods by way of pledge or hypothecation. Though these accounts are repayable on demand, banks usually do not recall such advances, unless they are compelled to do so by adverse factors.

(e) **Advances against goods:** Advances against goods occupy an important place in total bank credit. Goods as security have certain distinct advantages. They provide a reliable source of repayment. Advances against them are safe and liquid. Also, there is a quick turnover in goods, as they are in constant demand. So a banker accepts them as security. Generally goods are charged to the bank either by way of pledge or by way of hypothecation. The term 'goods' includes all forms of movables which are offered to the bank as security. They may be agricultural commodities or industrial raw materials or partly finished goods.

(f) **Bills Purchased/Discounted:** These advances are allowed against the security of bills which may be clean or documentary. Bills are sometimes purchased from approved customers in whose favour limits are sanctioned. Before granting a limit the banker satisfies himself as to the credit worthiness of the drawer. Although the term 'bills purchased' gives the impression that the bank becomes the owner or purchaser of such bills, in actual practice the bank holds the bills only as security for the advance. The bank, in addition to the rights against the parties liable on the bills, can also exercise a pledge's rights over the goods covered by the documents.

(viii) **Financing of Export Trade by Banks:** Exports play an important role in accelerating the economic growth of developing countries like India. Of the several factors influencing export growth, credit is a very important factor which enables exporters in efficiently executing their export orders. The commercial banks provide short-term export finance mainly by way of pre and post-shipment credit. Export finance is granted in Rupees as well as in foreign currency.

In view of the importance of export credit in maintaining the pace of export growth, RBI has initiated several measures in the recent years to ensure timely and hassle free flow of credit to the export sector. These measures, *inter alia*, include rationalization and liberalization of export credit interest rates, flexibility in repayment/prepayment of pre-shipment credit, special financial package for large value exporters, export finance for agricultural exports, Gold Card Scheme for exporters etc. Further, banks have been granted freedom by RBI to source funds from abroad without any limit for exclusively for the purpose of granting export credit in foreign currency, which has enabled banks to increase their lending's under export credit in foreign currency substantially during the last few years.

The advances by commercial banks for export financing are in the form of:

- (i) Pre-shipment finance i.e., before shipment of goods.
- (ii) Post-shipment finance i.e., after shipment of goods.

Pre-Shipment Finance: This generally takes the form of packing credit facility; packing credit is an advance extended by banks to an exporter for the purpose of buying, manufacturing, processing, packing, shipping goods to overseas buyers. Any exporter, having at hand a firm export order placed with him by his foreign buyer or an irrevocable letter of credit opened in his favour, can

approach a bank for availing of packing credit. An advance so taken by an exporter is required to be liquidated within 180 days from the date of its commencement by negotiation of export bills or receipt of export proceeds in an approved manner. Thus packing credit is essentially a short-term advance.

Normally, banks insist upon their customers to lodge with them irrevocable letters of credit opened in favour of the customers by the overseas buyers. The letter of credit and firm sale contracts not only serve as evidence of a definite arrangement for realisation of the export proceeds but also indicate the amount of finance required by the exporter. Packing credit, in the case of customers of long standing, may also be granted against firm contracts entered into by them with overseas buyers.

Types of Packing Credit

- (a) **Clean packing credit:** This is an advance made available to an exporter only on production of a firm export order or a letter of credit without exercising any charge or control over raw material or finished goods. It is a clean type of export advance. Each proposal is weighed according to particular requirements of the trade and credit worthiness of the exporter. A suitable margin has to be maintained. Also, Export Credit Guarantee Corporation (ECGC) cover should be obtained by the bank.
- (b) **Packing credit against hypothecation of goods:** Export finance is made available on certain terms and conditions where the exporter has pledge able interest and the goods are hypothecated to the bank as security with stipulated margin. At the time of utilising the advance, the exporter is required to submit, along with the firm export order or letter of credit relative stock statements and thereafter continue submitting them every fortnight and/or whenever there is any movement in stocks.
- (c) **Packing credit against pledge of goods:** Export finance is made available on certain terms and conditions where the exportable finished goods are pledged to the banks with approved clearing agents who will ship the same from time to time as required by the exporter. The possession of the goods so pledged lies with the bank and is kept under its lock and key.
- (d) **E.C.G.C. guarantee:** Any loan given to an exporter for the manufacture, processing, purchasing, or packing of goods meant for export against a firm order qualifies for the packing credit guarantee issued by Export Credit Guarantee Corporation.

(e) **Forward exchange contract:** Another requirement of packing credit facility is that if the export bill is to be drawn in a foreign currency, the exporter should enter into a forward exchange contact with the bank, thereby avoiding risk involved in a possible change in the rate of exchange.

Post-shipment Finance: It takes the following forms:

- (a) **Purchase/discounting of documentary export bills:** Finance is provided to exporters by purchasing export bills drawn payable at sight or by discounting usance export bills covering confirmed sales and backed by documents including documents of the title of goods such as bill of lading, post parcel receipts, or air consignment notes.
- (b) **E.C.G.C. Guarantee:** Post-shipment finance, given to an exporter by a bank through purchase, negotiation or discount of an export bill against an order, qualifies for post-shipment export credit guarantee. It is necessary, however, that exporters should obtain a shipment or contracts risk policy of E.C.G.C. Banks insist on the exporters to take a contracts shipments (comprehensive risks) policy covering both political and commercial risks. The Corporation, on acceptance of the policy, will fix credit limits for individual exporters and the Corporation's liability will be limited to the extent of the limit so fixed for the exporter concerned irrespective of the amount of the policy.
- (c) **Advance against export bills sent for collection:** Finance is provided by banks to exporters by way of advance against export bills forwarded through them for collection, taking into account the creditworthiness of the party, nature of goods exported, usance, standing of drawee, etc. appropriate margin is kept.
- (d) **Advance against duty draw backs, cash subsidy, etc.:** To finance export losses sustained by exporters, bank advance against duty draw-back, cash subsidy, etc., receivable by them against export performance. Such advances are of clean nature; hence necessary precaution should be exercised.

Bank providing finance in this manner see that the relative export bills are either negotiated or forwarded for collection through it so that it is in a position to verify the exporter's claims for duty draw-backs, cash subsidy, etc. 'An advance so availed of by an exporter is required to be liquidated within 180 days from the date of shipment of relative goods.

Other facilities extended to exporters:

- (i) On behalf of approved exporters, banks establish letters of credit on their overseas or up country suppliers.
- (ii) Guarantees for waiver of excise duty, etc. due performance of contracts, bond in lieu of cash security deposit, guarantees for advance payments etc., are also issued by banks to approved clients.
- (iii) To approved clients undertaking exports on deferred payment terms, banks also pro- vide finance.
- (iv) Banks also endeavour to secure for their exporter-customers status reports of their buyers and trade information on various commodities through their correspondents.
- (v) Economic intelligence on various countries is also provided by banks to their ex- porter clients.

(ix) Inter Corporate Deposits: The companies can borrow funds for a short period say 6 months from other companies which have surplus liquidity. The rate of interest on inter corporate deposits varies depending upon the amount involved and time period.

(x) Certificate of Deposit (CD): The certificate of deposit is a document of title similar to a time deposit receipt issued by a bank except that there is no prescribed interest rate on such funds.

The main advantage of CD is that banker is not required to encash the deposit before maturity period and the investor is assured of liquidity because he can sell the CD in secondary market.

(xi) Public Deposits: Public deposits are very important source of short-term and medium term finances particularly due to credit squeeze by the Reserve Bank of India. A company can accept public deposits subject to the stipulations of Reserve Bank of India from time to time maximum up to 35 per cent of its paid up capital and reserves, from the public and shareholders. These deposits may be accepted for a period of six months to three years. Public deposits are unsecured loans; they should not be used for acquiring fixed assets since they are to be repaid within a period of 3 years. These are mainly used to finance working capital requirements.



2.8. OTHER SOURCES OF FINANCING

(i) **Seed Capital Assistance:** The Seed capital assistance scheme is designed by IDBI for professionally or technically qualified entrepreneurs and/or persons possessing relevant experience, skills and entrepreneurial traits but lack adequate financial resources. All the projects eligible for financial assistance from IDBI, directly or indirectly through refinance are eligible under the scheme.

The Seed Capital Assistance is interest free but carries a service charge of one per cent per annum for the first five years and at increasing rate thereafter. However, IDBI will have the option to charge interest at such rate as may be determined by IDBI on the loan if the financial position and profitability of the company so permits during the currency of the loan. The repayment schedule is fixed depending upon the repaying capacity of the unit with an initial moratorium upto five years.

The project cost should not exceed ₹2crores and the maximum assistance under the project will be restricted to 50 percent of the required promoter's contribution or ₹15 lacs, whichever is lower.

(ii) **Internal Cash Accruals:** Existing profit making companies which undertake an expansion/ diversification programme may be permitted to invest a part of their accumulated reserves or cash profits for creation of capital assets. In such cases, past performance of the company permits the capital expenditure from within the company by way of disinvestment of working/invested funds. In other words, the surplus generated from operations, after meeting all the contractual, statutory and working requirement of funds, is available for further capital expenditure.

(iii) **Unsecured Loans:** Unsecured loans are typically provided by promoters to meet the promoters' contribution norm. These loans are subordinate to institutional loans. The rate of interest chargeable on these loans should be less than or equal to the rate of interest on institutional loans and interest can be paid only after payment of institutional dues. These loans cannot be repaid without the prior approval of financial institutions. Unsecured loans are considered as part of the equity for the purpose of calculating of debt equity ratio.

(iv) **Deferred Payment Guarantee:** Many a time suppliers of machinery provide deferred credit facility under which payment for the purchase of machinery can

be made over a period of time. The entire cost of the machinery is financed and the company is not required to contribute any amount initially towards acquisition of the machinery. Normally, the supplier of machinery insists that bank guarantee should be furnished by the buyer. Such a facility does not have a moratorium period for repayment. Hence, it is advisable only for an existing profit making company.

(v) **Capital Incentives:** The backward area development incentives available often determine the location of a new industrial unit. These incentives usually consist of a lump sum subsidy and exemption from or deferment of sales tax and octroi duty. The quantum of incentives is determined by the degree of backwardness of the location.

The special capital incentive in the form of a lump sum subsidy is a quantum sanctioned by the implementing agency as a percentage of the fixed capital investment subject to an overall ceiling. This amount forms a part of the long-term means of finance for the project. However, it may be mentioned that the viability of the project must not be dependent on the quantum and availability of incentives. Institutions, while appraising the project, assess the viability of the project per se, without considering the impact of incentives on the cash flows and profitability of the project.

Special capital incentives are sanctioned and released to the units only after they have complied with the requirements of the relevant scheme. The requirements may be classified into initial effective steps and final effective steps.

(vi) **Deep Discount Bonds:** Deep Discount Bonds is a form of zero-interest bonds. These bonds are sold at a discounted value and on maturity face value is paid to the investors. In such bonds, there is no interest payout during lock in period.

(vii) **Secured Premium Notes:** Secured Premium Notes is issued along with a detachable warrant and is redeemable after a notified period of say 4 to 7 years. The conversion of detachable warrant into equity shares will have to be done within time period notified by the company.

(viii) **Zero Interest Fully Convertible Debentures:** These are fully convertible debentures which do not carry any interest. The debentures are compulsorily and automatically converted after a specified period of time and holders thereof are entitled to new equity shares of the company at predetermined price. From the point of view of company this kind of instrument is beneficial in

the sense that no interest is to be paid on it, if the share price of the company in the market is very high than the investors tends to get equity shares of the company at the lower rate.

- (ix) **Zero Coupon Bonds:** A Zero Coupon Bonds does not carry any interest but it is sold by the issuing company at a discount. The difference between the discounted value and maturing or face value represents the interest to be earned by the investor on such bonds.
- (x) **Option Bonds:** These are cumulative and non-cumulative bonds where interest is payable on maturity or periodically. Redemption premium is also offered to attract investors. These were recently issued by IDBI, ICICI etc.
- (xi) **Inflation Bonds:** Inflation Bonds are the bonds in which interest rate is adjusted for inflation. Thus, the investor gets interest which is free from the effects of inflation. For example, if the interest rate is 11 per cent and the inflation is 5 per cent, the investor will earn 16 per cent meaning thereby that the investor is protected against inflation.
- (xii) **Floating Rate Bonds:** This as the name suggests is bond where the interest rate is not fixed and is allowed to float depending upon the market conditions. This is an ideal instrument which can be resorted to by the issuer to hedge themselves against the volatility in the interest rates. This has become more popular as a money market instrument and has been successfully issued by financial institutions like IDBI, ICICI etc.



2.9 INTERNATIONAL FINANCING

The essence of financial management is to raise and utilise the funds raised effectively. There are various avenues for organisations to raise funds either through internal or external sources. The sources of external sources include:

- (i) **Commercial Banks:** Like domestic loans, commercial banks all over the world extend Foreign Currency (FC) loans also for international operations. These banks also provide to overdraw over and above the loan amount.
- (ii) **Development Banks:** Development banks offer long & medium term loans including FC loans. Many agencies at the national level offer a number of concessions to foreign companies to invest within their country and to finance exports from their countries. E.g. EXIM Bank of USA.

(iii) **Discounting of Trade Bills:** This is used as a short term financing method. It is used widely in Europe and Asian countries to finance both domestic and international business.

(iv) **International Agencies:** A number of international agencies have emerged over the years to finance international trade & business. The more notable among them include The International Finance Corporation (IFC), The International Bank for Reconstruction and Development (IBRD), The Asian Development Bank (ADB), The International Monetary Fund (IMF), etc.

(v) **International Capital Markets:** Today, modern organisations including MNC's depend upon sizeable borrowings in Rupees as well as Foreign Currency (FC). In order to cater to the needs of such organisations, international capital markets have sprung all over the globe such as in London.

In international capital market, the availability of FC is assured under the four main systems viz:

- Euro-currency market
- Export credit facilities
- Bonds issues
- Financial Institutions.

The origin of the Euro-currency market was with the dollar denominated bank deposits and loans in Europe particularly in London. Euro-dollar deposits are dollar denominated time deposits available at foreign branches of US banks and at some foreign banks. Banks based in Europe accept dollar denominated deposits and make dollar denominated deposits to the clients. This forms the backbone of the Euro-currency market all over the globe. In this market, funds are made available as loans through syndicated Euro-credit of instruments such as FRN's, FR certificates of deposits.

(vi) **Financial Instruments:** Some of the various financial instruments dealt with in the international market are briefly described below:

(a) **External Commercial Borrowings (ECB):** ECBs refer to commercial loans (in the form of bank loans, buyers credit, suppliers credit, securitised instruments (e.g. floating rate notes and fixed rate bonds) availed from non-resident lenders with minimum average maturity of 3 years. Borrowers can raise ECBs through internationally recognised sources like (i) international banks, (ii) international capital markets, (iii) multilateral

financial institutions such as the IFC, ADB etc, (iv) export credit agencies, (v) suppliers of equipment, (vi) foreign collaborators and (vii) foreign equity holders.

External Commercial Borrowings can be accessed under two routes viz (i) Automatic route and (ii) Approval route. Under the Automatic route there is no need to take the RBI/Government approval whereas such approval is necessary under the Approval route. Company's registered under the Companies Act and NGOs engaged in micro finance activities are eligible for the Automatic Route whereas Financial Institutions and Banks dealing exclusively in infrastructure or export finance and the ones which had participated in the textile and steel sector restructuring packages as approved by the government are required to take the Approval Route.

- (b) **Euro Bonds:** Euro bonds are debt instruments which are not denominated in the currency of the country in which they are issued. E.g. a Yen note floated in Germany. Such bonds are generally issued in a bearer form rather than as registered bonds and in such cases they do not contain the investor's names or the country of their origin. These bonds are an attractive proposition to investors seeking privacy.
- (c) **Foreign Bonds:** These are debt instruments issued by foreign corporations or foreign governments. Such bonds are exposed to default risk, especially the corporate bonds. These bonds are denominated in the currency of the country where they are issued, however, in case these bonds are issued in a currency other than the investors home currency, they are exposed to exchange rate risks. An example of a foreign bond 'A British firm placing Dollar denominated bonds in USA'.
- (d) **Fully Hedged Bonds:** As mentioned above, in foreign bonds, the risk of currency fluctuations exists. Fully hedged bonds eliminate the risk by selling in forward markets the entire stream of principal and interest payments.
- (e) **Medium Term Notes:** Certain issuers need frequent financing through the Bond route including that of the Euro bond. However it may be costly and ineffective to go in for frequent issues. Instead, investors can follow the MTN programme. Under this programme, several lots of bonds can be issued, all having different features e.g. different coupon rates, different currencies etc. The timing of each lot can be decided keeping in

mind the future market opportunities. The entire documentation and various regulatory approvals can be taken at one point of time

- (f) **Floating Rate Notes (FRN):** These are issued up to seven years maturity. Interest rates are adjusted to reflect the prevailing exchange rates. They provide cheaper money than foreign loans.
- (g) **Euro Commercial Papers (ECP):** ECPs are short term money market instruments. They are for maturities less than one year. They are usually designated in US Dollars.
- (h) **Foreign Currency Option (FC):** A FC Option is the right to buy or sell, spot, future or forward, a specified foreign currency. It provides a hedge against financial and economic risks.
- (i) **Foreign Currency Futures:** FC Futures are obligations to buy or sell a specified currency in the present for settlement at a future date.
- (j) **Foreign Euro Bonds:** In domestic capital markets of various countries the Bonds referred to above are known by different names such as Yankee Bonds in the US, Swiss Francs in Switzerland, Samurai Bonds in Tokyo and Bulldogs in UK.
- (k) **Euro Convertible Bonds:** A convertible bond is a debt instrument which gives the holders of the bond an option to convert the bonds into a pre-determined number of equity shares of the company. Usually the price of the equity shares at the time of conversion will have a premium element. These bonds carry a fixed rate of interest and if the issuer company so desires may also include a Call Option (where the issuer company has the option of calling/ buying the bonds for redemption prior to the maturity date) or a Put Option (which gives the holder the option to put/sell his bonds to the issuer company at a pre-determined date and price).
- (l) **Euro Convertible Zero Bonds:** These bonds are structured as a convertible bond. No interest is payable on the bonds. But conversion of bonds takes place on maturity at a pre-determined price. Usually there is a five years maturity period and they are treated as a deferred equity issue.
- (m) **Euro Bonds with Equity Warrants:** These bonds carry a coupon rate determined by market rates. The warrants are detachable. Pure bonds are traded at a discount. Fixed In- come Funds Management may like to invest for the purposes of regular income.

(vii) **Euro Issues by Indian Companies:** Indian companies are permitted to raise foreign currency resources through issue of ordinary equity shares through Global Depository Receipts(GDRs)/ American Depository Receipts (ADRs) and / or issue of Foreign Currency Convertible Bonds (FCCB) to foreign investors i.e. institutional investors or individuals (including NRIs) residing abroad. Such investment is treated as Foreign Direct Investment. The government guidelines on these issues are covered under the Foreign Currency Convertible Bonds and Ordinary Shares (through depository receipt mechanism) Scheme, 1993 and notifications issued after the implementation of the said scheme.

(a) **American Depository Receipts (ADRs):** These are securities offered by **non-US companies who want to list on any of the US exchange**. Each ADR represents a certain number of a company's regular shares. ADRs allow US investors to buy shares of these companies without the costs of investing directly in a foreign stock exchange. ADRs are issued by an approved New York bank or trust company against the deposit of the original shares. These are deposited in a custodial account in the US. Such receipts have to be issued in accordance with the provisions stipulated by the Security Exchange Commission USA.

ADRs can be traded either by trading existing ADRs or purchasing the shares in the issuer's home market and having new ADRs created, based upon availability and market conditions. When trading in existing ADRs, the trade is executed on the secondary market on the New York Stock Exchange (NYSE) through Depository Trust Company (DTC) without involvement from foreign brokers or custodians. The process of buying new, issued ADRs goes through US brokers, Helsinki Exchanges and DTC as well as Deutsche Bank. When transactions are made, the ADRs change hands, not the certificates. This eliminates the actual transfer of stock certificates between the US and foreign countries.

In a bid to bypass the stringent disclosure norms mandated by the SEC for equity shares, the Indian companies have however, chosen the indirect route to tap the vast American financial market through private debt placement of GDRs listed in London and Luxembourg Stock Exchanges.

The Indian companies have preferred the GDRs to ADRs because the US market exposes them to a higher level of responsibility than a European listing in the areas of disclosure, costs, liabilities and timing. The SECs regulations set up to protect the retail investor base are somewhat more

stringent and onerous, even for companies already listed and held by retail investors in their home country. The most onerous aspect of a US listing for the companies is to provide full, half yearly and quarterly accounts in accordance with, or at least reconciled with US GAAPs.

(b) **Global Depository Receipts (GDRs):** These are negotiable certificate held in the bank of one country representing a **specific number of shares of a stock traded on the exchange of another country.** These financial instruments are used by companies to raise capital in either dollars or Euros. These are mainly traded in European countries and particularly in London.

ADRs/GDRs and the Indian Scenario: Indian companies are shedding their reluctance to tap the US markets. Infosys Technologies was the first Indian company to be listed on Nasdaq in 1999. However, the first Indian firm to issue sponsored GDR or ADR was Reliance Industries Limited. Beside, these two companies there are several other Indian firms are also listed in the overseas bourses. These are Wipro, MTNL, State Bank of India, Tata Motors, Dr. Reddy's Lab, Ranbaxy, Larsen & Toubro, ITC, ICICI Bank, Hindalco, HDFC Bank and Bajaj Auto.

(c) **Indian Depository Receipts (IDRs):** The concept of **the depository receipt mechanism which is used to raise funds in foreign currency** has been applied in the Indian Capital Market through the issue of Indian Depository Receipts (IDRs). IDRs are similar to ADRs/GDRs in the sense that foreign companies can issue IDRs to raise funds from the Indian Capital Market in the same lines as an Indian company uses ADRs/GDRs to raise foreign capital. The IDRs are listed and traded in India in the same way as other Indian securities are traded.

SUMMARY

- ◆ There are several sources of finance/funds available to any company.
- ◆ All the financial needs of a business may be grouped into the long term or short term financial needs.
- ◆ There are different sources of funds available to meet long term financial needs of the business. These sources may be broadly classified into share capital (both equity and preference) and debt.
- ◆ Another important source of long term finance is venture capital financing. It refers to financing of new high risky venture promoted by qualified

entrepreneurs who lack experience and funds to give shape to their ideas.

- ◆ Securitisation is another important source of finance and it is a process in which illiquid assets are pooled into marketable securities that can be sold to investors.
- ◆ Leasing is a very popular source to finance equipment. it is a contract between the owner and user of the asset over a specified period of time in which the asset is purchased initially by the lessor (leasing company) and thereafter leased to the user (lessee company) who pays a specified rent at periodical intervals.
- ◆ Some of the short terms sources of funding are trade credit, advances from customers, commercial paper, and bank advances etc.
- ◆ To support export, the commercial banks provide short term export finance mainly by way of pre and post-shipment credit.
- ◆ Every day new creative financial products keep on entering the market. some of the examples are seed capital assistance, deep discount bonds, option bonds, inflation bonds etc.
- ◆ Today the businesses are allowed to source funds from international market also. some of important products are External Commercial Borrowings (ECB), Euro Bonds, American Depository Receipts (ADR) etc.

TEST YOUR KNOWLEDGE

MCQs based Questions

1. Equity shares:
 - (a) Have an unlimited life, and voting rights and receive dividends
 - (b) Have a limited life, with no voting rights but receive dividends
 - (c) Have a limited life, and voting rights and receive dividends
 - (d) Have an unlimited life, and voting rights but receive no dividends
2. External sources of finance do not include:
 - (a) Debentures
 - (b) Retained earnings
 - (c) Overdrafts

(d) Leasing

3. Internal sources of finance do not include:

- (a) Better management of working capital
- (b) Ordinary shares
- (c) Retained earnings
- (d) Reserve and Surplus

4. Preference shares:

- (a) Do not get dividends
- (b) Have no voting rights
- (c) Are not part of a company's share capital
- (d) Receive interest

5. A debenture:

- (a) Is a long-term loan
- (b) Does not require security
- (c) Is a short-term loan
- (d) Receives dividend payments

6. Debt capital refers to:

- (a) Money raised through the sale of shares.
- (b) Funds raised by borrowing that must be repaid.
- (c) Factoring accounts receivable.
- (d) Inventory loans.

7. The most popular source of short-term funding is:

- (a) Factoring.
- (b) Trade credit.
- (c) Family and friends.
- (d) Commercial banks.

Theoretical based Questions

1. DESCRIBE the different types of Packing Credit.

2. DISCUSS the advantages of raising funds by issue of equity shares.
3. EXPLAIN in brief the features of Commercial Paper.
4. DISCUSS the features of Secured Premium Notes (SPNs).
5. DISCUSS ADRs and GDRs?
6. DISTINGUISH between Preference Shares and Debentures?

ANSWERS/SOLUTIONS

Answers to the MCQs based Questions

1. (a) 2. (b) 3. (b) 4. (b) 5. (a) 6. (b)
7. (b)

Answers to Theoretical based Questions

1. Please refer paragraph 2.7.8.1
2. Please refer paragraph 2.3.1
3. Please refer paragraph 2.7.4
4. Please refer paragraph 2.8.7
5. Please refer paragraph 2.9.7
6. Please refer paragraph 2.3.4



FINANCIAL ANALYSIS AND PLANNING— RATIO ANALYSIS



LEARNING OUTCOMES

- Discuss Sources of financial data for Analysis
- Discuss financial ratios and its Types
- Discuss use of financial ratios to analyse the financial statement.
- Analyse the ratios from the perspective of investors, lenders, suppliers, managers etc. to evaluate the profitability and financial position of an entity.
- Describe the users and objective of Financial Analysis:- A Birds Eye View
- Discuss Du Pont analysis
- State the limitations of Ratio Analysis

CHAPTER OVERVIEW

RATIO ANALYSIS

Types of Ratios

- ◆ Liquidity Ratios/Short-term solvency ratios
- ◆ Leverage Ratio/Long term solvency Ratios
- ◆ Activity Ratios/Efficiency Ratios/Performance Ratios/Turnover ratios
- Profitability Ratios

Application of Ratio Analysis in decision making

Relationship of Financial Management with other disciplines of accounting.



3.1 INTRODUCTION

The basis for financial analysis, planning and decision making is financial statements which mainly consist of Balance Sheet and Profit and Loss Account. The profit & loss account shows the operating activities of the concern and the balance sheet depicts the balance value of the acquired assets and of liabilities at a particular point of time.

However, the above statements do not disclose all of the necessary and relevant information. For the purpose of obtaining the material and relevant information necessary for ascertaining the financial strengths and weaknesses of an enterprise, it is necessary to analyse the data depicted in the financial statement.

The financial manager has certain analytical tools which help in financial analysis and planning. One of the main tool is Ratio Analysis. Let us discuss the Ratio Analysis.



3.2 RATIOS AND RATIO ANALYSIS

Let us first understand the definition of ratio and meaning of ratio analysis

3.2.1 Definition of Ratio

A ratio is defined as “**the indicated quotient of two mathematical expressions and as the relationship between two or more things.**” Here ratio means financial ratio or accounting ratio which is a mathematical expression of the relationship between accounting figures.

3.2.2 Ratio Analysis

The term financial ratio can be explained by defining how it is calculated and what the objective of this calculation is

a. Calculation Basis (Basis of Calculation)

- A relationship expressed in mathematical terms;
- Between two individual figures or group of figures;
- Connected with each other in some logical manner; and
- Selected from financial statements of the concern

b. Objective for financial ratios is that all stakeholders (owners, investors, lenders, employees etc.) can draw conclusions about the

- Performance (past, present and future);
- Strengths & weaknesses of a firm; and
- Can take decisions in relation to the firm.

Ratio analysis is based on the fact that a single accounting figure by itself may not communicate any meaningful information but when **expressed relative to some other figure**, it may definitely provide some significant information.

Ratio analysis is not just comparing different numbers from the balance sheet, income statement, and cash flow statement. It is comparing the number against previous years, other companies, the industry, or even the economy in general for the purpose of financial analysis.

3.2.3 Sources of Financial Data for Analysis

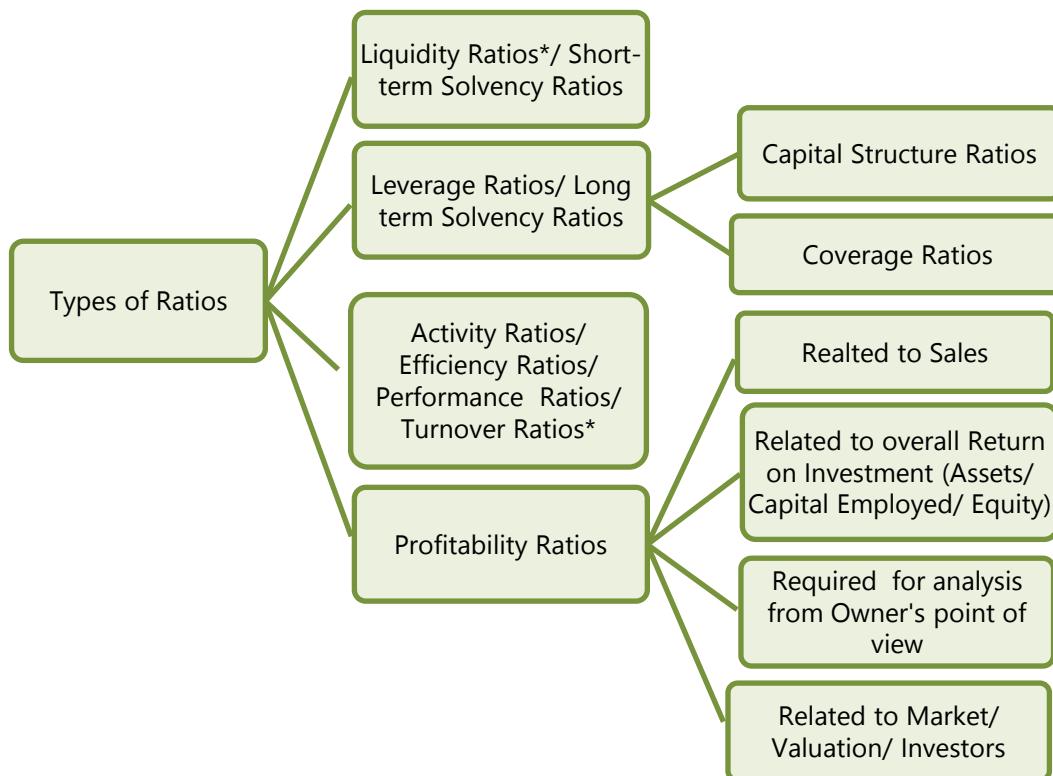
The sources of information for financial statement analysis are:

1. Annual Reports

2. Interim financial statements
3. Notes to Accounts
4. Statement of cash flows
5. Business periodicals.
6. Credit and investment advisory services



3.3 TYPES OF RATIOS



Classification of Ratios

**Liquidity ratios should be examined taking relevant turnover ratios into consideration.*

3.3.1 Liquidity Ratios

The terms '**liquidity**' and '**short-term solvency**' are used synonymously.

Liquidity or short-term solvency means ability of the business to pay its short-term liabilities. Inability to pay-off short-term liabilities affects its credibility as well as its credit rating. Continuous default on the part of the business leads to commercial bankruptcy. Eventually such commercial bankruptcy may lead to its sickness and dissolution. Short-term lenders and creditors of a business are very much interested to know its state of liquidity because of their financial stake. Both lack of sufficient liquidity and excess liquidity is bad for the organization.

Various Liquidity Ratios are:

- (a) Current Ratio
- (b) Quick Ratio or Acid test Ratio
- (c) Cash Ratio or Absolute Liquidity Ratio
- (d) Basic Defense Interval or Interval Measure Ratios
- (e) Net Working Capital Ratio

(a) Current Ratio: The Current Ratio is one of the best known measures of short term solvency. It is the most common measure of short-term liquidity.

The main question this ratio addresses is: "**Does your business have enough current assets to meet the payment schedule of its current debts with a margin of safety for possible losses in current assets?**"

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Where,

Current Assets = Inventories + Sundry Debtors + Cash and Bank Balances + Receivables/ Accruals + Loans and Advances + Disposable Investments + Any other current assets.

Current Liabilities = Creditors for goods and services + Short-term Loans + Bank Overdraft + Cash Credit + Outstanding Expenses + Provision for Taxation + Proposed Dividend + Unclaimed Dividend + Any other current liabilities.

The main question this ratio addresses is: "Does your business have enough current assets to meet the payment schedule of its current debts with a margin of safety for possible losses in current assets?"

Interpretation

A generally acceptable current ratio is 2:1. But whether or not a specific ratio is satisfactory depends on the nature of the business and the characteristics of its current assets and liabilities.

(b) Quick Ratio: The Quick Ratio is sometimes called the "**acid-test**" ratio and is one of the best **measures of liquidity**.

$$\text{Quick Ratio or Acid Test Ratio} = \frac{\text{Quick Assets}}{\text{Current Liabilities}}$$

Where,

$$\begin{aligned} \text{Quick Assets} &= \text{Current Assets} - \text{Inventories} - \text{Prepaid expenses} \\ \text{Current Liabilities} &= \text{As mentioned under Current Ratio.} \end{aligned}$$

The Quick Ratio is a much more conservative measure of short-term liquidity than the Current Ratio. It helps answer the question: "If all sales revenues should disappear, could my business meet its current obligations with the readily convertible quick funds on hand?"

Quick Assets consist of only cash and near cash assets. Inventories are deducted from current assets on the belief that these are not 'near cash assets' and also because in times of financial difficulty inventory may be saleable only at liquidation value. But in a seller's market inventories are also near cash assets.

Interpretation

An acid-test of 1:1 is considered satisfactory unless the majority of "quick assets" are in accounts receivable, and the pattern of accounts receivable collection lags behind the schedule for paying current liabilities.

(c) Cash Ratio/ Absolute Liquidity Ratio: The cash ratio measures the absolute liquidity of the business. This ratio considers only the absolute liquidity available with the firm. This ratio is calculated as:

$$\text{Cash Ratio} = \frac{\text{Cash and Bank balances} + \text{Marketable Securities}}{\text{Current Liabilities}}$$

Or,

$$\frac{\text{Cash and Bank balances} + \text{Current Investments}}{\text{Current Liabilities}}$$

Interpretation

The Absolute Liquidity Ratio only tests short-term liquidity in terms of cash and marketable securities/ current investments.

(d) Basic Defense Interval/ Interval Measure:

$$\text{Basic Defense Interval} = \frac{\text{Cash and Bank balances} + \text{Marketable Securities}}{\text{Operating Expenses} \div \text{No. of days (say 360)}}$$

Or

$$\text{Interval Measure} = \frac{\text{Current Assets} - \text{Inventories}}{\text{Daily Operating Expenses}}$$

$$\text{Daily Operating Expenses} = \frac{\text{Cost of Goods Sold} + \text{Selling, Administartion and other General expenses} - \text{Depreciation and other non cash expenditure}}{\text{No. of days in a year}}$$

Interpretation

If for some reason all the company's revenues were to suddenly cease, the Basic Defense Interval would help determine the number of days for which the company can cover its cash expenses without the aid of additional financing.

(e) Net Working Capital Ratio:

Net working capital is more a measure of cash flow than a ratio. The result of this calculation must be a positive number. It is calculated as shown below:

$$\text{Net Working Capital Ratio} = \frac{\text{Current Assets} - \text{Current Liabilities}}{\text{(Excluding short-term bank borrowing)}}$$

Interpretation

Bankers look at Net Working Capital over time to determine a company's ability to weather financial crises. Loans are often tied to minimum working capital requirements.

3.3.2 Long-term Solvency Ratios /Leverage Ratios

The leverage ratios may be defined as those financial ratios which measure the **long term stability and structure of the firm**. These ratios indicate the mix of funds provided by owners and lenders and assure the lenders of the long term funds with regard to:

- (i) Periodic payment of interest during the period of the loan and
- (ii) Repayment of principal amount on maturity.

Leverage ratios are of two types:

1. **Capital Structure Ratios**
 - (a) Equity Ratio
 - (b) Debt Ratio
 - (c) Debt to Equity Ratio
 - (d) Debt to Total Assets Ratio
 - (e) Capital Gearing Ratio
 - (f) Proprietary Ratio
2. **Coverage Ratios**
 - (a) Debt-Service Coverage Ratio (DSCR)
 - (b) Interest Coverage Ratio
 - (c) Preference Dividend Coverage Ratio
 - (d) Fixed Charges Coverage Ratio

3.3.2.1 Capital Structure Ratios

These ratios provide an insight into the financing techniques used by a business and focus, as a consequence, on the **long-term solvency position**.

From the balance sheet one can get only the absolute fund employed and its sources, but only capital structure ratios show the relative weight of different sources.

Various capital structure ratios are:

(a) Equity Ratio:

$$\text{Equity Ratio} = \frac{\text{Shareholders' Equity}}{\text{Capital Employed}}$$

This ratio indicates proportion of owners' fund to total fund invested in the business. Traditionally, it is believed that higher the proportion of owners' fund lower is the degree of risk.

(b) Debt Ratio:

$$\text{Debt Ratio} = \frac{\text{Total outside liabilities}}{\text{Total Debt} + \text{Net worth}}$$

Or,

$$\text{Debt Ratio} = \frac{\text{Total Debt}}{\text{Net Assets}}$$

Total debt or total outside liabilities includes short and long term borrowings from financial institutions, debentures/bonds, deferred payment arrangements for buying capital equipment, bank borrowings, public deposits and any other interest bearing loan.

Interpretation

This ratio is used to analyse the long-term solvency of a firm.

(c) Debt to Equity Ratio:

$$\text{Debt to Equity Ratio} = \frac{\text{Total Outside Liabilities}}{\text{Shareholders' Equity}} = \frac{\text{Total Debt} *}{\text{Shareholders' Equity}}$$

Or,

$$= \frac{\text{Long-term Debt} **}{\text{Shareholders' equity}}$$

*Not merely long-term debt.

** Sometimes only interest-bearing, long term debt is used instead of total liabilities (exclusive of current liabilities)

The shareholders' equity is equity and preference share capital + post accumulated profits (excluding fictitious assets etc).

Interpretation

A high debt to equity ratio here means less protection for creditors, a low ratio, on the other hand, indicates a wider safety cushion (i.e., creditors feel the owner's funds can help absorb possible losses of income and capital). This ratio indicates the proportion of debt fund in relation to equity. This ratio is very often referred in capital structure decision as well as in the legislation dealing with the capital structure decisions (i.e. issue of shares and debentures). Lenders are also very keen to know this ratio since it shows relative weights of debt and equity. Debt equity ratio is the indicator of firm's financial leverage.

(d) Debt to Total Assets Ratio: This ratio measures the **proportion of total assets financed with debt** and, therefore, the extent of financial leverage.

$$\text{Debt to Total Assets Ratio} = \frac{\text{Total Outside Liabilities}}{\text{Total Assets}}$$

Or,

$$= \frac{\text{Total Debt}}{\text{Total Assets}}$$

(e) Capital Gearing Ratio: In addition to debt-equity ratio, sometimes capital gearing ratio is also calculated to show the proportion of fixed interest (dividend) bearing capital to funds belonging to equity shareholders i.e. equity funds or net worth.

$$\text{Capital Gearing ratio} = \frac{(\text{Preference Share Capital} + \text{Debentures} + \text{Other Borrowed funds})}{(\text{Equity Share Capital} + \text{Reserves} \& \text{ Surplus} - \text{Losses})}$$

(f) Proprietary Ratio:

$$\text{Proprietary Ratio} = \frac{\text{Proprietary Fund}}{\text{Total Assets}}$$

Proprietary fund includes Equity Share Capital + Preference Share Capital + Reserve & Surplus. Total assets exclude fictitious assets and losses.

Interpretation

It indicates the proportion of total assets financed by shareholders.

3.3.2.2 Coverage Ratios

The coverage ratios measure the **firm's ability to service the fixed liabilities**. These ratios establish the relationship between fixed claims and what is normally available out of which these claims are to be paid. The fixed claims consist of:

- (i) Interest on loans
- (ii) Preference dividend
- (iii) Amortisation of principal or repayment of the instalment of loans or redemption of preference capital on maturity.

The following are important coverage ratios:

(a) Debt Service Coverage Ratio (DSCR): Lenders are interested in **debt service coverage to judge the firm's ability to pay off current interest and instalments**.

$$\text{Debt Service Coverage Ratio} = \frac{\text{Earnings available for debt services}}{\text{Interest} + \text{Instalments}}$$

Earnings for debt service* = Net profit (Earnings after taxes) + Non-cash operating expenses like depreciation and other amortizations + Interest + other adjustments like loss on sale of Fixed Asset etc.

*Fund from operations (or cash from operations) before interest and taxes also can be considered as per the requirement.

Interpretation

Normally DSCR of 1.5 to 2 is satisfactory. You may note that sometimes in both numerator and denominator lease rentals may be added.

(b) Interest Coverage Ratio: This ratio also known as "**times interest earned ratio**" indicates the firm's ability to meet interest (and other fixed-charges) obligations. This ratio is computed as:

$$\text{Interest Coverage Ratio} = \frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Interest}}$$

Interpretation

Earnings before interest and taxes are used in the numerator of this ratio because the ability to pay interest is not affected by tax burden as interest on debt funds is deductible expense. This ratio indicates the extent to which earnings may fall without causing any embarrassment to the firm regarding the payment of interest charges. A high interest coverage ratio means that an enterprise can easily meet its interest obligations even if earnings before interest and taxes suffer a considerable decline. A lower ratio indicates excessive use of debt or inefficient operations.

(c) Preference Dividend Coverage Ratio: This ratio measures the **ability of a firm to pay dividend on preference shares** which carry a stated rate of return. This ratio is computed as:

$$\text{Preference Dividend Coverage Ratio} = \frac{\text{Net Profit / Earnings after taxes (EAT)}}{\text{Preference dividend liability}}$$

Earnings after tax is considered because unlike debt on which interest is charged on the profit of the firm, the preference dividend is treated as appropriation of profit.

Interpretation

This ratio indicates margin of safety available to the preference shareholders. A higher ratio is desirable from preference shareholders point of view.

Similarly **Equity Dividend coverage ratio** can also be calculated taking (EAT – Pref. Dividend) and equity fund figures into consideration.

(d) Fixed Charges Coverage Ratio: This ratio shows how many times the cash flow before interest and taxes covers all fixed financing charges. This ratio of more than 1 is considered as safe.

$$\text{Fixed Charges Coverage Ratio} = \frac{\text{EBIT} + \text{Depreciation}}{\text{Interest} + \frac{\text{Repayment of loan}}{1 - \text{taxrate}}}$$

Notes for calculating Ratios:

1. EBIT (Earnings before interest and taxes) = PBIT (Profit before interest and taxes),
EAT (Earnings after taxes) = PAT (Profit after taxes),
EBT (Earnings before taxes) = PBT (Profit before taxes)

2. Ratios shall be calculated based on requirement and availability and may deviate from original formulae.
3. Numerator should be taken in correspondence with the denominator and vice-versa.

3.3.3 Activity Ratios/ Efficiency Ratios/ Performance Ratios/ Turnover Ratios

These ratios are employed to **evaluate the efficiency with which the firm manages and utilises its assets**. For this reason, they are often called 'Asset management ratios'. These ratios usually indicate the frequency of sales with respect to its assets. These assets may be capital assets or working capital or average inventory.

Activity Ratios/ Efficiency Ratios/ Performance Ratios/ Turnover Ratios:

- (a) Total Assets Turnover Ratio
- (b) Fixed Assets Turnover Ratio
- (c) Capital Turnover Ratio
- (d) Current Assets Turnover Ratio
- (e) Working Capital Turnover Ratio
 - (i) Inventory/ Stock Turnover Ratio
 - (ii) Receivables (Debtors) Turnover Ratio
 - (iii) Payables (Creditors) Turnover Ratio.

These ratios are usually calculated with reference to sales/cost of goods sold and are expressed in terms of rate or times.

Asset Turnover Ratios: Based on different concepts of assets employed, it can be expressed as follows:

(a) Total Asset Turnover Ratio: This ratio measures the efficiency with which the firm uses its total assets. This ratio is computed as:

$$\text{Total Asset Turnover Ratio} = \frac{\text{Sales / Cost of Goods Sold}}{\text{Total Assets}}$$

(b) Fixed Assets Turnover Ratio: It measures the efficiency with which the firm uses its fixed assets.

$$\text{Fixed Assets Turnover Ratio} = \frac{\text{Sales / Cost of Goods Sold}}{\text{Fixed Assets}}$$

Interpretation

A high fixed assets turnover ratio indicates efficient utilisation of fixed assets in generating sales. A firm whose plant and machinery are old may show a higher fixed assets turnover ratio than the firm which has purchased them recently.

(c) Capital Turnover Ratio/ Net Asset Turnover Ratio:

$$\text{Capital Turnover Ratio} = \frac{\text{Sales / Cost of Goods Sold}}{\text{Net Assets}}$$

Interpretation

This ratio indicates the firm's ability of generating sales/ Cost of Goods Sold per rupee of long term investment. The higher the ratio, the more efficient is the utilisation of owner's and long-term creditors' funds. Net Assets includes Net Fixed Assets and Net Current Assets (Current Assets – Current Liabilities). Since Net Assets equals to capital employed it is also known as Capital Turnover Ratio.

(d) Current Assets Turnover Ratio: It measures the efficiency using the current assets by the firm.

$$\text{Current Assets Turnover Ratio} = \frac{\text{Sales / Cost of Goods Sold}}{\text{Current Assets}}$$

(e) Working Capital Turnover Ratio:

$$\text{Working Capital Turnover Ratio} = \frac{\text{Sales / Cost of Goods Sold}}{\text{Working Capital}}$$

Interpretation

Working Capital Turnover is further segregated into Inventory Turnover, Debtors Turnover, and Creditors Turnover.

Note: Average of Total Assets/ Fixed Assets/ Current Assets/ Net Assets/ Working Capital also can be taken.

(i) Inventory/ Stock Turnover Ratio: This ratio also known as **stock turnover ratio** establishes the relationship between the cost of goods sold during the

year and average inventory held during the year. It measures the efficiency with which a firm utilizes or manages its inventory. It is calculated as follows:

$$\text{Inventory Turnover Ratio} = \frac{\text{Cost of Goods Sold / Sales}}{\text{Average Inventory}^*}$$

$$^* \text{Average Inventory} = \frac{\text{Opening Stock} + \text{Closing Stock}}{2}$$

In the case of inventory of raw material the inventory turnover ratio is calculated using the following formula :

$$\text{Raw Material Inventory Turnover Ratio} = \frac{\text{Raw Material Consumed}}{\text{Average Raw Material Stock}}$$

Interpretation

This ratio indicates that how fast inventory is used or sold. A high ratio is good from the view point of liquidity and vice versa. A low ratio would indicate that inventory is not used/ sold/ lost and stays in a shelf or in the warehouse for a long time.

(ii) Receivables (Debtors) Turnover Ratio: In case firm sells goods on credit, the realization of sales revenue is delayed and the receivables are created. The cash is realised from these receivables later on.

The **speed with which these receivables are collected affects** the liquidity position of the firm. The debtor's turnover ratio throws light on the collection and credit policies of the firm. It measures the efficiency with which management is managing its accounts receivables. It is calculated as follows:

$$\text{Receivable (Debtor) Turnover Ratio} = \frac{\text{Credit Sales}}{\text{Average Accounts Receivable}}$$

Receivables (Debtors') Velocity: Debtors' turnover ratio indicates the average collection period. However, the average collection period can be directly calculated as follows:

Receivable Velocity/ Average Collection Period = $\frac{\text{Average Accounts Receivables}}{\text{Average Daily Credit Sales}}$

Or, $= \frac{12 \text{ months} / 52 \text{ weeks} / 360 \text{ days}}{\text{Receivable Turnover Ratio}}$

Average Daily Credit Sales = $\frac{\text{Credit Sales}}{\text{No.of days in year (say 360)}}$

Interpretation

The average collection period measures the average number of days it takes to collect an account receivable. This ratio is also referred to as the number of days of receivable and the number of day's sales in receivables.

(iii) Payables Turnover Ratio: This ratio is calculated on the same lines as receivable turnover ratio is calculated. This ratio shows the velocity of payables payment by the firm. It is calculated as follows:

Payables Turnover Ratio = $\frac{\text{Annual Net Credit Purchases}}{\text{Average Accounts Payables}}$

A low creditor's turnover ratio reflects liberal credit terms granted by suppliers, while a high ratio shows that accounts are settled rapidly.

Payable Velocity/ Average payment period can be calculated using:

$= \frac{\text{Average Accounts Payable}}{\text{Average Daily Credit Purchases}}$

Or,

$= \frac{12 \text{ months} / 52 \text{ weeks} / 360 \text{ days}}{\text{Payables Turnover Ratio}}$

In determining the credit policy, debtor's turnover and average collection period provide a unique guidance.

Interpretation

The firm can compare what credit period it receives from the suppliers and what it offers to the customers. Also it can compare the average credit period offered to the customers in the industry to which it belongs.

The above three ratios i.e. Inventory Turnover Ratio/ Receivables Turnover Ratio are also relevant to examine liquidity of an organization.

Notes for calculating Ratios:

1. Only selling & distribution expenses differentiate Cost of Goods Sold (COGS) and Cost of Sales (COS) in its absence, COGS will be equal to sales.
2. We can consider Cost of Goods Sold/ Cost of Sales to calculate turnover ratios eliminating profit part.
3. Average of Total Assets/ Fixed Assets/ Current Assets/ Net Assets/ Working Capital/ also can be taken in calculating the above ratios. Infact when average figures of total assets, net assets, capital employed, shareholders' fund etc. are available it may be preferred to calculate ratios by using this information.
4. Ratios shall be calculated based on requirement and availability and may deviate from original formulae.

3.3.4 Profitability Ratios

The profitability ratios **measure the profitability or the operational efficiency** of the firm. These ratios reflect the final results of business operations. They are some of the most closely watched and widely quoted ratios. Management attempts to maximize these ratios to maximize firm value.

The results of the firm can be evaluated in terms of its earnings with reference to a given level of assets or sales or owner's interest etc. Therefore, the profitability ratios are broadly classified in four categories:

- (i) Profitability Ratios related to Sales
- (ii) Profitability Ratios related to overall Return on Investment
- (iii) Profitability Ratios required for Analysis from Owner's Point of View
- (iv) Profitability Ratios related to Market/ Valuation/ Investors.

Profitability Ratios are as follows:

1. Profitability Ratios based on Sales

- (a) Gross Profit Ratio
- (b) Net Profit Ratio
- (c) Operating Profit Ratio

(d) Expenses Ratio

2. Profitability Ratios related to Overall Return on Assets/ Investments

- (a) Return on Investments (ROI)
- (i) Return on Assets (ROA)
- (ii) Return of Capital Employed (ROCE)
- (iii) Return on Equity (ROE)

3. Profitability Ratios required for Analysis from Owner's Point of View

- (a) Earnings per Share (EPS)
- (b) Dividend per Share (DPS)
- (c) Dividend Payout Ratio (DP)

4. Profitability Ratios related to Market/ Valuation/ Investors

- (a) Price Earnings (P/E) Ratio
- (b) Dividend and Earning Yield
- (c) Market Value/ Book Value per Share (MVBV)
- (d) Q Ratio

3.3.4.1 Profitability Ratios based on Sales

(a) Gross Profit (G.P) Ratio/ Gross Profit Margin: It measures the percentage of each sale in rupees remaining after payment for the goods sold.

$$\text{Gross Profit Ratio} = \frac{\text{Gross Profit}}{\text{Sales}} \times 100$$

Interpretation

Gross profit margin depends on the relationship between price/ sales, volume and costs. A high Gross Profit Margin is a favourable sign of good management.

(b) Net Profit Ratio/ Net Profit Margin: It measures the relationship between net profit and sales of the business. Depending on the concept of net profit it can be calculated as:

$$(i) \text{ Net Profit Ratio} = \frac{\text{Net Profit}}{\text{Sales}} \times 100 \text{ or } \frac{\text{Earnings after taxes (EAT)}}{\text{Sales}} \times 100$$

$$(ii) \text{ Pre-tax Profit Ratio} = \frac{\text{Earnings before taxes (EBT)}}{\text{Sales}} \times 100$$

Interpretation

Net Profit ratio finds the proportion of revenue that finds its way into profits. A high net profit ratio will ensure positive returns of the business.

(c) Operating Profit Ratio:

Operating profit ratio is also calculated to evaluate operating performance of business.

$$\text{Operating Profit Ratio} = \frac{\text{Operating Profit}}{\text{Sales}} \times 100$$

or,

$$\frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Sales}} \times 100$$

Where,

Operating Profit = Sales – Cost of Goods Sold (COGS) – Expenses

Interpretation

Operating profit ratio measures **the percentage of each sale in rupees that remains after the payment of all costs and expenses except for interest and taxes**. This ratio is followed closely by analysts because it focuses on operating results. Operating profit is often referred to as earnings before interest and taxes or EBIT.

(d) Expenses Ratio: Based on different concepts of expenses it can be expressed in different variants as below:

$$(i) \text{ Cost of Goods Sold (COGS) Ratio} = \frac{\text{COGS}}{\text{Sales}} \times 100$$

$$(ii) \text{ Operating Expenses Ratio} = \frac{\text{Administrative exp.} + \text{Selling & Distribution OH}}{\text{Sales}} \times 100$$

$$(iii) \text{ Operating Ratio} = \frac{\text{COGS} + \text{Operating expenses}}{\text{Sales}} \times 100$$

$$(iv) \text{ Financial Expenses Ratio} = \frac{\text{Financial expenses}^*}{\text{Sales}} \times 100$$

*It excludes taxes, loss due to theft, goods destroyed by fire etc.

Administration Expenses Ratio and Selling & Distribution Expenses Ratio can also be calculated in similar ways.

3.3.4.2 Profitability Ratios related to Overall Return on Assets/ Investments

(a) Return on Investment (ROI): ROI is the most important ratio of all. It is the **percentage of return on funds invested in the business by its owners**. In short, this ratio tells the owner whether or not all the effort put into the business has been worthwhile. It compares earnings/ returns/ profit with the investment in the company. The ROI is calculated as follows:

$$\text{Return on Investment} = \frac{\text{Return/Profit/Earnings}}{\text{Investment}} \times 100$$

Or,

$$= \frac{\text{Return/Profit/Earnings}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Investment}}$$

$$\frac{\text{Return/Profit/Earnings}}{\text{Sales}} = \text{Profitability Ratio}$$

$$\text{Investment Turnover Ratio} = \frac{\text{Sales}}{\text{Investments}}$$

So, **ROI = Profitability Ratio × Investment Turnover Ratio**. ROI can be improved either by improving Profitability Ratio or Investment Turnover Ratio or by both.

The concept of investment varies and accordingly there are three broad categories of ROI i.e.

- (i) **Return on Assets (ROA),**
- (ii) **Return on Capital Employed (ROCE) and**
- (iii) **Return on Equity (ROE).**

We should keep in mind that investment may be Total Assets or Net Assets. Further funds employed in net assets are also known as capital employed which is nothing but Net worth plus Debt, where Net worth is equity shareholders' fund. Similarly the concept of returns/ earnings/ profits may vary as per the requirement and availability of information.

(i) Return on Assets (ROA): The profitability ratio is measured in terms of relationship between **net profits and assets employed** to earn that profit. This ratio measures the profitability of the firm in terms of assets employed in the firm. Based on various concepts of net profit (return) and assets the ROA may be measured as follows:

$$ROA = \frac{\text{Net Profit after taxes}}{\text{Average Total Assets}} \text{ or } \frac{\text{Net Profit after taxes}}{\text{Average Tangible Assets}} \text{ or } \frac{\text{Net Profit after taxes}}{\text{Average Fixed Assets}}$$

Here net profit is exclusive of interest. As Assets are also financed by lenders, hence ROA can be calculated as:

$$= \frac{\text{Net Profit after taxes} + \text{Interest}}{\text{Average Total Assets} / \text{Average Tangible Assets} / \text{Average Fixed Assets}}$$

Or,

$$\frac{EBIT(1-t)}{\text{Average Total Assets}} \text{ (also known as } \mathbf{Return on Total Assets (ROTA)}\text{)}$$

Or,

$$\frac{EBIT(1-t)}{\text{Average Net Assets}} \text{ (also known as } \mathbf{Return on Net Assets (RONA)}\text{)}$$

(ii) Return on Capital Employed (ROCE): It is another variation of ROI.

The ROCE is calculated as follows:

$$ROCE \text{ (Pre-tax)} = \frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Capital Employed}} \times 100$$

$$ROCE \text{ (Post-tax)} = \frac{EBIT(1-t)}{\text{Capital Employed}} \times 100$$

Sometime it is calculated as

$$= \frac{\text{Net Profit after taxes (PAT / EAT)} + \text{Interest}}{\text{Capital Employed}} \times 100$$

Where,

$$\text{Capital Employed} = \text{Total Assets} - \text{Current Liabilities}$$

Or

$$= \text{Fixed Assets} + \text{Working Capital}$$

ROCE should always be higher than the rate at which the company borrows.

Intangible assets (assets which have no physical existence like goodwill, patents and trade-marks) should be included in the capital employed. But no fictitious asset should be included within capital employed. If information is available then average capital employed shall be taken.

(iii) Return on Equity (ROE): Return on Equity measures the **profitability of equity funds invested in the firm**. This ratio reveals how profitably of the owners' funds have been utilised by the firm. It also measures the percentage return generated to equity shareholders. This ratio is computed as:

$$\text{ROE} = \frac{\text{Net Profit after taxes-Preference dividend (if any)}}{\text{Networth}} \times 100$$

$$\frac{}{\text{equity shareholders'fund}}$$

Return on equity is one of the most important indicators of a firm's profitability and potential growth. Companies that boast a high return on equity with little or no debt are able to grow without large capital expenditures, allowing the owners of the business to withdraw cash and reinvest it elsewhere. Many investors fail to realize, however, that two companies can have the same return on equity, yet one can be a much better business. If return on total shareholders is calculated then Net Profit after taxes (before preference dividend) shall be divided by total shareholders' fund includes preference share capital.

Return on Equity using the Du Pont Model:

A finance executive at E.I. Du Pont de Nemours and Co., of Wilmington, Delaware, created the DuPont system of financial analysis in 1919. That system is used around the world today and serves as the basis of components that make up return on equity.

There are various components in the calculation of return on equity using the traditional DuPont model- the net profit margin, asset turnover, and the equity multiplier. By examining each input individually, the sources of a company's return on equity can be discovered and compared to its competitors.

(i) Profitability/Net Profit Margin: The **net profit margin is simply the after-tax profit a company generates for each rupee of revenue**. Net profit margin varies across industries, making it important to compare a potential

investment against its competitors. Although the general rule-of-thumb is that a higher net profit margin is preferable, it is not uncommon for management to purposely lower the net profit margin in a bid to attract higher sales.

$$\frac{\text{Profitability}}{\text{Net profit margin}} = \frac{\text{Profit}}{\text{Net Income}} \div \frac{\text{Sales}}{\text{Revenue}}$$

Net profit margin is a safety cushion; the lower the margin, the less room for error. A business with 1% margins has no room for flawed execution. Small miscalculations on management's part could lead to tremendous losses with little or no warning.

(ii) **Investment Turnover/Asset Turnover/Capital Turnover:** The asset turnover ratio is a measure of **how effectively a company converts its assets into sales.** It is calculated as follows:

$$\begin{aligned} \text{Investment Turnover/Asset Turnover/Capital Turnover} \\ = \text{Sales/Revenue} \div \text{Investment/Assets/Capital} \end{aligned}$$

The asset turnover ratio tends to be inversely related to the net profit margin; i.e., the higher the net profit margin, the lower the asset turnover. The result is that the investor can compare companies using different models (low-profit, high-volume vs. high-profit, low-volume) and determine which one is the more attractive business.

(iii) **Equity Multiplier:** It is possible for a company with terrible sales and margins to take on excessive debt and artificially increase its return on equity. The equity multiplier, a measure of financial leverage, allows the investor to see what portion of the return on equity is the result of debt. The equity multiplier is calculated as follows:

$$\text{Equity Multiplier} = \text{Investment /Assets /Capital} \div \text{Shareholders' Equity}$$

Calculation of Return on Equity

To calculate the return on equity using the DuPont model, simply multiply the three components (net profit margin, asset turnover, and equity multiplier.)

$$\text{Return on Equity} = (\text{Profitability/Net profit margin}) (\text{Investment Turnover / Asset Turnover / Capital Turnover}) \text{Equity Multiplier}$$

Example: XYZ Company's details are as under:

Revenue: ₹29,261; Net Income: ₹4,212; Assets: ₹27,987; Shareholders' Equity: ₹13,572. CALCULATE return on equity.

Solution

Net Profit Margin = Net Income (₹ 4,212) ÷ Revenue (₹ 29,261) = 0.14439, or 14.39%

Asset Turnover = Revenue (₹ 29,261) ÷ Assets (₹ 27,987) = 1.0455

Equity Multiplier = Assets (₹ 27,987) ÷ Shareholders' Equity (₹ 13,572) = 2.0621

Finally, we multiply the three components together to calculate the return on equity: (₹ 27,987)

Return on Equity = Net Profit Margin x Asset Turnover x Equity Multiplier
 $= (0.1439) \times (1.0455) \times (2.0621) = 0.3102$, or 31.02%

Analysis: A 31.02% return on equity is good in any industry. Yet, if you were to leave out the equity multiplier to see how much company would earn if it were completely debt-free, you will see that the ROE drops to 15.04%. 15.04% of the return on equity was due to profit margins and sales, while 15.96% was due to returns earned on the debt at work in the business. If you found a company at a comparable valuation with the same return on equity yet a higher percentage arose from internally-generated sales, it would be more attractive.

3.3.4.3 Profitability Ratios Required for Analysis from Owner's Point of View

(a) Earnings per Share (EPS): The profitability of a firm from the point of view of ordinary shareholders can be measured in terms of earnings per share basis. This is known as Earnings per share. It is calculated as follows:

$$\text{Earnings per Share (EPS)} = \frac{\text{Net profit available to equity shareholders}}{\text{Number of equity shares outstanding}}$$

(b) Dividend per Share (DPS): Earnings per share as stated above reflects the profitability of a firm per share; it does not reflect how much profit is paid as dividend and how much is retained by the business. Dividend per share ratio indicates the amount of profit distributed to equity shareholders per share. It is calculated as:

$$\text{Dividend per Share (DPS)} = \frac{\text{Total Dividend paid to equity shareholders}}{\text{Number of equity shares outstanding}}$$

(c) Dividend Payout Ratio (DP): This ratio measures the dividend paid in relation to net earnings. It is determined to see to how much extent earnings per share have been retained by the management for the business. It is computed as:

$$\text{Dividend payout Ratio} = \frac{\text{Dividend per equity share (DPS)}}{\text{Earning per Share (EPS)}}$$

3.3.4.4 Profitability Ratios related to market/ valuation/ Investors

These ratios involve measures that consider the market value of the company's shares. Frequently share prices data are punched with the accounting data to generate new set of information. These are (a) Price- Earnings Ratio, (b) Dividend Yield, (c) Market Value/ Book Value per share, (d) Q Ratio.

(a) Price- Earnings Ratio (P/E Ratio): The price earnings ratio indicates the **expectation of equity investors about the earnings of the firm**. It relates earnings to market price and is generally taken as a summary measure of growth potential of an investment, risk characteristics, shareholders orientation, corporate image and degree of liquidity. It is calculated as

$$\text{Price-Earnings per Share (P/E Ratio)} = \frac{\text{Market Price per Share (MPS)}}{\text{Earning per Share (EPS)}}$$

Interpretation

It indicates the payback period to the investors or prospective investors.

(b) Dividend and Earning Yield:

$$\text{Dividend Yield} = \frac{\text{Dividend} \pm \text{Change in share price}}{\text{Initial share price}} \times 100$$

Sometime it is calculated as

$$\frac{\text{Dividend per Share (DPS)}}{\text{Market Price per Share (MPS)}} \times 100$$

Interpretation

This ratio indicates return on investment; this may be on average investment or closing investment. Dividend (%) indicates return on paid up value of shares. But yield (%) is the indicator of true return in which share capital is taken at its market value. Earning Yield also can be calculated as

$$\text{Earnings Yield} = \frac{\text{Earnings per Share (EPS)}}{\text{Market Price per Share (MPS)}} \times 100$$

Also known as Earnings Price (EP) Ratio.

(c) Market Value /Book Value per Share (MVBV): It provides evaluation of how investors view the company's past and future performance.

$$\frac{\text{Market value per share}}{\text{Book value per share}} = \frac{\text{Average share price}}{\text{Net worth} \div \text{No. of equity shares}}$$

Or,

$$\frac{\text{Closing share price}}{\text{Net worth} \div \text{No. of equity shares}}$$

Interpretation

This ratio indicates market response of the shareholders' investment. Undoubtedly, higher the ratios better is the shareholders' position in terms of return and capital gains.

(d) Q Ratio: This ratio is proposed by James Tobin, a ratio is defined as

$$\frac{\text{Market Value of equity and liabilities}}{\text{Estimated replacement cost of assets}}$$

Notes for calculating Ratios:

1. EBIT (Earnings before interest and taxes) = PBIT (Profit before interest and taxes),
EAT (Earnings after taxes) = PAT (Profit after taxes),
EBT (Earnings before taxes) = PBT (Profit before taxes)
2. In absence of preference dividend PAT can be taken as earnings available to equity shareholders.
3. If information is available then average capital employed shall be taken while calculating ROCE.
3. Ratios shall be calculated based on requirement and availability and may deviate from original formulae.
4. Numerator should be taken in correspondence with the denominator and vice-versa.



3.4 USERS AND OBJECTIVE OF FINANCIAL ANALYSIS:- A BIRDS EYE VIEW

Financial Statement analysis is useful to various shareholders to obtain the derived information about the firm

S.No.	Users	Objectives	Ratios used in general
1.	Shareholders	Being owners of the organisation they are interested to know about profitability and growth of the organization	<ul style="list-style-type: none"> ◆ Mainly Profitability Ratio [In particular Earning per share (EPS), Dividend per share (DPS), Price Earnings (P/E), Dividend Payout ratio (DP)]
2.	Investors	They are interested to know overall financial health of the organisation particularly future perspective of the organisations.	<ul style="list-style-type: none"> ◆ Profitability Ratios ◆ Capital structure Ratios ◆ Solvency Ratios ◆ Turnover Ratios
3.	Lenders	They will keep an eye on the safety perspective of their money lent to the organisation	<ul style="list-style-type: none"> ◆ Coverage Ratios ◆ Solvency Ratios ◆ Turnover Ratios ◆ Profitability Ratios
4.	Creditors	They are interested to know liability position of the organisation particularly in short term. Creditors would like to know whether the organisation will be able to pay the amount on due date.	<ul style="list-style-type: none"> ◆ Liquidity Ratios ◆ Short term solvency Ratios/ Liquidity Ratios

5.	Employees	They will be interested to know the overall financial wealth of the organisation and compare it with competitor company.	<ul style="list-style-type: none"> ◆ Liquidity Ratios ◆ Long terms solvency Ratios ◆ Profitability Ratios ◆ Return of investment
6.	Regulator / Government	They will analyse the financial statements to determine taxations and other details payable to the government.	Profitability Ratios
7.	Managers:-		
	(a) Production Managers	They are interested to know about data regarding input output, production quantities etc.	<ul style="list-style-type: none"> ◆ Input output Ratio ◆ Raw material consumption ratio.
	(b) Sales Managers	Data related to units sold for various years, other associated figures and predicted future sales figure will be an area of interest for them	<ul style="list-style-type: none"> ◆ Turnover ratios (basically receivable turnover ratio) ◆ Expenses Ratios
	(c) Financial Manager	They are interested to know various ratios for their future predictions of financial requirement.	<ul style="list-style-type: none"> ◆ Profitability Ratios (particularly related to Return on investment) ◆ Turnover ratios ◆ Capital Structure Ratios
	Chief Executive/ General Manager	They will try to assess the complete perspective of the company, starting from Sales, Finance, Inventory, Human resources, Production etc.	<ul style="list-style-type: none"> ◆ All Ratios

8.	Different Industry		
	(a) Telecom		<ul style="list-style-type: none"> ◆ Ratio related to 'call' ◆ Revenue and expenses per customer
	(b) Bank		<ul style="list-style-type: none"> ◆ Loan to deposit Ratios ◆ Operating expenses and income ratios
	(c) Hotel		<ul style="list-style-type: none"> ◆ Room occupancy ratio ◆ Bed occupancy Ratios
			<ul style="list-style-type: none"> ◆ Passenger - kilometre ◆ Operating cost - per passenger kilometre.



3.5 APPLICATION OF RATIO ANALYSIS IN FINANCIAL DECISION MAKING

A popular technique of analysing the performance of a business concern is that of financial ratio analysis. As a tool of financial management, they are of crucial significance.

The importance of ratio analysis lies in the fact that it presents facts on a comparative basis and enables drawing of inferences regarding the performance of a firm.

Ratio analysis is relevant in assessing the performance of a firm in respect of following aspects:

3.5.1 Financial Ratios for Evaluating Performance

- (a) **Liquidity Position:** With the help of ratio analysis one can draw conclusions regarding liquidity position of a firm. The liquidity position of a firm would be satisfactory if it is able to meet its obligations when they become due. This ability is reflected in the liquidity ratios of a firm. The liquidity ratios are particularly useful in credit analysis by banks and other suppliers of short-term loans.
- (b) **Long-term Solvency:** Ratio analysis is equally useful for assessing the long-term financial viability of a firm. This aspect of the financial position of a borrower is of concern to the long term creditors, security analysts and the present and potential owners of a business.

The long term solvency is measured by the leverage/capital structure and profitability ratios which focus on earning power and operating efficiency.

The leverage ratios, for instance, will indicate whether a firm has a reasonable proportion of various sources of finance or whether heavily loaded with debt in which case its solvency is exposed to serious strain.

Similarly, the various profitability ratios would reveal whether or not the firm is able to offer adequate return to its owners consistent with the risk involved.

- (c) **Operating Efficiency:** Ratio analysis throws light on the degree of efficiency in the management and utilisation of its assets.

The various activity ratios measure this kind of operational efficiency. In fact, the solvency of a firm is, in the ultimate analysis, dependent upon the sales revenues generated by the use of its assets – total as well as its components.

- (d) **Overall Profitability:** Unlike the outside parties which are interested in one aspect of the financial position of a firm, the management is constantly concerned about the overall profitability of the enterprise. That is, they are concerned about the ability of the firm to meet its short-term as well as long-term obligations to its creditors, to ensure a reasonable return to its owners and secure optimum utilisation of the assets of the firm. This is possible if an integrated view is taken and all the ratios are considered together.

- (e) **Inter-firm Comparison:** Ratio analysis not only throws light on the financial position of a firm but also serves as a stepping stone to remedial measures. This is made possible due to inter-firm comparison/comparison with industry averages.

A single figure of particular ratio is meaningless unless it is related to some standard or norm. One of the popular techniques is to compare the ratios of a firm with the industry average. It should be reasonably expected that the performance of a firm should be in broad conformity with that of the industry to which it belongs.

An inter-firm comparison would demonstrate the relative position vis-a-vis its competitors. If the results are at variance either with the industry average or with those of the competitors, the firm can seek to identify the probable reasons and, in the light, take remedial measures.

Ratios not only perform post mortem of operations, but also serve as barometer for future. Ratios have predictor value and they are very helpful in forecasting and planning the business activities for a future. It helps in budgeting.

Conclusions are drawn on the basis of the analysis obtained by using ratio analysis. The decisions affected may be whether to supply goods on credit to a concern, whether bank loans will be made available, etc.

(f) **Financial Ratios for Budgeting:** In this field ratios are able to provide a great deal of assistance. Budget is only an estimate of future activity based on past experience, in the making of which the relationship between different spheres of activities are invaluable.

It is usually possible to estimate budgeted figures using financial ratios.

Ratios also can be made use of for measuring actual performance with budgeted estimates. They indicate directions in which adjustments should be made either in the budget or in performance to bring them closer to each other.



3.6 LIMITATIONS OF FINANCIAL RATIOS

The limitations of financial ratios are listed below:

- (i) **Diversified product lines:** Many businesses operate a large number of divisions in quite different industries. In such cases ratios calculated on the basis of aggregate data cannot be used for inter-firm comparisons.
- (ii) **Financial data are badly distorted by inflation:** Historical cost values may be substantially different from true values. Such distortions of financial data are also carried in the financial ratios.
- (iii) **Seasonal factors:** It may also influence financial data.

Example: A company deals in cotton garments. It keeps a high inventory during October - January every year. For the rest of the year its inventory level becomes just 1/4th of the seasonal inventory level.

So liquidity ratios and inventory ratios will produce biased picture. Year end picture may not be the average picture of the business. Sometimes it is suggested to take monthly average inventory data instead of year end data to eliminate seasonal factors. But for external users it is difficult to get monthly inventory figures. (Even in some cases monthly inventory figures may not be available).

- (iv) **To give a good shape to the popularly used financial ratios (like current ratio, debt- equity ratios, etc.):** The business may make some year-end adjustments. Such window dressing can change the character of financial ratios which would be different had there been no such change.
- (v) **Differences in accounting policies and accounting period:** It can make the accounting data of two firms non-comparable as also the accounting ratios.
- (vi) **No standard set of ratios against which a firm's ratios can be compared:** Sometimes a firm's ratios are compared with the industry average. But if a firm desires to be above the average, then industry average becomes a low standard. On the other hand, for a below average firm, industry averages become too high a standard to achieve.
- (vii) **Difficulty to generalise whether a particular ratio is good or bad:** For example, a low current ratio may be said 'bad' from the point of view of low liquidity, but a high current ratio may not be 'good' as this may result from inefficient working capital management.
- (viii) **Financial ratios are inter-related, not independent:** Viewed in isolation one ratio may highlight efficiency. But when considered as a set of ratios they may speak differently. Such interdependence among the ratios can be taken care of through multivariate analysis.

Financial ratios provide clues but not conclusions. These are tools only in the hands of experts because there is no standard ready-made interpretation of financial ratios.



3.7 FINANCIAL ANALYSIS

It may be of two types: - Horizontal and vertical:

Horizontal Analysis: When financial statement of one year are analysed and interpreted after comparing with another year or years, it is known as horizontal

analysis. It can be based on the ratios derived from the financial information over the same time span.

Vertical Analysis: When financial statement of single year is analyzed then it is called vertical analysis. This analysis is useful in inter firm comparison. Every item of Profit and loss account is expressed as a percentage of gross sales, while every item on a balance sheet is expressed as a percentage of total assets held by the firm.



3.8 SUMMARY OF RATIOS

Another way of categorizing the ratios is being shown to you in a tabular form. A summary of the ratios has been tabulated as under:

Ratio	Formulae	Interpretation
Liquidity Ratio		
Current Ratio	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$	A simple measure that estimates whether the business can pay short term debts.
Quick Ratio	$\frac{\text{Quick Assets}}{\text{Current Liabilities}}$	It measures the ability to meet current debt immediately. Ideal ratio is 1
Cash Ratio	$\frac{\text{(Cash and Bank balances + Marketable Securities)}}{\text{Current Liabilities}}$	It measures absolute liquidity of the business.
Basic Defense Interval Ratio	$\frac{\text{(Cash and Bank balances + Marketable Securities)}}{\text{Operating Expenses} \div \text{No. of days}}$	It measures the ability of the business to meet regular cash expenditures.
Net Working Capital Ratio	$\frac{\text{Current Assets} - \text{Current Liabilities}}{\text{Current Assets}}$	It is a measure of cash flow to determine the ability of business to survive financial crisis.
Capital Structure Ratio		
Equity Ratio	$\frac{\text{Shareholders' Equity}}{\text{Capital Employed}}$	It indicates owner's fund in companies to total fund invested.

Debt Ratio	$\frac{\text{Totaloutsideliabilities}}{\text{TotalDebt} + \text{Networth}}$	It is an indicator of use of outside funds.
Debt to equity Ratio	$\frac{\text{TotalOutsideLiabilities}}{\text{Shareholders'Equity}}$	It indicates the composition of capital structure in terms of debt and equity.
Debt to Total Assets Ratio	$\frac{\text{TotalOutsideLiabilities}}{\text{TotalAssets}}$	It measures how much of total assets is financed by the debt.
Capital Gearing Ratio	$\frac{\left(\text{Preference Share Capital} + \text{Debentures} + \text{OtherBorrowedfunds} \right)}{\left(\text{Equity Share Capital} + \text{Reserves} \& \text{Surplus} - \text{Losses} \right)}$	It shows the proportion of fixed interest bearing capital to equity shareholders' fund. It also signifies the advantage of financial leverage to the equity shareholder.
Proprietary Ratio	$\frac{\text{Proprietary Fund}}{\text{Total Assets}}$	It measures the proportion of total assets financed by shareholders.
Coverage Ratios		
Debt Service Coverage Ratio (DSCR)	$\frac{\text{Earningsavailablefordebt} \text{ services}}{\text{Interest} + \text{Instalments}}$	It measures the ability to meet the commitment of various debt services like interest, instalment etc. Ideal ratio is 2.
Interest Coverage Ratio	$\frac{\text{EBIT}}{\text{Interest}}$	It measures the ability of the business to meet interest obligations. Ideal ratio is > 1 .
Preference Dividend Coverage Ratio	$\frac{\text{NetProfit} / \text{Earning after taxes (EAT)}}{\text{Preferreddividendliability}}$	It measures the ability to pay the preference shareholders' dividend. Ideal ratio is > 1 .

Fixed Charges Coverage Ratio	$\frac{\text{EBIT} + \text{Depreciation}}{\text{Interest} + \frac{\text{Re-payment of loan}}{1 - \text{taxrate}}}$	This ratio shows how many times the cash flow before interest and taxes covers all fixed financing charges. The ideal ratio is > 1.
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Activity Ratio/ Efficiency Ratio/ Performance Ratio/ Turnover Ratio

Total Asset Turnover Ratio	$\frac{\text{Sales} / \text{Cost of Goods Sold}}{\text{Average Total Assets}}$	A measure of total asset utilisation. It helps to answer the question - What sales are being generated by each rupee's worth of assets invested in the business?
Fixed Assets Turnover Ratio	$\frac{\text{Sales} / \text{Cost of Goods Sold}}{\text{Fixed Assets}}$	This ratio is about fixed asset capacity. A reducing sales or profit being generated from each rupee invested in fixed assets may indicate overcapacity or poorer-performing equipment.
Capital Turnover Ratio	$\frac{\text{Sales} / \text{Cost of Goods Sold}}{\text{Net Assets}}$	This indicates the firm's ability to generate sales per rupee of long term investment.
Working Capital Turnover Ratio	$\frac{\text{Sales} / \text{COGS}}{\text{Working Capital}}$	It measures the efficiency of the firm to use working capital.
Inventory Turnover Ratio	$\frac{\text{COGS} / \text{Sales}}{\text{Average Inventory}}$	It measures the efficiency of the firm to manage its inventory.
Debtors Turnover Ratio	$\frac{\text{Credit Sales}}{\text{Average Accounts Receivable}}$	It measures the efficiency at which firm is managing its receivables.
Receivables (Debtors') Velocity	$\frac{\text{Average Accounts Receivables}}{\text{Average Daily Credit Sales}}$	It measures the velocity of collection of receivables.

Payables Turnover Ratio	$\frac{\text{Annual Net Credit Purchases}}{\text{Average Accounts Payables}} \times 100$	It measures the velocity of payables payment.
Profitability Ratios based on Sales		
Gross Profit Ratio	$\frac{\text{Gross Profit}}{\text{Sales}} \times 100$	This ratio tells us something about the business's ability consistently to control its production costs or to manage the margins it makes on products it buys and sells.
Net Profit Ratio	$\frac{\text{Net Profit}}{\text{Sales}} \times 100$	It measures the relationship between net profit and sales of the business.
Operating Profit Ratio	$\frac{\text{Operating Profit}}{\text{Sales}} \times 100$	It measures operating performance of business.
Expenses Ratio		
Cost of Goods Sold (COGS) Ratio	$\frac{\text{COGS}}{\text{Sales}} \times 100$	It measures portion of a particular expenses in comparison to sales.
Operating Expenses Ratio	$\left(\frac{\text{Administrative exp.} + \text{Selling & Distribution Overhead}}{\text{Sales}} \right) \times 100$	
Operating Ratio	$\frac{\text{COGS} + \text{Operating expenses}}{\text{Sales}} \times 100$	
Financial Expenses Ratio	$\frac{\text{Financial expenses}}{\text{Sales}} \times 100$	
Profitability Ratios related to Overall Return on Assets/ Investments		
Return on Investment (ROI)	$\frac{\text{Return / Profit / Earnings}}{\text{Investments}} \times 100$	It measures overall return of the business on investment/equity funds/capital employed/ assets.

Return on Assets (ROA)	$\frac{\text{Net Profit after taxes}}{\text{Average total assets}}$	It measures net profit per rupee of average total assets/ average tangible assets/ average fixed assets.
Return on Capital Employed ROCE (Pre-tax)	$\frac{\text{EBIT}}{\text{Capital Employed}} \times 100$	It measures overall earnings (either pre-tax or post tax) on total capital employed.
Return on Capital Employed ROCE (Post-tax)	$\frac{\text{EBIT}(1-t)}{\text{Capital Employed}} \times 100$	It indicates earnings available to equity shareholders in comparison to equity shareholders' net worth.
Return on Equity (ROE)	$\frac{\left(\text{Net Profit after taxes} - \text{Preferred dividend (if any)} \right)}{\text{Net worth / equity shareholders' fund}} \times 100$	

Profitability Ratios Required for Analysis from Owner's Point of View

Earnings per Share (EPS)	$\frac{\text{Net profit available to equity shareholders}}{\text{Number of equity shares outstanding}}$	EPS measures the overall profit generated for each share in existence over a particular period.
Dividend per Share (DPS)	$\frac{\text{Dividend paid to equity shareholders}}{\text{Number of equity shares outstanding}}$	Proportion of profit distributed per equity share.
Dividend payout Ratio (DP)	$\frac{\text{Dividend per equity share}}{\text{Earnings per Share (EPS)}}$	It shows % of EPS paid as dividend and retained earnings.

Profitability Ratios related to market/ valuation/ Investors

Price-Earnings per Share (P/E Ratio)	$\frac{\text{Market Price per Share (MPS)}}{\text{Earnings per Share (EPS)}}$	At any time, the P/E ratio is an indication of how highly the market "rates" or "values" a business. A P/E ratio is best viewed in the context of a sector or market average to get a feel for relative value and stock market pricing.
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Dividend Yield	$\frac{\text{Dividend} \pm \text{Change in share price}}{\text{Initial share price}} \times 100$ OR $\frac{\text{Dividend per Share (DPS)}}{\text{Market Price per Share (MPS)}} \times 100$	It measures dividend paid based on market price of shares.
Earnings Yield	$\frac{\text{Earnings per Share (EPS)}}{\text{Market Price per Share (MPS)}} \times 100$	It is the relationship of earning per share and market value of shares.
Market Value /Book Value per Share	$\frac{\text{Market value per share}}{\text{Book value per share}}$	It indicates market response of the shareholders' investment.
Q Ratio	$\frac{\text{Market Value of equity and liabilities}}{\text{Estimated replacement cost of assets}}$	It measures market value of equity as well as debt in comparison to all assets at their replacement cost.

ILLUSTRATION 1

In a meeting held at Solan towards the end of 2018, the Directors of M/s HPCL Ltd. have taken a decision to diversify. At present HPCL Ltd. sells all finished goods from its own warehouse. The company issued debentures on 01.01.2019 and purchased fixed assets on the same day. The purchase prices have remained stable during the concerned period. Following information is provided to you:

INCOME STATEMENTS

Particulars	2018 (₹)	2019 (₹)
Cash Sales	30,000	32,000
Credit Sales	2,70,000	3,42,000
Less: Cost of goods sold	2,36,000	2,98,000
Gross profit	64,000	76,000
Less: Operating Expenses		
Warehousing	13,000	14,000
Transport	6,000	10,000
Administrative	19,000	19,000

Selling	11,000		14,000	
		49,000		57,000
Net Profit		15,000		19,000

BALANCE SHEET

Assets & Liabilities	2018 (₹)	2019 (₹)	
Fixed Assets (Net Block)	-	30,000	-
Receivables	50,000		82,000
Cash at Bank	10,000		7,000
Stock	60,000		94,000
Total Current Assets (CA)	1,20,000		1,83,000
Payables	50,000		76,000
Total Current Liabilities (CL)	50,000		76,000
Working Capital (CA - CL)		70,000	1,07,000
Total Assets		1,00,000	1,47,000
Represented by:			
Share Capital		75,000	75,000
Reserve and Surplus		25,000	42,000
Debentures		-	30,000
		1,00,000	1,47,000

You are required to CALCULATE the following ratios for the years 2018 and 2019.

- (i) Gross Profit Ratio
- (ii) Operating Expenses to Sales Ratio.
- (iii) Operating Profit Ratio
- (iv) Capital Turnover Ratio
- (v) Stock Turnover Ratio
- (vi) Net Profit to Net Worth Ratio, and
- (vii) Receivables Collection Period.

Ratio relating to capital employed should be based on the capital at the end of the year. Give the reasons for change in the ratios for 2 years. Assume opening stock of ₹40,000 for the year 2019. Ignore Taxation.

SOLUTION

Computation of Ratios		
Ratio	2018 (₹)	2019 (₹)
1. Gross profit ratio (Gross profit/sales)	$\frac{64,000 \times 100}{3,00,000} = 21.3\%$	$\frac{76,000 \times 100}{3,74,000} = 20.3\%$
2. Operating expense to sales ratio (Operating exp/ Total sales)	$\frac{49,000 \times 100}{3,00,000} = 16.3\%$	$\frac{57,000 \times 100}{3,74,000} = 15.2\%$
3. Operating profit ratio (Operating profit / Total sales)	$\frac{15,000 \times 100}{3,00,000} = 5\%$	$\frac{19,000 \times 100}{3,74,000} = 5.08\%$
4. Capital turnover ratio (Sales / capital employed)	$\frac{3,00,000}{1,00,000} = 3$	$\frac{3,74,000}{1,47,000} = 2.54$
5. Stock turnover ratio (COGS / Average stock)	$\frac{2,36,000}{50,000} = 4.72$	$\frac{2,98,000}{77,000} = 3.87$
6. Net Profit to Networth (Net profit / Networth)	$\frac{15,000 \times 100}{1,00,000} = 15\%$	$\frac{17,000 \times 100}{1,17,000} = 14.5\%$
7. Receivables collection period(Average receivables / Average daily credit sales) (Refer to working note)	$\frac{50,000}{739.73} = 67.6 \text{ days}$	$\frac{82,000}{936.99} = 87.5 \text{ days}$
Working note: Average daily sales = Credit sales / 365	$\frac{2,70,000}{365} = 739.73$	$\frac{3,42,000}{365} = 936.99$

Analysis: The decline in the Gross profit ratio could be either due to a reduction in the selling price or increase in the direct expenses (since the purchase price has remained the same). Similarly there is a decline in the ratio of operating expenses to sales. However since operating expenses have little bearing with sales, a decline in this ratio cannot be necessarily interpreted as an increase in

operational efficiency. An in-depth analysis reveals that the decline in the warehousing and the administrative expenses has been partly set off by an increase in the transport and the selling expenses. The operating profit ratio has remained the same in spite of a decline in the Gross profit margin ratio. In fact the company has not benefited at all in terms of operational performance because of the increased sales.

The company has not been able to deploy its capital efficiently. This is indicated by a decline in the Capital turnover from 3 to 2.5 times. In case the capital turnover would have remained at 3 the company would have increased sales and profits by ₹ 67,000 and ₹ 3,350 respectively.

The decline in stock turnover ratio implies that the company has increased its investment in stock. Return on Net worth has declined indicating that the additional capital employed has failed to increase the volume of sales proportionately. The increase in the Average collection period indicates that the company has become liberal in extending credit on sales. However, there is a corresponding increase in the current assets due to such a policy.

It appears as if the decision to expand the business has not shown the desired results.

ILLUSTRATION 2

Following is the abridged Balance Sheet of Alpha Ltd. :-

Liabilities	₹	Assets	₹	₹
Share Capital	1,00,000	Land and Buildings		80,000
Profit and Loss Account	17,000	Plant and Machineries	50,000	
Current Liabilities	40,000	Less: Depreciation	15,000	35,000
				1,15,000
		Stock	21,000	
		Receivables	20,000	
		Bank	1,000	42,000
Total	1,57,000	Total		1,57,000

With the help of the additional information furnished below, you are required to PREPARE Trading and Profit & Loss Account and a Balance Sheet as at 31st March, 2019:

(i) The company went in for reorganisation of capital structure, with share capital remaining the same as follows:

Share capital	50%
Other Shareholders' funds	15%
5% Debentures	10%
Payables	25%

Debentures were issued on 1st April, interest being paid annually on 31st March.

(ii) Land and Buildings remained unchanged. Additional plant and machinery has been bought and a further ₹ 5,000 depreciation written off.

(The total fixed assets then constituted 60% of total fixed and current assets.)

(iii) Working capital ratio was 8 : 5.

(iv) Quick assets ratio was 1 : 1.

(v) The receivables (four-fifth of the quick assets) to sales ratio revealed a credit period of 2 months. There were no cash sales.

(vi) Return on net worth was 10%.

(vii) Gross profit was at the rate of 15% of selling price.

(viii) Stock turnover was eight times for the year.

Ignore Taxation.

SOLUTION

Particulars	%	(₹)
Share capital	50%	1,00,000
Other shareholders funds	15%	30,000
5% Debentures	10%	20,000
Payables	25%	50,000
Total	100%	2,00,000

Land and Buildings

$$\begin{aligned}
 \text{Total liabilities} &= \text{Total Assets} \\
 ₹ 2,00,000 &= \text{Total Assets} \\
 \text{Fixed Assets} &= 60\% \text{ of total fixed assets and current assets} \\
 &= ₹ 2,00,000 \times 60/100 = ₹ 1,20,000
 \end{aligned}$$

Calculation of additions to Plant & Machinery

	₹
Total fixed assets	1,20,000
Less: Land & Buildings	80,000
Plant and Machinery (after providing depreciation)	40,000
Depreciation on Machinery up to 31-3-20X8	15,000
Add: Further depreciation	5,000
Total	20,000

$$\begin{aligned} \text{Current assets} &= \text{Total assets} - \text{Fixed assets} \\ &= ₹ 2,00,000 - ₹ 1,20,000 = ₹ 80,000 \end{aligned}$$

Calculation of stock

$$\begin{aligned} \text{Quick ratio:} &= \frac{\text{Current assets} - \text{Stock}}{\text{Current liabilities}} = 1 \\ &= \frac{₹ 80,000 - \text{Stock}}{₹ 50,000} = 1 \\ ₹ 50,000 &= ₹ 80,000 - \text{Stock} \\ \text{Stock} &= ₹ 80,000 - ₹ 50,000 \\ &= ₹ 30,000 \\ \text{Receivables} &= 4/5^{\text{th}} \text{ of quick assets} \\ &= (₹ 80,000 - 30,000) \times 4/5 \\ &= ₹ 40,000 \end{aligned}$$

Receivables turnover ratio

$$\begin{aligned} &= \frac{\text{Receivables}}{\text{Credit Sales}} \times 12 \text{ Months} = 2 \text{ months} \\ &= \frac{40,000 \times 12}{\text{Credit Sales}} = 2 \text{ months} \\ 2 \times \text{credit sales} &= 4,80,000 \\ \text{Credit sales} &= 4,80,000/2 \\ &= ₹ 2,40,000 \end{aligned}$$

Gross profit (15% of sales)

$$\text{₹ } 2,40,000 \times 15/100 = \text{₹ } 36,000$$

Return on net worth (net profit)

$$\text{Net worth} = \text{₹ } 1,00,000 + \text{₹ } 30,000$$

$$= \text{₹ } 1,30,000$$

$$\text{Net profit} = \text{₹ } 1,30,000 \times 10/100 = \text{₹ } 13,000$$

$$\text{Debenture interest} = \text{₹ } 20,000 \times 5/100 = \text{₹ } 1,000$$

Projected profit and loss account for the year ended 31-3-2019

To cost of goods sold	2,04,000	By sales	2,40,000
To gross profit	<u>36,000</u>		<u> </u>
	2,40,000		2,40,000
To debenture interest	1,000	By gross profit	36,000
To administration and other expenses	22,000		
To net profit	<u>13,000</u>		<u> </u>
	<u>36,000</u>		<u>36,000</u>

Projected Balance Sheet as at 31st March, 2019

Liabilities	₹	Assets		₹
Share capital	1,00,000	Fixed assets		
Profit and loss A/c	30,000	Land & buildings		80,000
(17,000+13,000)		Plant & machinery	60,000	
5% Debentures	20,000	<i>Less: Depreciation</i>	20,000	40,000
Current liabilities		Current assets		
		Stock	30,000	
Trade creditors	50,000	Receivables	40,000	
	<u>—</u>	Bank	10,000	80,000
	2,00,000			2,00,000

ILLUSTRATION 3

X Co. has made plans for the next year. It is estimated that the company will employ total assets of ₹ 8,00,000; 50 per cent of the assets being financed by borrowed capital at an interest cost of 8 per cent per year. The direct costs for the year are estimated at ₹ 4,80,000 and all other operating expenses are estimated at ₹ 80,000. The goods will be sold to customers at 150 per cent of the direct costs. Tax rate is assumed to be 50 per cent.

You are required to CALCULATE: (i) net profit margin; (ii) return on assets; (iii) asset turnover and (iv) return on owners' equity.

SOLUTION

The net profit is calculated as follows:

Particulars	₹	₹
Sales (150% of ₹ 4,80,000)		7,20,000
Direct costs		4,80,000
Gross profit		2,40,000
Operating expenses	80,000	
Interest changes (8% of ₹ 4,00,000)	32,000	1,12,000
Profit before taxes		1,28,000
Taxes (@ 50%)		64,000
Net profit after taxes		64,000

$$(i) \text{ Net profit margin} = \frac{\text{Profit after taxes}}{\text{Sales}} = \frac{\text{₹ } 64,000}{\text{₹ } 7,20,000} = 0.89 \text{ or } 8.9\%$$

$$\text{Net profit margin} = \frac{\text{EBIT} (1 - T)}{\text{Sales}} = \frac{\text{₹ } 1,60,000(1-0.5)}{7,20,000} = 0.111 \text{ or } 11.1\%$$

$$(ii) \text{ Return on assets} = \frac{\text{EBIT} (1 - T)}{\text{Assets}} = \frac{\text{₹ } 1,60,000(1-0.5)}{8,00,000} = 0.10 \text{ or } 10\%$$

$$(iii) \text{ Asset turnover} = \frac{\text{Sales}}{\text{Assets}} = \frac{\text{₹ } 7,20,000}{\text{₹ } 8,00,000} = 0.9 \text{ times}$$

$$\begin{aligned}
 \text{(iv) Return on equity} &= \frac{\text{Net Profit after taxes}}{\text{Owners' equity}} = \frac{\text{₹ 64,000}}{50\% \text{ of ₹ 8,00,000}} \\
 &= \frac{\text{₹ 64,000}}{\text{₹ 4,00,000}} = 0.16 \text{ or } 16\%
 \end{aligned}$$

ILLUSTRATION 4

ABC Company sells plumbing fixtures on terms of 2/10, net 30. Its financial statements over the last 3 years are as follows:

Particular	2017	2018	2019
	₹	₹	₹
Cash	30,000	20,000	5,000
Accounts receivable	2,00,000	2,60,000	2,90,000
Inventory	4,00,000	4,80,000	6,00,000
Net fixed assets	8,00,000	8,00,000	8,00,000
	14,30,000	15,60,000	16,95,000
	₹	₹	₹
Accounts payable	2,30,000	3,00,000	3,80,000
Accruals	2,00,000	2,10,000	2,25,000
Bank loan, short-term	1,00,000	1,00,000	1,40,000
Long-term debt	3,00,000	3,00,000	3,00,000
Common stock	1,00,000	1,00,000	1,00,000
Retained earnings	5,00,000	5,50,000	5,50,000
	14,30,000	15,60,000	16,95,000
	₹	₹	₹
Sales	40,00,000	43,00,000	38,00,000
Cost of goods sold	32,00,000	36,00,000	33,00,000
Net profit	3,00,000	2,00,000	1,00,000

ANALYSE the company's financial condition and performance over the last 3 years. Are there any problems?

SOLUTION

Ratios	2017	2018	20179
Current ratio	1.19	1.25	1.20
Acid-test ratio	0.43	0.46	0.40
Average collection period	18	22	27
Inventory turnover	NA*	8.2	6.1
Total debt to net worth	1.38	1.40	1.61
Long-term debt to total capitalization	0.33	0.32	0.32
Gross profit margin	0.200	0.163	0.132
Net profit margin	0.075	0.047	0.026
Asset turnover	2.80	2.76	2.24
Return on assets	0.21	0.13	0.06

Analysis: The company's profitability has declined steadily over the period. As only ₹ 50,000 is added to retained earnings, the company must be paying substantial dividends. Receivables are growing slower, although the average collection period is still very reasonable relative to the terms given. Inventory turnover is slowing as well, indicating a relative buildup in inventories. The increase in receivables and inventories, coupled with the fact that net worth has increased very little, has resulted in the total debt-to-worth ratio increasing to what would have to be regarded on an absolute basis as a high level.

The current and acid-test ratios have fluctuated, but the current ratio is not particularly inspiring. The lack of deterioration in these ratios is clouded by the relative build up in both receivables and inventories, evidencing deterioration in the liquidity of these two assets. Both the gross profit and net profit margins have declined substantially. The relationship between the two suggests that the company has reduced relative expenses in 2016 in particular. The build-up in inventories and receivables has resulted in a decline in the asset turnover ratio, and this, coupled with the decline in profitability, has resulted in a sharp decrease in the return on assets ratio.

ILLUSTRATION 5

Following information are available for Navya Ltd. along with various ratio relevant to the particulars industry it belongs to. APPRAISE your comments on strength and weakness of Navya Ltd. comparing its ratios with the given industry norms.

Navya Ltd.**BALANCE SHEET AS AT 31.3.2019**

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity Share Capital	48,00,000	Fixed Assets	24,20,000
10% Debentures	9,20,000	Cash	8,80,000
Sundry Creditors	6,60,000	Sundry debtors	11,00,000
Bills Payable	8,80,000	Stock	33,00,000
Other current Liabilities	4,40,000		-
Total	77,00,000	Total	77,00,000

STATEMENT OF PROFITABILITY**FOR THE YEAR ENDING 31.3.2019**

Particulars	Amount (₹)	Amount (₹)
Sales		1,10,00,000
Less: Cost of goods sold:	-	-
Material	41,80,000	-
Wages	26,40,000	-
Factory Overhead	12,98,000	81,18,000
Gross Profit	-	28,82,000
Less: Selling and Distribution Cost	11,00,000	-
Administrative Cost	12,28,000	23,28,000
Earnings before Interest and Taxes	-	5,54,000
Less: Interest Charges	-	92,000
Earning before Tax	-	4,62,000
Less: Taxes & 50%	-	2,31,000
Net Profit (PAT)		2,31,000

INDUSTRY NORMS

Ratios	Norm
Current Assets/Current Liabilities	2.5
Sales/ debtors	8.0
Sales/ Stock	9.0
Sales/ Total Assets	2.0

<i>Net Profit/ Sales</i>	3.5%
<i>Net profit /Total Assets</i>	7.0%
<i>Net Profit/ Net Worth</i>	10.5%
<i>Total Debt/Total Assets</i>	60.0%

SOLUTION

Ratios	Navya Ltd.	Industry Norms
1. $\frac{\text{Current Assets}}{\text{Current Liabilities}}$	$\frac{52,80,000}{19,80,000} = 2.67$	2.50
2. $\frac{\text{Sales}}{\text{Debtors}}$	$\frac{1,10,00,000}{11,00,000} = 10.0$	8.00
3. $\frac{\text{Sales}}{\text{Stock}}$	$\frac{1,10,00,000}{33,00,000} = 3.33$	9.00
4. $\frac{\text{Sales}}{\text{Total Assets}}$	$\frac{1,10,00,000}{77,00,000} = 1.43$	2.00
5. $\frac{\text{Net Profit}}{\text{Sales}}$	$\frac{2,31,000}{1,10,00,000} = 2.10\%$	3.50%
6. $\frac{\text{Net Profit}}{\text{Total Assets}}$	$\frac{2,31,000}{77,00,000} = 3.00\%$	7%
7. $\frac{\text{Net Profit}}{\text{Net Worth}}$	$\frac{2,31,000}{48,00,000} = 4.81\%$	10.5%
8. $\frac{\text{Total Debt}}{\text{Total Assets}}$	$\frac{29,00,000}{77,00,000} = 37.66\%$	60%

Comments:

1. The position of Navya Ltd. is better than the industry norm with respect to Current Ratios and the Sales to Debtors Ratio.
2. However, the position of sales to stock and sales to total assets is poor comparing to industry norm.
3. The firm also has its net profit ratios, net profit to total assets and net profit to total worth ratio much lower than the industry norm.
4. Total debt to total assets ratio suggest that, the firm is geared at lower level and debt are used to Asset.

SUMMARY

- ◆ **Financial Analysis and its Tools:** For the purpose of obtaining the material and relevant information necessary for ascertaining the financial strengths and weaknesses of an enterprise, it is necessary to analyze the data depicted in the financial statement. The financial manager has certain analytical tools which help in financial analysis and planning. The main tools are Ratio Analysis and Cash Flow Analysis.
- ◆ **Ratio Analysis:-** The ratio analysis is based on the fact that a single accounting figure by itself may not communicate any meaningful information but when expressed as a relative to some other figure, it may definitely provide some significant information. Ratio analysis is not just comparing different numbers from the balance sheet, income statement, and cash flow statement. It is comparing the number against previous years, other companies, the industry, or even the economy in general for the purpose of financial analysis.
- ◆ **Type of Ratios and Importance of Ratios Analysis:-** The ratios can be classified into following four broad categories:
 - (i) Liquidity Ratios
 - (ii) Capital Structure/Leverage Ratios
 - (iii) Activity Ratios
 - (iv) Profitability Ratios
- ◆ A popular technique of analyzing the performance of a business concern is that of financial ratio analysis. As a tool of financial management, they are of crucial significance. The importance of ratio analysis lies in the fact that it presents facts on a comparative basis and enables drawing of inferences regarding the performance of a firm.
- ◆ Ratio analysis is relevant in assessing the performance of a firm in respect of following aspects:
 - I Liquidity Position
 - II Long-term Solvency
 - III Operating Efficiency
 - IV Overall Profitability
 - V Inter-firm Comparison
 - VI Financial Ratios for Supporting Budgeting

TEST YOUR KNOWLEDGE

MCQs based Questions

1. Ratio of Net sales to Net working capital is a:
 - (a) Profitability ratio
 - (b) Liquidity ratio
 - (c) Current ratio
 - (d) Working capital turnover ratio
2. Long-term solvency is indicated by:
 - (a) Debt/ equity ratio
 - (b) Current Ratio
 - (c) Operating ratio
 - (d) Net profit ratio
3. Ratio of net profit before interest and tax to sales is:
 - (a) Gross profit ratio
 - (b) Net profit ratio
 - (c) Operating profit ratio
 - (d) Interest coverage ratio.
4. Observing changes in the financial variables across the years is:
 - (a) Vertical analysis
 - (b) Horizontal Analysis
 - (c) Peer-firm Analysis
 - (d) Industry Analysis.
5. The Receivable-Turnover ratio helps management to:
 - (a) Managing resources
 - (b) Managing inventory
 - (c) Managing customer relationship
 - (d) Managing working capital

Theoretical Questions

- DISCUSS any three ratios computed for investment analysis.
- DISCUSS the financial ratios for evaluating company performance on operating efficiency and liquidity position aspects.
- DISCUSS Stock Turnover ratio and Gearing ratio?
- DISCUSS the composition of Return on Equity (ROE) using the DuPont model.
- EXPLAIN briefly the limitations of Financial ratios.
- DISCUSS DuPont Model.

Practical Problems

- The total sales (all credit) of a firm are ₹ 6,40,000. It has a gross profit margin of 15 per cent and a current ratio of 2.5. The firm's current liabilities are ₹ 96,000; inventories ₹ 48,000 and cash ₹ 16,000.
 - DETERMINE the average inventory to be carried by the firm, if an inventory turnover of 5 times is expected? (Assume a 360 day year).
 - DETERMINE the average collection period if the opening balance of debtors is intended to be of ₹ 80,000? (Assume a 360 day year).
- The capital structure of Beta Limited is as follows:

Equity share capital of ₹ 10 each	8,00,000
9% preference share capital of ₹ 10 each	3,00,000
	11,00,000

Additional information: Profit (after tax at 35 per cent), ₹ 2,70,000; Depreciation, ₹ 60,000; Equity dividend paid, 20 per cent; Market price of equity shares, ₹ 40.

You are required to COMPUTE the following, showing the necessary workings:

- Dividend yield on the equity shares
- Cover for the preference and equity dividends
- Earnings per shares
- Price-earnings ratio.

- The following accounting information and financial ratios of PQR Ltd. relate to the year ended 31st December, 2018

		2016
I	<i>Accounting Information:</i>	
	Gross Profit	15% of Sales
	Net profit	8% of sales
	Raw materials consumed	20% of works cost
	Direct wages	10% of works cost
	Stock of raw materials	3 months' usage
	Stock of finished goods	6% of works cost
	Debt collection period	60 days
	All sales are on credit	
II	<i>Financial Ratios:</i>	
	Fixed assets to sales	1 : 3
	Fixed assets to Current assets	13 : 11
	Current ratio	2 : 1
	Long-term loans to Current liabilities	2 : 1
	Capital to Reserves and Surplus	1 : 4

If value of fixed assets as on 31st December, 2017 amounted to ₹ 26 lakhs, PREPARE a summarised Profit and Loss Account of the company for the year ended 31st December, 2018 and also the Balance Sheet as on 31st December, 2018.

4. Ganpati Limited has furnished the following ratios and information relating to the year ended 31st March, 2019.

Sales	₹ 60,00,000
Return on net worth	25%
Rate of income tax	50%
Share capital to reserves	7:3
Current ratio	2
Net profit to sales	6.25%
Inventory turnover (based on cost of goods sold)	12
Cost of goods sold	₹ 18,00,000

Interest on debentures	₹ 60,000
Receivables	₹ 2,00,000
Payables	₹ 2,00,000

You are required to:

- CALCULATE the operating expenses for the year ended 31st March, 2019.
- PREPARE a balance sheet as on 31st March in the following format:

Balance Sheet as on 31st March, 2019

Liabilities	₹	Assets	₹
Share Capital		Fixed Assets	
Reserve and Surplus		Current Assets	
15% Debentures		Stock	
Payables		Receivables	
		Cash	● ● ●

- Using the following information, PREPARE this balance sheet:

Long-term debt to net worth		0.5 to 1
Total asset turnover		2.5 ×
Average collection period*		18 days
Inventory turnover		9 ×
Gross profit margin		10%
Acid-test ratio		1 to 1

*Assume a 360-day year and all sales on credit.

	₹		₹
Cash	_____	Notes and payables	1,00,000
Accounts receivable	_____	Long-term debt	_____
Inventory	_____	Common stock	1,00,000
Plant and equipment	_____	Retained earnings	1,00,000
Total assets	_____	Total liabilities and equity	_____

ANSWERS/SOLUTIONS

Answers to the MCQs based Questions

1. (d) 2. (a) 3. (c) 4. (b) 5. (d)

Answers to the Theoretical Questions

1. Please refer paragraph 3.3.4.2
2. Please refer paragraph 3.3.4
3. Please refer paragraph 3.3.3. & 3.3.2
4. Please refer paragraph 3.3.4.2
5. Please refer paragraph 3.5
6. Please refer paragraph 3.3.4.2

Answers to the Practical Problems

1. (a) Inventory turnover = $\frac{\text{Cost of goods sold}}{\text{Average inventory}}$

Since gross profit margin is 15 per cent, the cost of goods sold should be 85 per cent of the sales.

$$\text{Cost of goods sold} = 0.85 \times ₹ 6,40,000 = ₹ 5,44,000.$$

$$\text{Thus, } = \frac{₹ 5,44,000}{\text{Average inventory}} = 5$$

$$\text{Average inventory} = \frac{₹ 5,44,000}{5} = ₹ 1,08,800$$

(b) Average collection period = $\frac{\text{Average Receivables}}{\text{Credit Sales}} \times 360 \text{ days}$

$$\text{Average Receivables} = \frac{(\text{Opening Receivables} + \text{Closing Receivables})}{2}$$

Closing balance of receivables is found as follows:

	₹	₹
Current assets (2.5 of current liabilities)		2,40,000
Less: Inventories	48,000	
Cash	16,000	64,000
.. Receivables		1,76,000

... Average Receivables = $\frac{(\text{₹ }1,76,000 + \text{₹ }80,000)}{2}$

$\text{₹ }2,56,000 \div 2 = \text{₹ }1,28,000$

Average collection period = $\frac{\text{₹ }1,28,000}{\text{₹ }6,40,000} \times 360 = 72 \text{ days}$

2. (a) **Dividend yield on the equity shares**

$$= \frac{\text{Dividend per share}}{\text{Market price per share}} \times 100 = \frac{\text{₹ }2 (= 0.20 \times \text{₹ }10)}{\text{₹ }40} \times 100 = 5 \text{ per cent}$$

(b) **Dividend coverage ratio**

$$\begin{aligned} \text{(i) Preference} &= \frac{\text{Profit after taxes}}{\text{Dividend payable to preference shareholders}} \\ &= \frac{\text{₹ }2,70,000}{\text{₹ }27,000 (= 0.09 \times \text{₹ }3,00,000)} = 10 \text{ times} \end{aligned}$$

(ii) **Equity** =

$$\frac{\text{Profit after taxes} - \text{Preference share dividend}}{\text{Dividend payable to equity shareholders at current rate of ₹ 2 per share}}$$

$$= \frac{\text{₹ }2,70,000 - \text{₹ }27,000}{\text{₹ }1,60,000 (80,000 \text{ shares} \times \text{₹ }2)} = 1.52 \text{ times}$$

(c) **Earnings per equity share** = $\frac{\text{Earnings available to equity shareholders}}{\text{Number of equity shares outstanding}}$

$$= \frac{\text{₹ }2,43,000}{80,000} = \text{₹ }3.04 \text{ per share}$$

(d) **Price-earning(P/E)ratio** = $\frac{\text{Market price per share}}{\text{Earnings per share}} = \frac{\text{₹ }40}{\text{₹ }3.04} = 13.2 \text{ times}$

3. (a) **Working Notes:**

(i) **Calculation of Sales** = $\frac{\text{Fixed Assets}}{\text{Sales}} = \frac{1}{3}$

$$\therefore \frac{26,00,000}{\text{Sales}} = \frac{1}{3} \Rightarrow \text{Sales} = \text{₹ }78,00,000$$

(ii) Calculation of Current Assets

$$\frac{\text{Fixed Assets}}{\text{Current Assets}} = \frac{13}{11}$$

$$\therefore \frac{26,00,000}{\text{Current Assets}} = \frac{13}{11} \Rightarrow \text{Current Assets} = ₹ 22,00,000$$

(iii) Calculation of Raw Material Consumption and Direct Wages

	₹
Sales	78,00,000
Less: Gross Profit	11,70,000
Works Cost	66,30,000

Raw Material Consumption (20% of Works Cost) ₹ 13,26,000

Direct Wages (10% of Works Cost) ₹ 6,63,000

(iv) Calculation of Stock of Raw Materials (= 3 months usage)

$$= 13,26,000 \times \frac{3}{12} = ₹ 3,31,500$$

(v) Calculation of Stock of Finished Goods (= 6% of Works Cost)

$$= 66,30,000 \times \frac{6}{100} = ₹ 3,97,800$$

(vi) Calculation of Current Liabilities

$$\frac{\text{Current Assets}}{\text{Current Liabilities}} = 2$$

$$\therefore \frac{22,00,000}{\text{Current Liabilities}} = 2 \Rightarrow \text{Current Liabilities} = ₹ 11,00,000$$

(vii) Calculation of Receivables

$$\text{Average collection period} = \frac{\text{Receivables}}{\text{Credit Sales}} \times 365$$

$$\frac{\text{Receivables}}{78,00,000} \times 365 = 60 \Rightarrow \text{Receivables} = ₹ 12,82,191.78 \text{ or } ₹ 12,82,192$$

... (viii) Calculation of Long term Loan

$$\frac{\text{Long term Loan}}{\text{Current Liabilities}} = \frac{2}{1}$$

$$\frac{\text{Long term loan}}{11,00,000} = \frac{2}{1} \Rightarrow \text{Long term loan} = ₹ 22,00,000.$$

(ix) Calculation of Cash Balance

	₹
Current assets	22,00,000
<i>Less:</i> Receivables 12,82,192	
Raw materials stock	3,31,500
Finished goods stock	<u>3,97,800</u>
Cash balance	20,11,492
	1,88,508

(x) Calculation of Net worth

Fixed Assets		26,00,000
Current Assets		22,00,000
Total Assets		48,00,000
<i>Less:</i> Long term Loan	22,00,000	
Current Liabilities	<u>11,00,000</u>	33,00,000
Net worth		15,00,000

$$\text{Net worth} = \text{Share capital} + \text{Reserves} = 15,00,000$$

$$= \frac{\text{Capital}}{\text{Reserves and Surplus}} = \frac{1}{4} \Rightarrow \text{Share Capital}$$

$$= 15,00,000 \times \frac{1}{5} = ₹ 3,00,000$$

$$\text{Reserves and Surplus} = 15,00,000 \times \frac{4}{5} = ₹ 12,00,000$$

Profit and Loss Account of PQR Ltd.
for the year ended 31st December, 2018

Particulars	₹	Particulars	₹
To Direct Materials	13,26,000	By Sales	78,00,000
To Direct Wages	6,63,000		
To Works (Overhead)	46,41,000		
Balancing figure			
To Gross Profit c/d (15% of Sales)	11,70,000		
	78,00,000		78,00,000
To Selling and Distribution Expenses (Balancing figure)	5,46,000	By Gross Profit b/d	11,70,000
To Net Profit (8% of Sales)	6,24,000		
	11,70,000		11,70,000

Balance Sheet of PQR Ltd.
as at 31st December, 2018

Liabilities	₹	Assets	₹
Share Capital	3,00,000	Fixed Assets	26,00,000
Reserves and Surplus	12,00,000	Current Assets:	
Long term loans	22,00,000	Stock of Raw Material	3,31,500
Current liabilities	11,00,000	Stock of Finished Goods	3,97,800
	-	Receivables	12,82,192
	48,00,000	Cash	1,88,508
			48,00,000

4. (a) Calculation of Operating Expenses for the year ended 31st March, 2019.

		(₹)
Net Profit [@ 6.25% of Sales]		3,75,000
Add: Income Tax (@ 50%)		3,75,000

Profit Before Tax (PBT)		7,50,000
Add: Debenture Interest		60,000
Profit before interest and tax (PBIT)		8,10,000
Sales		60,00,000
Less: Cost of goods sold	18,00,000	
PBIT	8,10,000	26,10,000
Operating Expenses		33,90,000

(b) Balance Sheet as on 31st March, 2019

Liabilities	₹	Assets	₹
Share Capital	10,50,000	Fixed Assets	17,00,000
Reserve and Surplus	4,50,000	Current Assets:	
15% Debentures	4,00,000	Stock	1,50,000
Payables	2,00,000	Receivables	2,00,000
-	-	Cash	50,000
	21,00,000		21,00,000

Working Notes:

(i) Share Capital and Reserves

The return on net worth is 25%. Therefore, the profit after tax of ₹ 3,75,000 should be equivalent to 25% of the net worth.

$$\text{Net worth} \times \frac{25}{100} = ₹ 3,75,000$$

$$\therefore \text{Net worth} = \frac{₹ 3,75,000 \times 100}{25} = ₹ 15,00,000$$

The ratio of share capital to reserves is 7:3

$$\text{Share Capital} = 15,00,000 \times \frac{7}{10} = ₹ 10,50,000$$

$$\text{Reserves} = 15,00,000 \times \frac{3}{10} = ₹ 4,50,000$$

(ii) Debentures

Interest on Debentures @ 15% = ₹ 60,000

$$\therefore \text{Debentures} = \frac{60,000 \times 100}{15} = ₹ 4,00,000$$

(iii) **Current Assets**

$$\text{Current Ratio} = 2$$

$$\text{Payables} = ₹ 2,00,000$$

$$\therefore \text{Current Assets} = 2 \text{ Current Liabilities} = 2 \times 2,00,000 = ₹ 4,00,000$$

(iv) **Fixed Assets**

Liabilities	₹
Share capital	10,50,000
Reserves	4,50,000
Debentures	4,00,000
Payables	2,00,000
	21,00,000
<i>Less: Current Assets</i>	4,00,000
Fixed Assets	17,00,000

(v) **Composition of Current Assets**

$$\text{Inventory Turnover} = 12$$

$$\frac{\text{Cost of goods sold}}{\text{Closing stock}} = 12$$

$$\text{Closing stock} = \frac{₹ 18,00,000}{12} = \text{Closing stock} = ₹ 1,50,000$$

Composition	₹
Stock	1,50,000
Receivables	2,00,000
Cash (balancing figure)	50,000
Total Current Assets	4,00,000

5.
$$\frac{\text{Long-term debt}}{\text{Net worth}} = 0.5 = \frac{\text{Long-term debt}}{2,00,000}$$

Long-term debt = ₹ 1,00,000

Total liabilities and net worth = ₹ 4,00,000

Total assets = ₹ 4,00,000

$$\frac{\text{Sales}}{\text{Total assets}} = 2.5 = \frac{\text{Sales}}{4,00,000} = \text{Sales} = ₹ 10,00,000$$

Cost of goods sold = (0.9) (₹ 10,00,000) = ₹ 9,00,000.

$$\frac{\text{Cost of goods sold}}{\text{Inventory}} = \frac{9,00,000}{\text{Inventory}} = 9 = \text{Inventory} = ₹ 1,00,000$$

$$\frac{\text{Receivables} \times 360}{10,00,000} = 18 \text{ days}$$

Receivables = ₹ 50,000

$$\frac{\text{Cash} + 50,000}{1,00,000} = 1$$

Cash = ₹ 50,000

Plant and equipment = ₹ 2,00,000.

Balance Sheet

	₹		₹
Cash	50,000	Notes and payables	1,00,000
Accounts receivable	50,000	Long-term debt	1,00,000
Inventory	1,00,000	Common stock	1,00,000
Plant and equipment	2,00,000	Retained earnings	1,00,000
Total assets	4,00,000	Total liabilities and equity	4,00,000

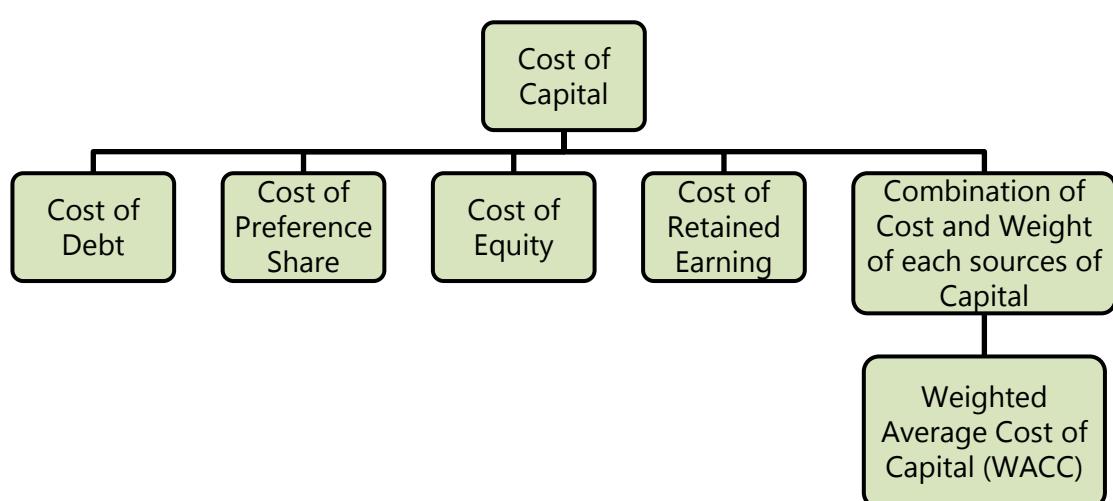
COST OF CAPITAL



LEARNING OUTCOMES

- Discuss the need and sources of finance to a business entity.
- Discuss the meaning of cost of capital for raising capital from different sources of finance.
- Measure cost of individual components of capital
- Calculate weighted cost of capital and marginal cost of capital, Effective Interest rate.

CHAPTER OVERVIEW





4.1 INTRODUCTION

We know that the basic task of a finance manager is procurement of funds and its effective utilization. Whereas objective of financial management is maximization of wealth. Here wealth or value is equal to performance divided by expectations.

Therefore the finance manager is required to select **such a capital structure** in which expectation of investors is minimum hence shareholders' wealth is maximum. For that purpose first he need to calculate cost of various sources of finance. In this chapter we will learn to calculate cost of debt, cost of preference shares, cost of equity shares, cost of retained earnings and also overall cost of capital.



4.2 MEANING OF COST OF CAPITAL

Cost of capital is the return expected by the providers of capital (i.e. shareholders, lenders and the debt-holders) to the business as a compensation for their contribution to the total capital. When an entity (corporate or others) procured finances from either sources as listed above, it has to pay some additional amount of money besides the principal amount. The additional money paid to these financiers may be either one off payment or regular payment at specified intervals. This additional money paid is said to be the cost of using the capital and it is called the cost of capital. This cost of capital expressed in rate is used to discount/ compound the cashflow or stream of cashflows. Cost of capital is also known as 'cut-off' rate, 'hurdle rate', 'minimum rate of return' etc. It is used as a benchmark for:

- ◆ Framing debt policy of a firm.
- ◆ Taking Capital budgeting decisions.



4.3 SIGNIFICANCE OF THE COST OF CAPITAL

The cost of capital is important to arrive at correct amount and helps the management or an investor to take an appropriate decision. The correct cost of capital helps in the following decision making:

(i) Evaluation of investment options: The estimated benefits (future cashflows) from available investment opportunities (business or project) are converted into the present value of benefits by **discounting them with the relevant cost of capital**. Here it is pertinent to mention that every investment option may have different cost of capital hence it is very important to use the cost of capital which is relevant to the options available.

(ii) **Financing Decision:** When a finance manager has to choose one of the two sources of finance, he can simply compare their cost and choose the source which has lower cost. Besides cost he also considers financial risk and control.

(iii) **Designing of optimum credit policy:** While appraising the credit period to be allowed to the customers, the cost of allowing credit period is compared against the benefit/ profit earned by providing credit to customer of segment of customers. Here cost of capital is used to arrive at the present value of cost and benefits received.



4.4 DETERMINATION OF THE COST OF CAPITAL

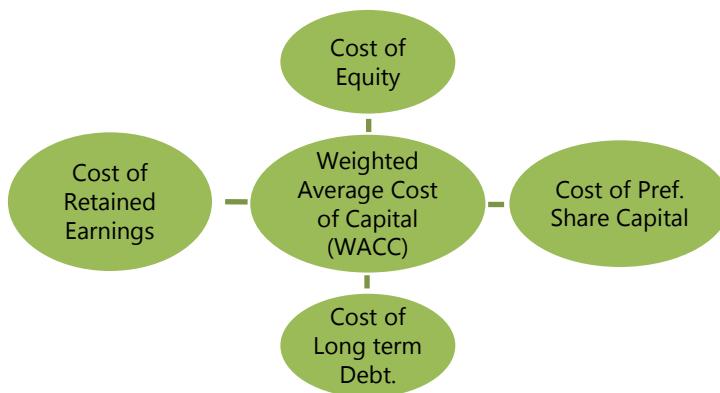
Cost is not the amount which the company plans to pay or actually pays, rather than it is the **expectation of stakeholders**. Here Stakeholders include providers of capital (shareholders, debenture holder, money lenders etc.), intermediaries (brokers, underwriters, merchant bankers etc.), and Government (for taxes).

For example if the company issues 9% coupon debentures but expectation of investors is 10% then investors will subscribe it at discount and not at par. Hence cost to the company will not be 9%, rather than it will be 10%. Besides giving return to investors company will also have to give commission, brokerage, fees etc. To intermediaries for issue debentures. It will increase cost of capital above 10%. On the other hand payment of interest is a deductible expense under the Income tax act hence it will reduce cost of capital to the company. Cost of any sources of finance is expresses in terms of percent per annum. To calculate cost first of all we should identify various cash flows like:

1. inflow of amount received at the beginning
2. outflows of payment of interest, dividend, redemption amount etc.
3. Inflow of tax benefit on interest or outflow of payment of dividend tax.

Thereafter we can use trial & error method to arrive at a rate where present value of outflows is equal to present value of inflows. That rate is basically IRR. In investment decisions IRR indicates income, because there we have initial outflow followed by series of inflows. In cost of capital chapter this **IRR represents cost**, because here we have initial inflow followed by series of net outflows.

Alternatively we can use shortcut formulas. Though these shortcut formulas are easy to use but they give approximate answer and not the exact answer. We will discuss the cost of capital of each source of finance separately.



4.5 COST OF LONG TERM DEBT

External borrowings or debt instruments do not confer ownership to the providers of finance. The providers of the debt fund do not participate in the affairs of the company but enjoys the charge on the profit before taxes. Long term debt includes long term loans from the financial institutions, capital from issuing debentures or bonds etc. (In the next chapter we will discuss in detail about the sources of long term debt.).

As discussed above the external borrowing or debt includes long term loan from financial institutions, issuance of debt instruments like debentures or bonds etc. The calculation of cost of loan from a financial institution is similar to that of redeemable debentures. Here we confine our discussion of cost debt to Debentures or Bonds only.

4.5.1 Features of debentures or bonds:

- (i) **Face Value:** Debentures or Bonds are denominated with some value; this denominated value is called face value of the debenture. Interest is calculated on the face value of the debentures. E.g. If a company issues 9% Non-convertible debentures of ₹100 each, this means the face value is ₹ 100 and the interest @ 9% will be calculated on this face value.
- (ii) **Interest (Coupon) Rate:** Each debenture bears a fixed interest (coupon) rate (except Zero coupon bond and Deep discount bond). Interest (coupon) rate is applied to face value of debenture to calculate interest, which is payable to the holders of debentures periodically.

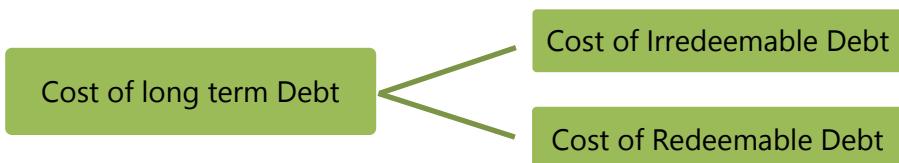
- (iii) **Maturity period:** Debentures or Bonds has a fixed maturity period for redemption. However, in case of irredeemable debentures maturity period is not defined and it is taken as infinite.
- (iv) **Redemption Value:** Redeemable debentures or bonds are redeemed on its specified maturity date. Based on the debt covenants the redemption value is determined. Redemption value may vary from the face value of the debenture.
- (v) **Benefit of tax shield:** The payment of interest to the debenture holders are allowed as expenses for the purpose of corporate tax determination. Hence, interest paid to the debenture holders save the tax liability of the company. Saving in the tax liability is also known as tax shield. The example given below will show you how interest paid by a company reduces the tax liability:

Example: There are two companies namely X Ltd. and Y Ltd. The capital of the X Ltd is fully financed by the shareholders whereas Y Ltd uses debt fund as well. The below is the profitability statement of both the companies:

	X Ltd. (₹ in lakh)	Y Ltd. (₹ in lakh)
Earnings before interest and taxes (EBIT)	100	100
Interest paid to debenture holders	-	(40)
Profit before tax (PBT)	100	60
Tax @ 35%	(35)	(21)
Profit after tax (PAT)	65	39

A comparison of the two companies shows that an interest payment of 40 by the Y Ltd. results in a tax shield (tax saving) of ₹14 lakh (₹ 40 lakh paid as interest × 35% tax rate). Therefore the effective interest is ₹ 26 lakh only.

Based on redemption (repayment of principal) on maturity the debts can be categorised into two types (i) Irredeemable debts and (ii) Redeemable debts.



4.5.2 Cost of Irredeemable Debentures

The cost of debentures which are not redeemed by the issuer of the debenture is known as irredeemable debentures. Cost of debentures not redeemable during the life time of the company is calculated as below:

$$K_d = \frac{I}{NP}(1-t)$$

Where,

- K_d = Cost of debt after tax
- I = Annual interest payment
- NP = Net proceeds of debentures or current market price
- t = Tax rate

Net proceeds means issue price less issue expenses. If issue price is not given then students can assume it to be equal to current market price. If issue expenses are not given simply assume it equal to zero.

Suppose a company issues 1,000, 15% debentures of the face value of ₹100 each at a discount of ₹5. Suppose further, that the under-writing and other costs are ₹ 5,000/- for the total issue. Thus ₹ 90,000 is actually realised, i.e., ₹ 1,00,000 minus ₹ 5,000 as discount and ₹ 5,000 as under-writing expenses. The interest per annum of ₹15,000 is therefore the cost of ₹ 90,000, actually received by the company. This is because interest is charge on profit and every year the company will save ₹ 7,500 as tax, assuming that the income tax rate is 50%. Hence the after tax cost of ₹ 90,000 is ₹ 7,500 which comes to 8.33%.

ILLUSTRATION 1

Five years ago, Sona Limited issued 12 per cent irredeemable debentures at ₹ 103, at ₹ 3 premium to their par value of ₹ 100. The current market price of these debentures is ₹ 94. If the company pays corporate tax at a rate of 35 per cent CALCULATE its current cost of debenture capital?

SOLUTION

Cost of irredeemable debenture:

$$K_d = \frac{I}{NP}(1-t)$$

$$K_d = \frac{\text{₹ } 12}{\text{₹ } 94}(1-0.35) = 0.08297 \text{ or } 8.30\%$$

4.5.3 Cost of Redeemable Debentures (using approximation method)

The cost of redeemable debentures will be calculated as below:

$$\text{Cost of Redeemable Debenture (K}_d\text{)} = \frac{I(1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

Where,

I = Interest payment

NP = Net proceeds from debentures in case of new issue of debt or Current market price in case of existing debt.

RV = Redemption value of debentures

t = Tax rate applicable to the company

n = Remaining life of debentures.

The above formula to calculate cost of debt is used where only interest on debt is tax deductible. Sometime, debts are issued at discount and/ or redeemed at a premium. If discount on issue and/ or premium on redemption are tax deductible, the following formula can be used to calculate the cost of debt.

$$\text{Cost of Redeemable Debenture (K}_d\text{)} = I + \frac{\frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}(1-t)$$

In absence of any specific information, students may use any of the above formulae to calculate the Cost of Debt (K_d) with logical assumption.

Above formulas give approximate value of cost of debt. In these formulas higher the difference between RV and NP, lower the accuracy of answer. Therefore one should not use these formulas if difference between RV and NP is very high. Also these formulas are not suitable in case of gradual redemption of bonds.

ILLUSTRATION 2

A company issued 10,000, 10% debentures of ₹ 100 each at a premium of 10% on 1.4.2017 to be matured on 1.4.2022. The debentures will be redeemed on maturity. COMPUTE the cost of debentures assuming 35% as tax rate.

SOLUTION

The cost of debenture (K_d) will be calculated as below:

$$\text{Cost of debenture } (K_d) = \frac{I(1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

I	= Interest on debenture = 10% of ₹100	= ₹10
NP	= Net Proceeds = 110% of ₹100	= ₹110
RV	= Redemption value	= ₹100
n	= Period of debenture	= 5 years
t	= Tax rate	= 35% or 0.35

$$K_d = \frac{\frac{₹10(1-0.35) + \frac{₹100 - ₹110}{5 \text{ years}}}{2}}{\frac{₹100 + ₹110}{2}}$$

$$\text{Or, } K_d = \frac{\frac{₹10 \times 0.65 - ₹2}{₹105}}{\frac{₹105}{₹105}} = \frac{₹4.5}{₹105} = 0.0428 \text{ or } 4.28\%$$

ILLUSTRATION 3

A company issued 10,000, 10% debentures of ₹ 100 each at par on 1.4.2012 to be matured on 1.4.2022. The company wants to know the cost of its existing debt on 1.4.2017 when the market price of the debentures is ₹ 80. COMPUTE the cost of existing debentures assuming 35% tax rate.

SOLUTION

$$\text{Cost of debenture } (K_d) = \frac{I(1-t) + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

I	= Interest on debenture = 10% of ₹100	= ₹10
NP	= Current market price	= ₹80
RV	= Redemption value	= ₹100

n = Period of debenture = 5 years

t = Tax rate = 35% or 0.35

$$K_d = \frac{\frac{\text{₹}10(1-0.35) + \frac{(\text{₹}100-\text{₹}80)}{5 \text{ years}}}{(\text{₹}100+\text{₹}80)}}{2}$$

$$\text{Or, } = \frac{\text{₹}10 \times 0.65 + \text{₹}4}{\text{₹}90} = \frac{\text{₹}10.5}{\text{₹}90} = 0.1166 \text{ or } 11.67\%$$

4.5.3.1 Cost of Debt using Present value method [Yield to maturity (YTM) approach]

The cost of redeemable debt (K_d) is also calculated by discounting the relevant cash flows using Internal rate of return (IRR). (The concept of IRR is discussed in the Chapter- Investment Decisions). Here YTM is the annual return of an investment from the current date till maturity date. So, YTM is the internal rate of return at which current price of a debt equals to the present value of all cash-flows.

The relevant cash flows are as follows:

Year	Cash flows
0	Net proceeds in case of new issue/ Current market price in case of existing debt (NP or P_0)
1 to n	Interest net of tax $[I(1-t)]$
n	Redemption value (RV)

Steps to calculate relevant cash flows:

Step-1: Identify the cash flows

Step-2: Calculate NPVs of cash flows as identified above using two discount rates (guessing).

Step-3: Calculate IRR

Example: A company issued 10,000, 10% debentures of ₹ 100 each on 1.4.2013 to be matured on 1.4.2018. The company wants to know the current cost of its existing debt and the market price of the debentures is ₹ 80. Compute the cost of existing debentures assuming 35% tax rate.

Step-1: Identification of relevant cash flows

Year	Cash flows
0	Current market price (P_0) = ₹80
1 to 5	Interest net of tax [$I(1-t)$] = 10% of ₹100 (1-0.35) = ₹6.5
5	Redemption value (RV) = Face value i.e. ₹100

Step- 2: Calculation of NPVs at two discount rates

Year	Cash flows (₹)	Discount factor @ 10%	Present Value	Discount factor @ 15%	Present Value (₹)
0	80	1.000	(80.00)	1.000	(80.00)
1 to 5	6.5	3.791	24.64	3.352	21.79
5	100	0.621	62.10	0.497	49.70
NPV			+6.74		-8.51

Step- 3: Calculation of IRR

$$IRR = L + \frac{NPV_L}{NPV_L - NPV_H} (H - L) = 10\% + \frac{6.74}{6.74 - (-8.51)} (15\% - 10\%) = 12.21\%$$

YTM or present value method is a superior method of determining cost of debt of company to approximation method and it is also preferred in the field of finance. We may keep in mind that in the above formula, **higher the difference between H and L, lower the accuracy** of answer.

ILLUSTRATION 4

Institutional Development Bank(IDB) issued Zero interest deep discount bonds of face value of ₹ 1,00,000 each issued at ₹ 2500 & repayable after 25 years. COMPUTE the cost of debt if there is no corporate tax.

SOLUTION

Here,

Redemption Value (RV)= ₹1,00,000

Net Proceeds (NP) = ₹ 2,500

Interest = 0

Life of bond = 25 years

There is huge difference between RV and NP therefore in place of approximation method we should use trial & error method.

$$FV = PV \times (1+r)^n$$

$$1,00,000 = 2,500 \times (1+r)^{25}$$

$$40 = (1+r)^{25}$$

$$\text{Trial 1: } r = 15\%, (1.15)^{25} = 32.919$$

$$\text{Trial 2: } r = 16\%, (1.16)^{25} = 40.874$$

Here:

$$L = 15\%, H = 16\%$$

$$NPV_L = 32.919 - 40 = -7.081$$

$$NPV_H = 40.874 - 40 = +0.874$$

$$\begin{aligned} IRR &= L + \frac{NPV_L}{NPV_L - NPV_H} (H - L) \\ &= 15\% + \frac{-7.081}{-7.081 - (0.874)} \times (16\% - 15\%) = 15.89\% \end{aligned}$$

4.5.3.2 Amortisation of Bond

A bond may be amortised every year i.e. principal is repaid every year rather than at maturity. In such a situation, the principal will go down with annual payments and interest will be computed on the outstanding amount. The cash flows of the bonds will be uneven.

The formula for determining the value of a bond or debenture that is amortised every year is as follows:

$$\begin{aligned} V_B &= \frac{C_1}{(1+K_d)^1} + \frac{C_2}{(1+K_d)^2} + \dots + \frac{C_n}{(1+K_d)^n} \\ V_B &= \sum_{t=1}^n \frac{C_t}{(1+K_d)^t} \end{aligned}$$

ILLUSTRATION 5

RBML is proposing to sell a 5-year bond of ₹ 5,000 at 8 per cent rate of interest per annum. The bond amount will be amortised equally over its life. CALCULATE the bond's present value for an investor if he expects a minimum rate of return of 6 per cent?

SOLUTION

The amount of interest will go on declining as the outstanding amount of bond will be reducing due to amortisation. The amount of interest for five years will be:

First year: $\text{₹}5,000 \times 0.08 = \text{₹} 400$;

Second year: $(\text{₹}5,000 - \text{₹}1,000) \times 0.08 = \text{₹} 320$;

Third year: $(\text{₹}4,000 - \text{₹}1,000) \times 0.08 = \text{₹} 240$;

Fourth year: $(\text{₹}3,000 - \text{₹}1,000) \times 0.08 = \text{₹} 160$; and

Fifth year: $(\text{₹}2,000 - \text{₹}1,000) \times 0.08 = \text{₹} 80$.

The outstanding amount of bond will be zero at the end of fifth year.

Since RBML will have to return ₹1,000 every year, the outflows every year will consist of interest payment and repayment of principal:

First year: $\text{₹}1,000 + \text{₹} 400 = \text{₹}1,400$;

Second year: $\text{₹}1,000 + \text{₹} 320 = \text{₹}1,320$;

Third year: $\text{₹}1,000 + \text{₹} 240 = \text{₹}1,240$;

Fourth year: $\text{₹}1,000 + \text{₹} 160 = \text{₹}1,160$; and

Fifth year: $\text{₹}1,000 + \text{₹}80 = \text{₹} 1,080$.

The above cash flows of all five years will be discounted with the cost of capital. Here the expected rate i.e. 6% will be used.

Value of the bond is calculated as follows:

$$\begin{aligned}
 V_B &= \frac{\text{₹}1,400}{(1.06)^1} + \frac{\text{₹}1,320}{(1.06)^2} + \frac{\text{₹}1,240}{(1.06)^3} + \frac{\text{₹}1,160}{(1.06)^4} + \frac{\text{₹}1,080}{(1.06)^5} \\
 &= \frac{\text{₹}1,400}{1.06} + \frac{\text{₹}1,320}{1.1236} + \frac{\text{₹}1,240}{1.1910} + \frac{\text{₹}1,160}{1.2624} + \frac{\text{₹}1,080}{1.3382} \\
 &= \text{₹}1,320.75 + \text{₹}1,174.80 + \text{₹}1,041.14 + \text{₹}918.88 + \text{₹}807.05 = \text{₹} 5,262.62
 \end{aligned}$$

4.5.4 Cost of Convertible Debenture

Holders of the convertible debentures has the option to either get the debentures redeemed into the cash or get specified numbers of companies shares in lieu of cash. The calculation of cost of convertible debentures are very much similar to the redeemable debentures. While determining the redemption value of the debentures, it is assumed that all the debenture holders will choose the option

which has the higher value and accordingly it is considered to calculate cost of debt.

Example: A company issued 10,000, 15% Convertible debentures of ₹100 each with a maturity period of 5 years. At maturity the debenture holders will have the option to convert the debentures into equity shares of the company in the ratio of 1:10 (10 shares for each debenture). The current market price of the equity shares is ₹12 each and historically the growth rate of the shares are 5% per annum. Compute the cost of debentures assuming 35% tax rate.

Determination of Redemption value:

Higher of

(i) The cash value of debentures	= ₹100
(ii) Value of equity shares	= 10 shares × ₹12 (1+0.05) ⁵
	= 10 shares × 15.312 = ₹153.12

₹153.12 will be taken as redemption value as it is higher than the cash option and attractive to the investors.

Calculation of Cost of Convertible debenture (using approximation method):

$$K_d = \frac{\frac{I(1-t) + \frac{(RV-NP)}{n}}{2}}{\frac{(RV+NP)}{2}} = \frac{\frac{15(1-0.35) + \frac{(153.12-100)}{5}}{2}}{\frac{(153.12+100)}{2}} = \frac{9.75+10.62}{126.53} = 16.09\%$$

Alternatively:

Using present value method

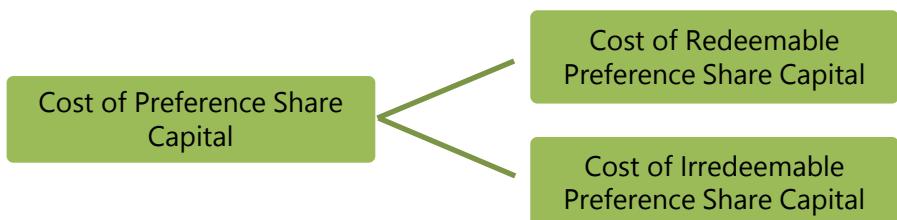
Year	Cash flows (₹)	Discount factor @ 15%	Present Value	Discount factor @ 20%	Present Value (₹)
0	100	1.000	(100.00)	1.000	(100.00)
1 to 5	9.75	3.352	32.68	2.991	29.16
5	153.12	0.497	76.10	0.402	61.55
NPV			+8.78		-9.29

$$IRR = L + \frac{NPV_L}{NPV_L - NPV_H} (H-L) = 15\% + \frac{8.78}{8.78 - (-9.29)} (20\% - 15\%) = 0.17429 \text{ or } 17.43\%$$



4.6 COST OF PREFERENCE SHARE CAPITAL

The preference share capital is paid dividend at a specified rate on face value of preference shares. Payment of dividend to the preference shareholders are not mandatory but are given priority over the equity shareholder. The payment of dividend to the preference shareholders are not charged as expenses but treated as appropriation of after tax profit. Hence, dividend paid to preference shareholders does not reduce the tax liability to the company. Like the debentures, Preference share capital can be categorised as redeemable and irredeemable. Accordingly cost of capital for each type will be discussed here.



4.6.1 Cost of Redeemable Preference Shares

Preference shares issued by a company which are redeemed on its maturity is called redeemable preference shares. Cost of redeemable preference share is similar to the cost of redeemable debentures with the exception that the dividends paid to the preference shareholders are not tax deductible. Cost of preference capital is calculated as follows:

$$\text{Cost of Redeemable Preference Shares } K_p = \frac{\frac{PD + \frac{(RV - NP)}{n}}{(RV + NP)}}{2}$$

Where,

PD = Annual preference dividend

RV = Redemption value of preference shares

NP = Net proceeds on issue of preference shares

n = Remaining life of preference shares.

Net proceeds mean issue price less issue expenses. If issue price is not given then students can assume it to be equal to current market price. If issue expenses are not given simply assume it equal to zero.

The cost of redeemable preference share could also be calculated as the discount rate that equates the net proceeds of the sale of preference shares with the present value of the future dividends and principal payments.

ILLUSTRATION 6

XYZ Ltd. issues 2,000 10% preference shares of ₹ 100 each at ₹ 95 each. The company proposes to redeem the preference shares at the end of 10th year from the date of issue. CALCULATE the cost of preference share?

SOLUTION

$$K_p = \frac{PD + \frac{(RV-NP)}{n}}{\frac{(RV+NP)}{2}}$$

$$K_p = \frac{10 + \left(\frac{100 - 95}{10} \right)}{\left(\frac{100 + 95}{2} \right)} = 0.1077 \text{ (approx.)} = 10.77\%$$

4.6.2 Cost of Irredeemable Preference Shares

The cost of irredeemable preference shares is similar to calculation of perpetuity. The cost is calculated by dividing the preference dividend with the current market price or net proceeds from the issue. The cost of irredeemable preference share is as below:

$$\text{Cost of Irredeemable Preference Share (} K_p \text{)} = \frac{PD}{P_0}$$

Where,

PD = Annual preference dividend

P_0 = Net proceeds in issue of preference shares

ILLUSTRATION 7

XYZ & Co. issues 2,000 10% preference shares of ₹ 100 each at ₹ 95 each. CALCULATE the cost of preference shares.

SOLUTION

$$K_p = \frac{PD}{P_0}$$

$$K_p = \frac{(10 \times 2,000)}{(95 \times 2,000)} = \frac{10}{95} = 0.1053 = 10.53\%$$

ILLUSTRATION 8

If R Energy is issuing preferred stock at ₹100 per share, with a stated dividend of ₹12, and a floatation cost of 3% then, CALCULATE the cost of preference share?

SOLUTION

$$K_p = \frac{\text{Preferred stock dividend}}{\text{Market price of preferred stock (1- floatation cost)}} \\ = \frac{\text{₹}12}{\text{₹}100(1-0.03)} = \frac{\text{₹}12}{\text{₹}97} = 0.1237 \text{ or } 12.37\%$$

**4.7 COST OF EQUITY SHARE CAPITAL**

Just like any other source of finance, cost of equity is expectation of equity shareholders. We know that value is performance divided by expectations. If we know value and performance, then we can calculate expectation as a balancing figure.

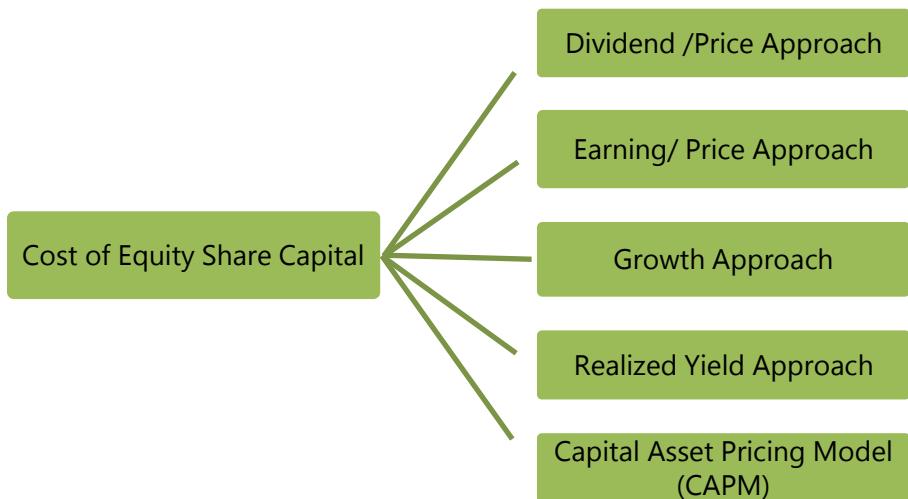
Here performance means the amount paid by the company to investors, like interest, dividend, redemption price etc. In case of debentures and preference shares amount of interest or dividend is fixed but in case of equity shares it is uncertain.

Therefore there is no single method for calculation of cost of equity.

- 1) If dividend is expected to be constant then **dividend price approach** should be used.
- 2) If earning per share is expected to be constant then **earning price approach** should be used.
- 3) If dividend and earning are expected to grow at a constant rate then **growth approach**, which is also named as **Gordon's model** should be used.

- 4) If it is difficult to forecast future then **realised yield approach** should be used, which looks into past.
- 5) All above methods calculate cost of equity as a balancing figure. While the cost of equity or expectation of investors is dependent on risk. Higher the risk higher the expectations and vice versa. **Capital asset pricing model** calculates cost of equity based on risk

Different methods are employed to compute the cost of equity share capital.



4.7.1 Dividend Price Approach

This is also known as Dividend Valuation Model. This model makes an assumption that the dividend per share is expected to remain constant forever. Here, cost of equity capital is computed by dividing the expected dividend by market price per share as follows:

$$\text{Cost of Equity (K}_e\text{)} = \frac{D}{P_0}$$

Where,

K_e = Cost of equity

D = Expected dividend

P_0 = Market price of equity (ex- dividend)

4.7.2 Earning/ Price Approach

The advocates of this approach co-relate the earnings of the company with the market price of its share. Accordingly, the cost of equity share capital would be based upon the expected rate of earnings of a company. The argument is that each investor expects a certain amount of earnings, whether distributed or not from the company in whose shares he invests. Thus, if an investor expects that the company in which he is going to subscribe for shares should have at least a 20% rate of earning, the cost of equity share capital can be construed on this basis. Suppose the company is expected to earn 30% the investor will be prepared to pay ₹ 150 $\left(\frac{30}{20} \times 100 \right)$ for each share of ₹ 100.

Earnings/ Price Approach:

$$\text{Cost of Equity (K}_e\text{)} = \frac{E}{P}$$

Where,

E = Current earnings per share

P = Market share price

This approach assumes that earning per share will remain constant forever. The Earning Price Approach is similar to the dividend price approach; only it seeks to nullify the effect of changes in the dividend policy.

4.7.3 Growth Approach or Gordon's Model

As per this approach the rate of dividend growth remains constant. Where earnings, dividends and equity share price all grow at the same rate, the cost of equity capital may be computed as follows:

$$\text{Cost of Equity (K}_e\text{)} = \frac{D_1}{P_0} + g$$

Where,

$D_1 = [D_0 (1 + g)]$ i.e. next expected dividend

P_0 = Current Market price per share

g = Constant Growth Rate of Dividend.

In case of newly issued equity shares where floatation cost is incurred, the cost of equity share with an estimation of constant dividend growth is calculated as below:

$$\text{Cost of Equity } (K_e) = \frac{D_1}{P_0 - F} + g$$

Where, F = Flotation cost per share

ILLUSTRATION 9

A company has paid dividend of ₹ 1 per share (of face value of ₹ 10 each) last year and it is expected to grow @ 10% next year. CALCULATE the cost of equity if the market price of share is ₹ 55.

SOLUTION

$$K_e = \frac{D_1}{P_0} + g = \frac{₹1(1+0.1)}{₹55} + 0.1 = 0.12 = 12\%$$

Dividend Discount Model with variable growth rate is explained in chapter 9 i.e. Dividend Decision

Estimation of Growth Rate

The calculation of 'g' (the growth rate) is an important factor in calculating cost of equity share capital. Generally two methods are used to determine the growth rate, which are discussed below:

(i) Average Method

It calculated as below:

$$\text{Current Dividend } (D_0) = D_n(1+g)^n$$

or

$$\text{Growth rate} = \sqrt[n]{\frac{D_0}{D_n}} - 1$$

Where,

D_0 = Current dividend,

D_n = Dividend in n years ago

Growth rate can also be found as follows:

Step-I: Divide D_0 by D_n , find out the result, then refer the FVIF table,

Step-II: Find out the result found at Step-I in corresponding year's row

Step-III: See the interest rate for the corresponding column. This is the growth rate.

Example: The current dividend (D_0) is ₹16.10 and the dividend 5 year ago was ₹10. The growth rate in the dividend can be found out as follows:

Step-I: Divide D_0 by D_n i.e. ₹16.10 ÷ ₹10 = 1.61

Step-II: Find out the result found at Step-I i.e. 1.61 in corresponding year's row i.e. 5th year

Step-III: See the interest rate for the corresponding column which is 10%. Therefore, growth rate (g) is 10%.

(ii) **Gordon's Growth Model**

Unlike the Average method, Gordon's growth model attempts to derive a future growth rate. As per this model increase in the level of investment will give rise to an increase in future dividends. This model takes Earnings retention rate (b) and rate of return on investments (r) into account to estimate the future growth rate.

It can be calculated as below:

$$\text{Growth (g)} = b \times r$$

Where,

r = rate of return on fund invested

b = earnings retention ratio/ rate*

*Proportion of earnings available to equity shareholders which is not distributed as dividend

(This Model is discussed in detail in chapter 9 i.e. Dividend Decision)

4.7.4 Realized Yield Approach

According to this approach, the average rate of return realized in the past few years is historically regarded as 'expected return' in the future. It computes cost of equity based on the past records of dividends actually realized by the equity shareholders. Though, this approach provides a single mechanism of calculating cost of equity, it has unrealistic assumptions like risks faced by the company remain same; the shareholders continue to expect the same rate of return; and the reinvestment opportunity cost (rate) of the shareholders is same as the realized yield. If the earnings do not remain stable, this method is not practical.

ILLUSTRATION 10

Mr. Mehra had purchased a share of Alpha Limited for ₹ 1,000. He received dividend for a period of five years at the rate of 10 percent. At the end of the fifth year, he sold the share of Alpha Limited for ₹ 1,128. You are required to COMPUTE the cost of equity as per realised yield approach.

SOLUTION

We know that as per the realised yield approach, cost of equity is equal to the realised rate of return. Therefore, it is important to compute the internal rate of return by trial and error method. This realised rate of return is the discount rate which equates the present value of the dividends received in the past five years plus the present value of sale price of ₹ 1,128 to the purchase price of ₹ 1,000. The discount rate which equalises these two is 12 percent approximately. Let us look at the table given for a better understanding:

Year	Dividend (₹)	Sale Proceeds (₹)	Discount Factor @ 12%	Present Value (₹)
1	100	-	0.893	89.3
2	100	-	0.797	79.7
3	100	-	0.712	71.2
4	100	-	0.636	63.6
5	100	-	0.567	56.7
6	Beginning	1,128	0.567	639.576
				1,000.076

We find that the purchase price of Alpha limited's share was ₹ 1,000 and the present value of the past five years of dividends plus the present value of the sale price at the discount rate of 12 per cent is ₹ 1,000.076. Therefore, the realised rate of return may be taken as 12 percent. This 12 percent is the cost of equity.

ILLUSTRATION 11

Calculate the cost of equity from the following data using realized yield approach:

Year	1	2	3	4	5
Dividend per share	1.00	1.00	1.20	1.25	1.15
Price per share (at the beginning)	9.00	9.75	11.50	11.00	10.60

SOLUTION

In this questions we will first calculate yield for last 4 years and then calculate it geometric mean as follows:

$$1+Y_1 = \frac{D_1+P_1}{P_0} = \frac{1+9.75}{9} = 1.1944$$

$$1+Y_2 = \frac{D_2+P_2}{P_1} = \frac{1+11.50}{9.75} = 1.2821$$

$$1+Y_3 = \frac{D_3+P_3}{P_2} = \frac{1.2+11}{11.5} = 1.0609$$

$$1+Y_4 = \frac{D_4+P_4}{P_3} = \frac{1.25+10.60}{11} = 1.0772$$

Geometric mean:

$$K_e = [(1+Y_1) \times (1+Y_2) \times \dots \times (1+Y_n)]^{1/n} - 1$$

$$K_e = [1.1944 \times 1.2821 \times 1.0609 \times 1.0772]^{1/4} - 1 = 0.15 = 15\%$$

Note: to calculate power $1/4$ simply press square root switch, two times on your calculator.

4.7.5 Capital Asset Pricing Model (CAPM) Approach

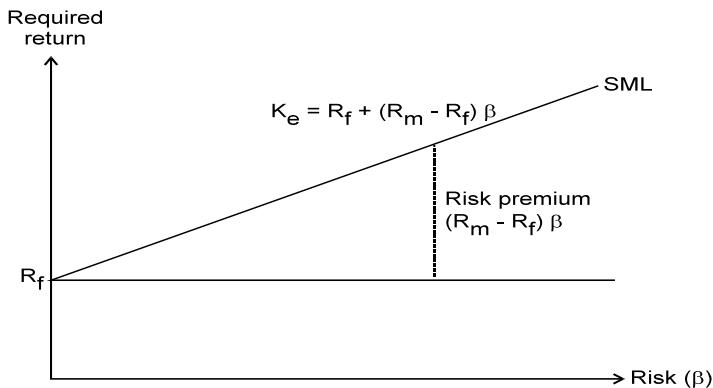
CAPM model describes the risk-return trade-off for securities. It describes the linear relationship between risk and return for securities.

The risks, to which a security is exposed, can be classified into two groups:

- (i) **Unsystematic Risk:** This is also called company specific risk as the risk is related with the company's performance. This type of risk can be reduced or eliminated by diversification of the securities portfolio. This is also known as diversifiable risk.
- (ii) **Systematic Risk:** It is the macro-economic or market specific risk under which a company operates. This type of risk cannot be eliminated by the diversification hence, it is non-diversifiable. The examples are inflation, Government policy, interest rate etc.

As diversifiable risk can be eliminated by an investor through diversification, the non-diversifiable risk is the risk which cannot be eliminated; therefore a business should be concerned as per CAPM method, solely with non-diversifiable risk.

The non-diversifiable risks are assessed in terms of beta coefficient (b or β) through fitting regression equation between return of a security and the return on a market portfolio.



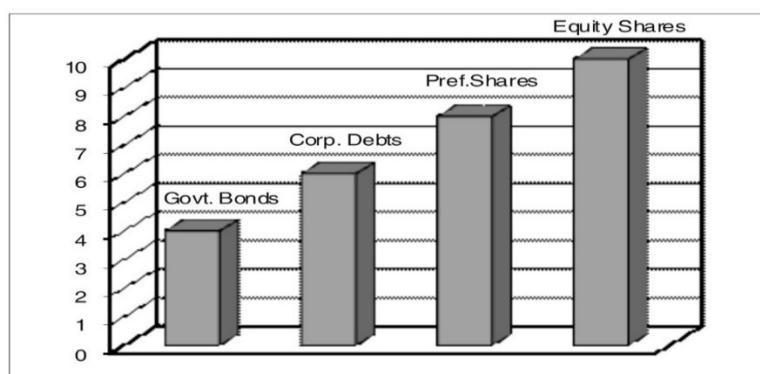
Cost of Equity under CAPM

Thus, the cost of equity capital can be calculated under this approach as:

$$\text{Cost of Equity (K}_e\text{)} = R_f + \beta (R_m - R_f)$$

Where,

- K_e = Cost of equity capital
- R_f = Risk free rate of return
- β = Beta coefficient
- R_m = Rate of return on market portfolio
- $(R_m - R_f)$ = Market risk premium



Risk Return relationship of various securities

Therefore, Required rate of return = Risk free rate + Risk premium

- ◆ The idea behind CAPM is that investors need to be compensated in two ways-time value of money and risk.
- ◆ The time value of money is represented by the risk-free rate in the formula and compensates the investors for placing money in any investment over a period of time.
- ◆ The other half of the formula represents risk and calculates the amount of compensation the investor needs for taking on additional risk. This is calculated by taking a risk measure (beta) which compares the returns of the asset to the market over a period of time and compares it to the market premium.

The CAPM says that the expected return of a security or a portfolio equals the rate on a risk-free security plus a risk premium. If this expected return does not meet or beat the required return, then the investment should not be undertaken.

The shortcomings of this approach are:

- (a) Estimation of betas with historical data is unrealistic; and
- (b) Market imperfections may lead investors to unsystematic risk.

Despite these shortcomings, the CAPM is useful in calculating cost of equity, even when the firm is suffering losses.

The basic factor behind determining the cost of equity share capital is to measure the expectation of investors from the equity shares of that particular company. Therefore, the whole question of determining the cost of equity shares hinges upon the factors which go into the expectations of particular group of investors in a company of a particular risk class.

ILLUSTRATION 12

CALCULATE the cost of equity capital of H Ltd., whose risk free rate of return equals 10%. The firm's beta equals 1.75 and the return on the market portfolio equals to 15%.

SOLUTION

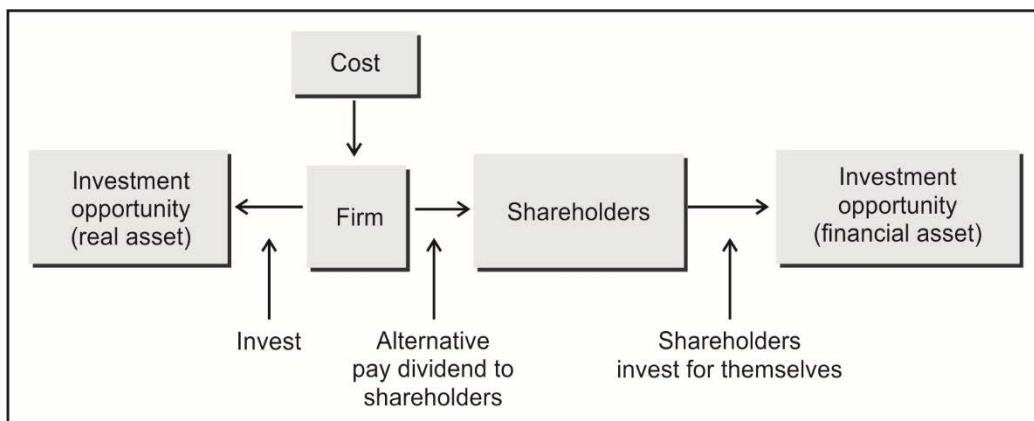
$$\begin{aligned}
 K_e &= R_f + \beta (R_m - R_f) \\
 K_e &= 0.10 + 1.75 (0.15 - 0.10) \\
 &= 0.10 + 1.75 (0.05) \\
 &= 0.1875 \text{ or } 18.75\%
 \end{aligned}$$



4.8 COST OF RETAINED EARNINGS

Like another source of fund, retained earnings involve cost. It is the opportunity cost of dividends foregone by shareholders.

The given figure depicts how a company can either keep or reinvest cash or return it to the shareholders as dividends. (Arrows represent possible cash flows or transfers.) If the cash is reinvested, the opportunity cost is the expected rate of return that shareholders could have obtained by investing in financial assets.



Cost of Retained Earnings

The cost of retained earnings is often used interchangeably with the cost of equity, as cost of retained earnings is nothing but the expected return of the shareholders from the investment in shares of the company. However, normally cost of equity remains higher than the cost of retained earnings, due to issue of shares at a price lower than current market price and floatation cost.

Formulas used for calculation of cost of retained earnings are same as formulas used for calculation of cost equity:

$$\text{Dividend Price method: } K_r = \frac{D}{P}$$

$$\text{Earning Price method: } K_r = \frac{EPS}{P}$$

$$\text{Growth method: } K_r = \frac{D_1}{P_0} + g$$

But for the purpose of calculation of K_e : $P = \text{net proceeds realized} = \text{issue price less floatation cost}$. And for the purpose of calculation of K_r : $P = \text{current market price}$.

ILLUSTRATION 13

Face value of equity shares of a company is Rs.10, while current market price is Rs.200 per share. Company is going to start a new project, and is planning to finance it partially by new issue and partially by retained earnings. You are required to CALCULATE cost of equity shares as well as cost of retained earnings if issue price will be Rs.190 per share and floatation cost will be Rs.5 per share. Dividend at the end of first year is expected to be Rs.10 and growth rate will be 5%.

SOLUTION

$$K_r = \frac{D_1}{P_0} + g = \frac{10}{200} + .05 = 10\%$$

$$K_e = \frac{D_1}{P_0} + g = \frac{10}{190 - 5} + .05 = 10.41\%$$

If personal tax is also considered then a shortcut formula may be as follows:

$$K_r = K_e (1-t_p)(1-f)$$

Here t_p is rate of personal tax on dividend and "f" is rate of flotation cost.

Here personal income tax means income tax payable on dividend income by equity shareholders. Currently dividend income is not taxable in the hands of investors. Only dividend received in excess of Rs.10 lakhs by an Individual, HUF or firm from domestic company is taxed at the rate of 10%.

Example: Cost of equity of a company is 20%. Rate of floatation cost is 5%. Rate of personal income tax is 30%. Calculate cost of retained earnings.

Solution:

$$K_r = K_e (1-t_p)(1-f) = 20\% \times (1-0.30) \times (1-0.05) = 13.3\%$$

Floatation Cost: The new issue of a security (debt or equity) involves some expenditure in the form of underwriting or brokerage fees, legal and administrative charges, registration fees, printing expenses etc. The sum of all these cost is known as floatation cost. This expenditure is incurred to make the securities available to the investors. Floatation cost is adjusted to arrive at net proceeds for the calculation of cost of capital.

ILLUSTRATION 14

ABC Company provides the following details:

$$D_0 = ₹ 4.19 \quad P_0 = ₹ 50 \quad g = 5\%$$

CALCULATE the cost of retained earnings.

SOLUTION

$$\begin{aligned} K_r &= \frac{D_1}{P_0} + g = \frac{D_0(1+g)}{P_0} + g \\ &= \frac{₹4.19(1+0.05)}{₹50} + 0.05 \\ &= 0.088 + 0.05 \\ &= 13.8\% \end{aligned}$$

ILLUSTRATION 15

ABC Company provides the following details:

$$R_f = 7\% \quad \beta = 1.20 \quad R_m - R_f = 6\%$$

CALCULATE the cost of retained earnings based on CAPM method.

SOLUTION

$$\begin{aligned} K_r &= R_f + \beta (R_m - R_f) \\ &= 7\% + 1.20 (6\%) \\ &= 7\% + 7.20 \\ K_r &= 14.2\% \end{aligned}$$

**4.9 EFFECTIVE INTEREST RATE (EIR) METHOD:**

After the introduction to Effective Interest Rate Method under Ind AS 109, one should be familiar with this concept as well. Though students will study this concept and the standard in detail in the subject of Accounting/Financial reporting, a brief and relevant part of it, is stated here for reference only.

Definition of 'Effective Interest Method': It is 'the rate that exactly discounts estimated future cash payments or receipts through the expected life of the financial asset or financial liability to the gross carrying amount of a financial asset or to the amortised cost of a financial liability. When calculating the effective

interest rate, an entity shall estimate the expected cash flows by considering all the contractual terms of the financial instrument (for example, prepayment, extension, call and similar options) but shall not consider the expected credit losses (ECL). The calculation includes all fees and points paid or received between parties to the contract that are an integral part of the effective interest rate, transaction costs, and all other premiums or discounts. There is a presumption that the cash flows and the expected life of a group of similar financial instruments can be estimated reliably. However, in those rare cases when it is not possible to reliably estimate the cash flows or the expected life of a financial instrument (or group of financial instruments), the entity shall use the contractual cash flows over the full contractual term of the financial instrument (or group of financial instruments).'

Application of EIR Method: For floating (variable)-rate financial assets or financial liabilities, periodic re-estimation of cash flows to reflect the movements in the market rates of interest alters the effective interest rate. If the floating (variable)-rate financial asset or financial liability is recognized initially at an amount equal to the principal receivable or payable on maturity, re-estimating the future interest payments normally has no significant effect on the carrying amount of the asset or the liability.

So, depending on Materiality an appropriate approach for amortisation can be determined. If the amount of transaction costs, premiums or discount is not significant the straight line amortisation can be done .if the amounts are significant EIR rate, for amortising these amounts may be applied.



4.10 WEIGHTED AVERAGE COST OF CAPITAL (WACC)

To balance financial risk, control over the company and cost of capital, a company usually does not procure entire fund from a single source. Rather than it makes a mix of various sources of finance. Hence cost of total capital will be equal to weighted average of cost of individual sources of finance.

WACC is also known as the overall cost of capital of having capitals from the different sources as explained above. WACC of a company depends on the capital structure of a company. It weighs the cost of capital of a particular source of capital with its proportion to the total capital. Thus, weighted average cost of capital is the weighted average after tax costs of the individual components of firm's capital structure. That is, the after tax cost of each debt and equity is calculated separately and added together to a single overall cost of capital

The steps to calculate WACC is as follows:

Step 1: Calculated the total capital from all the sources.

(i.e. Long term debt capital + Pref. Share Capital + Equity Share Capital + Retained Earnings)

Step 2: Calculated the proportion (or %) of each source of capital to the total capital.

(i.e.
$$\frac{\text{Equity Share Capital (for example)}}{\text{Total Capital (as calculated in Step 1 above)}}$$
)

Step 3: Multiply the proportion as calculated in Step 2 above with the respective cost of capital.

(i.e. $K_e \times$ Proportion (%) of equity share capital (for example) calculated in Step 2 above)

Step 4: Aggregate the cost of capital as calculated in Step 3 above. This is the WACC.

(i.e. $K_e + K_d + K_p + K_s$ as calculated in Step 3 above)

Example:

Calculation of WACC

Capital Component	Cost of capital	% of total capital structure	Total
Retained Earnings	10% (K_r)	25% (W_r)	2.50% ($K_r \times W_r$)
Equity Share Capital	11% (K_e)	10% (W_e)	1.10% ($K_e \times W_e$)
Preference Share Capital	9% (K_p)	15% (W_p)	1.35% ($K_p \times W_p$)
Long term debts	6% (K_d)	50% (W_d)	3.00% ($K_d \times W_d$)
Total (WACC)			7.95%

The cost of weighted average method is preferred because the proportions of various sources of funds in the capital structure are different. To be representative, therefore, cost of capital should take into account the relative proportions of different sources of finance.

Securities analysts employ WACC all the time when valuing and selecting investments. In discounted cash flow analysis, WACC is used as the discount rate

applied to future cash flows for deriving a business's net present value. WACC can be used as a hurdle rate against which to assess return on investment capital performance. Investors use WACC as a tool to decide whether or not to invest. The WACC represents the minimum rate of return at which a company produces value for its investors. Let's say a company produces a return of 20% and has a WACC of 11%. By contrast, if the company's return is less than WACC, the company is shedding value, which indicates that investors should put their money elsewhere.

Therefore, WACC serves as a useful reality check for investors.

4.10.1 Choice of weights

There is a choice weights between the book value (BV) and market value(MV).

Book Value(BV): Book value weights is operationally easy and convenient. **While** using BV, reserves such as share premium and retained profits are included in the BV of equity, in addition to the nominal value of share capital. Here the value of equity will generally not reflect historic asset values, as well as the future prospects of an organisation.

Market Value(MV): Market value weight is more correct and represent a firm's capital structure. It is preferable to use MV weights for the equity. While using MV, reserves such as share premium and retained profits are ignored as they are in effect incorporated into the value of equity. It represents existing conditions and also take into consideration the impacts of changing market conditions and the current prices of various security. Similarly, in case of debt MV is better to be used rather than the BV of the debt, though the difference may not be very significant.

There is no separate market value for retained earnings. Market value of equity shares represents both paid up equity capital and retained earnings. But cost of equity is not same as cost of retained earnings. Hence to give market value weights, market value equity shares should be apportioned in the ratio of book value of paid up equity capital and book value of retained earnings.

ILLUSTRATION 16

Cost of equity of a company is 10.41% while cost of retained earnings is 10%. There are 50,000 equity shares of Rs.10 each and retained earnings of Rs.15,00,000. Market price per equity share is Rs.50. Calculate WACC using market value weights if there is no other sources of finance.

SOLUTION

Book value of paid up equity capital = ₹ 5,00,000

Book value of retained earnings = ₹ 15,00,000

Ratio Paid up equity capital & retained earnings = 500000:1500000 = 1:3

Market value of paid equity capital & retained earnings = ₹ 50,000 x ₹ 50 = ₹ 25,00,000

Market value of paid up equity capital = ₹ 25,00,000 x $\frac{1}{4}$ = ₹ 6,25,000

Market value of retained earnings = ₹ 25,00,000 x $\frac{3}{4}$ = ₹ 18,75,000

Calculation of WACC using market value weights

Source of capital	Market Value	Weights	Cost of capital	WACC (K _o)
	(₹)	(a)	(b)	(c) = (a) x (b)
Equity shares	6,25,000	0.25	0.1041	0.0260
Retained earnings	18,75,000	0.75	0.1000	0.0750
	25,00,000	1.000		0.1010

WACC (K_o) = 0.1010 or 10.10%

ILLUSTRATION 17

CALCULATE the WACC using the following data by using:

(a) Book value weights

(b) Market value weights

The capital structure of the company is as under:

	(₹)
Debentures (₹ 100 per debenture)	5,00,000
Preference shares (₹ 100 per share)	5,00,000
Equity shares (₹ 10 per share)	10,00,000
	20,00,000

The market prices of these securities are:

Debentures ₹ 105 per debenture

Preference shares ₹ 110 per preference share

Equity shares ₹ 24 each.

Additional information:

- (1) ₹ 100 per debenture redeemable at par, 10% coupon rate, 4% floatation costs, 10 year maturity.
- (2) ₹ 100 per preference share redeemable at par, 5% coupon rate, 2% floatation cost and 10 year maturity.
- (3) Equity shares has ₹ 4 floatation cost and market price ₹ 24 per share.

The next year expected dividend is ₹ 1 with annual growth of 5%. The firm has practice of paying all earnings in the form of dividend.

Corporate tax rate is 50%. Assume that floatation cost is to be calculated on face value

SOLUTION

$$\text{Cost of Equity (K}_e\text{)} = \frac{D_1}{P_0 - F} + g = \frac{₹1}{₹24 - ₹4} + 0.05 = 0.1 \text{ or } 10\%$$

$$\text{Cost of Debt (K}_d\text{)} = \frac{I(1-t) + \left(\frac{RV - NP}{n} \right)}{\left(\frac{RV + NP}{2} \right)} = \frac{10(1-0.5) + \left(\frac{100 - NP}{n} \right)}{\left(\frac{RV + NP}{2} \right)}$$

$$\text{Cost of debt} = K_d = \frac{10(1-0.5) + \frac{(100 - 96)}{10}}{\frac{(100 + 96)}{2}} = \left(\frac{5 + 0.4}{98} \right) = 0.055 \text{ (approx.)}$$

$$\text{Cost of preference shares} = K_p = \left(\frac{5 + \frac{2}{10}}{\frac{198}{2}} \right) = \left(\frac{5.2}{99} \right) = 0.053 \text{ (approx.)}$$

(a) Calculation of WACC using book value weights

Source of capital	Book Value	Weights	After tax cost of capital	WACC (K _o)
	(₹)	(a)	(b)	(c) = (a) × (b)
10% Debentures	5,00,000	0.25	0.055	0.0137
5% Preference shares	5,00,000	0.25	0.053	0.0132
Equity shares	10,00,000	0.50	0.10	0.0500
	20,00,000	1.00		0.0769

WACC (K_o) = 0.0769 or 7.69%

(b) Calculation of WACC using market value weights

Source of capital	Market Value	Weights	After tax cost of capital	WACC (K_o)
	(₹)	(a)	(b)	(c) = (a) x (b)
10% Debentures ($₹105 \times 5,000$)	5,25,000	0.151	0.055	0.008
5% Preference shares ($₹110 \times 5,000$)	5,50,000	0.158	0.053	0.008
Equity shares ($₹24 \times 1,00,000$)	24,00,000	0.691	0.10	0.069
	34,75,000	1.000		0.085

WACC (K_o) = 0.085 or 8.5%



4.11 MARGINAL COST OF CAPITAL

The marginal cost of capital may be defined as the cost of raising an additional rupee of capital. Since the capital is raised in substantial amount in practice, marginal cost is referred to as the cost incurred in raising new funds. Marginal cost of capital is derived, when the average cost of capital is **calculated using the marginal weights**.

The marginal weights represent the proportion of funds the firm intends to employ. Thus, the problem of choosing between the book value weights and the **market value weights** does not arise in the case of marginal cost of capital computation.

To calculate the marginal cost of capital, the intended financing proportion should be applied as weights to marginal component costs. The marginal cost of capital should, therefore, be calculated in the composite sense. When a firm raises funds in proportional manner and the component's cost remains unchanged, there will be no difference between average cost of capital (of the total funds) and the marginal cost of capital. The component costs may remain constant upto certain level of funds raised and then start increasing with amount of funds raised.

For example, the cost of debt may remain 7% (after tax) till ₹10 lakhs of debt is raised, between ₹10 lakhs and ₹15 lakhs, the cost may be 8% and so on. Similarly, if the firm has to use the external equity when the retained profits are not sufficient, the cost of equity will be higher because of the floatation costs. When the

components cost start rising, the average cost of capital will rise and the marginal cost of capital will however, rise at a faster rate.

ILLUSTRATION 18

ABC Ltd. has the following capital structure EXAMINE which is considered to be optimum as on 31st March, 2017.

	(₹)
14% Debentures	30,000
11% Preference shares	10,000
Equity Shares (10,000 shares)	1,60,000
	2,00,000

The company share has a market price of ₹ 23.60. Next year dividend per share is 50% of year 2017 EPS. The following is the trend of EPS for the preceding 10 years which is expected to continue in future.

Year	EPS (₹)	Year	EPS (₹)
2008	1.00	2013	1.61
2009	1.10	2014	1.77
2010	1.21	2015	1.95
2011	1.33	2016	2.15
2012	1.46	2017	2.36

The company issued new debentures carrying 16% rate of interest and the current market price of debenture is ₹ 96.

Preference share ₹ 9.20 (with annual dividend of ₹ 1.1 per share) were also issued. The company is in 50% tax bracket.

- (A) *CALCULATE after tax:*
 - (i) *Cost of new debt*
 - (ii) *Cost of new preference shares*
 - (iii) *New equity share (assuming new equity from retained earnings)*
- (B) *CALCULATE marginal cost of capital when no new shares are issued.*
- (C) *DETERMINE the amount that can be spent for capital investment before new ordinary shares must be sold. Assuming that retained earnings for next year's investment are 50 percent of 2017.*

(D) COMPUTE marginal cost of capital when the funds exceeds the amount calculated in (C), assuming new equity is issued at ₹20 per share?

SOLUTION

(A) (i) Cost of new debt

$$K_d = \frac{I(1-t)}{P_0}$$

$$= \frac{16(1-0.5)}{96} = 0.0833$$

(ii) Cost of new preference shares

$$K_p = \frac{PD}{P_0} = \frac{1.1}{9.2} = 0.12$$

(iii) Cost of new equity shares

$$K_e = \frac{D_1}{P_0} + g$$

$$= \frac{1.18}{23.60} + 0.10 = 0.05 + 0.10 = 0.15$$

Calculation of D_1

$D_1 = 50\% \text{ of } 2013 \text{ EPS} = 50\% \text{ of } 2.36 = ₹ 1.18$

(B) Calculation of marginal cost of capital

Type of Capital	Proportion	Specific Cost	Product
(1)	(2)	(3)	(2) × (3) = (4)
Debenture	0.15	0.0833	0.0125
Preference Share	0.05	0.12	0.0060
Equity Share	0.80	0.15	0.1200
	Marginal cost of capital		0.1385

(C) The company can spend the following amount without increasing marginal cost of capital and without selling the new shares:

Retained earnings = (0.50) (2.36 × 10,000) = ₹ 11,800

The ordinary equity (Retained earnings in this case) is 80% of total capital

11,800 = 80% of Total Capital

$$\therefore \text{Capital investment before issuing equity} = \frac{\text{₹}11,800}{0.80} = \text{₹}14,750$$

(D) If the company spends in excess of ₹ 14,750 it will have to issue new shares.

$$\therefore \text{Capital investment before issuing equity} = \frac{\text{₹}1.18}{20} + 0.10 = 0.159$$

The marginal cost of capital will be:

Type of Capital (1)	Proportion (2)	Specific Cost (3)	Product (2) × (3) = (4)
Debentures	0.15	0.0833	0.0125
Preference Shares	0.05	0.1200	0.0060
Equity Shares (New)	0.80	0.1590	0.1272
			0.1457

SUMMARY

- ◆ **Cost of Capital:** In simple terms Cost of capital refers to the discount rate that is used in determining the present value of the estimated future cash proceeds of the business/new project and eventually deciding whether the business/new project is worth undertaking or not. It is also the minimum rate of return that a firm must earn on its investment which will maintain the market value of share at its current level. It can also be stated as the opportunity cost of an investment, i.e. the rate of return that a company would otherwise be able to earn at the same risk level as the investment that has been selected.
- ◆ **Components of Cost of Capital:** In order to calculate the specific cost of each type of capital, recognition should be given to the explicit and the implicit cost. The cost of capital can be either explicit or implicit. The explicit cost of any source of capital may be defined as the discount rate that equals that present value of the cash inflows that are incremental to the taking of financing opportunity with the present value of its incremental cash outflows. Implicit cost is the rate of return associated with the best investment opportunity for the firm and its shareholders that will be foregone if the project presently under consideration by the firm was accepted.
- ◆ **Measurement of Specific Cost of Capital for each source of Capital:** The first step in the measurement of the cost of the capital of the firm is the calculation of the cost of individual sources of raising funds. From the viewpoint of capital

budgeting decisions, the long term sources of funds are relevant as they constitute the major sources of financing the fixed assets. In calculating the cost of capital, therefore the focus on long-term funds and which are:-

Long term debt (including Debentures)

Preference Shares

Equity Capital

Retained Earnings

- ◆ **Weighted Average Cost of Capital:-** WACC (weighted average cost of capital) represents the investors' opportunity cost of taking on the risk of putting money into a company. Since every company has a capital structure i.e. what percentage of funds comes from retained earnings, equity shares, preference shares, debt and bonds, so by taking a weighted average, it can be seen how much cost/interest the company has to pay for every rupee it borrows/invest. This is the weighted average cost of capital.

TEST YOUR KNOWLEDGE

MCQs based Questions

1. Which of the following is not an assumption of the capital asset pricing model (CAPM)?
 - (a) The capital Market is efficient
 - (b) Investors lend or borrow at a risk-free rate of return
 - (c) Investors do not have the same expectations about the risk and return
 - (d) Investor's decisions are based on a single-time period
2. Given: risk-free rate of return = 5 % market return = 10%, cost of equity = 15% value of beta (β) is:
 - (a) 1.9
 - (b) 1.8
 - (c) 2.0
 - (d) 2.2
3. Which of the following sources of funds is related to Implicit Cost of Capital?
 - (a) Equity Share Capital,

(b) Preference Share Capital,
...
(c) Debentures,
(d) Retained earnings.

4. Which of the following cost of capital require to adjust tax?
(a) Cost of Equity Shares,
(b) Cost of Preference Shares,
(c) Cost of Debentures,
(d) Cost of Retained Earnings.

5. Marginal Cost of capital is the cost of:
(a) Additional Revenue,
(b) Additional Funds,
(c) Additional Interests,
(d) None of the above.

6. In order to calculate Weighted Average Cost of Capital, weights may be based on:
(a) Market Values,
(b) Target Values
(c) Book Values,
(d) Anyone.

7. Firm's Cost of Capital is the average cost of :
(a) All sources of finance,
(b) All Borrowings,
(c) All share capital,
(d) All Bonds & Debentures.

Theoretical based Questions

1. DISCUSS the meaning of weighted average cost of capital? ILLUSTRATE with an example.

2. DISCUSS the dividend-price approach, and earnings price approach to estimate cost of equity capital.
3. What is the DIFFERENCE between Book Value and Market Value?
4. DISCUSS Marginal Cost of Capital?
5. EXPLAIN YTM approach of calculating Cost of Debt.
6. DISCUSS the meaning of Amortisation of Bond?

Practical Problems

1. DETERMINE the cost of capital of Best Luck Limited using the book value (BV) and market value (MV) weights from the following information:

Sources	Book Value	Market Value
	(₹)	(₹)
Equity shares	1,20,00,000	2,00,00,000
Retained earnings	30,00,000	—
Preference shares	36,00,000	33,75,000
Debentures	9,00,000	10,40,000

Additional information :

- I. Equity: Equity shares are quoted at ₹ 130 per share and a new issue priced at ₹ 125 per share will be fully subscribed; flotation costs will be ₹ 5 per share.
- II. Dividend: During the previous 5 years, dividends have steadily increased from ₹ 10.60 to ₹ 14.19 per share. Dividend at the end of the current year is expected to be ₹ 15 per share.
- III. Preference shares: 15% Preference shares with face value of ₹ 100 would realise ₹ 105 per share.
- IV. Debentures : The company proposes to issue 11-year 15% debentures but the yield on debentures of similar maturity and risk class is 16% ; flotation cost is 2%.
- V. Tax : Corporate tax rate is 35%. Ignore dividend tax.
2. Gamma Limited has in issue 5,00,000 ₹ 1 ordinary shares whose current ex-dividend market price is ₹ 1.50 per share. The company has just paid a dividend of 27 paise per share, and dividends are expected to continue at this level for

some time. If the company has no debt capital, COMPUTE the weighted average cost of capital?

3. Masco Limited wishes to raise additional finance of ₹ 10 lakhs for meeting its investment plans. It has ₹ 2,10,000 in the form of retained earnings available for investment purposes. Further details are as following:

(1)	Debt / equity mix	30%/70%
(2)	Cost of debt	
	Upto ₹ 1,80,000	10% (before tax)
	Beyond ₹ 1,80,000	16% (before tax)
(3)	Earnings per share	₹ 4
(4)	Dividend pay out	50% of earnings
(5)	Expected growth rate in dividend	10%
(6)	Current market price per share	₹ 44
(7)	Tax rate	50%

You are required:

- (a) To DETERMINE the pattern for raising the additional finance.
- (b) To DETERMINE the post-tax average cost of additional debt.
- (c) To DETERMINE the cost of retained earnings and cost of equity, and
- (d) COMPUTE the overall weighted average after tax cost of additional finance.

4. The following details are provided by the GPS Limited:

	(₹)
Equity Share Capital	65,00,000
12% Preference Share Capital	12,00,000
15% Redeemable Debentures	20,00,000
10% Convertible Debentures	8,00,000

The cost of equity capital for the company is 16.30% and Income Tax rate for the company is 30%.

You are required to CALCULATE the Weighted Average Cost of Capital (WACC) of the company.

ANSWERS/SOLUTIONS

Answers to the MCQs based Questions

1. (c) 2. (c) 3. (d) 4. (c) 5. (b) 6. (d)
7. (a)

Answers to the Theoretical Questions

1. Please refer paragraph 4.10
2. Please refer paragraph 4.7.1
3. Please refer paragraph 4.10.1
4. Please refer paragraph 4.11
5. Please refer paragraph 4.5.3.1
6. Please refer paragraph 4.5.3.2



Answers to the Practical Problems

1. (i) Cost of Equity (K_e) = $\frac{D_1}{P_0 - F} + g = \frac{\text{₹}15}{\text{₹}125 - \text{₹}5} + 0.06$ (refer to working note)
 $K_e = 0.125 + 0.06 = 0.185$

Working Note: Calculation of 'g'

$$\text{₹} 10.6(1+g)^5 = \text{₹} 14.19 \text{ Or, } (1+g)^5 = \frac{14.19}{10.6} = 1.338$$

Table (FVIF) suggests that ₹1 compounds to ₹1.338 in 5 years at the compound rate of 6 percent. Therefore, g is 6 per cent.

(ii) Cost of Retained Earnings (K_s) = $\frac{D_1}{P_0} + g = \frac{\text{₹}15}{\text{₹}125} + 0.06 = 0.18$

(iii) Cost of Preference Shares (K_p) = $\frac{PD}{P_0} = \frac{\text{₹}15}{\text{₹}105} = 0.1429$

(iv) Cost of Debentures (K_d) =
$$\frac{I(1-t) + \left(\frac{RV - NP}{n} \right)}{\frac{RV + NP}{2}}$$

$$\begin{aligned}
 & \dots \\
 & = \frac{\text{₹}15(1-0.35) + \left(\frac{\text{₹}100 - \text{₹}91.75^*}{11 \text{years}} \right)}{\frac{\text{₹}100 + \text{₹}91.75^*}{2}} \\
 & = \frac{\text{₹}15 \times 0.65 + \text{₹}0.75}{\text{₹}95.875} = \frac{\text{₹}10.5}{\text{₹}95.875} = 0.1095
 \end{aligned}$$

*Since yield on similar type of debentures is 16 per cent, the company would be required to offer debentures at discount.

Market price of debentures (approximation method)

$$= \text{₹}15 \div 0.16 = \text{₹}93.75$$

Sale proceeds from debentures = ₹93.75 - ₹2 (i.e., floatation cost) = ₹91.75

Market value (P_0) of debentures can also be found out using the present value method:

$$P_0 = \text{Annual Interest} \times \text{PVIFA} (16\%, 11 \text{ years}) + \text{Redemption value} \times \text{PVIF} (16\%, 11 \text{ years})$$

$$P_0 = \text{₹}15 \times 5.029 + \text{₹}100 \times 0.195$$

$$P_0 = \text{₹}75.435 + \text{₹}19.5 = \text{₹}94.935$$

$$\text{Net Proceeds} = \text{₹}94.935 - 2\% \text{ of } \text{₹}100 = \text{₹}92.935$$

Accordingly, the cost of debt can be calculated

Cost of capital (amount in lakh of rupees)

[BV weights and MV weights]

Source of capital	Weights		Specific Cost (K)	Total cost	
	BV	MV		(BV × K)	(MV × K)
Equity Shares	120	160*	0.1850	22.2	29.6
Retained Earnings	30	40*	0.1800	5.4	7.2
Preference Shares	36	33.75	0.1429	5.14	4.82
Debentures	9	10.4	0.1095	.986	1.139
Total	195	244.15		33.73	42.76

*Market Value of equity has been apportioned in the ratio of Book Value of equity and retained earnings

Weighted Average Cost of Capital (WACC):

$$\text{Using Book Value} = \frac{\text{₹ }33.73}{\text{₹ }195} = 0.1729 \text{ or } 17.29\%$$

$$\text{Using Market Value} = \frac{\text{₹ }42.76}{\text{₹ }244.15} = 0.1751 \text{ or } 17.51\%$$

2. Market value of equity, $E = 5,00,000 \text{ shares} \times \text{₹ }1.50 = \text{₹ }7,50,000$

Market value of debt, $D = \text{Nil}$

$$\text{Cost of equity capital, } K_e = \frac{D_1}{P_0} = \frac{\text{Nu. }0.27}{\text{Nu. }1.50} = 0.18$$

Since there is no debt capital, WACC = $K_e = 18$ per cent.

3. (a) Pattern of raising additional finance

Equity	70% of ₹ 10,00,000	= ₹ 7,00,000	● ● ●
Debt	30% of ₹ 10,00,000	= ₹ 3,00,000	

The capital structure after raising additional finance:

		(₹)
Shareholders' funds		
Equity Capital	(7,00,000–2,10,000)	4,90,000
Retained earnings		2,10,000
Debt (Interest at 10% p.a.)		1,80,000
(Interest at 16% p.a.)	(3,00,000–1,80,000)	1,20,000
Total Funds		10,00,000

(b) Determination of post-tax average cost of additional debt

$$K_d = I (1 - t)$$

Where,

I = Interest Rate

t = Corporate tax-rate

$$\text{On ₹ } 1,80,000 = 10\% (1 - 0.5) = 5\% \text{ or } 0.05$$

$$\text{On ₹ } 1,20,000 = 16\% (1 - 0.5) = 8\% \text{ or } 0.08$$

... Average Cost of Debt

$$= \frac{(\text{₹}1,80,000 \times 0.05) + (\text{₹}1,20,000 \times 0.08)}{\text{₹}3,00,000} \times 100 = 6.2\%$$

(c) Determination of cost of retained earnings and cost of equity applying Dividend growth model:

$$K_e = \frac{D_1}{P_0} + g$$

Where,

K_e = Cost of equity

$D_1 = D_0(1 + g)$

D_0 = Dividend paid (i.e., 50% of EPS = 50% \times ₹ 4 = ₹ 2)

g = Growth rate

P_0 = Current market price per share

$$\text{Then, } K_e = \frac{\text{₹}2(1.1)}{\text{₹}44} + 0.10 = \frac{\text{₹}2.2}{\text{₹}44} + 0.10 = 0.05 + 0.10 = 0.15 = 15\%$$

(d) Computation of overall weighted average after tax cost of additional finance

Particular	(₹)	Weights	Cost of funds	Weighted Cost (%)
Equity (including retained earnings)	7,00,000	0.70	15%	10.5
Debt	3,00,000	0.30	6.2%	1.86
WACC	10,00,000			12.36

4. Calculation of Weighted Average Cost of Capital (WACC)

Source	Amount (₹)	Weight	Cost of Capital after tax	WACC
Equity Capital	65,00,000	0.619	0.163	0.1009
12% Preference Capital	12,00,000	0.114	0.120	0.0137

15% Redeemable Debentures	20,00,000	0.190	0.105*	0.020
10% Convertible Debentures	8,00,000	0.076	0.07**	0.0053
Total	1,05,00,000	1.0000		0.1399

* Cost of Debentures (after tax) = 15 (1 – 0.30) = 10.5% = 0.105

** Cost of Debentures (after tax) = 10 (1 – 0.30) = 7% = 0.07

Weighted Average Cost of Capital = 0.1399 = 13.99%

(Note: In the above solution, the Cost of Debentures has been computed in the above manner without considering the impact of special features i.e. redeemability and convertibility in absence of requisite information.)



FINANCING DECISIONS

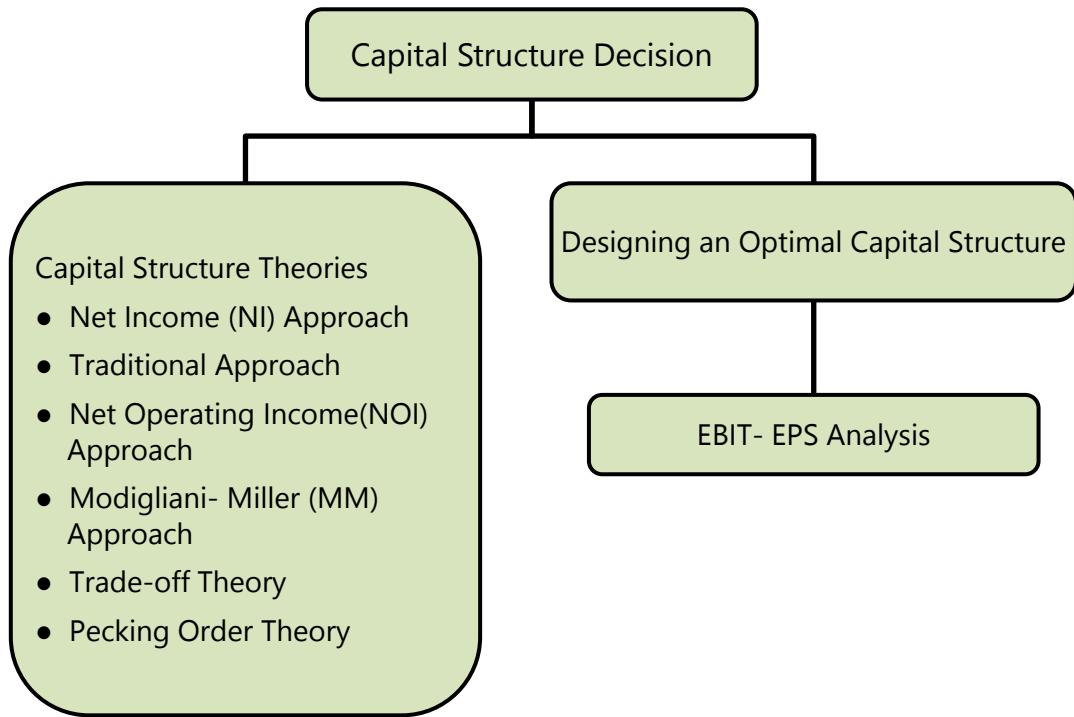
CAPITAL STRUCTURE



LEARNING OUTCOMES

- State the meaning and significance of capital structure.
- Discuss the various capital structure theories i.e. Net Income Approach, Traditional Approach, Net Operating Income (NOI) Approach, Modigliani and Miller (MM) Approach, Trade- off Theory and Pecking Order Theory.
- Describe concepts and factors for designing an optimal capital structure.
- Discuss essential features of capital structure of an entity.
- Discuss optimal capital structure.
- Analyse the relationship between the performance of a company and its impact on the earnings of the shareholders i.e. EBIT-EPS analysis.
- Discuss the meaning, causes and consequences of over and under capitalisation to an entity.

CHAPTER OVERVIEW



5.1 MEANING OF CAPITAL STRUCTURE

Capital structure is the combination of capitals from different sources of finance. The capital of a company consists of equity share holders' fund, preference share capital and long term external debts. The source and quantum of capital is decided keeping in mind following factors:

1. **Control:** capital structure should be designed in such a manner that existing shareholders continue to hold majority stack.
2. **Risk:** capital structure should be designed in such a manner that financial risk of the company does not increase beyond tolerable limit.
3. **Cost:** overall cost of capital remains minimum.

Practically it is difficult to achieve all of the above three goals together hence a finance manager has to make a balance among these three objectives.

However, the objective of a company is to maximise the value of the company and it is prime objective while deciding the optimal capital structure. Capital Structure decision refers to deciding the forms of financing (which sources to be tapped); their actual requirements (amount to be funded) and their relative proportions (mix) in total capitalisation.

$$\text{Value of the firm} = \frac{\text{EBIT}}{\text{Overall cost of capital / Weighted average cost of capital}}$$

$$K_o = (\text{Cost of debt} \times \text{weight of debt}) + (\text{Cost of equity} \times \text{weight of equity})$$

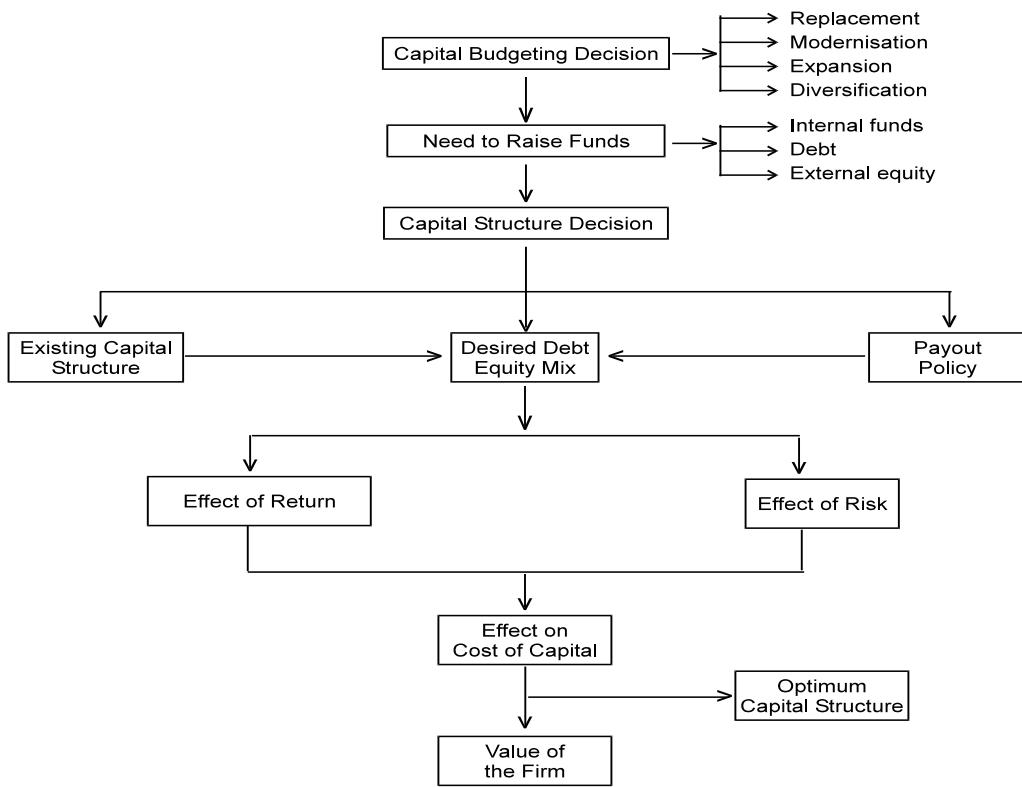
$$K_o = [\{K_d \times D / (D+S)\} + \{K_e \times S / (D+S)\}]$$

Where:

- ◆ K_o is the weighted average cost of capital (WACC)
- ◆ K_d is the cost of debt
- ◆ D is the market value of debt
- ◆ S is the market value of equity
- ◆ K_e is the cost of equity

Capital structure decision will decide weight of debt and equity and ultimately overall cost of capital as well as Value of the firm. So capital structure is relevant in maximizing value of the firm and minimizing overall cost of capital.

Whenever funds are to be raised to finance investments, capital structure decision is involved. A demand for raising funds generates a new capital structure since a decision has to be made as to the quantity and forms of financing. The process of financing or capital structure decision is depicted in the figure below.

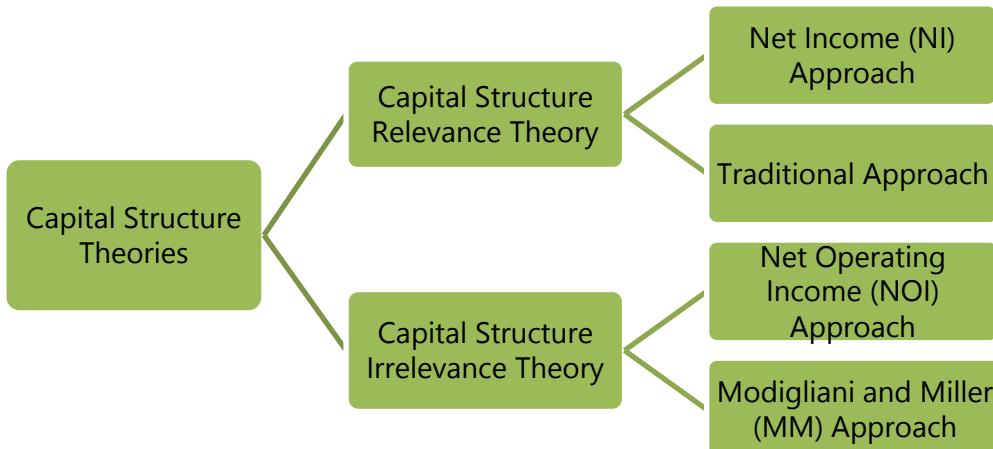


Financing Decision Process



5.2 CAPITAL STRUCTURE THEORIES

The following approaches explain the relationship between cost of capital, capital structure and value of the firm:



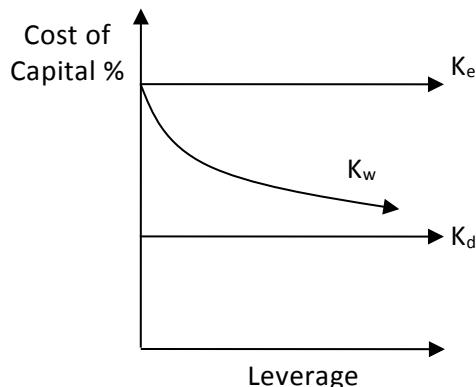
- (a) Net Income (NI) approach
- (b) Traditional approach.
- (c) Net Operating Income (NOI) approach
- (d) Modigliani-Miller (MM) approach

However, the following assumptions are made to understand this relationship.

- ◆ There are only two kinds of funds used by a firm i.e. debt and equity.
- ◆ The total assets of the firm are given. The degree of average can be changed by selling debt to purchase shares or selling shares to retire debt.
- ◆ Taxes are not considered.
- ◆ The payout ratio is 100%.
- ◆ The firm's total financing remains constant.
- ◆ Business risk is constant over time.
- ◆ The firm has perpetual life.

5.2.1 Net Income (NI) Approach

According to this approach, capital structure decision is **relevant** to the value of the firm. An increase in financial leverage will lead to decline in the weighted average cost of capital (WACC), while the value of the firm as well as market price of ordinary share will increase. Conversely, a decrease in the leverage will cause an increase in the overall cost of capital and a consequent decline in the value as well as market price of equity shares.



From the above diagram, K_e and K_d are assumed not to change with leverage. As debt increases, it causes weighted average cost of capital (WACC) to decrease.

The value of the firm on the basis of Net Income Approach can be ascertained as follows:

$$\text{Value of Firm (V)} = S + D$$

Where,

V = Value of the firm

S = Market value of equity

D = Market value of debt

$$\text{Market value of equity (S)} = \frac{NI}{K_e}$$

Where,

NI = Earnings available for equity shareholders

K_e = Equity Capitalisation rate

Under, NI approach, the value of the firm will be maximum at a point where weighted average cost of capital (WACC) is minimum. Thus, the theory suggests total or maximum possible debt financing for minimising the cost of capital. The overall cost of capital under this approach is:

$$\text{Overall cost of capital} = \frac{\text{EBIT}}{\text{Value of the firm}}$$

Thus according to this approach, the firm can increase its total value by decreasing its overall cost of capital through increasing the degree of leverage. The significant conclusion of this approach is that it pleads for the firm to employ as much debt as possible to maximise its value.

ILLUSTRATION 1

Rupa Ltd.'s EBIT is ₹5,00,000. The company has 10%, ₹20 lakh debentures. The equity capitalization rate i.e. K_e is 16%.

You are required to CALCULATE:

(i) *Market value of equity and value of firm*

(ii) Overall cost of capital.

SOLUTION

(i) Statement showing value of firm

	₹
EBIT	5,00,000
Less: Interest on debentures (10% of ₹ 20,00,000)	(2,00,000)
Earnings available for equity holders i.e. Net Income (NI)	3,00,000
Equity capitalization rate (K _e)	16%
Market value of equity (S) = $\frac{NI}{K_e} = \left(\frac{3,00,000}{16.00} \times 100 \right)$	18,75,000
Market value of debt (D)	20,00,000
Total value of firm V = S + D	38,75,000

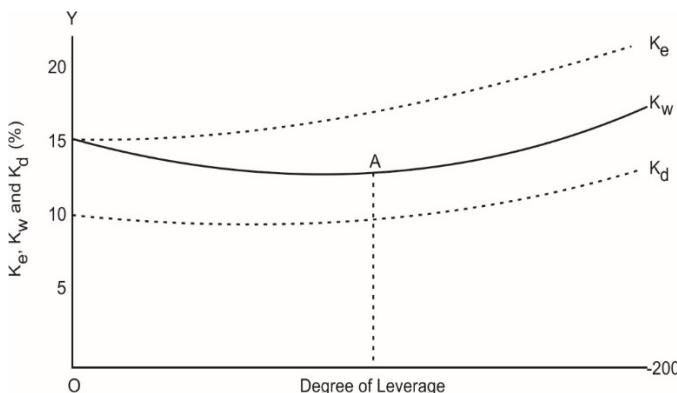
$$(ii) \text{ Overall cost of capital} = \frac{\text{EBIT}}{\text{Value of firm}} = \frac{\text{₹} 5,00,000}{\text{₹} 38,75,000} = 12.90\%$$

5.2.2 Traditional Approach

This approach favours that as a result of financial leverage up to some point, cost of capital comes down and value of firm increases. However, beyond that point, reverse trends emerge. The principle implication of this approach is that the cost of capital is dependent on the capital structure and there is an optimal capital structure which minimises cost of capital.

Under this 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.



Optimum capital structure occurs at the point where value of the firm is highest and the cost of capital is the lowest.

According to net operating income approach, capital structure decisions are totally irrelevant. Modigliani-Miller supports the net operating income approach but provides behavioural justification. The traditional approach strikes a balance between these extremes.

Main Highlight of Traditional Approach

The firm should strive to reach the optimal capital structure and its total valuation through a judicious use of the both debt and equity in capital structure. At the optimal capital structure, the overall cost of capital will be minimum and the value of the firm will be maximum.

ILLUSTRATION 2

Indra Ltd. has EBIT of ₹ 1,00,000. The company makes use of debt and equity capital. The firm has 10% debentures of ₹ 5,00,000 and the firm's equity capitalization rate is 15%.

You are required to COMPUTE:

- (i) *Current value of the firm*
- (ii) *Overall cost of capital.*

SOLUTION

(i) Calculation of total value of the firm

EBIT	₹ 1,00,000
------	------------

Less: Interest (@10% on ₹ 5,00,000)	50,000
Earnings available for equity holders	50,000
Equity capitalization rate i.e. K_e	15%

$$\text{Value of equity holders} = \frac{\text{Earnings available for equity holders}}{\text{Value of equity (S)}}$$

$$= \frac{50,000}{0.15} = ₹ 3,33,333$$

$$\text{Value of Debt (given) } D \quad 5,00,000$$

$$\text{Total value of the firm } V = D + S (5,00,000 + 3,33,333) \quad 8,33,333$$

$$\begin{aligned}
 \text{(ii) Overall cost of capital } K_o &= K_e \left(\frac{S}{V} \right) + K_d \left(\frac{D}{V} \right) \text{ or } \frac{\text{EBIT}}{V} \\
 &= 0.15 \left(\frac{3,33,333}{8,33,333} \right) + 0.10 \left(\frac{5,00,000}{8,33,333} \right) \\
 &= \frac{1}{8,33,333} [50,000 + 50,000] = 12.00\%
 \end{aligned}$$

ILLUSTRATION 3

DETERMINE the optimal capital structure of a company from the following information:

Options	Cost of Debt(K_d) in %	Cost of Equity(K_e) in %	Percentage of Debt on total value (Debt +Equity)
1	11	13.0	0.0
2	11	13.0	0.1
3	11.6	14.0	0.2
4	12.0	15.0	0.3
5	13.0	16.0	0.4
6	15.0	18.0	0.5
7	18.0	20.0	0.6

SOLUTION

Note that the ratio given in this question is not debt to equity ratio. Rather than it is the debt to value ratio. Therefore, if the ratio is 0.6, it means that capital employed comprises 60% debt and 40% equity.

$$K_o = \frac{K_d \times D + K_e \times S}{D + S}$$

In this question total of weight is equal to 1 in all cases, hence we need not to divide by it.

- 1) $K_o = 11\% \times 0 + 13\% \times 1 = 13\%$
- 2) $K_o = 11\% \times 0.1 + 13\% \times 0.9 = 12.8\%$
- 3) $K_o = 11.6\% \times 0.2 + 14\% \times 0.8 = 13.52\%$
- 4) $K_o = 12\% \times 0.3 + 15\% \times 0.7 = 14.1\%$
- 5) $K_o = 13\% \times 0.4 + 16\% \times 0.6 = 14.8\%$
- 6) $K_o = 15\% \times 0.5 + 18\% \times 0.5 = 16.5\%$
- 7) $K_o = 18\% \times 0.6 + 20\% \times 0.4 = 18.8\%$

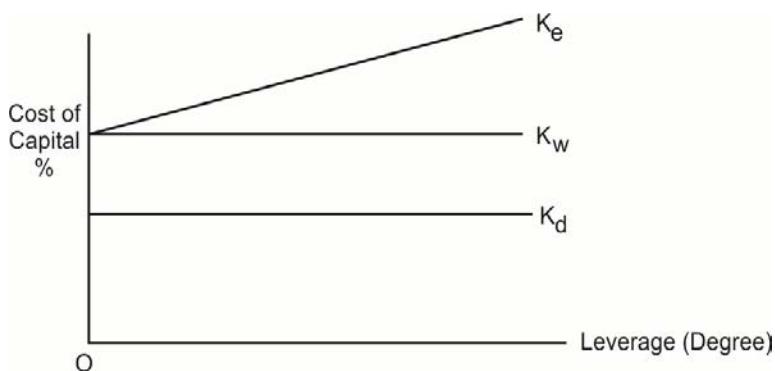
Decision: 2nd option is the best because it has lowest WACC.

5.2.3 Net Operating Income Approach (NOI)

NOI means earnings before interest and tax (EBIT). According to this approach, capital structure decisions of the firm are **irrelevant**.

Any change in the leverage will not lead to any change in the total value of the firm and the market price of shares, as the overall cost of capital is independent of the degree of leverage. As a result, the division between debt and equity is irrelevant.

As per this approach, an increase in the use of debt which is apparently cheaper is offset by an increase in the equity capitalisation rate. This happens because equity investors seek higher compensation as they are opposed to greater risk due to the existence of fixed return securities in the capital structure.



The above diagram shows that K_o (Overall capitalisation rate) and (debt – capitalisation rate) are constant and K_e (Cost of equity) increases with leverage.

ILLUSTRATION 4

Amita Ltd's operating income (EBIT) is ₹5,00,000. The firm's cost of debt is 10% and currently the firm employs ₹15,00,000 of debt. The overall cost of capital of the firm is 15%.

You are required to CALCULATE:

- (i) Total value of the firm.
- (ii) Cost of equity.

SOLUTION

(i) Statement showing value of the firm

	₹
Net operating income/EBIT	5,00,000
Less: Interest on debentures (10% of ₹15,00,000)	(1,50,000)
Earnings available for equity holders	3,50,000
Total cost of capital (K_o) (given)	15%
Value of the firm $V = \frac{\text{EBIT}}{k_o} = \frac{₹5,00,000}{0.15}$	33,33,333

(ii) Calculation of cost of equity

	₹
Market value of debt (D)	15,00,000
Market value of equity (s) $S = V - D = ₹33,33,333 - ₹15,00,000$	18,33,333

$$K_e = \frac{\text{Earnings available for equity holders}}{\text{Value of equity (S)}}$$

$$\text{Or, } \frac{\text{EBIT} - \text{Interest paid on debt}}{\text{Market value of equity}} = \frac{\text{₹}3,50,000}{\text{₹}18,33,333} = 19.09\%$$

OR

$$K_o = K_e \left(\frac{S}{V} \right) + K_d \left(\frac{D}{V} \right)$$

$$K_e = K_o \left(\frac{V}{S} \right) - K_d \left(\frac{D}{S} \right)$$

$$= 0.15 \left(\frac{33,33,333}{18,33,333} \right) - 0.10 \left(\frac{15,00,000}{18,33,333} \right)$$

$$= \frac{1}{18,33,333} [(0.15 \times 33,33,333) - (0.10 \times 15,00,000)]$$

$$= \frac{1}{18,33,333} [5,00,000 - 1,50,000] = 19.09\%$$

ILLUSTRATION 5

Alpha Limited and Beta Limited are identical except for capital structures. Alpha Ltd. has 50 per cent debt and 50 per cent equity, whereas Beta Ltd. has 20 per cent debt and 80 per cent equity. (All percentages are in market-value terms). The borrowing rate for both companies is 8 per cent in a no-tax world, and capital markets are assumed to be perfect.

- (a) (i) *If you own 2 per cent of the shares of Alpha Ltd., DETERMINE your return if the company has net operating income of ₹3,60,000 and the overall capitalisation rate of the company, K_o is 18 per cent?*
- (ii) *CALCULATE the implied required rate of return on equity?*
- (b) *Beta Ltd. has the same net operating income as Alpha Ltd. (i) DETERMINE the implied required equity return of Beta Ltd.? (ii) ANALYSE why does it differ from that of Alpha Ltd.?*

SOLUTION

$$(a) \text{ Value of the Alpha Ltd.} = \frac{\text{NOI}}{K_o} = \frac{\text{₹}3,60,000}{18\%} = \text{₹}20,00,000$$

(i) Return on Shares on Alpha Ltd.

	₹
Value of the company	20,00,000
Market value of debt (50%)	10,00,000
Market value of shares (50%)	10,00,000

	₹
Net operating income	3,60,000
Interest on debt (8% × ₹10,00,000)	80,000
Earnings available to shareholders	2,80,000
Return on 2% shares (2% × ₹ 2,80,000)	5,600

(ii) Implied required rate of return on equity = $\frac{₹ 2,80,000}{₹ 10,00,000} = 28\%$

(b) (i) Calculation of Implied rate of return

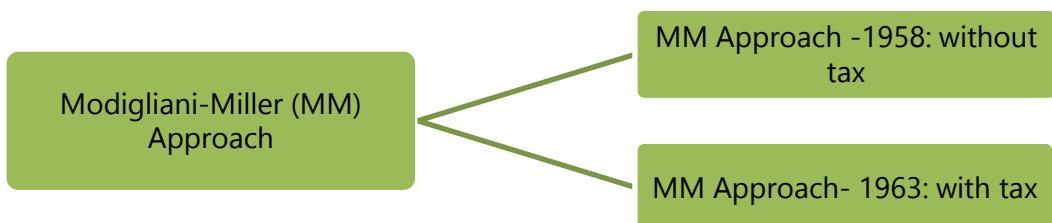
	₹
Total value of company	20,00,000
Market value of debt (20% × ₹20,00,000)	4,00,000
Market value of equity (80% × ₹20,00,000)	16,00,000
	₹
Net operating income	3,60,000
Interest on debt (8% × ₹4,00,000)	32,000
Earnings available to shareholders	3,28,000

Implied required rate of return on equity = $\frac{₹ 3,28,000}{₹ 16,00,000} = 20.5\%$

(ii) It is lower than the Alpha Ltd. because Beta Ltd. uses less debt in its capital structure. As the equity capitalisation is a linear function of the debt-to-equity ratio when we use the net operating income approach, the decline in required equity return offsets exactly the disadvantage of not employing so much in the way of "cheaper" debt funds.

5.2.4 Modigliani-Miller Approach (MM)

The NOI approach is definitional or conceptual and lacks behavioural significance. It does not provide operational justification for irrelevance of capital structure. However, Modigliani-Miller approach provides behavioural justification for constant overall cost of capital and therefore, total value of the firm.



MM Approach – 1958: without tax:

This approach describes, in a perfect capital market where there is no transaction cost and no taxes, the value and cost of capital of a company remain unchanged irrespective of change in the capital structure. The approach is based on further additional assumptions like:

- ◆ Capital markets are perfect. All information is freely available and there are no transaction costs.
- ◆ All investors are rational.
- ◆ Firms can be grouped into 'Equivalent risk classes' on the basis of their business risk.
- ◆ Non-existence of corporate taxes.

Based on the above assumptions, Modigliani-Miller derived the following three propositions:

- (i) Total market value of a firm is equal to its expected net operating income divided by the discount rate appropriate to its risk class decided by the market.

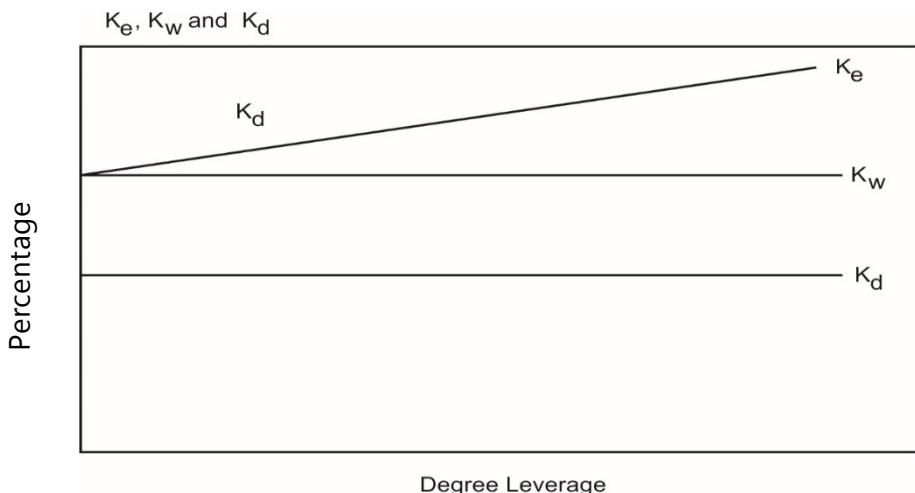
$$\text{Value of levered firm } (V_g) = \text{Value of unlevered firm } (V_u)$$

$$\text{Value of a firm} = \frac{\text{Net Operating Income}(NOI)}{K_0}$$

(ii) A firm having debt in capital structure has higher cost of equity than an unlevered firm. The cost of equity will include risk premium for the financial risk. The cost of equity in a levered firm is determined as under:

$$K_e = K_o + (K_o - K_d) \frac{\text{Debt}}{\text{Equity}}$$

(iii) The structure of the capital (financial leverage) does not affect the overall cost of capital. The cost of capital is only affected by the business risk.



It is evident from the above diagram that the average cost of the capital (K_o) is a constant and not affected by leverage.

The operational justification of Modigliani-Miller hypothesis is explained through the functioning of the arbitrage process and substitution of corporate leverage by personal leverage. Arbitrage refers to buying asset or security at lower price in one market and selling it at a higher price in another market. As a result, equilibrium is attained in different markets. This is illustrated by taking two identical firms of which one has debt in the capital structure while the other does not. Investors of the firm whose value is higher will sell their shares and instead buy the shares of the firm whose value is lower. They will be able to earn the same return at lower outlay with the same perceived risk or lower risk. They would, therefore, be better off.

The value of the levered firm can neither be greater nor lower than that of an unlevered firm according this approach. The two must be equal. There is neither advantage nor disadvantage in using debt in the firm's capital structure.

The approach considers capital structure of a firm as a whole pie divided into equity, debt and other securities. No matter how the capital structure of a firm is divided (among debt, equity etc.), there is a conservation of investment value. Since the total investment value of a corporation depends upon its underlying profitability and risk, it is invariant with respect to relative changes in the firm's financial capitalisation.

According to MM, since the sum of the parts must equal the whole, therefore, regardless of the financing mix, the total value of the firm stays the same.

The shortcoming of this approach is that the arbitrage process as suggested by Modigliani-Miller will fail to work because of imperfections in capital market, existence of transaction cost and presence of corporate income taxes.

MM Approach- 1963: with tax

In 1963, MM model was amended by incorporating tax, they recognised that the value of the firm will increase, or cost of capital will decrease where corporate taxes exist. As a result, there will be some difference in the earnings of equity and debt-holders in levered and unlevered firm and value of levered firm will be greater than the value of unlevered firm by an amount equal to amount of debt multiplied by corporate tax rate.

MM has developed the formulae for computation of cost of capital (K_o), cost of equity (K_e) for the levered firm.

(i) Value of a levered company = Value of an unlevered company + Tax benefit

$$\text{Or, } V_g = V_u + TB$$

(ii) Cost of equity in a levered company (K_{eg}) = $K_{eu} + (K_{eu} - K_d) \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$

Where,

K_{eg} = Cost of equity in a levered company

K_{eu} = Cost of equity in an unlevered company

K_d = Cost of debt

t = Tax rate

(iii) WACC in a levered company (K_{og}) = $K_{eu}(1-tL)$

Where,

K_{og} = WACC of a levered company

K_{eu} = Cost of equity in an unlevered company

t = Tax rate

L = $\frac{\text{Debt}}{\text{Debt} + \text{Equity}}$

ILLUSTRATION 6: When value of levered firm is more than the value of unlevered firm

There are two company N Ltd. and M Ltd., having same earnings before interest and taxes i.e. EBIT of ₹ 20,000. M Ltd. is a levered company having a debt of ₹ 1,00,000 @ 7% rate of interest. The cost of equity of N Ltd. is 10% and of M Ltd. is 11.50%.

COMPUTE how arbitrage process will be carried on?

SOLUTION

	Company	
	M Ltd.	N Ltd.
EBIT (NOI)	₹ 20,000	₹ 20,000
Debt (D)	₹ 1,00,000	---
K_e	11.50%	10%
K_d	7%	---

$$\text{Value of equity (S)} = \frac{\text{NOI} - \text{Interest}}{\text{Cost of equity}}$$

$$S_M = \frac{20,000 - 7,000}{11.50\%} = ₹ 1,13,043$$

$$S_N = \frac{20,000}{10\%} = ₹ 2,00,000$$

$$VM = 1,13,043 + 1,00,000 \{V = S + D\} = ₹ 2,13,043$$

$$VN = ₹ 2,00,000$$

Arbitrage Process:

If you have 10% shares of M Ltd., your value of investment in equity shares is 10% of ₹ 1,13,043 i.e. ₹ 11,304.30 and return will be 10% of (₹ 20,000 – ₹ 7,000) = ₹ 1,300.

Alternate Strategy will be:

Sell your 10% share of levered firm for ₹ 11,304.30 and borrow 10% of levered firms debt i.e. 10% of ₹ 1,00,000 and invest the money i.e. 10% in unlevered firms stock:

Total resources /Money we have = ₹11,304.30 + ₹10,000 = ₹21,304.3 and you invest 10% of ₹2,00,000 = ₹ 20,000

Surplus cash available with you is = ₹21,304.3 – ₹20,000 = ₹ 1,304.3

Your return = 10% EBIT of unlevered firm – Interest to be paid on borrowed funds i.e. = 10% of ₹ 20,000 – 7% of ₹ 10,000 = ₹2,000 – ₹700 = ₹ 1,300

i.e. your return is same i.e. ₹ 1,300 which you are getting from N Ltd. before investing in M Ltd. but still you have ₹ 1,304.3 excess money available with you. Hence, you are better off by doing arbitrage.

In the above example you have not invested entire amount received from "sale of shares of levered company plus amount borrowed". You maintained same level of earning and reduced investment. Alternatively, you could have invested entire amount in unlevered company. In that case your annual earnings would have increased. An example for the same is as follows:

ILLUSTRATION 7

Following data is available in respect of two companies having same business risk:

Capital employed = ₹2,00,000, EBIT = ₹30,000

$K_e = 12.5\%$

Sources	Levered Company (₹)	Unlevered Company (₹)
Debt (@10%)	1,00,000	Nil
Equity	1,00,000	200000

Investor is holding 15% shares in levered company. CALCULATE increase in annual earnings of investor if he switches his holding from Levered to Unlevered company.

SOLUTION

1. Valuation of firms

Particulars	Levered Firm (₹)	Unlevered Firm (₹)
EBIT	30,000	30,000

Less: interest	10,000	Nil
Earnings available to Equity Shareholder/Ke	20,000	30,000
	12.5%	12.5%
Value of Equity	1,60,000	2,40,000
Debt	1,00,000	Nil
Value of Firm	2,60,000	2,40,000

Value of Levered company is more than that of unlevered company therefore investor will sell his shares in levered company and buy shares in unlevered company. To maintain the level of risk he will borrow proportionate amount and invest that amount also in shares of unlevered company.

2. Investment & Borrowings

Sell shares in Levered company (1,60,000x15%)	24,000
Borrow money (1,00,000 x15%)	<u>15,000</u>
Buy shares in Unlevered company	39,000

3. Change in Return

Income from shares in Unlevered company	
(39,000 x 12.5%)	4,875
Less: interest on loan (15,000 x 10%)	<u>1,500</u>
Net Income from unlevered firm	3,375
Income from Levered firm (24000 x 12.5%)	<u>3,000</u>
Incremental Income due to arbitrage	375

ILLUSTRATION 8: When value of unlevered firm is more than the value of levered firm

There are two companies U Ltd. and L Ltd., having same NOI of ₹20,000 except that L Ltd. is a levered company having a debt of ₹1,00,000 @ 7% and cost of equity of U Ltd. & L Ltd. are 10% and 18% respectively.

COMPUTE how arbitrage process will work.

SOLUTION

	Company	
	U Ltd.	L Ltd.
NOI	₹ 20,000	₹ 20,000
Debt capital	–	₹ 1,00,000
K_d	–	7%
K_e	10%	18%
Value of equity capital (s) = $\left(\frac{EBIT - \text{Interest}}{K_e} \right)$	₹ 2,00,000 $\left(\frac{20,000}{0.10} \right)$	₹ 72,222 $\left(\frac{20,000 - 7,000}{0.18} \right)$
Total value of the firm $V = S + D$	₹ 2,00,000	₹ 1,72,222 (₹ 72,222 + ₹1,00,000)

Assume you have 10% shares of unlevered firm i.e. investment of 10% of ₹ 2,00,000 = ₹ 20,000 and Return @ 10% on ₹ 20,000. Investment will be 10% of earnings available for equity i.e. $10\% \times 20,000 = ₹ 2,000$.

Alternative strategy:

Sell your shares in unlevered firm for ₹ 20,000 and buy 10% shares of levered firm's equity plus debt

i.e. 10% equity of levered firm = 7,222

10% debt of levered firm = 10,000

Total investment = 17,222

Your resources are ₹ 20,000

Surplus cash available = Surplus – Investment = $20,000 - 17,222 = ₹ 2,778$

Your return on investment is:

7% on debt of ₹ 10,000 700

10% on equity i.e. 10% of earnings available for equity holders i.e. 1,300
($10\% \times 13,000$)

Total return 2,000

i.e. in both the cases the return received is ₹ 2,000 and still you have excess cash of ₹ 2,778.

Hence, you are better off i.e. you will start selling unlevered company shares and buy levered company's shares thereby pushing down the value of shares of unlevered firm and increasing the value of levered firm till equilibrium is reached.

In the above example we have not invested entire amount received from "sale of shares of Unlevered company". We have also ned same level of earning and reduced investment. Alternatively, we could have invested entire amount in Levered company. In that case annual earnings would have increased. An example for the same is as follows:

ILLUSTRATION 9

Following data is available in respect of two companies having same business risk:

Capital employed = ₹ 2,00,000 ,EBIT = ₹ 30,000

Sources	Levered Company (₹)	Unlevered Company(₹)
Debt (@10%)	1,00,000	Nil
Equity	1,00,000	200000
K_e	20 %	12.5%

Investor is holding 15% shares in Unlevered company. CALCULATE increase in annual earnings of investor if he switches his holding from Unlevered to Levered Company.

SOLUTION

1. Valuation of firms

Particulars	Levered Firm (₹)	Unlevered Firm(₹)
EBIT	30,000	30,000
Less: interest	10,000	Nil
Earnings available to Equity Shareholder/ K_e	20,000	30,000
	20%	12.5%
Value of Equity	1,00,000	2,40,000
Debt	1,00,000	Nil
Value of Firm	2,00,000	2,40,000

Value of Unlevered company is more than that of Levered company therefore investor will sell his shares in unlevered company and buy shares in levered company. Market value of Debt and Equity of Levered company are in the ratio of ₹ 1,00,000 : ₹1,00,000, i.e., 1:1. To maintain the level of risk he will lend proportionate amount (50%) and invest balance amount (50%) in shares of Levered company.

2. Investment & Borrowings

Sell shares in Unlevered company (240000x15%)	₹ <u>36,000</u>
Lend money (36000 x50%)	18,000
Buy shares in Levered company (36000 x50%)	<u>18,000</u>
Total	<u>36,000</u>

3. Change in Return

Income from shares in Levered company	₹
(18000 x 20%)	3,600
Interest on money lent (18000 x 10%)	<u>1,800</u>
Total Income after switch over	5,400
Income from Unlevered firm (36000 x 12.5%)	<u>4,500</u>
Incremental Income due to arbitrage	900

5.2.5 The Trade-off Theory

The trade-off theory of capital structure refers to the idea that a company chooses how much debt finance and how much equity finance to use by balancing the costs and benefits. Trade-off theory of capital structure basically entails offsetting the costs of debt against the benefits of debt.

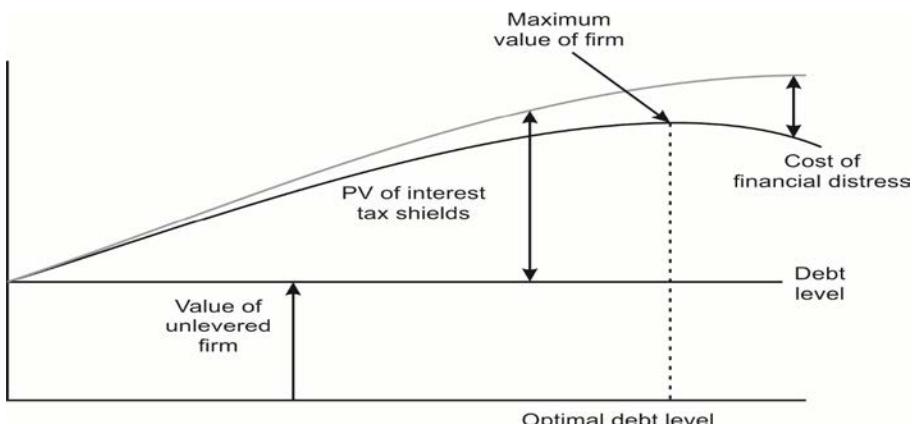
Trade-off theory of capital structure primarily deals with the two concepts - cost of financial distress and agency costs. An important purpose of the trade-off theory of capital structure is to explain the fact that corporations usually are financed partly with debt and partly with equity.

It states that there is an **advantage** to financing with debt, the **tax benefits** of debt and there is a **cost** of financing with debt, the costs of **financial distress** including bankruptcy costs of debt and non-bankruptcy costs (e.g. staff leaving, suppliers demanding disadvantageous payment terms, bondholder/ stockholder infighting, etc).

The marginal benefit of further increases in debt declines as debt increases, while the marginal cost increases, so that a firm that is optimizing its overall value will focus on this trade-off when choosing how much debt and equity to use for financing. Modigliani and Miller in 1963 introduced the tax benefit of debt. Later work led to an optimal capital structure which is given by the trade-off theory. According to Modigliani and Miller, the attractiveness of debt decreases with the personal tax on the interest income. A firm experiences financial distress when the firm is unable to cope with the debt holders' obligations. If the firm continues to fail in making payments to the debt holders, the firm can even be insolvent.

The first element of Trade-off theory of capital structure, considered as the cost of debt is usually the financial distress costs or bankruptcy costs of debt. The **direct cost of financial distress** refers to the cost of insolvency of a company. Once the proceedings of insolvency start, the assets of the firm may be needed to be sold at **distress price**, which is generally much lower than the current values of the assets. A huge amount of administrative and **legal costs** is also associated with the insolvency. Even if the company is not insolvent, the financial distress of the company may include a number of **indirect costs** like - cost of employees, cost of customers, cost of suppliers, cost of investors, cost of managers and cost of shareholders.

The firms may often experience a dispute of interests among the management of the firm, debt holders and shareholders. These disputes generally give birth to agency problems that in turn give rise to the agency costs. The agency costs may affect the capital structure of a firm. There may be two types of conflicts - shareholders-managers conflict and shareholders-debt holders conflict. The introduction of a dynamic Trade-off theory of capital structure makes the predictions of this theory a lot more accurate and reflective of that in practice.



As the Debt-equity ratio (i.e. leverage) increases, there is a trade-off between the interest tax shield and bankruptcy, causing an optimum capital structure, D/E*

5.2.6 Pecking order theory

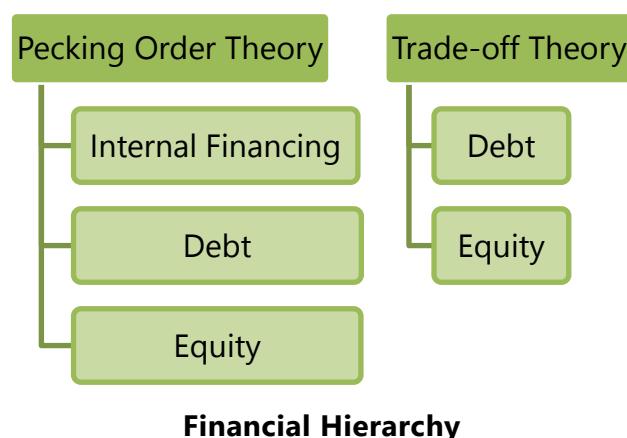
This theory is based on Asymmetric information, which refers to a situation in which different parties have different information. In a firm, managers will have better information than investors. This theory states that firms prefer to issue debt when they are positive about future earnings. Equity is issued when they are doubtful and internal finance is insufficient.

The pecking order theory argues that the capital structure decision is affected by manager's choice of a source of capital that gives higher priority to sources that reveal the least amount of information.

Myres has given the name 'PECKING ORDER' theory as here is no well-defined debt-equity target and there are two kind of equity internal and external. Now Debt is cheaper than both internal and external equity because of interest. Further internal equity is less than external equity particularly because of no transaction/issue cost, no tax etc.

Pecking order theory suggests that managers may use various sources for raising of fund in the **following order**.

1. Managers first choice is to use **internal finance**
2. In absence of internal finance they can use secured **debt**, unsecured debt, hybrid debt etc.
3. Managers may issue new **equity** shares as a last option.





5.3 FACTORS DETERMINING CAPITAL STRUCTURE

5.3.1 Choice of source of funds

A firm has the choice to raise funds for financing its investment proposals from different sources in different proportions. It can:

- (a) Exclusively use debt (in case of existing company), or
- (b) Exclusively use equity capital, or
- (c) Exclusively use preference share capital (in case of existing company), or
- (d) Use a combination of debt and equity in different proportions, or
- (e) Use a combination of debt, equity and preference capital in different proportions, or
- (f) Use a combination of debt and preference capital in different proportion (in case of existing company).

The choice of the combination of these sources is called capital structure mix. But the question is which of the pattern should the firm choose?

5.3.2 Factors affecting capital structure

While choosing a suitable financing pattern, certain fundamental principles should be kept in minds, to design capital structure, which are discussed below:

- (1) **Financial leverage of Trading on Equity:** The use of long-term fixed interest bearing debt and preference share capital along with equity share capital is called financial leverage or trading on equity. The use of long-term debt increases the earnings per share if the firm yields a return higher than the cost of debt. The earnings per share also increase with the use of preference share capital but due to the fact that interest is allowed to be deducted while computing tax, the leverage impact of debt is much more. However, leverage can operate adversely also if the rate of interest on long-term loan is more than the expected rate of earnings of the firm. Therefore, it needs caution to plan the capital structure of a firm.
- (2) **Growth and stability of sales:** The capital structure of a firm is highly influenced by the growth and stability of its sale. If the sales of a firm are expected to remain fairly stable, it can raise a higher level of debt. Stability of sales ensures that the firm will not face any difficulty in meeting its fixed

commitments of interest repayments of debt. Similarly, the rate of the growth in sales also affects the capital structure decision. Usually, greater the rate of growth of sales, greater can be the use of debt in the financing of firm. On the other hand, if the sales of a firm are highly fluctuating or declining, it should not employ, as far as possible, debt financing in its capital structure.

- (3) **Cost Principle:** According to this principle, an ideal pattern or capital structure is one that minimises cost of capital structure and maximises earnings per share (EPS). For e.g. Debt capital is cheaper than equity capital from the point of its cost and interest being deductible for income tax purpose, whereas no such deduction is allowed for dividends.
- (4) **Risk Principle:** According to this principle, reliance is placed more on common equity for financing capital requirements than excessive use of debt. Use of more and more debt means higher commitment in form of interest payout. This would lead to erosion of shareholders' value in unfavorable business situation. With increase in amount of Debt, financial risk increase and vice versa.
- (5) **Control Principle:** While designing a capital structure, the finance manager may also keep in mind that existing management control and ownership remains undisturbed. Issue of new equity will dilute existing control pattern and also it involves higher cost. Issue of more debt causes no dilution in control, but causes a higher degree of financial risk.
- (6) **Flexibility Principle:** By flexibility it means that the management chooses such a combination of sources of financing which it finds easier to adjust according to changes in need of funds in future too. While debt could be interchanged (If the company is loaded with a debt of 18% and funds are available at 15%, it can return old debt with new debt, at a lesser interest rate), but the same option may not be available in case of equity investment.
- (7) **Other Considerations:** Besides above principles, other factors such as nature of industry, timing of issue and competition in the industry should also be considered. Industries facing severe competition also resort to more equity than debt.

Thus, a finance manager in designing a suitable pattern of capital structure must bring about satisfactory compromise between the above principles. The compromise can be reached by assigning weights to these principles in terms of various characteristics of the company.



5.4 OPTIMAL CAPITAL STRUCTURE

Objective of financial management is to maximize wealth. Therefore one should chose a capital structure which maximizes wealth. For this purpose following analysis should be done:

- 1) EBIT-EPS-MPS Analysis: chose a capital structure which maximizes market price per share. For that start with same EBIT for all capital structures and calculate EPS. Thereafter either multiply EPS by price earning ration or divide it by cost of equity to arrive at MPS.
- 2) Indifference Point Analysis: In above analysis we have considered value at a given EBIT only. What will happen if EBIT changes? Will it change your decision also? To answer this question you can do indifference point analysis.
- 3) Financial Break Even point Analysis: With change in capital structure, financial risk also changes. Though this risk has already been considered in PE ratio or in cost of equity in point one above, but one may calculate and consider it separately also by calculating financial BEP.



5.5 EBIT-EPS-MPS ANALYSIS

5.5.1 Relationship between EBIT - EPS-MPS

The basic objective of financial management is to design an appropriate capital structure which can provide the highest wealth, i.e., highest MPS, which in turn depends on EPS.

Given a level of EBIT, EPS will be different under different financing mix depending upon the extent of debt financing. The effect of leverage on the EPS emerges because of the existence of fixed financial charge i.e., interest on debt financial fixed dividend on preference share capital. The effect of fixed financial charge on the EPS depends upon the relationship between the rate of return on assets and the rate of fixed charge. If the rate of return on assets is higher than the cost of financing, then the increasing use of fixed charge financing (i.e., debt and preference share capital) will result in increase in the EPS. This situation is also known as favourable financial leverage or Trading on Equity. On the other hand, if the rate of return on assets is less than the cost of financing, then the effect may be negative and, therefore, the increasing use of debt and preference share capital may reduce the EPS of the firm.

The fixed financial charge financing may further be analyzed with reference to the choice between the debt financing and the issue of preference shares. Theoretically, the choice is tilted in favour of debt financing for two reasons: (i) the explicit cost of debt financing i.e., the rate of interest payable on debt instruments or loans is generally lower than the rate of fixed dividend payable on preference shares, and (ii) interest on debt financing is tax-deductible and therefore the real cost (after-tax) is lower than the cost of preference share capital.

Thus, the analysis of the different types of capital structure and the effect of leverage on the expected EPS and eventually MPS will provide a useful guide to selection of a particular level of debt financing. The EBIT-EPS analysis is of significant importance and if undertaken properly, can be an effective tool in the hands of a financial manager to get an insight into the planning and designing of the capital structure of the firm.

ILLUSTRATION 10

Suppose that a firm has an all equity capital structure consisting of 100,000 ordinary shares of ₹ 10 per share. The firm wants to raise ₹ 250,000 to finance its investments and is considering three alternative methods of financing – (i) to issue 25,000 ordinary shares at ₹ 10 each, (ii) to borrow ₹ 2,50,000 at 8 per cent rate of interest, (iii) to issue 2,500 preference shares of ₹ 100 each at an 8 per cent rate of dividend. If the firm's earnings before interest and taxes after additional investment are ₹ 3,12,500 and the tax rate is 50 per cent, FIND the effect on the earnings per share under the three financing alternatives.

SOLUTION

EPS under alternative financing favourable EBIT:

Particulars	Equity Financing (₹)	Debt Financing(₹)	Preference Financing (₹)
EBIT	3,12,500	3,12,500	3,12,500
Less: Interest	0	<u>20,000</u>	0
PBT	3,12,500	2,92,500	3,12,500
Less: Taxes	1,56,250	1,46,250	1,56,250
PAT	1,56,250	1,46,250	1,56,250
Less: Preference dividend	0	0	20,000

Earning available to ordinary shareholders	1,56,250	1,46,250	136,250
Shares outstanding	1,25,000	1,00,000	1,00,000
EPS	1.25	1.46	1.36

The firm is able to maximize the earnings per share when it uses debt financing. Though the rate of preference dividend is equal to the rate of interest, EPS is high in case of debt financing because interest charges are tax deductible while preference dividends are not. With increasing levels of EBIT, EPS will increase at a faster rate with a high degree of leverage.

We know that market price per share is equal to earning per share multiplied by price earning (PE) ratio. If PE ration is same for all three plans then the plan which has highest EPS will also have highest MPS and it will be selected. On the other hand if PE ratio for equity plan is 10 times, for debt plan it is 8 times and for preference plan it is 7 times then:

EPS	1.25	1.46	1.36
PE ratio	x10	x8	x7
MPS	12.50	11.68	9.52

Now despite lower EPS, equity plan will be selected because it has highest MPS.

However, if a company is not able to earn a rate of return on its assets higher than the interest rate (or the preference dividend rate), debt (or preference financing) will have an adverse impact on EPS. Suppose the firm in illustration above has an EBIT of ₹75,000/-, then EPS under different methods will be as follows:

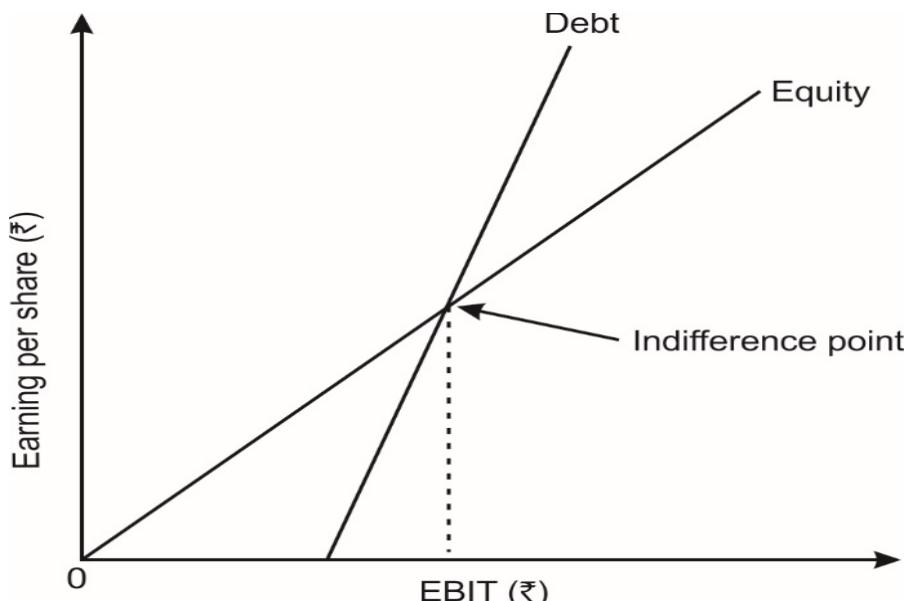
EPS under alternative financing methods: Unfavourable EBIT:

Particulars	Equity Financing (₹)	Debt Financing(₹)	Preference Financing (₹)
EBIT	75,000	75,000	75,000
Less: Interest	0	20,000	0
PBT	75,000	55,000	75,000
Less: Taxes	37,500	27,500	37,500
PAT	37,500	27,500	37,500
Less: Preference dividend	0	0	20,000

Earning available to ordinary shareholders	37,500	27,500	17,500
Shares outstanding	1,25,000	1,00,000	1,00,000
EPS	0.30	0.275	0.175

It is obvious that under unfavourable conditions, i.e. when the rate of return on the total assets is less than the cost of debt, the earnings per share will fall with the degree of leverage.

5.5.2 Financial Break-even and Indifference Analysis



Financial break-even point is the minimum level of EBIT needed to satisfy all the fixed financial charges i.e. interest and preference dividends. It denotes the level of EBIT for which the company's EPS equals zero.

If the EBIT is less than the financial breakeven point, then the EPS will be negative but if the expected level of EBIT is more than the breakeven point, then more fixed costs financing instruments can be taken in the capital structure, otherwise, equity would be preferred.

EBIT-EPS breakeven analysis is used for determining the appropriate amount of debt a company might carry.

Another method of considering the impact of various financing alternatives on earnings per share is to prepare the EBIT chart or the range of Earnings Chart. This chart shows the likely EPS at various probable EBIT levels. Thus, under one particular

alternative, EPS may be ₹ 2 at a given EBIT level. However, the EPS may go down if another alternative of financing is chosen even though the EBIT remains at the same level. At a given EBIT, earnings per share under various alternatives of financing may be plotted. A straight line representing the EPS at various levels of EBIT under the alternative may be drawn. Wherever this line intersects, it is known as break-even point. This point is a useful guide in formulating the capital structure. This is known as EPS equivalency point or indifference point since this shows that, between the two given alternatives of financing (i.e., regardless of leverage in the financial plans), EPS would be the same at the given level of EBIT.

The equivalency or indifference point can also be calculated algebraically in the following manner:

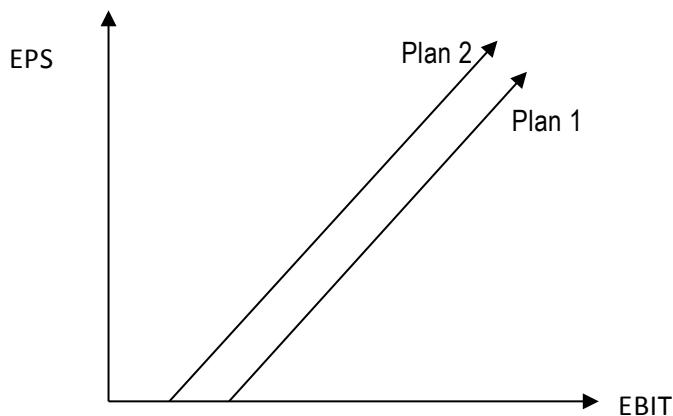
$$\frac{(EBIT - I_1)(1-t)}{E_1} = \frac{(EBIT - I_2)(1-t)}{E_2}$$

Where,

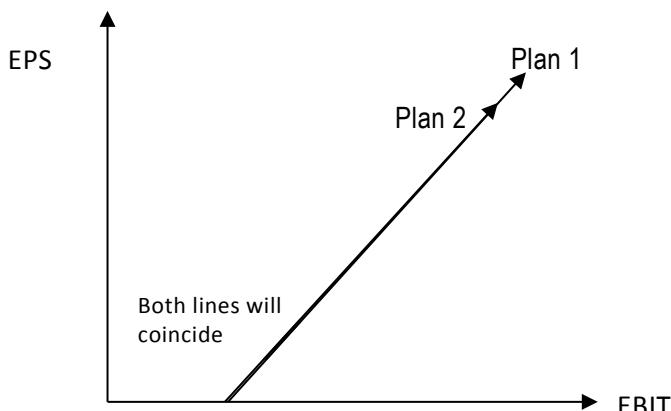
EBIT	=	Indifference point
E_1	=	Number of equity shares in Alternative 1
E_2	=	Number of equity shares in Alternative 2
I_1	=	Interest charges in Alternative 1
I_2	=	Interest charges in Alternative 2
T	=	Tax-rate

Just keep in mind that if amount of equity share capital is same under two financial plans then one of the following two situations will arise:

1. **No indifference point:** if after tax cost of the source other than equity shares is **not same** under both plans then there will be no indifference point between the two. Because one plan will be better than other at all levels of EBIT. For example if two plans have equity shares of ₹ 1,00,000 each. Plan 1 has 10% debentures of ₹ 50,000 while plan 2 has 8% Term loan of ₹ 50,000. Then plan 2 will be better than plan 1 at any level of EBIT and there will be no indifference point



2. **Many indifference points:** if after tax cost of the source other than equity shares is **same** under both plans then each EBIT will be an indifference point.



Debt-Equity Indifference Point

ILLUSTRATION 11

Best of Luck Ltd., a profit making company, has a paid-up capital of ₹ 100 lakhs consisting of 10 lakhs ordinary shares of ₹ 10 each. Currently, it is earning an annual pre-tax profit of ₹ 60 lakhs. The company's shares are listed and are quoted in the range of ₹ 50 to ₹ 80. The management wants to diversify production and has approved a project which will cost ₹ 50 lakhs and which is expected to yield a pre-tax income of ₹ 40 lakhs per annum. To raise this additional capital, the following options are under consideration of the management:

- (a) To issue equity share capital for the entire additional amount. It is expected that the new shares (face value of ₹ 10) can be sold at a premium of ₹ 15.
- (b) To issue 16% non-convertible debentures of ₹ 100 each for the entire amount.
- (c) To issue equity capital for ₹ 25 lakhs (face value of ₹ 10) and 16% non-convertible debentures for the balance amount. In this case, the company can issue shares at a premium of ₹ 40 each.

CALCULATE the additional capital can be raised, keeping in mind that the management wants to maximise the earnings per share to maintain its goodwill. The company is paying income tax at 50%.

SOLUTION

Calculation of Earnings per share under the three options:

Particulars	Options		
	Option I: Issue Equity shares only	Option II: Issue 16% Debentures only	Option III: Issue Equity Shares and 16% Debentures of equal amount
Number of Equity Shares (nos):			
- Existing	10,00,000	10,00,000	10,00,000
- Newly issued	2,00,000	---	50,000 $\left(\frac{\text{₹}25,00,000}{\text{₹}(10+40)} \right)$
Total	12,00,000	10,00,000	10,50,000
16% Debentures ₹	---	50,00,000	25,00,000
Profit Before Interest and Tax:	₹	₹	₹
- Existing pre-tax profit	60,00,000	60,00,000	60,00,000
- From new projects	40,00,000	40,00,000	40,00,000
	1,00,00,000	1,00,00,000	1,00,00,000

Less: Interest on 16% Debentures	---	8,00,000 (16% × ₹50,00,000)	4,00,000 (16% × ₹25,00,000)
Profit Before Tax	1,00,00,000	92,00,000	96,00,000
Tax at 50%	50,00,000	46,00,000	48,00,000
Profit After Tax	50,00,000	46,00,000	48,00,000
Earnings Per Share (EPS) $\left(\frac{\text{PAT}}{\text{No.ofShares}} \right)$	4.17 $\left(\frac{₹50,00,000}{12,00,000} \right)$	4.60 $\left(\frac{₹46,00,000}{10,00,000} \right)$	4.57 $\left(\frac{₹48,00,000}{10,50,000} \right)$

Advise: Option II i.e. issue of 16% Debentures is most suitable to maximize the earnings per share.

ILLUSTRATION 12

Shahji Steels Limited requires ₹25,00,000 for a new plant. This plant is expected to yield earnings before interest and taxes of ₹5,00,000. While deciding about the financial plan, the company considers the objective of maximizing earnings per share. It has three alternatives to finance the project - by raising debt of ₹2,50,000 or ₹10,00,000 or ₹15,00,000 and the balance, in each case, by issuing equity shares. The company's share is currently selling at ₹150, but is expected to decline to ₹125 in case the funds are borrowed in excess of ₹10,00,000. The funds can be borrowed at the rate of 10 percent upto ₹2,50,000, at 15 percent over ₹2,50,000 and upto ₹10,00,000 and at 20 percent over ₹10,00,000. The tax rate applicable to the company is 50 percent. ANALYSE which form of financing should the company choose?

SOLUTION

Plan I= Raising Debt of ₹ 2.5 lakh + Equity of ₹ 22.5 lakh.

Plan II = Raising Debt of ₹ 10 lakh + Equity of ₹ 15 lakh.

Plan III= Raising Debt of ₹ 15 lakh + Equity of ₹ 10 lakh.

Calculation of Earnings per share (EPS):

Particulars	FINANCIAL PLANS		
	Plan I	Plan II	Plan III
	₹	₹	₹
Expected EBIT	5,00,000	5,00,000	5,00,000
Less: Interest ^(a)	(25,000)	(1,37,500)	(2,37,500)

Earnings before taxes	4,75,000	3,62,500	2,62,500
Less: Taxes @ 50%	(2,37,500)	(1,81,250)	(1,31,250)
Earnings after taxes (EAT)	2,37,500	1,81,250	1,31,250
Number of shares ^(b)	15,000	10,000	8,000
Earnings per share (EPS)	15.83	18.13	16.41

Financing Plan II (i.e. Raising debt of ₹10 lakh and issue of equity share capital of ₹15 lakh) is the option which maximises the earnings per share.

Working Notes:

(a) Calculation of interest on Debt.

Plan I	(₹2,50,000 × 10%)		₹ 25,000
Plan II	(₹2,50,000 × 10%)	₹ 25,000	
	(₹7,50,000 × 15%)	₹1,12,500	₹1,37,500
Plan III	(₹2,50,000 × 10%)	₹ 25,000	
	(₹7,50,000 × 15%)	₹1,12,500	
	(₹5,00,000 × 20%)	₹1,00,000	₹2,37,500

(b) Number of equity shares to be issued

$$\text{Plan I: } \frac{\text{₹ } 22,50,000}{\text{₹ } 150 \text{ (Market price of share)}} = 15,000 \text{ shares}$$

$$\text{Plan II: } \frac{\text{₹ } 15,00,000}{\text{₹ } 150} = 10,000 \text{ shares}$$

$$\text{Plan III: } \frac{\text{₹ } 10,00,000}{\text{₹ } 125} = 8,000 \text{ shares}$$

ILLUSTRATION 13

The following data are presented in respect of Quality Automation Ltd.:

	Amount (₹)
Profit before interest and tax	52,00,000
Less : Interest on debentures @ 12%	12,00,000
Profit before tax	40,00,000

Less : Income tax @ 50%	<u>20,00,000</u>
Profit After tax	20,00,000
No. of equity shares (of ₹ 10 each)	8,00,000
EPS	2.5
P/E Ratio	10
Market price per share	25

The company is planning to start a new project requiring a total capital outlay of ₹ 40,00,000. You are informed that a debt equity ratio (D/D+E) higher than 35% push the K_e up to 12.5% means reduce PE ratio to 8 and rises the interest rate on additional amount borrowed at 14%. FIND OUT the probable price of share if:

- (i) the additional funds are raised as a loan.
- (ii) the amount is raised by issuing equity shares.

(Note : Retained earnings of the company is ₹ 1.2 crore)

SOLUTION

In this question EBIT after proposed extension is not given. Therefore, we can assume that existing return on capital employed will be maintained.

Working notes:

$$1. \text{ Return on Capital Employed} = \frac{\text{EBIT}}{\text{Capital Employed}} = \frac{\text{₹} 52,00,000}{\text{₹} 3,00,00,000} = 17.33\%$$

$$\text{Capital Employed} = \text{Debt} + \text{Equity}$$

$$= 1,00,00,000 + (80,00,000 + 1,20,00,000) = \text{₹} 3,00,00,000$$

$$2. \text{ Proposed EBIT} = \text{Proposed Capital Employed} \times \text{Return on capital employed}$$

$$= (3,00,00,000 + 40,00,000) \times 17.33\% = \text{₹} 58,92,200$$

(if you take return on capital employed in full digits then accurate EBIT will be 58,93,333)

$$3. \text{ Debt Equitiy ratio} = \frac{\text{Debt}}{\text{Debt} + \text{Equity}}$$

Option1: Loan option

$$\text{Debt} = 1,00,00,000 + 40,00,000 = \text{₹} 1,40,00,000$$

Equity = ₹ 2,00,00,000

$$\text{Debt Equity ratio} = \frac{1.4 \text{ cr.}}{1.4 \text{ cr.} + 2 \text{ cr.}} = 41.18\%$$

Debt equity ratio has crossed the limit of 35% hence PE ratio in this case will be 8 times and additional borrowing will be at the rate of 14%

Option2: Equity option

Debt = 1,00,00,000

$$\text{Equity} = 2,00,00,000 + 40,00,000 = ₹2,40,00,000$$

$$\text{Debt Equity ratio} = \frac{1 \text{ cr.}}{1 \text{ cr.} + 2.4 \text{ cr.}} = 29.41\%$$

Debt equity ratio has not crossed the limit of 35% hence PE ratio in this case will remain at 10 times.

4. Number of equity shares to be issued in case of equity option@ ₹25 per share
 $= ₹40,00,000 / ₹25 = 1,60,000$

Calculation of EPS and MPS under two financial options Particulars	Financial Options	
	Option I 14% additional loan of 40,00,000(₹)	Option II 8,00,000 equity share @ ₹10 i.e 1,60,000 equity shares @25(₹)
Profit before interest and Tax (PBIT)	58,92,200	58,92,200
Less: Interest on old debentures @12%	<u>12,00,000</u>	<u>12,00,000</u>
Less: Interest on additional loan(new) @ 14% on ₹ 40,00,000	5,60,000	Nil
Profit before tax	41,32,200	46,92,000
Less: Taxes @ 50%	20,66,100	23,46,100
Earnings for equity shareholders (EAT/Profit after tax)	20,66,100	23,46,100
Number of Equity	8,00,000	9,60,000

Shares		
Earnings per Share (EPS)	2.58	2.44
Price/ Earnings ratio	8	10
Probable per share (MPS)	20.66	24.44

Decision: Though loan option has higher EPS but equity option has higher MPS therefore company should raise additional fund through equity option.



5.6 OVER-CAPITALISATION AND UNDER - CAPITALISATION

5.6.1 Over- Capitalisation

It is a situation where a firm has more capital than it needs or in other words assets are worth less than its issued share capital, and earnings are insufficient to pay dividend and interest. This situation mainly arises when the existing capital is not effectively utilized on account of fall in earning capacity of the company while company has raised funds more than its requirements. The chief sign of over-capitalisation is the fall in payment of dividend and interest leading to fall in value of the shares of the company.

Causes of Over-Capitalisation: Over-capitalisation arises due to following reasons:

- (i) Raising more money through issue of shares or debentures than company can employ profitably.
- (ii) Borrowing huge amount at higher rate than rate at which company can earn.
- (iii) Excessive payment for the acquisition of fictitious assets such as goodwill etc.
- (iv) Improper provision for depreciation, replacement of assets and distribution of dividends at a higher rate.
- (v) Wrong estimation of earnings and capitalisation.

Consequences of Over-Capitalisation: Over-capitalisation results in the following consequences:

- (i) Considerable reduction in the rate of dividend and interest payments.
- (ii) Reduction in the market price of shares.

- (iii) Resorting to "window dressing".
- (iv) Some companies may opt for reorganization. However, sometimes the matter gets worse and the company may go into liquidation.

Remedies for Over-Capitalisation: Following steps may be adopted to avoid the negative consequences of over-capitalisation:

- (i) Company should go for thorough reorganization.
- (ii) Buyback of shares.
- (iii) Reduction in claims of debenture-holders and creditors.
- (iv) Value of shares may also be reduced. This will result in sufficient funds for the company to carry out replacement of assets.

5.6.2 Under Capitalisation

It is just reverse of over-capitalisation. It is a state, when its actual capitalisation is lower than its proper capitalisation as warranted by its earning capacity. This situation normally happens with companies which have insufficient capital but large secret reserves in the form of considerable appreciation in the values of the fixed assets not brought into the books.

Consequences of Under-Capitalisation: Under-capitalisation results in the following consequences:

- (i) The dividend rate will be higher in comparison to similarly situated companies.
- (ii) Market value of shares will be higher than value of shares of other similar companies because their earning rate being considerably more than the prevailing rate on such securities.
- (iii) Real value of shares will be higher than their book value.

Effects of Under-Capitalisation: Under-capitalisation has the following effects:

- (i) It encourages acute competition. High profitability encourages new entrepreneurs to come into same type of business.
- (ii) High rate of dividend encourages the workers' union to demand high wages.
- (iii) Normally common people (consumers) start feeling that they are being exploited.
- (iv) Management may resort to manipulation of share values.

- (v) Invite more government control and regulation on the company and higher taxation also.

Remedies: Following steps may be adopted to avoid the negative consequences of under capitalization:

- (i) The shares of the company should be split up. This will reduce dividend per share, though EPS shall remain unchanged.
- (ii) Issue of Bonus Shares is the most appropriate measure as this will reduce both dividend per share and the average rate of earning.
- (iii) By revising upward the par value of shares in exchange of the existing shares held by them.

5.6.3 Over-Capitalisation vis-à-vis Under-Capitalisation

From the above discussion it can be said that both over capitalisation and under capitalisation are not good. However, over capitalisation is more dangerous to the company, shareholders and the society than under capitalisation. The situation of under capitalisation can be handled more easily than the situation of over-capitalisation. Moreover, under capitalisation is not an economic problem but a problem of adjusting capital structure. Thus, under capitalisation should be considered less dangerous but both situations are bad and every company should strive to have a proper capitalisation.

SUMMARY

- ◆ **Capital Structure:** Capital structure refers to the mix of a firm's capitalisation (i.e. mix of long term sources of funds such as debentures, preference share capital, equity share capital and retained earnings for meeting total capital requirement). While choosing a suitable financing pattern, certain factors like cost, risk, control, flexibility and other considerations like nature of industry, competition in the industry etc. should be considered
- ◆ **Capital Structure Theories:-** The following approaches explain the relationship between cost of capital, capital structure and value of the firm:
 - Net income approach
 - Net operating income approach
 - Modigliani-Miller approach
 - Traditional approach

Trade-off Theory

Pecking Order Theory

- ◆ **Optimal Capital Structure (EBIT-EPS Analysis):** The basic objective of financial management is to design an appropriate capital structure which can provide the highest earnings per share (EPS) over the firm's expected range of earnings before interest and taxes (EBIT). PS measures a firm's performance for the investors. The level of EBIT varies from year to year and represents the success of a firm's operations. EBIT-EPS analysis is a vital tool for designing the optimal capital structure of a firm. The objective of this analysis is to find the EBIT level that will equate EPS regardless of the financing plan chosen.
- ◆ **Over Capitalisation :** It is a situation where a firm has more capital than it needs or in other words assets are worth less than its issued share capital, and earnings are insufficient to pay dividend and interest.
- ◆ **Under Capitalisation :** It is just reverse of over-capitalisation. It is a state, when its actual capitalization is lower than its proper capitalization as warranted by its earning capacity

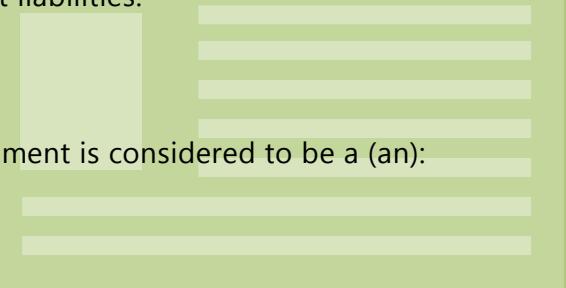
TEST YOUR KNOWLEDGE

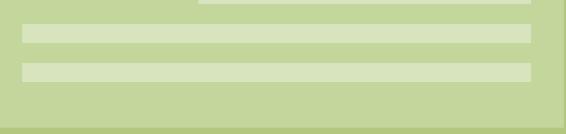
MCQs based Questions

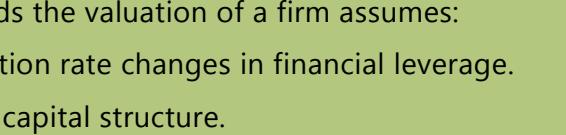
1. The assumptions of M-M hypothesis of capital structure do not include the following;
 - (a) Capital markets are imperfect
 - (b) Investors have homogeneous expectations
 - (c) All firms can be classified into homogeneous risk classes
 - (d) The dividend-payout ratio is cent percent, and there is no corporate tax
2. Which of the following is irrelevant for optimal capital structure?
 - (a) Flexibility,
 - (b) Solvency,
 - (c) Liquidity,
 - (d) Control.
3. Financial Structure refer to
 - (a) All Financial resources,

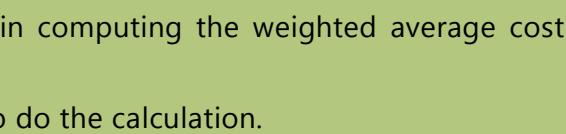
(b) Short-term funds,
(c) Long-term funds
(d) None of these.

4. An EBIT-EPS indifference analysis chart is used for
(a) Evaluating the effects of business risk on EPS
(b) Examining EPS results for alternative financial plans at varying EBIT levels
(c) Determining the impact of a change in sales on EBIT
(d) Showing the changes in EPS quality over time

5. The term "capital structure" means
(a) Long-term debt, preferred stock, and equity shares. 
(b) Current assets and current liabilities.
(c) Net working capital
(d) Shareholders' equity. 

6. The cost of monitoring management is considered to be a (an):
(a) Bankruptcy cost.
(b) Transaction cost.
(c) Agency cost.
(d) Institutional cost. 

7. The traditional approach towards the valuation of a firm assumes:
(a) That the overall capitalization rate changes in financial leverage.
(b) That there is an optimum capital structure.
(c) That total risk is not changed with the changes in the capital structure.
(d) That markets are perfect. 

8. Market values are often used in computing the weighted average cost of capital because
(a) This is the simplest way to do the calculation.
(b) This is consistent with the goal of maximizing shareholder value.
(c) This is required by SEBI. 

(d). This is a very common mistake.

9. A firm's optimal capital structure:

- Is the debt-equity ratio that results in the minimum possible weighted average cost of capital.
- 40 percent debt and 60 percent equity.
- When the debt-equity ratio is .50.
- When Cost of equity is minimum

10. Capital structure of a firm influences the

- Risk.
- Return
- Both Risk and Return.
- Return but not Risk

Theoretical based Questions

- DESCRIBE Capital Structure.
- EXPLAIN in brief the assumptions of Modigliani-Miller theory.
- DESCRIBE Net Operating Income (NOI) theory of capital structure? EXPLAIN the assumptions of Net Operating Income approach theory of capital structure.
- EXPLAIN the principles of "Trading on equity".
- DISCUSS the concept of Debt-Equity or EBIT-EPS indifference point, while determining the capital structure of a company.
- DISCUSS financial break-even and EBIT-EPS indifference analysis.

Practical Problems

- Ganesha Limited is setting up a project with a capital outlay of ₹ 60,00,000. It has two alternatives in financing the project cost.
Alternative-I : 100% equity finance by issuing equity shares of ₹ 10 each
Alternative-II : Debt-equity ratio 2:1 (issuing equity shares of ₹ 10 each)
The rate of interest payable on the debts is 18% p.a. The corporate tax rate is 40%. CALCULATE the indifference point between the two alternative methods of financing.

2. Ganapati Limited is considering three financing plans. The key information is as follows:

- (a) Total investment to be raised ₹ 2,00,000
- (b) Plans of Financing Proportion:

Plans	Equity	Debt	Preference Shares
A	100%	-	-
B	50%	50%	-
C	50%	-	50%

- (c) Cost of debt 8%
- Cost of preference shares 8%
- (d) Tax rate 50%
- (e) Equity shares of the face value of ₹ 10 each will be issued at a premium of ₹ 10 per share.
- (f) Expected EBIT is ₹ 80,000.

You are required to DETERMINE for each plan: -

- (i) Earnings per share (EPS)
- (ii) The financial break-even point.
- (iii) Indicate if any of the plans dominate and compute the EBIT range among the plans for indifference.

3. Yoyo Limited presently has ₹36,00,000 in debt outstanding bearing an interest rate of 10 per cent. It wishes to finance a ₹40,00,000 expansion programme and is considering three alternatives: additional debt at 12 per cent interest, preference shares with an 11 per cent dividend, and the issue of equity shares at ₹16 per share. The company presently has 8,00,000 shares outstanding and is in a 40 per cent tax bracket.

- (a) If earnings before interest and taxes are presently ₹15,00,000, DETERMINE earnings per share for the three alternatives, assuming no immediate increase in profitability?
- (b) ANALYSE which alternative do you prefer? COMPUTE how much would EBIT need to increase before the next alternative would be best?

4. Alpha Limited requires funds amounting to ₹80 lakh for its new project. To raise the funds, the company has following two alternatives:

- To issue Equity Shares of ₹100 each (at par) amounting to ₹60 lakh and borrow the balance amount at the interest of 12% p.a.; or
- To issue Equity Shares of ₹100 each (at par) and 12% Debentures in equal proportion.

The Income-tax rate is 30%.

IDENTIFY the point of indifference between the available two modes of financing and state which option will be beneficial in different situations.

5. One-third of the total market value of Sanghmani Limited consists of loan stock, which has a cost of 10 per cent. Another company, Samsui Limited, is identical in every respect to Sanghmani Limited, except that its capital structure is all-equity, and its cost of equity is 16 per cent. According to Modigliani and Miller, if we ignored taxation and tax relief on debt capital, COMPUTE the cost of equity of Sanghmani Limited?

ANSWERS/SOLUTIONS

Answers to the MCQs based Questions

1. (a)	2. (b)	3. (a)	4. (b)	5. (a)	6. (c)
7. (b)	8. (b)	9. (a)	10. (c)		

Answers to Theoretical based Questions

- Please refer paragraph 5.1
- Please refer paragraph 5.2.4
- Please refer paragraph 5.2.3
- Please refer paragraph 5.3.2
- Please refer paragraph 5.5
- Please refer paragraph 5.5.2

Answers to Practical problems

1. Calculation of Indifference point between the two alternatives of financing.

Alternative-I By issue of 6,00,000 equity shares of ₹10 each amounting to ₹60 lakhs. No financial charges are involved.

Alternative-II By raising the funds in the following way:

Debt = ₹40 lakhs

Equity = ₹20 lakhs (2,00,000 equity shares of ₹10 each)

Interest payable on debt = $40,00,000 \times \frac{18}{100} = ₹7,20,000$

The difference point between the two alternatives is calculated by:

$$\frac{(EBIT - I_1)(1 - T)}{E_1} = \frac{(EBIT - I_2)(1 - T)}{E_2}$$

Where,

EBIT = Earnings before interest and taxes

I_1 = Interest charges in Alternative-I

I_2 = Interest charges in Alternative-II

T = Tax rate

E_1 = Equity shares in Alternative-I

E_2 = Equity shares in Alternative-II

Putting the values, the break-even point would be as follows:

$$\frac{(EBIT - 0)(1 - 0.40)}{6,00,000} = \frac{(EBIT - 7,20,000)(1 - 0.40)}{2,00,000}$$

$$\frac{(EBIT)(0.60)}{6,00,000} = \frac{(EBIT - 7,20,000)(0.60)}{2,00,000}$$

$$\frac{EBIT(0.60)}{3} = \frac{0.60(EBIT - 7,20,000)}{1}$$

$$EBIT = 3EBIT - 21,60,000$$

$$-2 EBIT = -21,60,000$$

$$\dots \quad \text{EBIT} = \frac{21,60,000}{2}$$

$$\text{EBIT} = ₹10,80,000$$

Therefore, at EBIT of ₹10,80,000 earnings per share for the two alternatives is equal.

2. (i) Computation of Earnings per share (EPS)

Plans	A	B	C
Earnings before interest and tax (EBIT)	80,000	80,000	80,000
Less: Interest charges	---	(8,000) (8% × ₹1 lakh)	---
Earnings before tax (EBT)	80,000	72,000	80,000
Less: Tax (@ 50%)	(40,000)	(36,000)	(40,000)
Earnings after tax (EAT)	40,000	36,000	40,000
Less: Preference Dividend	---	---	(8,000) (8% × ₹1 lakh)
Earnings available for Equity shareholders (A)	40,000	36,000	32,000
No. of Equity shares (B)	10,000 (₹2 lakh ÷ ₹20)	5,000 (₹1 lakh ÷ ₹20)	5,000 (₹1 lakh ÷ ₹20)
EPS ₹ [(A) ÷ (B)]	4	7.20	6.40

(ii) Calculation of Financial Break-even point

Financial break-even point is the earnings which are equal to the fixed finance charges and preference dividend.

Plan A: Under this plan there is no interest or preference dividend payment hence, the Financial Break-even point will be zero.

Plan B: Under this plan there is an interest payment of ₹8,000 and no preference dividend, hence, the Financial Break-even point will be ₹8,000 (Interest charges).

Plan C: Under this plan there is no interest payment but an after tax preference dividend of ₹8,000 is paid. Hence, the Financial Break-even point will be before tax earnings of ₹16,000 (i.e. ₹8,000 ÷ 0.5 = ₹16,000.)

(iii) Computation of indifference point between the plans.

The indifference between two alternative methods of financing is calculated by applying the following formula.

$$\frac{(EBIT - I_1)(1-T)}{E_1} = \frac{(EBIT - I_2)(1-T)}{E_2}$$

Where,

EBIT = Earnings before interest and tax.

I_1 = Fixed charges (interest or pref. dividend) under Alternative

I_2 = Fixed charges (interest or pref. dividend) under Alternative

T = Tax rate

E_1 = No. of equity shares in Alternative 1

E_2 = No. of equity shares in Alternative 2



Now, we can calculate indifference point between different plans of financing.

I. Indifference point where EBIT of Plan A and Plan B is equal.

$$\frac{(EBIT - 0)(1 - 0.5)}{10,000} = \frac{(EBIT - 8,000)(1 - 0.5)}{5,000}$$

$$0.5 EBIT (5,000) = (0.5 EBIT - 4,000) (10,000)$$

$$0.5 EBIT = EBIT - 8,000$$

$$0.5 EBIT = 8,000$$

$$EBIT = ₹16,000$$

II. Indifference point where EBIT of Plan A and Plan C is equal.

$$\frac{(EBIT - 0)(1 - 0.5)}{10,000} = \frac{(EBIT - 0)(1 - 0.5) - 8,000}{5,000}$$

$$\frac{0.5 EBIT}{10,000} = \frac{0.5 EBIT - 8,000}{5,000}$$

$$0.25 EBIT = 0.5 EBIT - 8,000$$

$$0.25 EBIT = 8,000$$

$$EBIT = ₹ 32,000$$

III. Indifference point where EBIT of Plan B and Plan C are equal.

$$\frac{(EBIT - 8,000)(1 - 0.5)}{5,000} = \frac{(EBIT - 0)(1 - 0.5) - 8,000}{5,000}$$

$$0.5 EBIT - 4,000 = 0.5 EBIT - 8,000$$

There is no indifference point between the financial plans B and C.

It can be seen that Financial Plan B dominates Plan C. Since, the financial break-even point of the former is only ₹8,000 but in case of latter it is ₹16,000. Further EPS of plant B is the highest.

3. (a)

Particulars	Alternatives		
	Alternative-I : Take additional Debt	Alternative-II: Issue 11% Preference Shares	Alternative-III: Issue further Equity Shares
	₹	₹	₹
EBIT	15,00,000	15,00,000	15,00,000
Interest on Debts:			
- on existing debt @10%	(3,60,000)	(3,60,000)	(3,60,000)
- on new debt @ 12%	(4,80,000)	---	---
Profit before taxes	6,60,000	11,40,000	11,40,000
Taxes @ 40%	(2,64,000)	(4,56,000)	(4,56,000)
Profit after taxes	3,96,000	6,84,000	6,84,000
Preference shares dividend	---	(4,40,000)	---
Earnings available to equity Shareholders	3,96,000	2,44,000	6,84,000
Number of shares	8,00,000	8,00,000	10,50,000
Earnings per share	0.495	0.305	0.651

(b) For the present EBIT level, equity shares are clearly preferable. EBIT would need to increase by ₹2,376 – ₹1,500 = ₹876 before an indifference point with

debt is reached. One would want to be comfortably above this indifference point before a strong case for debt should be made. The lower the probability that actual EBIT will fall below the indifference point, the stronger the case that can be made for debt, all other things remain the same.

4. (i) Amount = ₹80,00,000

Plan I = Equity of ₹60,00,000 + Debt of ₹20,00,000

Plan II = Equity of ₹40,00,000 + 12% Debentures of ₹40,00,000

Plan I: Interest Payable on Loan

$$= 12\% \times ₹20,00,000 = ₹2,40,000$$

Plan II: Interest Payable on Debentures

$$= 12\% \times ₹40,00,000 = ₹4,80,000$$



Computation of Point of Indifference

$$\frac{(EBIT - I_1)(1-t)}{E_1} = \frac{(EBIT - I_2)(1-t)}{E_2}$$

$$\frac{(EBIT - ₹2,40,000)(1-0.3)}{60,000} = \frac{(EBIT - ₹4,80,000)(1-0.3)}{40,000}$$

$$2(EBIT - ₹2,40,000) = 3(EBIT - ₹4,80,000)$$

$$2EBIT - ₹4,80,000 = 3EBIT - ₹14,40,000$$

$$2EBIT - 3EBIT = - ₹14,40,000 + ₹4,80,000$$

$$EBIT = ₹9,60,000$$

(ii) **Earnings per share (EPS) under Two Situations for both the Plans**

Situation A (EBIT is assumed to be ₹9,50,000)		
Particulars	Plan I	Plan II
EBIT	9,50,000	9,50,000
Less: Interest @ 12%	(2,40,000)	(4,80,000)
EBT	7,10,000	4,70,000
Less: Taxes @ 30%	(2,13,000)	(1,41,000)
EAT	4,97,000	3,29,000
No. of Equity Shares	60,000	40,000
EPS	8.28	8.23

Comment: In Situation A, when expected EBIT is less than the EBIT at indifference point then, Plan I is more viable as it has higher EPS. The advantage of EPS would be available from the use of equity capital and not debt capital.

Situation B (EBIT is assumed to be ₹9,70,000)		
Particulars	Plan I	Plan II
EBIT	9,70,000	9,70,000
Less: Interest @ 12%	(2,40,000)	(4,80,000)
EBT	7,30,000	4,90,000
Less: Taxes @ 30%	(2,19,000)	(1,47,000)
EAT	5,11,000	3,43,000
No. of Equity Shares	60,000	40,000
EPS	8.52	8.58

Comment: In Situation B, when expected EBIT is more than the EBIT at indifference point then, Plan II is more viable as it has higher EPS. The use of fixed-cost source of funds would be beneficial from the EPS viewpoint. In this case, financial leverage would be favourable.

(Note: The problem can also be worked out assuming any other figure of EBIT which is more than 9,60,000 and any other figure less than 9,60,000. Alternatively, the answer may also be based on the factors/governing the capital structure like the cost, risk, control, etc. Principles).

5. Here we are assuming that MM Approach 1958: Without tax, where capital structure has no relevance with the value of company and accordingly overall cost of capital of both levered as well as unlevered company is same. Therefore, the two companies should have similar WACCs. Because Samsui Limited is all-equity financed, its WACC is the same as its cost of equity finance, i.e. 16 per cent. It follows that Sanghmani Limited should have WACC equal to 16 per cent also.

Therefore, Cost of equity in Sanghmani Ltd. (levered company) will be calculated as follows:

$$K_o = \frac{2}{3} \times K_e + \frac{1}{3} \times K_d = 16\% \text{ (i.e. equal to WACC of Samsui Ltd.)}$$

$$\text{Or, } 16\% = \frac{2}{3} \times K_e + \frac{1}{3} \times 10\% \quad \text{Or, } K_e = 19$$

FINANCING DECISIONS

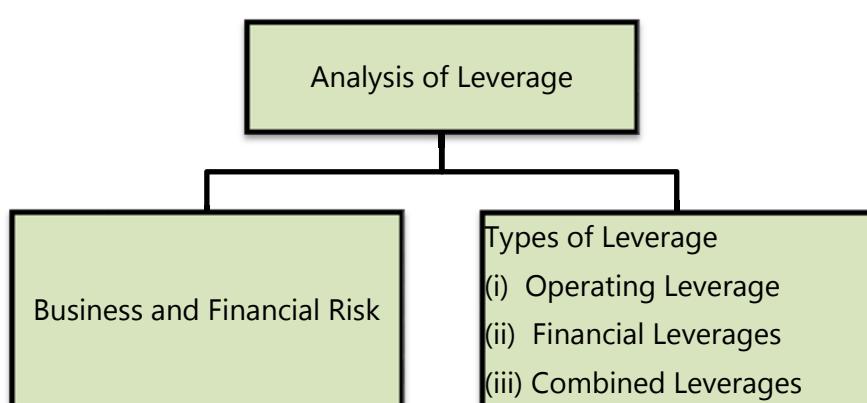
- LEVERAGES



LEARNING OUTCOMES

- Understand the concept of business risk and financial risk
- Discuss and Interpret the types of leverages.
- Discuss the relationship between operating leverage, Break - even analysis & Margin of Safety
- Discuss positive and negative Leverage
- Discuss Financial leverage as 'Trading on equity'
- Discuss Financial Leverage as 'Double Edged Sword'

CHAPTER OVERVIEW





6.1 INTRODUCTION

Objective of financial management is to **maximize wealth**. Here wealth means market value. Value is directly related to performance of company and inversely related to expectation of investors. In turn expectation of investor is dependent on risk of the company. Therefore, to maximize value company should try to manage its risk. This risk may be business risk, financial risk or both. In this chapter we will discuss factors that influence business and financial risks.



6.2 MEANING AND TYPES OF LEVERAGE

6.2.1 Meaning of Leverage

The term leverage represents influence or power. In financial analysis leverage represents the influence of one financial variable over some other related financial variable. These financial variables may be costs, output, sales revenue, Earnings Before Interest and Tax (EBIT), Earning per share (EPS) etc. Generally, if we want to calculate impact of change in variable X on variable Y, it is termed as Leverage of Y with X, and it is calculated as follows:

$$\text{Measurement of Leverage} = \frac{\text{Change in Y} \div Y}{\text{Change in X} \div X}$$

6.2.2 Types of Leverage

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

- (i) **Operating Leverage:** It is the relationship between Sales and EBIT and indicated **business risk**.
- (ii) **Financial Leverage:** it is the relationship between EBIT and EPS and indicates **financial risk**.
- (iii) **Combined Leverage:** It is the relationship between Sales and EPS and indicated **total risk**.

6.2.3 Chart Showing Operating Leverage, Financial Leverage and Combined leverage

Profitability Statement			
Sales	xxx		
<i>Less: Variable Cost</i>	(xxx)		
Contribution	xxx	Operating Leverage	
<i>Less: Fixed Cost</i>	(xxx)		
Operating Profit/ EBIT	xxx		
<i>Less: Interest</i>	(xxx)		
Earnings Before Tax (EBT)	xxx		Degree of Combined Leverage
<i>Less: Tax</i>	(xxx)		
Profit After Tax (PAT)	xxx	Financial Leverage	
<i>Less: Pref. Dividend (if any)</i>	(xxx)		
Net Earnings available to equity shareholders/ PAT	xxx		
No. Equity shares (N)			
Earnings per Share (EPS) = (PAT ÷ N)			



6.3 OPERATING LEVERAGE

Operating Leverage means tendency of operating income (EBIT) to change disproportionately with change in sale volume. This disproportionate change is caused by operating fixed cost, which does not change with change in sales volume.

In other words, operating leverage (OL) maybe defined **as the employment of an asset with a fixed cost** so that enough revenue can be generated to cover all the fixed and variable costs.

The use of assets for which a company pays a fixed cost is called operating leverage.

Operating leverage is a function of three factors:

- (i) Amount of fixed cost,

- (ii) Variable contribution margin, and
- (iii) Volume of sales.

6.3.1 Degree of Operating Leverage (DOL)

When we measure magnitude of disproportionate change it is termed as degree of leverage. Degree of Operating Leverage may be defined as percentage change in EBIT with respect to percentage change in sales quantity.

$$\text{Degree of Operating Leverage} = \frac{\text{Percentage Change in EBIT}}{\text{Percentage Change in Sales}}$$

Mathematically:

$$DOL = \frac{\Delta EBIT}{EBIT} \times \frac{\Delta Q}{Q}$$

Here, $EBIT = Q(S-V) - F$

Q = sales quantity

S = selling price per unit

V = variable cost per unit

Δ Denotes change

$$DOL = \frac{\Delta [Q(S-V)-F] / [Q(S-V)-F]}{\Delta Q / Q}$$

Now ΔF is nil because change in fixed cost is nil. Therefore:

$$DOL = \frac{\Delta Q(S-V)}{Q(S-V)-F} \times \frac{Q}{\Delta Q} = \frac{\Delta Q(S-V)}{Q(S-V)-F} \times \frac{Q}{\Delta Q} = \frac{Q(S-V)}{Q(S-V)-F}$$

$$DOL = \frac{\text{Contribution}}{\text{Contribution-Fixed Cost}} = \frac{\text{Contribution}}{EBIT}$$

6.3.2 Break-Even Analysis and Operating Leverage

Break-even analysis is generally used to study the Cost Volume Profit analysis. It is concerned with computing the break-even point. At this point of production level and sales there will be no profit and loss i.e. total cost is equal to total sales revenue.

$$\text{Break-even point in units} = \frac{\text{Fixed Cost}}{\text{Contribution per unit}}$$

Let us understand through the following example:

Particulars	Product X	Product Y
	(₹)	(₹)
Selling Price	40	20
Variable Cost	20	12
Contribution	20	8
Total Contribution of 1,000 units	20,000	8,000
Fixed Cost	15,000	5,000
Profit (EBIT)	5,000	3,000
Break-even point (Fixed Cost / Contribution)	$\frac{15,000}{20} = 750 \text{ units}$	$\frac{5,000}{8} = 625 \text{ units}$
Operating Leverage $\left(\frac{\text{Contribution}}{\text{EBIT}} \right)$	$\frac{20,000}{5,000} = 4$	$\frac{8,000}{3,000} = 2.67$

There is a relationship between leverage and Break-even point. Both are used for profit planning. In brief the relationship between leverage, break-even point and fixed cost as under:

Leverage	Break-even point
1. Firm with high leverage	1. Higher Break-even point
2. Firm with low leverage	2. Lower Break-even point
Fixed cost	Operating leverage
1. High fixed cost	1. High degree of operating leverage
2. Lower fixed cost	2. Lower degree of operating leverage

6.3.3 Margin of Safety and Operating Leverage

In cost accounting, one studies that margin of safety (MOS) may be calculated as follows:

$$MOS = \frac{Sales - BEP\ Sales}{Sales} \times 100$$

Higher margin of safety indicates lower business risk and higher profit and vice versa. If we both multiply and divide above formula with profit volume (PV) ratio then:

$$MOS = \frac{Sales - BEP\ Sales}{Sales} \times \frac{PV\ Ratio}{PV\ Ratio} = \frac{Sales \times PV - BEP \times PV}{Sales \times PV}$$

we know that:

$$PV\ ratio = \frac{Contribution}{Sales} \text{ or } Sales \times PV\ ratio = Contribution$$

$$\text{Further, } BEP = \frac{\text{Fixed Cost}}{PV\ ratio} \text{ or } BEP \times PV\ ratio = \text{Fixed Cost}$$

So

$$MOS = \frac{Contribution - Fixed\ Cost}{Contribution} = \frac{EBIT}{Contribution}$$

we know that:

$$DOL = \frac{Contribution}{EBIT}$$

hence:

$$\text{Degree of Operating leverage} = \frac{1}{Margin\ of\ Safety}$$

Let us Understand through the following example:

Particulars	Product X
	(₹)
Sales (50 x 1000 units)	50,000

Variable Cost (30 x 1000 units)	30,000
Contribution	20,000
Fixed Cost	15,000
Profit (EBIT)	5,000
Break- even point (Fixed Cost / PV ratio)	15000/0.40 = 37,500
Margin of Safety = (50000-37500)/50000	0.25
Operating Leverage = Contribution/EBIT = 20000/5000	4
Operating Leverage = 1/MOS = 1/0.25	4

If Margin of safety	Business Risk	DOL (= 1/MOS)
Rises	Falls	Falls
Falls	Rises	Rises

When DOL is more than one (1), operating leverage exists. More is the DOL higher is operating leverage.

A positive DOL/ OL means that the firm is operating at higher level than the break-even level and both sales and EBIT moves in the same direction. In case of negative DOL/ OL firm operates at lower than the break-even sales and EBIT is negative.

Situation 1: No. Fixed Cost

Particulars	20,000 units	30,000 units
	(₹)	(₹)
Sales @ ₹10	2,00,000	3,00,000
Variable cost @ ₹ 5	1,00,000	1,50,000
EBIT	1,00,000	1,50,000

$$\text{Degree of Operative leverage (DOL)} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}} = \frac{50\%}{50\%} = 1$$

Situation 2: Positive Leverage

Particulars	(₹)	(₹)
Sales @ ₹10	2,00,000	3,00,000

Variable Cost @ ₹5	1,00,000	1,50,000
Contribution	1,00,000	1,50,000
Fixed Cost	50,000	50,000
EBIT	50,000	1,00,000

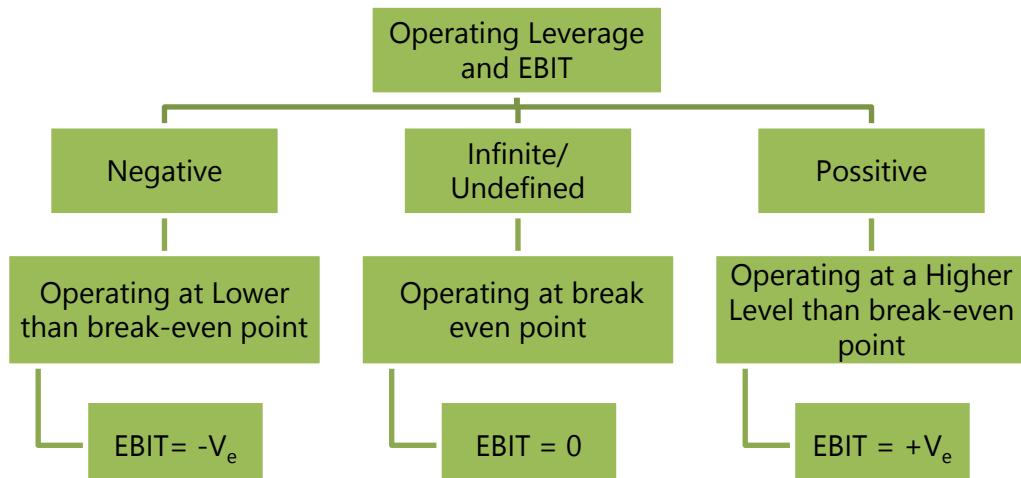
$$\text{Degree of Operative leverage (DOL)} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}} = \frac{100\%}{50\%} = 2$$

Situation 3: When EBIT is Nil (contribution = fixed cost)

$$\text{Degree of Operating Leverage (DOL)} = \frac{\text{Contribution}}{0} = \text{Undefined.}$$

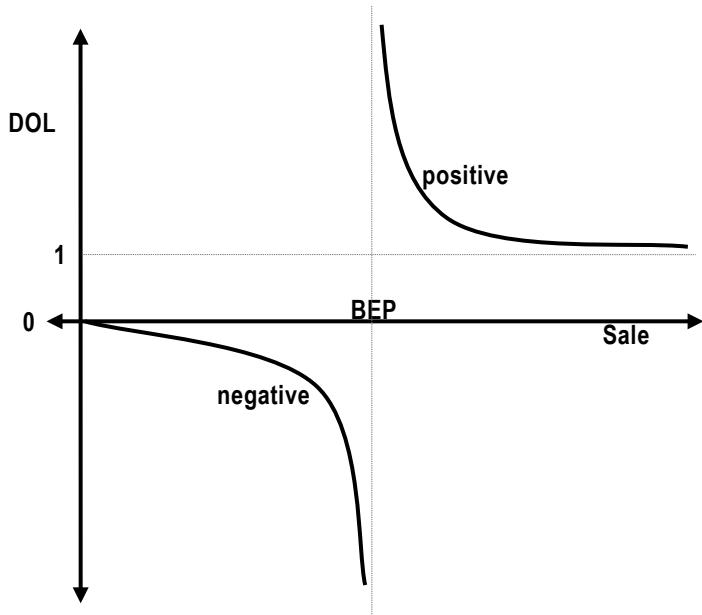
Analysis and Interpretation of operating leverage

S. No.	Situation	Result
1	No Fixed Cost	No operating leverage
2.	Higher Fixed cost	Higher Break-even point
3.	Higher than Break-even level	Positive operating leverage
4.	Lower than Break-even level	Negating operating leverage



Positive and Negative Operating Leverage

Note: DOL can never be between zero and one. It can be zero or less or it can be one or more.



When Sales is much higher than BEP sales, DOL will be slightly more than one. With decrease in sales DOL will increase. At BEP, DOL will be infinite. When sales is slightly less than BEP, DOL will be negative infinite. With further reduction in sale, DOL will move towards zero. At zero sales, DOL will also be zero.

ILLUSTRATION 1

A Company produces and sells 10,000 shirts. The selling price per shirt is ₹ 500. Variable cost is ₹ 200 per shirt and fixed operating cost is ₹ 25,00,000.

- (a) CALCULATE operating leverage.
- (b) If sales are up by 10%, then COMPUTE the impact on EBIT?

SOLUTION

- (a) Statement of Profitability

	₹
Sales Revenue ($10,000 \times 500$)	50,00,000
Less: Variable Cost ($10,000 \times 200$)	20,00,000
Contribution	30,00,000
Less: Fixed Cost	25,00,000
EBIT	5,00,000

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{₹ 30 lakhs}}{\text{₹ 5 lakhs}} = 6 \text{ times}$$

$$(b) \text{ Operating Leverage (OL)} = \frac{\% \text{ Change in EBIT}}{\% \text{ Change in Sales}}$$

$$6 = \frac{X / 5,00,000}{5,00,000 / 50,00,000}$$

$$X = ₹3,00,000$$

$$\therefore \Delta \text{EBIT} = ₹3,00,000 / 5,00,000 = 60\%$$

ILLUSTRATION 2

CALCULATE the operating leverage for each of the four firms A, B, C and D from the following price and cost data:

	Firms			
	A (₹)	B (₹)	C (₹)	D (₹)
Sale price per unit	20	32	50	70
Variable cost per unit	6	16	20	50
Fixed operating cost	60,000	40,000	1,00,000	Nil

What calculations can you draw with respect to levels of fixed cost and the degree of operating leverage result? Explain. Assume number of units sold is 5,000.

SOLUTION

	Firms			
	A	B	C	D
Sales (units)	5,000	5,000	5,000	5,000
Sales revenue (Units × price) (₹)	1,00,000	1,60,000	2,50,000	3,50,000
Less: Variable cost	(30,000)	(80,000)	(1,00,000)	(2,50,000)
(Units × variable cost per unit) (₹)				
Less: Fixed operating costs (₹)	(60,000)	(40,000)	(1,00,000)	Nil
EBIT	10,000	40,000	50,000	1,00,000

$$DOL = \frac{\text{Current sales (S) - Variable costs (VC)}}{\text{Current EBIT}}$$

$$DOL_{(A)} = \frac{\text{₹ 1,00,000} - \text{₹ 30,000}}{\text{₹ 10,000}} = 7$$

$$DOL_{(B)} = \frac{\text{₹1,60,000} - \text{₹ 80,000}}{\text{₹ 40,000}} = 2$$

$$DOL_{(C)} = \frac{\text{₹2,50,000} - \text{₹ 1,00,000}}{\text{₹ 50,000}} = 3$$

$$DOL_{(D)} = \frac{\text{₹3,50,000} - \text{₹ 2,50,000}}{\text{₹ 1,00,000}} = 1$$

The operating leverage exists only when there are fixed costs. In the case of firm D, there is no magnified effect on the EBIT due to change in sales. A 20 per cent increase in sales has resulted in a 20 per cent increase in EBIT. In the case of other firms, operating leverage exists. It is maximum in firm A, followed by firm C and minimum in firm B. The interpretation of DOL of 7 is that 1 per cent change in sales results in 7 per cent change in EBIT level in the direction of the change of sales level of firm A.



6.4 FINANCIAL LEVERAGE

Financial leverage (FL) maybe defined as '**the use of funds with a fixed cost in order to increase earnings per share.**' In other words, it is the use of company funds on which it pays a limited return. Financial leverage involves the use of funds obtained at a fixed cost in the hope of increasing the return to common stockholders.

$$\text{Financial Leverage (FL)} = \frac{\text{Earnings before interest and tax (EBIT)}}{\text{Earnings before tax (EBT)}}$$

Where, EBIT = Sales - (Variable cost + Fixed cost)

EBT = EBIT - Interest

6.4.1 Degree of Financial Leverage (DFL)

Degree of financial leverage is the ratio of the percentage increase in earnings per share (EPS) to the percentage increase in earnings before interest and taxes (EBIT). Financial Leverage (FL) is also defined as "**the ability of a firm to use fixed financial charges to magnify the effect of changes in EBIT on EPS**

Degree of Financial Leverage (DFL)

$$= \frac{\text{Percentage change in earnings per share (EPS)}}{\text{Percentage change in earnings before interest and tax (EBIT)}}$$

$$DFL = \frac{\Delta EPS}{EPS} / \frac{\Delta EBIT}{EBIT}$$

Δ EPS means change in EPS and Δ EBIT means change in EBIT

now $EPS = [(EBIT - I) (1 - t)] - D / \text{No. of Shares}$

Here

T = Tax Rate

D = Dividend on Preference Shares (inclusive of dividend tax if any)

on simplifying the above we get,

$$DFL = \frac{EBIT(1 - t)}{(EBIT - Int.)(1 - t) - D_P}$$

$$DFL = \frac{EBIT}{EBIT - Int. - \frac{D_P}{1-t}}$$

If the company has not issued preference shares, then:

$$DFL = \frac{EBIT}{EBIT - Int.} = \frac{EBIT}{PBT}$$

When DFL is more than one (1), financial leverage exists. More is DFL higher is financial leverage.

A positive DFL/ FL means firm is operating at a level higher than break-even point and EBIT and EPS moves in the same direction. Negative DFL/ FL indicates the firm is operating at lower than break-even point and EPS is negative.

Let us understand through the following analysis:

Situation 1: No Fixed Interest Charges

Particulars	X	Y
	₹	₹
EBIT	1,00,000	1,50,000
Tax @ 50%	50,000	75,000

PAT	50,000	75,000
No. of share	10,000	10,000
EPS	5	7.5

$$\text{Degree of Finance Leverage - (DFL)} = \frac{\text{Change in EP}}{\text{Change in EBIT}} = \frac{50\%}{50\%} = 1$$

Situation 2. Positive Financial Leverage

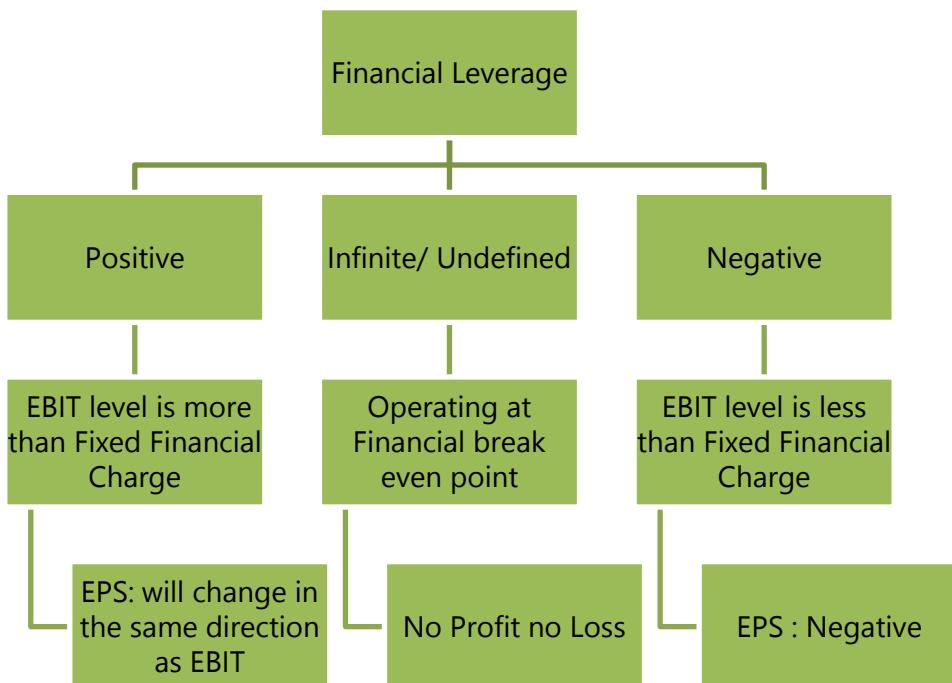
Particular	M	N
EBIT	1,00,000	1,50,000
Interest	20,000	20,000
EBT	80,000	1,30,000
Tax @ 50%	40,000	65,000
PAT	40,000	65,000
No of Share	10,000	10,000
	4	6.5

$$\text{Degree of Finance Leverage - (DFL)} = \frac{\text{Change in EPS}^*}{\text{Change in EBIT}} = \frac{62.5\%^*}{50\%} = 1.25$$

$$\frac{\left(\frac{2.5}{4} \times 100 \right)}{50\%} = 62.5\%$$

Situation 3. When EBT is nil (EBIT = Fixed Interest)

$$\text{Degree of Finance Leverage} = \frac{\text{EBIT}}{\text{Nil}} = \text{undefined.}$$



Positive and Negative Financial Leverage

Analysis and Interpretation of Financial leverage

Sl. No.	Situation	Result
1	No Fixed Financial Cost	No Financial leverage
2.	Higher Fixed Financial cost	Higher Financial Leverage
3.	When EBIT is higher than Financial Break-even point	Positive Financial leverage
4.	When EBIT is less than Finance Break-even point	Negating Financial leverage

6.4.2 Financial Leverage as 'Trading on Equity'

Financial leverage indicates the use of funds with fixed cost like long term debts and preference share capital alongwith equity share capital which is known as trading on equity. The basic aim of financial leverage is to increase the earnings available to equity shareholders using fixed cost fund. A firm is known to have a positive leverage when its earnings are more than the cost of debt. If earnings is equal to or less than cost of debt, it will be an unfavourable leverage. When the

quantity of fixed cost fund is relatively high in comparison to equity capital it is said that the firm is "**trading on equity**".

6.4.3 Financial Leverage as a 'Double edged Sword'

On one hand when cost of 'fixed cost fund' is less than the return on investment financial leverage will help to increase return on equity and EPS. The firm will also benefit from the saving of tax on interest on debts etc. However, when cost of debt will be more than the return it will affect return of equity and EPS unfavourably and as a result firm can be under financial distress. This is why financial leverage is known as "**double edged sword**".

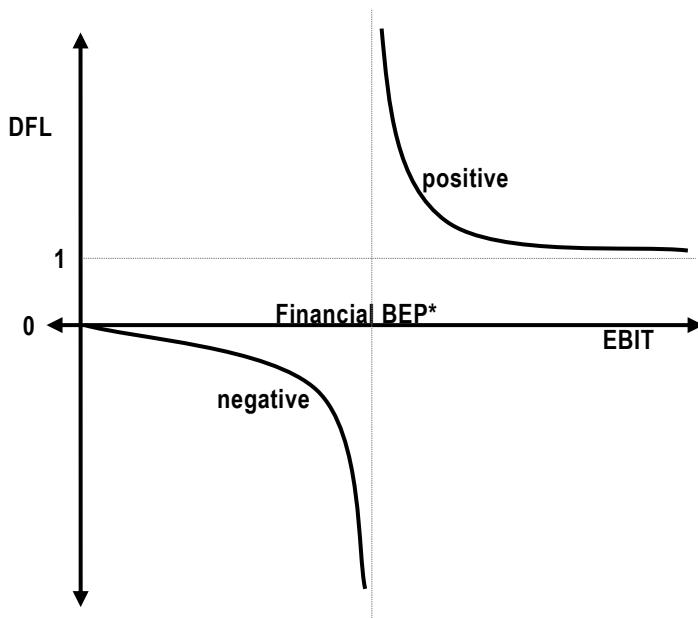
Effect on EPS and ROE:

When, $ROI > Interest$ – Favourable – Advantage

When, $ROI < Interest$ – Unfavourable – Disadvantage

When, $ROI = Interest$ – Neutral – Neither advantage nor disadvantage.

Note: DFL can never be between zero and one. It can be zero or less or it can be one or more.



*Financial BEP is the level of EBIT at which earning per share is zero. If a company has not issued preference shares then Financial BEP is simply equal to amount of Interest.

When EBIT is much higher than Financial BEP, DFL will be slightly more than one. With decrease in EBIT, DFL will increase. At Financial BEP, DFL will be infinite. When EBIT is slightly less than Financial BEP, DFL will be negative infinite. With further reduction in EBIT, DFL will move towards zero. At zero EBIT, DFL will also be zero.



6.5 COMBINED LEVERAGE

Combined leverage maybe defined as the potential use of fixed costs, both operating and financial, **which magnifies the effect of sales volume change on the earning per share of the firm.**

$$\begin{aligned}
 \text{Combined Leverage (CL)} &= \text{Operating Leverage (OL)} \times \text{Financial Leverage (FL)} \\
 &= \frac{C}{EBIT} \times \frac{EBIT}{EBT} \\
 &= \frac{C}{EBT}
 \end{aligned}$$

6.5.1 Degree of Combined Leverage (DCL)

Degree of combined leverage (DCL) is the ratio of percentage change in earning per share to the percentage change in sales. **It indicates the effect the sales changes will have on EPS.**

$$\begin{aligned}
 DCL &= DOL \times DFL \\
 &= \frac{\% \text{Change in EBIT}}{\% \text{Change in Sales}} \times \frac{\% \text{Change in EPS}}{\% \text{Change in EBIT}} \\
 &= \frac{\% \text{Change in EPS}}{\% \text{Change in Sales}}
 \end{aligned}$$

Like operating leverage and financial leverage, combined leverage can also be positive and negative combined leverage.

6.5.2 Analysis of combined leverage

Combine leverage measures total risk. It depends on combination of operating and financial risk.

DOL	DFL	Comments
Low	Low	Lower total risk. Can not take advantage of trading on equity.
High	High	Higher total risk. Very risky combination.

High	Low	Moderate total risk. Not a good combination. Lower EBIT due to higher DOL and lower advantage of trading on equity due to low DFL.
Low	High	Moderate total risk. Best combination. Higher financial risk is balanced by lower total business risk.

ILLUSTRATION 3

A firm's details are as under:

Sales (@100 per unit)	₹ 24,00,000
Variable Cost	50%
Fixed Cost	₹ 10,00,000

It has borrowed ₹ 10,00,000 @ 10% p.a. and its equity share capital is ₹ 10,00,000 (₹ 100 each)

CALCULATE:

- Operating Leverage
- Financial Leverage
- Combined Leverage
- Return on Investment
- If the sales increases by ₹ 6,00,000; what will the new EBIT?

SOLUTION

	₹
Sales	24,00,000
Less: Variable cost	12,00,000
Contribution	12,00,000
Less: Fixed cost	10,00,000
EBIT	2,00,000
Less: Interest	1,00,000
EBT	1,00,000
Less: Tax (50%)	50,000

EAT	50,000
No. of equity shares	10,000
EPS	5

(a) Operating Leverage = $\frac{12,00,000}{2,00,000} = 6$ times

(b) Financial Leverage = $\frac{2,00,000}{1,00,000} = 2$ times

(c) Combined Leverage = OL \times FL = $6 \times 2 = 12$ times.

(d) R.O. I = $\frac{50,000}{10,00,000} \times 100 = 5\%$

Here ROI is calculated as ROE i.e. $\frac{\text{EAT} - \text{Pref. Dividend}}{\text{Equity shareholders' fund}}$

(e) Operating Leverage = 6

$$6 = \frac{\Delta \text{EBIT}}{0.25}$$

$$\Delta \text{EBIT} = \frac{6 \times 1}{4} = 1.5$$

Increase in EBIT = ₹ 2,00,000 \times 1.5 = ₹ 3,00,000

New EBIT = 5,00,000

SUMMARY

DOL	DFL	DCL
Shows level of business risk.	Shows level of financial risk.	Shows level of total or combined risk.
It is dependent upon fixed cost.	It is dependent upon interest and preference dividend	It is dependent upon fixed cost, interest & preference dividend.
Measures % change in EBIT which results from a 1% change in Sales.	Measures % change in EPS which results from a 1% change in EBIT.	Measures % change in EPS which results from a 1% change in Sales.

For example, if DOL is 3 & there is 8% increase in output then EBIT will increase by 24% & if there is a 8% decrease in output EBIT will decrease by 24%.	For example, if DFL is 2 and there is 5% increase in EBIT then EPS will increase by 10% and if there is a 5% decrease in EBIT, EPS will decrease by 10%.	For example, if DCL is 6 and there is a 8% increase in sales then EPS will increase by 48%. And if there is a 8% decrease in sales then EPS will decrease by 48%.
There is unique DOL for each level of output.	There is a unique DFL for each level of EBIT.	There is a unique DCL for each level of sales.
It is undefined at Operating B.E.P.	It is undefined at Financial B.E.P.	It is undefined at Financial B.E.P.

TEST YOUR KNOWLEDGE

MCQs based Questions

1. Given

Operating fixed costs	₹ 20,000
Sales	₹ 1,00,000
P/ V ratio	40%

The operating leverage is:

- (a) 2.00
- (b) 2.50
- (c) 2.67
- (d) 2.47

2. If EBIT is ₹ 15,00,000, interest is ₹ 2,50,000, corporate tax is 40%, degree of financial leverage is

- (a) 1:11
- (b) 1.20
- (c) 1.31
- (d) 1.41

3. If DOL is 1.24 and DFL is 1.99, DCL would be:

- (a) 2.14

(b) ... 2.18
 (c) 2.31
 (d) 2.47

4. Operating Leverage is calculated as:
 (a) Contribution \div EBIT
 (b) EBIT \div PBT
 (c) EBIT \div Interest
 (d) EBIT \div Tax

5. Financial Leverage is calculated as:
 (a) EBIT \div Contribution
 (b) EBIT \div PBT
 (c) EBIT \div Sales
 (d) EBIT \div Variables Cost

6. Which of the following is correct?
 (a) $CL = OL + FL$
 (b) $CL = OL - FL$
 (c) $OL = OL \times FL$
 (d) $OL = OL \div FL$



Theoretical based Questions

1. DIFFERENTIATE between Business risk and Financial risk.
2. "Operating risk is associated with cost structure, whereas financial risk is associated with capital structure of a business concern." Critically EXAMINE this statement.

Practical Problems

1. The Sale revenue of TM excellence Ltd. @ Rs.20 Per unit of output is Rs.20 lakhs and Contribution is Rs.10 lakhs. At the present level of output the DOL of the company is 2.5. The company does not have any Preference Shares. The number of Equity Shares are 1 lakh. Applicable corporate Income Tax rate is 50% and the rate of interest on Debt Capital is 16% p.a. What is the EPS (At sales revenue

of ₹ 20 lakhs) and amount of Debt Capital of the company if a 25% decline in Sales will wipe out EPS.

2. Betatronics Ltd. has the following balance sheet and income statement information:

Balance Sheet as on March 31st 2019

Liabilities	₹	Assets	₹
Equity capital (₹ 10 per share)	8,00,000	Net fixed assets	10,00,000
10% Debt	6,00,000	Current assets	9,00,000
Retained earnings	3,50,000		
Current liabilities	1,50,000		
	19,00,000		19,00,000

Income Statement for the year ending March 31st 2019

	₹
Sales	3,40,000
Operating expenses (including ₹ 60,000 depreciation)	1,20,000
EBIT	2,20,000
Less: Interest	60,000
Earnings before tax	1,60,000
Less: Taxes	56,000
Net Earnings (EAT)	1,04,000

(a) DETERMINE the degree of operating, financial and combined leverages at the current sales level, if all operating expenses, other than depreciation, are variable costs.

(b) If total assets remain at the same level, but sales (i) increase by 20 percent and (ii) decrease by 20 percent, COMPUTE the earnings per share at the new sales level?

3. A company had the following Balance Sheet as on 31st March, 2019:

Liabilities	(₹ in crores)	Assets	(₹ in crores)
Equity Share Capital (50 lakhs shares of ₹ 10 each)	5		
Reserves and Surplus	1	Fixed Assets (Net)	12.5
15% Debentures	10	Current Assets	7.5
Current Liabilities	4		
	20		20

The additional information given is as under:

Fixed cost per annum (excluding interest)	₹ 4 crores
Variable operating cost ratio	65%
Total assets turnover ratio	2.5
Income Tax rate	30%

Required:

CALCULATE the following and comment:

- (i) Earnings Per Share
- (ii) Operating Leverage
- (iii) Financial Leverage
- (iv) Combined Leverage

4. CALCULATE the operating leverage, financial leverage and combined leverage from the following data under Situation I and II and Financial Plan A and B:

Installed Capacity	4,000 units
Actual Production and Sales	75% of the Capacity
Selling Price	₹ 30 Per Unit
Variable Cost	₹ 15 Per Unit

Fixed Cost:

Under Situation I	₹ 15,000
Under Situation-II	₹20,000

Capital Structure:

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

ANSWERS/SOLUTIONS



Answers to the MCQs based Questions

1. (a) 2. (b) 3. (d) 4. (a) 5. (b) 6. (c)

Answers to Theoretical based Questions

1. Please refer paragraph 6.1.1
2. Please refer paragraph 6.1.1

Answers to Practical problems

1. (i) Calculation of Fixed Cost

$$DOL = \frac{\text{Contribution}}{\text{Contribution-Fixed Cost}} \text{ or } 2.5 = \frac{10}{EBIT} \text{ or } EBIT = ₹ 4,00,000 \text{ lakhs}$$

$$EBIT = \text{Contribution} - \text{Fixed Cost}$$

$$4 = 10 - \text{Fixed Cost}$$

$$\text{Fixed Cost} = 10 - 4 = ₹ 6 \text{ lakhs}$$

(ii) Calculation of Degree of total Leverage (DTL)

Question says that 25% change in sales will wipe out EPS. Here wipe out means it will reduce EPS by 100%.

$$DTL = \frac{\text{Percentage Change in EPS}}{\text{Percentage Change in Sales}} = \frac{100\%}{25\%} = 4$$

(iii) Calculation of Degree of Financial Leverage (DFL)

$$DTL = DOL \times DFL \text{ or } 4 = 2.5 \times DFL$$

$$\text{So } DFL = 1.6$$

(iv) Calculation of Interest and amount of Debt

$$DFL = \frac{EBIT}{EBIT-Int} \text{ or } 1.6 = \frac{4}{4-Int} \text{ or } Int = ₹ 1,50,000 \text{ lakhs}$$

$$\text{Debt} \times \text{interest rate} = \text{Amount of Interest}$$

$$\text{Debt} \times 16\% = ₹ 1,50,000$$

$$\text{Debt} = ₹ 9,37,500$$

(v) Calculation of Earning per share (EPS)

$$EPS = \frac{(EBIT-Int)(1-t)}{N} = \frac{(4-1.5)0.5}{1} = ₹ 1.25$$

2. (a) Calculation of Degree of Operating (DOL), Financial (DFL) and Combined leverages (DCL).

$$DOL = \frac{₹ 3,40,000 - ₹ 60,000}{₹ 2,20,000} = 1.27$$

$$DFL = \frac{₹ 2,20,000}{₹ 1,60,000} = 1.38$$

$$DCL = DOL \times DFL = 1.27 \times 1.38 = 1.75$$

(b) Earnings per share at the new sales level

	Increase by 20%	Decrease by 20%
	(₹)	(₹)
Sales level	4,08,000	2,72,000
Less: Variable expenses	72,000	48,000
Less: Fixed cost	60,000	60,000
Earnings before interest and taxes	2,76,000	1,64,000
Less: Interest	60,000	60,000
Earnings before taxes	2,16,000	1,04,000
Less: Taxes	75,600	36,400
Earnings after taxes (EAT)	1,40,400	67,600

Number of equity shares	80,000	80,000
EPS	1.76	0.85

Working Notes:

- (i) Variable Costs = ₹ 60,000 (total cost – depreciation)
- (ii) Variable Costs at:
 - (a) Sales level, ₹ 4,08,000 = ₹ 72,000 (increase by 20%)
 - (b) Sales level, ₹ 2,72,000 = ₹ 48,000 (decrease by 20%)

3. Total Assets = ₹ 20 crores

Total Asset Turnover Ratio = 2.5

Hence, Total Sales = $20 \times 2.5 = ₹ 50$ crores

Computation of Profit after Tax (PAT)

	(₹ in crores)
Sales	50.00
Less: Variable Operating Cost @ 65%	32.50
Contribution	17.50
Less: Fixed Cost (other than Interest)	4.00
EBIT	13.50
Less: Interest on Debentures (15% \times 10)	1.50
PBT	12.00
Less: Tax @ 30%	3.60
PAT	8.40

(i) Earnings per Share

$$\text{EPS} = \frac{8.40 \text{ crores}}{\text{Number of Equity Shares}} = \frac{8.40 \text{ crores}}{50,00,000} = ₹ 16.80$$

It indicates the amount the company earns per share. Investors use this as a guide while valuing the share and making investment decisions. It is also a indicator used in comparing firms within an industry or industry segment.

(ii) Operating Leverage

$$\text{Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{17.50}{13.50} = 1.296$$

It indicates the choice of technology and fixed cost in cost structure. It is level specific. When firm operates beyond operating break-even level, then operating leverage is low. It indicates sensitivity of earnings before interest and tax (EBIT) to change in sales at a particular level.

(iii) Financial Leverage

$$\text{Financial Leverage} = \frac{\text{EBIT}}{\text{PBT}} = \frac{13.50}{12.00} = 1.125$$

The financial leverage is very comfortable since the debt service obligation is small vis-à-vis EBIT.

(iv) Combined Leverage

$$\text{Combined Leverage} = \frac{\text{Contribution}}{\text{EBIT}} \times \frac{\text{EBIT}}{\text{PBT}}$$

Or,

$$\begin{aligned} &= \text{Operating Leverage} \times \text{Financial Leverage} \\ &= 1.296 \times 1.125 = 1.458 \end{aligned}$$

The combined leverage studies the choice of fixed cost in cost structure and choice of debt in capital structure. It studies how sensitive the change in EPS is vis-à-vis change in sales. The leverages operating, financial and combined are used as measurement of risk.

4.

Operating Leverage:	Situation-I	Situation-II
	₹	₹
Sales (S)	90,000	90,000
3000 units @ ₹ 30/- per unit		
Less: Variable Cost (VC) @ ₹ 15 per unit	45,000	45,000
Contribution (C)	45,000	45,000
Less: Fixed Cost (FC)	15,000	20,000
Operating Profit (OP)	30,000	25,000
(EBIT)		

(i)... **Operating Leverage**

$$\begin{array}{rcl}
 \frac{C}{OP} & = & \frac{\text{₹ } 45,000}{\text{₹ } 30,000} \\
 & = & \frac{\text{₹ } 45,000}{\text{₹ } 25,000} \\
 & & 1.5 \qquad \qquad \qquad 1.8
 \end{array}$$

(ii) **Financial Leverages**

	A ₹	B ₹
Situation I		
Operating Profit (EBIT)	30,000	30,000
Less: Interest on debt	2,000	1,000
PBT	28,000	29,000

$$\text{Financial Leverage} = \frac{OP}{PBT} = \frac{\text{₹ } 30,000}{\text{₹ } 28,000} = 1.07 \quad \frac{\text{₹ } 30,000}{\text{₹ } 29,000} = 1.034$$

	A (₹)	B (₹)
Situation-II		
Operating Profit (OP)	25,000	25,000
(EBIT)		
Less: Interest on debt	2,000	1,000
PBT	23,000	24,000

$$\text{Financial Leverage} = \frac{OP}{PBT} = \frac{\text{₹ } 25,000}{\text{₹ } 23,000} = 1.09 \quad \frac{\text{₹ } 25,000}{\text{₹ } 24,000} = 1.04$$

(iii) **Combined Leverages**

	A	B
Situation-I		
FL x OL	$(1.5 \times 1.07) = 1.61$	$1.5 \times 1.034 = 1.55$
Situation-II		
FL x OL	$1.8 \times 1.09 = 1.96$	$1.8 \times 1.04 = 1.872$

APPENDIX

Future value interest factor of ₹1 per period at i% for n periods, FVIF(i,n).

(The Compound Sum of One Rupee)

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100
2	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188	1.210
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.063	13.268	17.449
35	1.417	2.000	2.814	3.946	5.516	7.686	10.677	14.785	20.414	28.102
40	1.489	2.208	3.262	4.801	7.040	10.286	14.974	21.725	31.409	45.259
50	1.645	2.692	4.384	7.107	11.467	18.420	29.457	46.902	74.358	117.391

Contd.....

Period	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	1.110	1.120	1.130	1.140	1.150	1.160	1.170	1.180	1.190	1.200
2	1.232	1.254	1.277	1.300	1.323	1.346	1.369	1.392	1.416	1.440
3	1.368	1.405	1.443	1.482	1.521	1.561	1.602	1.643	1.685	1.728
4	1.518	1.574	1.630	1.689	1.749	1.811	1.874	1.939	2.005	2.074
5	1.685	1.762	1.842	1.925	2.011	2.100	2.192	2.288	2.386	2.488
6	1.870	1.974	2.082	2.195	2.313	2.436	2.565	2.700	2.840	2.986
7	2.076	2.211	2.353	2.502	2.660	2.826	3.001	3.185	3.379	3.583
8	2.305	2.476	2.658	2.853	3.059	3.278	3.511	3.759	4.021	4.300
9	2.558	2.773	3.004	3.252	3.518	3.803	4.108	4.435	4.785	5.160
10	2.839	3.106	3.395	3.707	4.046	4.411	4.807	5.234	5.695	6.192
11	3.152	3.479	3.836	4.226	4.652	5.117	5.624	6.176	6.777	7.430
12	3.498	3.896	4.335	4.818	5.350	5.936	6.580	7.288	8.064	8.916
13	3.883	4.363	4.898	5.492	6.153	6.886	7.699	8.599	9.596	10.699
14	4.310	4.887	5.535	6.261	7.076	7.988	9.007	10.147	11.420	12.839
15	4.785	5.474	6.254	7.138	8.137	9.266	10.539	11.974	13.590	15.407
16	5.311	6.130	7.067	8.137	9.358	10.748	12.330	14.129	16.172	18.488
17	5.895	6.866	7.986	9.276	10.761	12.468	14.426	16.672	19.244	22.186
18	6.544	7.690	9.024	10.575	12.375	14.463	16.879	19.673	22.901	26.623
19	7.263	8.613	10.197	12.056	14.232	16.777	19.748	23.214	27.252	31.948
20	8.062	9.646	11.523	13.743	16.367	19.461	23.106	27.393	32.429	38.338
25	13.585	17.000	21.231	26.462	32.919	40.874	50.658	62.669	77.388	95.396
30	22.892	29.960	39.116	50.950	66.212	85.850	111.065	143.371	184.675	237.376
35	38.575	52.800	72.069	98.100	133.176	180.314	243.503	327.997	440.701	590.668
40	65.001	93.051	132.782	188.884	267.864	378.721	533.869	750.378	1,051.668	1,469.772
50	184.565	289.002	450.736	700.233	1,083.657	1,670.704	2,566.215	3,927.357	5,988.914	9,100.438

Present value interest factor of Re 1 per period at $i\%$ for n periods, PVIF(i, n).

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057
35	0.706	0.500	0.355	0.253	0.181	0.130	0.094	0.068	0.049	0.036
40	0.672	0.453	0.307	0.208	0.142	0.097	0.067	0.046	0.032	0.022
50	0.608	0.372	0.228	0.141	0.087	0.054	0.034	0.021	0.013	0.009

Contd....

Period	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065
16	0.188	0.163	0.141	0.123	0.107	0.093	0.081	0.071	0.062	0.054
17	0.170	0.146	0.125	0.108	0.093	0.080	0.069	0.060	0.052	0.045
18	0.153	0.130	0.111	0.095	0.081	0.069	0.059	0.051	0.044	0.038
19	0.138	0.116	0.098	0.083	0.070	0.060	0.051	0.043	0.037	0.031
20	0.124	0.104	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026
25	0.074	0.059	0.047	0.038	0.030	0.024	0.020	0.016	0.013	0.010
30	0.044	0.033	0.026	0.020	0.015	0.012	0.009	0.007	0.005	0.004
35	0.026	0.019	0.014	0.010	0.008	0.006	0.004	0.003	0.002	0.002
40	0.015	0.011	0.008	0.005	0.004	0.003	0.002	0.001	0.001	0.001
50	0.005	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000

**Future value interest factor of an ordinary annuity of Re 1 per period at i% for n periods,
FVIFA(i,n). (The Compound Value of an Annuity of One Rupee)**

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019	27.975
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361	31.772
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974	40.545
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347
30	34.785	40.568	47.575	56.085	66.439	79.058	94.461	113.28	136.31	164.49
35	41.660	49.994	60.462	73.652	90.320	111.43	138.24	172.32	215.71	271.02
40	48.886	60.402	75.401	95.026	120.80	154.76	199.64	259.06	337.88	442.59
50	64.463	84.579	112.80	152.67	209.35	290.34	406.53	573.77	815.08	1,163.9

Contd....

Period	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.110	2.120	2.130	2.140	2.150	2.160	2.170	2.180	2.190	2.200
3	3.342	3.374	3.407	3.440	3.473	3.506	3.539	3.572	3.606	3.640
4	4.710	4.779	4.850	4.921	4.993	5.066	5.141	5.215	5.291	5.368
5	6.228	6.353	6.480	6.610	6.742	6.877	7.014	7.154	7.297	7.442
6	7.913	8.115	8.323	8.536	8.754	8.977	9.207	9.442	9.683	9.930
7	9.783	10.089	10.405	10.730	11.067	11.414	11.772	12.142	12.523	12.916
8	11.859	12.300	12.757	13.233	13.727	14.240	14.773	15.327	15.902	16.499
9	14.164	14.776	15.416	16.085	16.786	17.519	18.285	19.086	19.923	20.799
10	16.722	17.549	18.420	19.337	20.304	21.321	22.393	23.521	24.709	25.959
11	19.561	20.655	21.814	23.045	24.349	25.733	27.200	28.755	30.404	32.150
12	22.713	24.133	25.650	27.271	29.002	30.850	32.824	34.931	37.180	39.581
13	26.212	28.029	29.985	32.089	34.352	36.786	39.404	42.219	45.244	48.497
14	30.095	32.393	34.883	37.581	40.505	43.672	47.103	50.818	54.841	59.196
15	34.405	37.280	40.417	43.842	47.580	51.660	56.110	60.965	66.261	72.035
16	39.190	42.753	46.672	50.980	55.717	60.925	66.649	72.939	79.850	87.442
17	44.501	48.884	53.739	59.118	65.075	71.673	78.979	87.068	96.022	105.93
18	50.396	55.750	61.725	68.394	75.836	84.141	93.406	103.74	115.27	128.12
19	56.939	63.440	70.749	78.969	88.212	98.603	110.28	123.41	138.17	154.74
20	64.203	72.052	80.947	91.025	102.44	115.38	130.03	146.63	165.42	186.69
25	114.41	133.33	155.62	181.87	212.79	249.21	292.10	342.60	402.04	471.98
30	199.02	241.33	293.20	356.79	434.75	530.31	647.44	790.95	966.71	1,181.9
35	341.59	431.66	546.68	693.57	881.17	1,120.7	1,426.5	1,816.7	2,314.2	2,948.3
40	581.83	767.09	1,013.7	1,342.0	1,779.1	2,360.8	3,134.5	4,163.2	5,529.8	7,343.9
50	1,668.8	2,400.0	3,459.5	4,994.5	7,217.7	10,436	15,090	21,813	31,515	45,497

**Present value interest factor of an (ordinary) annuity of Re 1 per period at $i\%$ for n periods,
PVIFA(i, n).**

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.129	8.514
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077
30	25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.427
35	29.409	24.999	21.487	18.665	16.374	14.498	12.948	11.655	10.567	9.644
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.915

Contd....

Period	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	7.379	6.974	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730
17	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	7.839	7.366	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870
25	8.422	7.843	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948
30	8.694	8.055	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979
35	8.855	8.176	7.586	7.070	6.617	6.215	5.858	5.539	5.251	4.992
40	8.951	8.244	7.634	7.105	6.642	6.233	5.871	5.548	5.258	4.997
50	9.042	8.304	7.675	7.133	6.661	6.246	5.880	5.554	5.262	4.999

Intermediate Course

Study Material

(Modules 1 to 2)

PAPER 8A

Financial

Management

MODULE – 2



BOARD OF STUDIES
THE INSTITUTE OF CHARTERED ACCOUNTANTS OF INDIA

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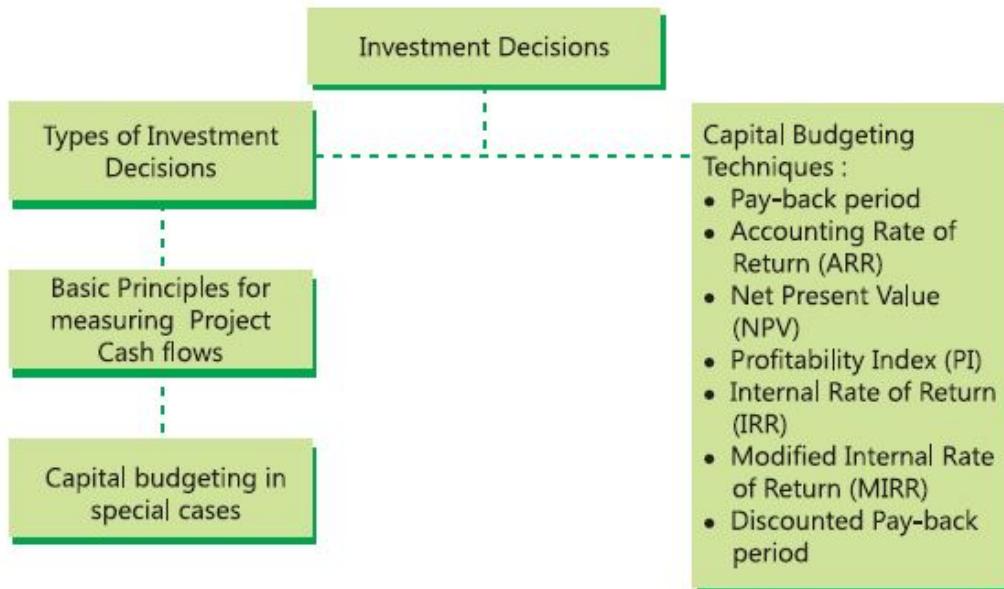
INVESTMENT DECISIONS



LEARNING OUTCOMES

- State the objectives of capital investment decisions.
- Discuss the importance and purpose of Capital budgeting for a business entity.
- Calculate cash flows in capital budgeting decisions and try to explain the basic principles for measuring the same.
- Discuss the various investment evaluation techniques like Pay-back, Net Present Value (NPV), Profitability Index (PI), Internal Rate of Return (IRR), Modified Internal Rate of Return (MIRR) and Accounting Rate of Return (ARR).
- Apply the concepts of the various investment evaluation techniques for capital investment decision making.
- Discuss the advantages and disadvantages of the above-mentioned techniques.

CHAPTER OVERVIEW



7.1 INTRODUCTION

In the first chapter we have discussed the three important functions of financial management which were Investment Decisions, Financing Decisions and Dividend Decisions. So far we have studied Financing decisions in previous chapters. In this chapter we will discuss the second important decision area of financial management which is Investment Decision. Investment decision is concerned with optimum utilization of fund to maximize the wealth of the organization and in turn the wealth of its shareholders. Investment decision is very crucial for an organization to fulfill its objectives; in fact, it generates revenue and ensures long term existence of the organization. Even the entities which exist not for profit are also required to make investment decision though not to earn profit but to fulfill its mission.

As we have seen in the financing decision chapters that each rupee of capital raised by an entity bears some cost, commonly known as cost of capital. It is necessary that each rupee raised is to be invested in a very prudent manner. It requires a proper planning for capital, and it is done through a proper budgeting. A proper

budgeting requires all the characteristics of budget. Due to this feature, investment decisions are very popularly known as Capital Budgeting, which means applying the principles of budgeting for capital investment.

In simple terms, Capital Budgeting involves: -

- **Identification** of investment projects that are strategic to business' overall objectives;
- **Estimating and evaluating** post-tax incremental cash flows for each of the investment proposals; and
- **Selection** of an investment proposal that maximizes the return to the investors.



7.2 PURPOSE OF CAPITAL BUDGETING

The capital budgeting decisions are important, crucial and critical business decisions due to following reasons:

- (i) **Substantial expenditure:** Investment decisions are related with fulfillment of long term objectives and existence of an organization. To invest in a project or projects, a substantial capital investment is required. Based on size of capital and timing of cash flows, sources of finance are selected. Due to huge capital investments and associated costs, it is therefore necessary for an entity to make such decisions after a thorough study and planning.
- (ii) **Long time period:** The capital budgeting decision has its effect over a long period of time. These decisions not only affect the future benefits and costs of the firm but also influence the rate and direction of growth of the firm.
- (iii) **Irreversibility:** Most of the investment decisions are irreversible. Once the decision implemented it is very difficult and reasonably and economically not possible to reverse the decision. The reason may be upfront payment of amount, contractual obligations, technological impossibilities etc.
- (iv) **Complex decisions:** The capital investment decision involves an assessment of future events, which in fact is difficult to predict. Further it is quite difficult to estimate in quantitative terms all the benefits or the costs relating to a particular investment decision.



7.3 CAPITAL BUDGETING PROCESS

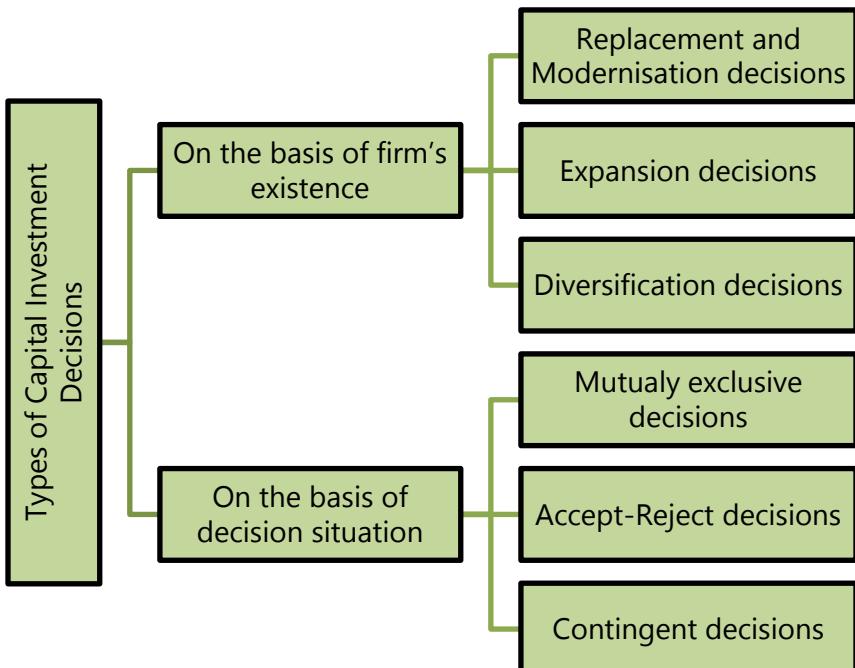
The extent to which the capital budgeting process needs to be **formalised and systematic** procedures established depends on the size of the organisation; number of projects to be considered; direct financial benefit of each project considered by itself; the composition of the firm's existing assets and management's desire to change that composition; timing of expenditures associated with the projects that are finally accepted.

- (i) **Planning:** The capital budgeting process begins with the **identification of potential investment opportunities**. The opportunity then enters the planning phase when the potential effect on the firm's fortunes is assessed and the ability of the management of the firm to exploit the opportunity is determined. Opportunities having little merit are rejected and promising opportunities are advanced in the form of a proposal to enter the evaluation phase.
- (ii) **Evaluation:** This phase involves the **determination of proposal** and its investments, inflows and outflows. Investment appraisal techniques, ranging from the simple payback method and accounting rate of return to the more sophisticated discounted cash flow techniques, are used to appraise the proposals. The technique selected should be the one that enables the manager to make the best decision in the light of prevailing circumstances.
- (iii) **Selection:** Considering the returns and risks associated with the individual projects as well as the cost of capital to the organisation, the organisation will **choose among projects** so as to maximise shareholders' wealth.
- (iv) **Implementation:** When the final selection has been made, the firm must acquire the necessary funds, purchase the assets, and begin the **implementation of the project**.
- (v) **Control:** The progress of the project is monitored with the aid of **feedback reports**. These reports will include capital expenditure progress reports, performance reports comparing actual performance against plans set and post completion audits.
- (vi) **Review:** When a project terminates, or even before, the organisation should **review the entire project** to explain its success or failure. This phase may have implication for firms planning and evaluation procedures. Further, the review may produce ideas for new proposals to be undertaken in the future.



7.4 TYPES OF CAPITAL INVESTMENT DECISIONS

There are many ways to classify the capital budgeting decision. Generally capital investment decisions are classified in two ways. One way is to classify them on the basis of firm's existence. Another way is to classify them on the basis of decision situation.



7.4.1 On the basis of firm's existence

The capital budgeting decisions are taken by both newly incorporated firms as well as by existing firms. The new firms may require taking decision in respect of selection of a plant to be installed. The existing firm may require taking decisions to meet the requirement of new environment or to face the challenges of competition. These decisions may be classified as follows:

- (i) **Replacement and Modernisation decisions:** The replacement and modernisation decisions aim at to improve operating efficiency and to reduce cost. Generally, all types of plant and machinery require replacement either because of the economic life of the plant or machinery is over or because it has become technologically outdated. The former decision is known as replacement decisions and latter is known as modernisation decisions. Both replacement and modernisation decisions are called cost reduction decisions.

- (ii) **Expansion decisions:** Existing successful firms may experience growth in demand of their product line. If such firms experience shortage or delay in the delivery of their products due to inadequate production facilities, they may consider proposal to add capacity to existing product line.
- (iii) **Diversification decisions:** These decisions require evaluation of proposals to diversify into new product lines, new markets etc. for reducing the risk of failure by dealing in different products or by operating in several markets.

Both expansion and diversification decisions are called revenue expansion decisions.

7.4.2 On the basis of decision situation

The capital budgeting decisions on the basis of decision situation are classified as follows:

- (i) **Mutually exclusive decisions:** The decisions are said to be mutually exclusive if two or more alternative proposals are such that the **acceptance of one proposal** will exclude the acceptance of the other alternative proposals. For instance, a firm may be considering proposal to install a semi-automatic or highly automatic machine. If the firm installs a semi-automatic machine it excludes the acceptance of proposal to install highly automatic machine.
- (ii) **Accept-reject decisions:** The accept-reject decisions occur when proposals are **independent** and do not compete with each other. The firm may accept or reject a proposal on the basis of a minimum return on the required investment. All those proposals which give a higher return than certain desired rate of return are accepted and the rest are rejected.
- (iii) **Contingent decisions:** The contingent decisions are **dependable** proposals. The investment in one proposal requires investment in one or more other proposals. For example, if a company accepts a proposal to set up a factory in remote area it may have to invest in infrastructure also e.g. building of roads, houses for employees etc.

7.4.3 Steps of Capital Budgeting Procedure

1. **Estimation** of Cash flows over the entire life for each of the projects under consideration.
2. **Evaluate** each of the alternative using different decision criteria.

3. **Determining** the minimum required rate of return (i.e. WACC) to be used as Discount rate.

Accordingly, this chapter is divided into two sections

1. Estimation of Cash Flows
2. Capital Budgeting Techniques

SECTION 1



7.5 ESTIMATION OF PROJECT CASH FLOWS

Capital Budgeting analysis considers only **incremental cash flows** from an investment likely to result due to acceptance of any project. Therefore, one of the most important tasks in capital budgeting is estimating future cash flows for a project. Though one of the techniques Accounting Rate of Return (ARR) evaluates profitability of a project on the basis of accounting profit but accounting profit has its limitations. Timing of cash flow may not match with the period of profit. Further, non-cash item like depreciation has no immediate cash outflow.

The cash flows are estimated on the basis of input provided by various departments.

The project cash flow stream consists of cash outflows and cash inflows. The costs are denoted as cash outflows whereas the benefits are denoted as cash inflows.

An investment decision implies the choice of an objective, an appraisal technique and the project's life. The objective and technique must be related to definite period of time. The life of the project may be determined by taking into consideration the following factors:

- (i) Technological obsolescence;
- (ii) Physical deterioration; and
- (iii) A decline in demand for the output of the project.

No matter how good a company's maintenance policy, its technological or demand forecasting abilities are, uncertainty always be there.

Calculating Cash Flows: Before, we analyze how cash flow is computed in capital budgeting decision, following items need consideration:

(a) Depreciation: As mentioned earlier depreciation is a **non-cash item** and itself does not affect the cash flow. However, we must consider tax shield or benefit from depreciation in our analysis. Since this benefit reduces cash outflow for taxes, it is considered as cash inflow. To understand how depreciation acts as tax shield let us consider following example:

Example

X Ltd. manufactures electronic motors fitted in desert coolers. It has an annual turnover of ₹30 crore and cash expenses to generate this much of sale is ₹25 crore. Suppose applicable tax rate is 30% and depreciation is ₹1.50 crore p.a. The table below is showing Tax shield due to depreciation under two scenarios i.e. with and without depreciation:

	No Depreciation is Charged	Depreciation is Charged
	(₹ Crore)	(₹ Crore)
Total Sales	30.00	30.00
Less: Cost of Goods Sold	(25.00)	(25.00)
	5.00	5.00
Less: Depreciation	-	1.50
Profit before tax	5.00	3.50
Tax @ 30%	1.50	1.05
Profit after Tax	3.50	2.45
Add: Depreciation*	-	1.50
Cash Flow	3.50	3.95

* Being non- cash expenditure depreciation has been added back while calculating the cash flow.

As we can see in the above table that due to depreciation under the second scenario, a tax saving of ₹0.45 crore (₹1.50 – ₹1.05) was made. This is called tax shield. The tax shield is considered while estimating cash flows.

(b) Opportunity Cost: Opportunity cost is **foregoing of a benefit** due to choosing of an alternative investment option. For example, if a company owns a piece of land acquired 10 years ago for ₹1 crore can be sold for ₹10 crore. If the company uses this piece of land for a project then its sale value i.e. ₹10 crore forms

the part of initial outlay as by using the land the company has foregone ₹10 crore which could be earned by selling it. This opportunity cost can occur both at the time of initial outlay and during the tenure of the project.

Opportunity costs are considered for estimation of cash outflows.

(c) Sunk Cost: Sunk cost is an outlay of cash that has **already been incurred** and cannot be reversed in present. Therefore, these costs do not have any impact on decision making, hence should be excluded from capital budgeting analysis. For example, if a company has paid a sum of ₹1,00,000 for consultancy fees to a firm to prepare a Project Report for analysing a particular project. The consultancy fee is irrelevant and not considered for estimating cash flows as it has already been paid and shall not affect our decision whether project should be undertaken or not.

(d) Working Capital: Every big project requires working capital because, for every business, investment in working capital is must. Therefore, while evaluating the projects **initial working capital requirement** should be treated as **cash outflow and at the end of the project** its release should be treated as **cash inflow**. It is important to note that no depreciation is provided on working capital though it might be possible that at the time of its release its value might have been reduced. Further there may be also a possibility that additional working capital may be required during the life of the project. In such cases the additional working capital required is treated as cash outflow at that period of time. Similarly, any reduction in working capital shall be treated as cash inflow. It may be noted that, if nothing has been specifically mentioned for the release of working capital it is assumed that full amount has been realized at the end of the project. However, adjustment on account of increase or decrease in working capital needs to be incorporated.

(e) Allocated Overheads: As discussed in subject of Cost and Management Accounting, allocated overheads are charged on the basis of some **rational basis** such as machine hour, labour hour, direct material consumption etc. Since, expenditures already incurred are allocated to new proposal; they should not be considered as cash flows. However, it is expected that overhead cost shall increase due to acceptance of any proposal then incremental overhead cost shall be treated as cash outflow.

(f) Additional Capital Investment: It is not necessary that capital investment shall be required in the beginning of the project. It can also be required during the continuance of the project. In such cases it shall be treated as cash outflows.

Categories of Cash Flows: It is helpful to place project cash flows into three categories:-

(a) Initial Cash Outflow: The initial cash outflow for a project depends upon the type of capital investment decision as follows:-

(i) If decision is related to investment in a **fresh proposal** or an expansion decision then initial cash outflow shall be calculated as follows:

		Amount	Amount
	Cost of new Asset(s)		xxx
Add:	Installation/Set-Up Costs	xxx	
Add:	Investment in Working Capital	xxx	xxx
	Initial Cash Outflow		xxx

(ii) If decision is related to **replacement decision** then initial cash outflow shall be calculated as follows:

		Amount	Amount
	Cost of new Asset(s)		xxx
Add:	Add: Installation/Set-Up Costs	xxx	
Add/(less):	Increase (Decrease) in net Working Capital level	xxx	
Less:	Net Proceeds from sale of old assets <i>(If it is a replacement situation)</i>	(xxx)	
Add/(less):	Tax expense (saving/ loss) due to sale of Old Asset <i>(If it is a replacement situation)</i>	xxx	xxx
	Initial Cash Outflow		xxx

(b) Interim Cash Flows: After making the initial cash outflow that is necessary to begin implementing a project, the firm hopes to get benefit from the future cash inflows generated by the project. As mentioned earlier calculation of cash flows depends on the fact whether analysis is related to fresh project or **modernization of existing facilities or replacement of existing machined decision**.

(i) New Project: If analysis is related to a fresh or completely a new project then interim cash flow is calculated as follows:-

		Amount	Amount
	Profit after Tax (PAT)		xxx
Add:	Non-Cash Expenses (e.g. Depreciation)	xxx	
Add/ (less):	Net decrease (increase) in Working Capital	xxx	xxx
	Interim net cash flow for the period		xxx

(ii) Similarly interim cash flow in case of replacement decision shall be calculated as follows:

		Amount	Amount
	Net increase (decrease) in Operating Revenue		xxx
Add/ (less):	Net decrease (increase) in operating expenses		xxx
	Net change in income before taxes		xxx
Add/ (less):	Net decrease (increase) in taxes		xxx
	Net change in income after taxes		xxx
Add/ (less):	Net decrease (increase) in depreciation charges		xxx
	Incremental net cash flow for the period		xxx

(c) **Terminal-Year Incremental Net Cash Flow:** We now pay attention to the Net Cash Flow in the terminal year of the project. For the purpose of **Terminal Year** we will first calculate the incremental net cash flow for the period as calculated in point (b) above and further to it we will make adjustments in order to arrive at Terminal-Year Incremental Net Cash flow as follows: -

		Amount	Amount
	Final salvage value (disposal costs) of asset		xxx
Add:	Interim Cash Flow		xxx

Add/ (less):	Tax savings (tax expenses) due to sale or disposal of asset (Including Depreciation)		xxx
Add:	Release of Net Working Capital		xxx
	Terminal Year incremental net cash flow		xxx



7.6 BASIC PRINCIPLES FOR MEASURING PROJECT CASH FLOWS

For developing the project cash flows the following principles must be kept in mind:

7.6.1 Block of Assets and Depreciation

From above discussion it is clear that tax shield/ benefit from depreciation is considered while calculating cash flows from the project. Taxable income is calculated as per the provisions of Income Tax or similar Act of a country. The treatment of depreciation is based on the concept of "Block of Assets", which means a group of assets falling within a particular class of assets. This class of assets can be building, machinery, furniture etc. in respect of which depreciation is charged at same rate. The treatment of tax depends on the fact whether block of asset consist of one asset or several assets. To understand the concept of block of asset let us discuss an example.

Example

Suppose A Ltd. acquired new machinery for ₹1,00,000 depreciable at 20% as per Written Down Value (WDV) method. The machine has an expected life of 5 years with salvage value of ₹10,000. The treatment of Depreciation/ Short Term Capital Loss in the 5th year in two cases shall be as follows:

Depreciation for initial 4 years shall be common and WDV at the beginning of the 5th year shall be computed as follows:

	₹
Purchase Price of Machinery	1,00,000
Less: Depreciation @20% for year 1	20,000
WDV at the end of year 1	80,000
Less: Depreciation @20% for year 2	16,000

WDV at the end of year 2	64,000
Less: Depreciation @20% for year 3	12,800
WDV at the end of year 3	51,200
Less: Depreciation @20% for year 4	10,240
WDV at the end of year 4	40,960

(i) **Case 1: There is no other asset in the Block:** When there is one asset in the block and block shall cease to exist at the end of 5th year no depreciation shall be charged in this year and tax benefit/loss on Short Term Capital Loss/ Gain shall be calculated as follows:

	₹
WDV at the beginning of year 5	40,960
Less: Sale value of Machine	10,000
Short Term Capital Loss	30,960
Tax Benefit on STCL @ 30%	9,288

(ii) **Case 2: More than one asset exists in the Block:** When more than one asset exists in the block and depreciation shall be charged in the terminal year (5th year) in which asset is sold. The WDV on which depreciation be charged shall be calculated by deducting sale value from the WDV in the beginning of the year. Tax benefit on Depreciation shall be calculated as follows:

	₹
WDV at the beginning of year 5	40,960
Less: Sale value of Machine	10,000
WDV	30,960
Depreciation @20%	6,192
Tax Benefit on Depreciation @ 30%	1,858

Now suppose if in above two cases sale value of machine is ₹ 50,000, then no depreciation shall be provided in case 2 and tax loss on Short Term Capital Gain in Case 1 shall be computed as follows:

	₹
WDV at the beginning of year 5	40,960

Less: Sale value of Machine	50,000
Short Term Capital Gain	9,040
Tax Loss on STCG @ 30%	2,712

7.6.2 Exclusion of Financing Costs Principle

When cash flows relating to long-term funds are being defined, financing costs of long-term funds (interest on long-term debt and equity dividend) should be excluded from the analysis. The interest and dividend payments are reflected in the weighted average cost of capital. Hence, if interest on long-term debt and dividend on equity capital are deducted in defining the cash flows, the cost of long-term funds will be counted twice.

The **exclusion** of financing costs principle means that:

- (i) **The interest on long-term debt** (or interest) is ignored while computing profits and taxes and;
- (ii) **The expected dividends** are deemed irrelevant in cash flow analysis.

While dividends pose no difficulty as they come only from profit after taxes, interest needs to be handled properly. Since interest is usually deducted in the process of arriving at profit after tax, an amount equal to 'Interest (1 – Tax rate)' should be added back to the figure of Profit after Tax as shown below:

Profit Before Interest and Tax \times (1 – Tax rate)

$$\begin{aligned}
 &= (\text{Profit Before Tax} + \text{Interest}) (1 - \text{Tax rate}) \\
 &= (\text{Profit Before Tax}) (1 - \text{Tax rate}) + (\text{Interest}) (1 - \text{Tax rate}) \\
 &= \text{Profit After Tax} + \text{Interest} (1 - \text{Tax rate})
 \end{aligned}$$

Thus, whether the tax rate is applied directly to the profit before interest and tax figure or whether the tax – adjusted interest, which is simply interest (1 – tax rate), is added to profit after tax, we get the same result.

Example

Suppose XYZ Ltd.'s expected profit for the forthcoming 4 years is as follows:

	Year 1	Year 2	Year 3	Year 4
Profit before Interest and Tax	₹10,000	₹20,000	₹40,000	₹50,000

If interest payable is ₹5,000 and tax rate is 30% the profit after tax excluding financing cost shall be as follows:

	Year 1 (₹)	Year 2 (₹)	Year 3 (₹)	Year 4 (₹)
Profit before Interest and Tax	10,000	20,000	40,000	50,000
<i>Less: Interest</i>	(5,000)	(5,000)	(5,000)	(5,000)
	5,000	15,000	35,000	45,000
<i>Less: Tax @ 30%</i>	(1,500)	(4,500)	(10,500)	13,500
Profit after Tax (PAT)	3,500	10,500	24,500	31,500
<i>Add: Interest (1- t)</i>	3,500	3,500	3,500	3,500
PAT excluding financing cost	7,000	14,000	28,000	35,000

Alternatively

	Year 1 (₹)	Year 2 (₹)	Year 3 (₹)	Year 4 (₹)
Profit before Interest and Tax	10,000	20,000	40,000	50,000
<i>Less: Tax @ 30%</i>	3,000	6,000	12,000	15,000
PAT excluding financing cost	7,000	14,000	28,000	35,000

7.6.3 Post-tax Principle

Tax payments like other payments must be properly deducted in deriving the cash flows. That is, cash flows must be defined in post-tax terms. It is always better to avoid using Pre Tax Cash Flows and using Pre-Tax Discounting Rate.

STATEMENT SHOWING THE CALCULATION OF CASH INFLOW AFTER TAX (CFAT)

Sl. No.		(₹)
1	Total Sales Units	xxx
2	Selling Price per unit	xxx
3.	Total Sales [1 × 2]	xxx
4.	Less: Variable Cost	xxx
5.	Contribution [3-4]	xxx
6.	Less: Fixed Cost	
	(a) Fixed Cash Cost	xxx
	(b) Depreciation	xxx

7.	Earning Before Tax [6-7]	xxx
8.	Less: Tax	xxx
9.	Earning After Tax [7-8]	xxx
10.	Add: Depreciation	xxx
11.	Cash Inflow After Tax (CFAT) [9 + 10]	xxx

ILLUSTRATION 1

ABC Ltd is evaluating the purchase of a new machinery with a depreciable base of ₹1,00,000; expected economic life of 4 years and change in earnings before taxes and depreciation of ₹45,000 in year 1, ₹30,000 in year 2, ₹25,000 in year 3 and ₹35,000 in year 4. Assume straight-line depreciation and a 20% tax rate. You are required to COMPUTE relevant cash flows.

SOLUTION

	Amount (in ₹)			
	Years			
	1	2	3	4
Earnings before tax and depreciation	45,000	30,000	25,000	35,000
Less: Depreciation	(25,000)	(25,000)	(25,000)	(25,000)
Earnings before tax	20,000	5,000	0	10,000
Less: Tax @20%	(4,000)	(1,000)	0	(2,000)
	16,000	4,000	0	8,000
Add: Depreciation	25,000	25,000	25,000	25,000
Net Cash flow	41,000	29,000	25,000	33,000

Working Note:

$$\text{Depreciation} = ₹1,00,000 \div 4 = ₹25,000$$

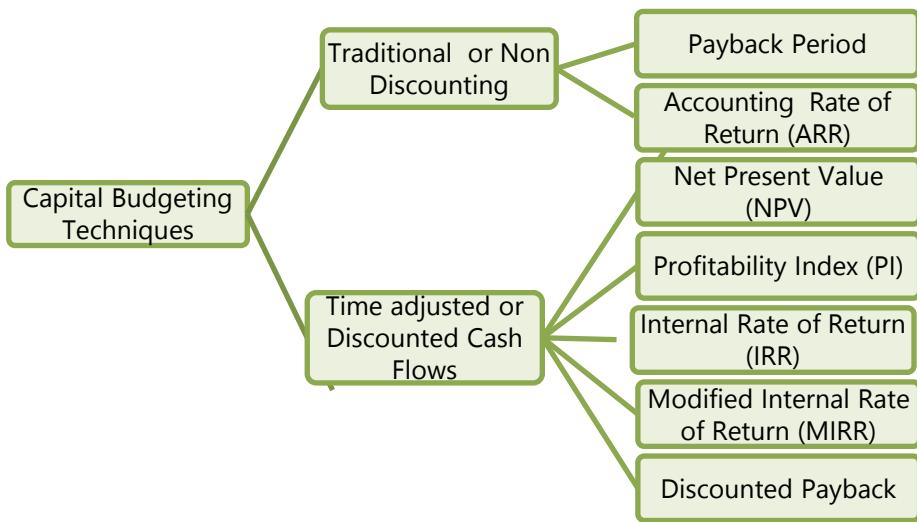
SECTION 2



7.7 CAPITAL BUDGETING TECHNIQUES

In order to maximise the return to the shareholders of a company, it is important that the best or most profitable investment projects are selected. Results of making a bad long-term investment decision can be devastating in both financial and strategic terms. Care required for investment project selection and evaluation.

There are a number of techniques available for appraisal of investment proposals and can be classified as presented below:



Organizations may use any one or more of capital investment evaluation techniques; some organizations use different methods for different types of projects while others may use multiple methods for evaluating each project. These techniques have been discussed below – net present value, profitability index, internal rate of return, modified internal rate of return, payback period, and accounting (book) rate of return.



7.8 TRADITIONAL OR NON-DISCOUNTING TECHNIQUES

These techniques of capital Budgeting does not discount the future cash flows. There are two such techniques namely Payback Period and Accounting Rate of Return

7.8.1 Payback Period

Time required to **recover the initial cash-outflow** is called pay-back period. The payback period of an investment is the length of time required for the cumulative total net cash flows from the investment to equal the total initial cash outlays. At that point in time, the investor has recovered the money invested in the project.

Steps in Payback period technique: -

- (a) The first steps in calculating the payback period is determining the total initial capital investment (cash outflow) and
- (b) The second step is calculating/estimating the annual expected after-tax cash flows over the useful life of the investment.

1. When the cash inflows are uniform over the useful life of the project, the number of years in the payback period can be calculated using the following equation:

$$\text{Payback period} = \frac{\text{Total initial capital investment}}{\text{Annual expected after - tax net cash flow}}$$

Example: Suppose a project costs ₹20,00,000 and yields annually a profit of ₹3,00,000 after depreciation @ 12½% (straight line method) but before tax 50%. The first step would be to calculate the cash inflow from this project. The cash inflow is ₹4,00,000 calculated as follows:

Particulars	(₹)
Profit before tax	3,00,000
Less: Tax @ 50%	(1,50,000)
Profit after tax	1,50,000
Add: Depreciation written off	2,50,000
Total cash inflow	4,00,000

While calculating cash inflow, depreciation is added back to profit after tax since it does not result in cash outflow. The cash generated from a project therefore is equal to profit after tax plus depreciation. The payback period of the project shall be:

$$\text{Payback period} = \frac{\text{₹}20,00,000}{4,00,000} = 5 \text{ Years}$$

Some Accountants calculate payback period after discounting the cash flows by a predetermined rate and the payback period so calculated is called, 'Discounted payback period' (discussed later on).

2. When the annual cash inflows are not uniform, the cumulative cash inflow from operations must be calculated for each year. The payback period shall be corresponding period when total of cumulative cash inflows is equal to the initial capital investment. However, if exact sum does not match then the period in which it lies should be identified. After that we need to compute the fraction of the year. This method can be understood with the help of an example

Example

Suppose XYZ Ltd. is analyzing a project requiring an initial cash outlay of ₹2,00,000 and expected to generate cash inflows as follows:

Year	Annual Cash Inflows
1	80,000
2	60,000
3	60,000
4	20,000

It's payback period shall be computed by using cumulative cash flows as follows:

Year	Annual Cash Inflows	Cumulative Cash Inflows
1	80,000	80,000
2	60,000	1,40,000
3	60,000	2,00,000
4	20,000	2,20,000

←

In 3 years total cash inflows equal to initial cash outlay. Hence, payback period is 3 years.

Suppose if in above example the initial outlay is ₹2,05,000 then payback period shall be computed as follows:

Year	Annual Cash Inflows	Cumulative Cash Inflows
1	80,000	80,000
2	60,000	1,40,000

3	60,000	2,00,000
4	20,000	2,20,000

←

Payback period shall lie between 3 to 4 years. Since up to 3 years a sum of ₹2,00,000 shall be recovered balance of ₹5,000 shall be recovered in the part (fraction) of 4th year, computation is as follows:

$$\frac{5,000}{20,000} = \frac{1}{4} \text{ year}$$

Thus, total cash outlay of ₹ 205,000 shall be recovered in 3½ years' time.

Advantages of Payback period

- It is easy to **compute**.
- It is easy to understand as it provides a **quick estimate** of the time needed for the organization to recoup the cash invested.
- The length of the payback period can also serve as an **estimate of a project's risk**; the longer the payback period, the riskier the project as long-term predictions are less reliable. In some industries with high obsolescence risk like software industry or in situations where an organization is short on cash, short payback periods often become the determining factor for investments.

Limitations of Payback period

- It **ignores the time value of money**. As long as the payback periods for two projects are the same, the payback period technique considers them equal as investments, even if one project generates most of its net cash inflows in the early years of the project while the other project generates most of its net cash inflows in the latter years of the payback period.
- A second limitation of this technique is its **failure** to consider an investment's total profitability; it only considers cash inflows upto the period in which initial investment is fully recovered and ignores cash flows after the payback period.
- Payback technique places much emphasis on **short payback periods** thereby ignoring long-term projects.

7.8.1.1 Payback Reciprocal

As the name indicates it is the reciprocal of payback period. A major drawback of the payback period method of capital budgeting is that it does not indicate any cut off period for the purpose of investment decision. It is, however, argued that the

reciprocal of the payback would be a close approximation of the Internal Rate of Return (later discussed in detail) if the life of the project is at least twice the payback period and the project generates equal amount of the annual cash inflows. In practice, the payback reciprocal is a helpful tool for quick estimation of rate of return of a project provided its life is at least twice the payback period.

The payback reciprocal can be calculated as follows:

$$\text{Payback Reciprocal} = \frac{\text{Average annual cash inflow}}{\text{Initial investment}}$$

Example

Suppose a project requires an initial investment of ₹20,000 and it would give annual cash inflow of ₹4,000. The useful life of the project is estimated to be 5 years. In this example payback reciprocal will be:

$$\frac{₹ 4,000 \times 100}{₹ 20,000} = 20\%$$

The above payback reciprocal provides a reasonable approximation of the internal rate of return, i.e. 19%.

7.8.2 Accounting (Book) Rate of Return (ARR) or Average Rate of Return (ARR)

The accounting rate of return of an investment measures the **average annual net income** of the project (incremental income) as a percentage of the investment.

$$\text{Accounting rate of return} = \frac{\text{Average annual net income}}{\text{Investment}}$$

The numerator is the average annual net income generated by the project over its useful life. The denominator can be either the initial investment (including installation cost) or the average investment over the useful life of the project. Average investment means the average amount of fund remained blocked during the lifetime of the project under consideration. Further ARR can be calculated in a number of ways as shown in the following example.

Example

Suppose Times Ltd. is going to invest in a project a sum of ₹ 3,00,000 having a life span of 3 years. Salvage value of machine is ₹90,000. The profit before depreciation for each year is ₹1,50,000.

The Profit after Tax and value of Investment in the Beginning and at the End of each year shall be as follows:

Year	Profit Before Depreciation (₹)	Depreciation (₹)	Profit after Dep. (₹)	Value of Investment in (₹)	
				Beginning	End
1	1,50,000	70,000	80,000	3,00,000	2,30,000
2	1,50,000	70,000	80,000	2,30,000	1,60,000
3	1,50,000	70,000	80,000	1,60,000	90,000

The ARR can be computed by following methods as follows:

(a) *Version 1: Annual Basis*

$$ARR = \frac{\text{Profit after Depreciation}}{\text{Investment in the beginning of the year}}$$

Year	
1	$\frac{80,000}{3,00,000} = 26.67\%$
2	$\frac{80,000}{2,30,000} = 34.78\%$
3	$\frac{80,000}{1,60,000} = 50\%$

$$\text{Average ARR} = \frac{26.67\% + 34.78\% + 50.00\%}{3} = 37.15\%$$

(b) *Version 2: Total Investment Basis*

$$ARR = \frac{\text{Average Annual Profit}}{\text{Investment in the beginning}} \times 100$$

$$= \frac{(80,000 + 80,000 + 80,000) / 3}{3,00,000} \times 100 = 26.67\%$$

(c) *Version 3: Average Investment Basis*

$$ARR = \frac{\text{Average Annual Profit}}{\text{Average Investment}} \times 100$$

$$\text{Average Investment} = (\text{₹}3,00,000 + \text{₹}90,000)/2 = \text{₹}1,95,000$$

$$\text{Or, } \frac{1}{2}(\text{Initial Investment} - \text{Salvage Value}) + \text{Salvage Value}$$

$$= \frac{1}{2}(\text{₹}3,00,000 - \text{₹}90,000) + \text{₹}90,000 = \text{₹}1,95,000$$

$$= \frac{80,000}{1,95,000} \times 100 = 41.03\%$$

Further, it is important to note that project may also require additional working capital during its life in addition to initial working capital. In such situation formula for the calculation of average investment shall be modified as follows:

$$\frac{1}{2}(\text{Initial Investment} - \text{Salvage Value}) + \text{Salvage Value} + \text{Additional Working Capital}$$

Continuing above example, suppose a sum of ₹45,000 is required as additional working capital during the project life then average investment shall be:

$$= \frac{1}{2}(\text{₹}3,00,000 - \text{₹}90,000) + \text{₹}90,000 + \text{₹}45,000 = \text{₹}2,40,000 \text{ and}$$

$$ARR = \frac{80,000}{2,40,000} \times 100 = 33.33\%$$

Some organizations prefer the initial investment because it is objectively determined and is not influenced by either the choice of the depreciation method or the estimation of the salvage value. Either of these amounts is used in practice but it is important that the same method be used for all investments under consideration.

Advantages of ARR

- This technique uses **readily available data** that is routinely generated for financial reports and does not require any special procedures to generate data.
- This method may also mirror the method used to **evaluate performance** on the operating results of an investment and management performance. Using the same procedure in both decision-making and performance evaluation ensures consistency.

- Calculation of the accounting rate of return method considers all net incomes over the **entire life of the project** and provides a measure of the investment's profitability.

Limitations of ARR

- The accounting rate of return technique, like the payback period technique, **ignores the time value of money** and considers the value of all cash flows to be equal.
- The technique uses accounting numbers that are dependent on the organization's **choice of accounting procedures**, and different accounting procedures, e.g., depreciation methods, can lead to substantially different amounts for an investment's net income and book values.
- The method uses **net income rather than cash flows**; while net income is a useful measure of profitability, the net cash flow is a better measure of an investment's performance.
- Furthermore, inclusion of only the book value of the invested asset **ignores** the fact that a project can require **commitments of working capital** and other outlays that are not included in the book value of the project.

ILLUSTRATION 2

A project requiring an investment of ₹10,00,000 and it yields profit after tax and depreciation which is as follows:

Years	Profit after tax and depreciation (₹)
1	50,000
2	75,000
3	1,25,000
4	1,30,000
5	80,000
<i>Total</i>	4,60,000

Suppose further that at the end of the 5th year, the plant and machinery of the project can be sold for ₹80,000. DETERMINE Average Rate of Return.

SOLUTION

In this case the rate of return can be calculated as follows:

$$\frac{\text{Total Profit} \div \text{No. of years}}{\text{Average investment / Initial Investment}} \times 100$$

(a) *If Initial Investment is considered then,*

$$= \frac{\text{₹}4,60,000 \div 5 \text{ years}}{\text{₹}10,00,000} \times 100 = \frac{\text{₹}92,000}{\text{₹}10,00,000} \times 100 = 9.2\%$$

This rate is compared with the rate expected on other projects, had the same funds been invested alternatively in those projects. Sometimes, the management compares this rate with the minimum rate (called-cut off rate). For example, management may decide that they will not undertake any project which has an average annual yield after tax less than 20%. Any capital expenditure proposal which has an average annual yield of less than 20% will be automatically rejected.

(b) *If Average investment is considered, then,*

$$= \frac{92,000}{\text{Average investment}} \times 100 = \frac{92,000}{5,40,000} \times 100 = 17.04\%$$

Where,

$$\begin{aligned} \text{Average Investment} &= \frac{1}{2} (\text{Initial investment} - \text{Salvage value}) + \text{Salvage value} \\ &= \frac{1}{2} (10,00,000 - 80,000) + 80,000 \\ &= 4,60,000 + 80,000 = 5,40,000 \end{aligned}$$



7.9 DISCOUNTING TECHNIQUES

Discounting techniques consider time value of money and discount the cash flows to their Present Value. These techniques are also known as Present Value techniques. These are namely Net Present Value (NPV), Internal Rate of Return (IRR) and Profitability Index (PI). First let us discuss about Determination of Discount rate and it will be followed by the three techniques.

Determining Discount Rate

Theoretically, the discount rate or **desired rate of return** on an investment is the rate of return the firm would have earned by investing the same funds in the best available alternative investment that has the same risk. Determining the best alternative opportunity available is difficult in practical terms so rather than using the true opportunity cost, organizations often use an alternative measure for the desired rate of return. An organization may establish a minimum rate of return that all capital projects must meet; this minimum could be based on an industry average

or the cost of other investment opportunities. Many organizations choose to use the overall cost of capital or Weighted Average Cost of Capital (WACC) that an organization has incurred in raising funds or expects to incur in raising the funds needed for an investment.

7.9.1 Net Present Value Technique (NPV)

The net present value technique is a discounted cash flow method that considers the time value of money in evaluating capital investments. An investment has cash flows throughout its life, and it is assumed that an amount of cash flow in the early years of an investment is worth more than an amount of cash flow in a later year.

The net present value method uses a specified discount rate to bring all subsequent cash inflows after the initial investment to their present values (the time of the initial investment is year 0).

The net present value of a project is the amount, in current value of amount, the investment earns after paying cost of capital in each period.

Net present value = Present value of net cash inflow - Total net initial investment

Since it might be possible that some additional investment may also be required during the life time of the project then appropriate formula shall be:

Net present value = Present value of cash inflows - Present value of cash outflows

It can be expressed as below:

$$NPV = \left(\frac{C_1}{(1+k)} + \frac{C_2}{(1+k)^2} + \frac{C_3}{(1+k)^3} + \dots + \frac{C_n}{(1+k)^n} \right) - I$$

$$NPV = \sum_{t=1}^n \frac{C_t}{(1+k)^t} - I$$

Where,

C = Cash flow of various years

K = discount rate

N = Life of the project

I = Investment

Steps to calculating Net Present Value (NPV):

The steps to calculating net present value are: -

1. **Determine** the net cash inflow in each year of the investment
2. **Select** the desired rate of return or discounting rate or Weighted Average Cost of Capital.
3. **Find** the discount factor for each year based on the desired rate of return selected.
4. **Determine** the present values of the net cash flows by multiplying the cash flows by respective discount factors of respective period called Present Value (PV) of Cash flows
5. Total the amounts of all **PVs of Cash Flows**

Decision Rule:

If $NPV \geq 0$	Accept the Proposal
If $NPV \leq 0$	Reject the Proposal

The NPV method can be used to select between mutually exclusive projects; the one with the higher NPV should be selected

ILLUSTRATION 3

COMPUTE the net present value for a project with a net investment of ₹1,00,000 and net cash flows year one is ₹55,000; for year two is ₹80,000 and for year three is ₹15,000. Further, the company's cost of capital is 10%?

[PVIF @ 10% for three years are 0.909, 0.826 and 0.751]

SOLUTION

Year	Net Cash Flows	PVIF @ 10%	Discounted Cash Flows
0	(1,00,000)	1.000	(1,00,000)
1	55,000	0.909	49,995
2	80,000	0.826	66,080
3	15,000	0.751	11,265
Net Present Value			27,340

Recommendation: Since the net present value of the project is positive, the company should accept the project.

ILLUSTRATION 4

ABC Ltd is a small company that is currently analyzing capital expenditure proposals for the purchase of equipment; the company uses the net present value technique to evaluate projects. The capital budget is limited to ₹ 500,000 which ABC Ltd believes is the maximum capital it can raise. The initial investment and projected net cash flows for each project are shown below. The cost of capital of ABC Ltd is 12%. You are required to COMPUTE the NPV of the different projects.

	Project A	Project B	Project C	Project D
<i>Initial Investment</i>	200,000	190,000	250,000	210,000
<i>Project Cash Inflows</i>				
Year 1	50,000	40,000	75,000	75,000
2	50,000	50,000	75,000	75,000
3	50,000	70,000	60,000	60,000
4	50,000	75,000	80,000	40,000
5	50,000	75,000	100,000	20,000

SOLUTION

Calculation of net present value:

Period	PV factor	Project A	Project B	Project C	Project D
0	1.000	(2,00,000)	(1,90,000)	(2,50,000)	(2,10,000)
1	0.893	44,650	35,720	66,975	66,975
2	0.797	39,850	39,850	59,775	59,775
3	0.712	35,600	49,840	42,720	42,720
4	0.636	31,800	47,700	50,880	25,440
5	0.567	28,350	42,525	56,700	11,340
Net Present Value		(19,750)	25,635	27,050	(3,750)

Advantages of NPV

- NPV method takes into account the **time value of money**.
- The whole stream of **cash flows is considered**.

- The net present value can be seen as the addition to the wealth of shareholders. The criterion of NPV is thus in conformity with basic financial objectives.
- The NPV uses the **discounted cash flows** i.e., expresses cash flows in terms of current rupees. The NPVs of different projects therefore can be compared. It implies that each project can be evaluated independent of others on its own merit.

Limitations of NPV

- It involves **difficult calculations**.
- The application of this method necessitates forecasting cash flows and the discount rate. Thus accuracy of NPV depends on accurate estimation of these two factors which may be **quite difficult in practice**.

The decision under NPV method is **based on absolute measure**. It ignores the difference in initial outflows, size of different proposals etc. while evaluating mutually exclusive projects.

7.9.2 Profitability Index /Desirability Factor/Present Value Index Method (PI)

The students may have seen how with the help of discounted cash flow technique, the two alternative proposals for capital expenditure can be compared. In certain cases we have to **compare a number of proposals each involving different amounts of cash inflows**.

One of the methods of comparing such proposals is to work out what is known as the '*Desirability factor*', or '*Profitability index*' or '*Present Value Index Method*'.

Mathematically:

The Profitability Index (PI) is calculated as below:

$$\text{Profitability Index (PI)} = \frac{\text{Sum of discounted cash inflows}}{\text{Initial cash outlay or Total discounted cash outflow (as the case may be)}}$$

Decision Rule:

If $PI \geq 1$	Accept the Proposal
If $PI \leq 1$	Reject the Proposal

In case of mutually exclusive projects; project with higher PI should be selected

ILLUSTRATION 5

Suppose we have three projects involving discounted cash outflow of ₹5,50,000, ₹75,000 and ₹1,00,20,000 respectively. Suppose further that the sum of discounted cash inflows for these projects are ₹6,50,000, ₹95,000 and ₹1,00,30,000 respectively. CALCULATE the desirability factors for the three projects.

SOLUTION

The desirability factors for the three projects would be as follows:

1. $\frac{₹6,50,000}{₹5,50,000} = 1.18$
2. $\frac{₹95,000}{₹75,000} = 1.27$
3. $\frac{₹1,00,30,000}{₹1,00,20,000} = 1.001$

It would be seen that in absolute terms project 3 gives the highest cash inflows yet its desirability factor is low. This is because the outflow is also very high. The Desirability/ Profitability Index factor helps us in ranking various projects.

Since PI is an extension of NPV it has same advantages and limitation.

Advantages of PI

- The method also uses the **concept of time value of money** and is a better project evaluation technique than NPV.
- In the PI method, since the present value of cash inflows is divided by the present value of cash outflow, it is a **relative measure** of a project's profitability.

Limitations of PI

- Profitability index **fails as a guide** in resolving capital rationing where projects are indivisible.
- Once a single large project with high NPV is selected, possibility of accepting several small projects which together may have higher NPV than the **single project is excluded**.
- Also situations may arise where a project with a lower profitability index selected may generate cash flows in such a way that another project can be taken up one or two years later, the total NPV in such case being more than the one with a project with highest Profitability Index.

The Profitability Index approach thus **cannot be used indiscriminately** but all other type of alternatives of projects will have to be worked out.

7.9.3 Internal Rate of Return Method (IRR)

The internal rate of return method considers the time value of money, the initial cash investment, and all cash flows from the investment. But unlike the net present value method, the internal rate of return method does not use the desired rate of return but estimates the discount rate that makes the present value of subsequent cash inflows equal to the initial investment. This discount rate is called IRR.

IRR Definition: Internal rate of return for an investment proposal is the discount rate that equates the present value of the expected cash inflows with the initial cash outflow.

This IRR is then compared to a criterion rate of return that can be the organization's desired rate of return for **evaluating capital investments**.

Calculation of IRR: The procedures for computing the internal rate of return vary with the pattern of net cash flows over the useful life of an investment.

Scenario 1: For an investment with uniform cash flows over its life, the following equation is used:

Step 1: Total initial investment = Annual cash inflow \times Annuity discount factor of the discount rate for the number of periods of the investment's useful life

If A is the annuity discount factor, then

$$A = \frac{\text{Total initial cash disbursements and commitments for the investment}}{\text{Annual (equal) cash inflows from the investment}}$$

Step 2: Once A has been calculated, the discount rate is the interest rate that has the same discounting factor as A in the annuity table along the row for the number of periods of the useful life of the investment. If exact value of 'A' could be found in Present Value Annuity Factor (PVAF) table corresponding to the period of the project the respective discounting factor or rate shall be IRR. However, it rarely happens therefore we follow the method discussed below:

Step 1: Compute approximate payback period also called fake payback period.

Step 2: Locate this value in PVAF table corresponding to period of life of the project. The value may be falling between two discounting rates.

Step 3: Discount cash flows using these two discounting rates.

Step 4: Use following Interpolation Formula:

$$LR + \frac{NPV \text{ at LR}}{NPV \text{ at LR} - NPV \text{ at HR}} \times (HR - LR)$$

Where,

LR = Lower Rate

HR = Higher Rate

ILLUSTRATION 6

A Ltd. is evaluating a project involving an outlay of ₹10,00,000 resulting in an annual cash inflow of ₹2,50,000 for 6 years. Assuming salvage value of the project is zero; DETERMINE the IRR of the project.

SOLUTION

First of all we shall find an approximation of the payback period:

$$\frac{10,00,000}{2,50,000} = 4$$

Now we shall search this figure in the PVAF table corresponding to 6-year row.

The value 4 lies between values 4.111 and 3.998 correspondingly discounting rates 12% and 13% respectively.

NPV @ 12%

$$NPV_{12\%} = (10,00,000) + 4.111 \times 2,50,000 = 27,750$$

$$NPV_{13\%} = (10,00,000) + 3.998 \times 2,50,000 = -500$$

The internal rate of return is, thus, more than 12% but less than 13%. The exact rate can be obtained by interpolation:

$$\begin{aligned} IRR &= 12\% + \frac{27,750}{27,750 - (500)} \times (13\% - 12\%) \\ &= 12\% + \frac{27,750}{28,250} = 12.98\% \end{aligned}$$

$$IRR = 12.98\%$$

Scenario 2: When the cash inflows are not uniform over the life of the investment, the determination of the discount rate can involve trial and error and interpolation

between discounting rates as mentioned above. However, IRR can also be found out by using following procedure:

Step 1: Discount the cash flow at any random rate say 10%, 15% or 20% randomly.

Step 2: If resultant NPV is negative then discount cash flows again by lower discounting rate to make NPV positive. Conversely, if resultant NPV is positive then again discount cash flows by higher discounting rate to make NPV negative.

Step 3: Use following Interpolation Formula:

$$= LR + \frac{NPV \text{ at LR}}{NPV \text{ at LR} - NPV \text{ at HR}} \times (HR - LR)$$

Where

LR = Lower Rate

HR = Higher Rate

ILLUSTRATION 7

CALCULATE the internal rate of return of an investment of ₹1,36,000 which yields the following cash inflows:

Year	Cash Inflows (in ₹)
1	30,000
2	40,000
3	60,000
4	30,000
5	20,000

SOLUTION

Let us discount cash flows by 10%.

Year	Cash Inflows (₹)	Discounting factor at 10%	Present Value (₹)
1	30,000	0.909	27,270
2	40,000	0.826	33,040
3	60,000	0.751	45,060
4	30,000	0.683	20,490

5	20,000	0.621	12,420
		Total present value	1,38,280

The present value at 10% comes to ₹1,38,280, which is more than the initial investment. Therefore, a higher discount rate is suggested, say, 12%.

Year	Cash Inflows (₹)	Discounting factor at 12%	Present Value (₹)
1	30,000	0.893	26,790
2	40,000	0.797	31,880
3	60,000	0.712	42,720
4	30,000	0.636	19,080
5	20,000	0.567	11,340
		Total present value	1,31,810

The internal rate of return is, thus, more than 10% but less than 12%. The exact rate can be obtained by interpolation:

$$\text{IRR} = 10 + \left(\frac{\text{₹}1,38,280 - \text{₹}1,36,000}{\text{₹}1,38,280 - \text{₹}1,31,810} \right) \times 2$$

$$= 10 + \left(\frac{2,280}{6,470} \times 2 \right) = 10 + 0.70$$

$$\text{IRR} = 10.70\%$$

ILLUSTRATION 8

A company proposes to install machine involving a capital cost of ₹3,60,000. The life of the machine is 5 years and its salvage value at the end of the life is nil. The machine will produce the net operating income after depreciation of ₹68,000 per annum. The company's tax rate is 45%.

The Net Present Value factors for 5 years are as under:

Discounting rate	14	15	16	17	18
Cumulative factor	3.43	3.35	3.27	3.20	3.13

You are required to CALCULATE the internal rate of return of the proposal.

SOLUTION**Computation of Cash inflow per annum (₹)**

Net operating income per annum	68,000
Less: Tax @ 45%	(30,600)
Profit after tax	37,400
Add: Depreciation (₹ 3,60,000 / 5 years)	72,000
Cash inflow	1,09,400

The IRR of the investment can be found as follows:

$$NPV = -₹3,60,000 + ₹1,09,400 (PVAF_5, r) = 0$$

$$\text{or } PVAF_5, r \text{ (Cumulative factor)} = \frac{₹3,60,000}{₹1,09,400} = 3.29$$

Computation of Internal Rate of Return

Discounting Rate	15%	16%
Cumulative factor	3.35	3.27
PV of Inflows	3,66,490 (₹1,09,400 × 3.35)	3,57,738 (₹1,09,400 × 3.27)
Initial outlay (₹)	3,60,000	3,60,000
NPV (₹)	6,490	(2,262)

$$IRR = 15 + \left[\frac{6,490}{6,490 + 2,262} \right] = 15 + 0.74 = 15.74\%.$$

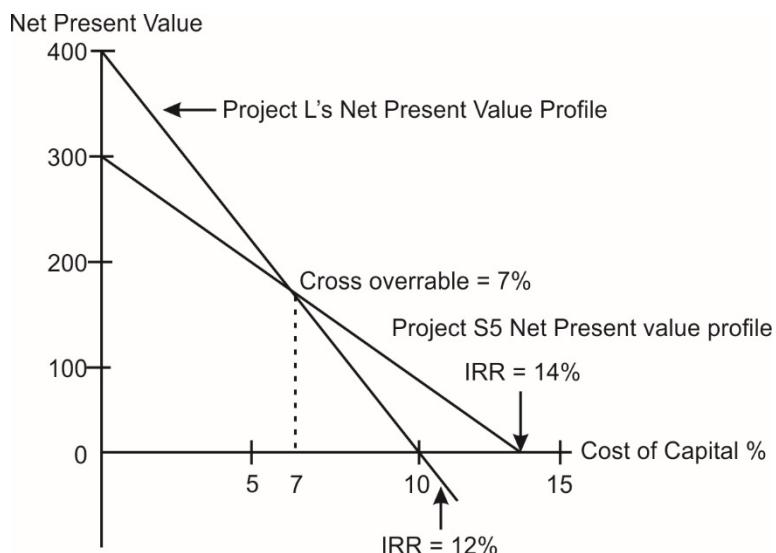
Acceptance Rule

The use of IRR, as a criterion to accept capital investment decision involves a comparison of IRR with the required rate of return known as cut off rate. The project should be accepted if IRR is greater than cut-off rate. If IRR is equal to cut off rate the firm is indifferent. If IRR less than cut off rate the project is rejected. Thus,

If $IRR \geq$ Cut-off Rate or WACC	Accept the Proposal
If $IRR \leq$ Cut-off Rate or WACC	Reject the Proposal

Internal Rate of Return and Mutually Exclusive Projects

Projects are called mutually exclusive, when the selection of one precludes the selection of others e.g. in case a company owns a piece of land which can be put to use for either of the two different projects S or L, then such projects are mutually exclusive to each other i.e. the selection of one project necessarily means the rejection of the other. Refer to the figure below:



As long as the cost of capital is greater than the crossover rate of 7%, then (1) NPV^S is larger than NPV^L and (2) IRR^S exceeds IRR^L . Hence, if the cut off rate or the cost of capital is greater than 7%, both the methods shall lead to selection of project S. However, if the cost of capital is less than 7%, the NPV method ranks Project L higher, but the IRR method indicates that the Project S is better.

As can be seen from the above discussion, mutually exclusive projects can create problems with the IRR technique because IRR is expressed as a percentage and does not take into account the scale of investment or the quantum of money earned.

Let us consider another example of two mutually exclusive projects A and B with the following details,

Cash flows

	Year 0	Year 1	IRR	NPV (10%)
Project A	(₹ 1,00,000)	₹1,50,000	50%	₹ 36,360
Project B	(₹ 5,00,000)	₹ 6,25,000	25%	₹ 68,180

Project A earns a return of 50% which is more than what Project B earns; however, the NPV of Project B is greater than that of Project A. Acceptance of Project A means that Project B must be rejected since the two Projects are mutually exclusive. Acceptance of Project A also implies that the total investment will be ₹4,00,000 less than if Project B had been accepted, ₹4,00,000 being the difference between the initial investment of the two projects. Assuming that the funds are freely available at 10%, the total capital expenditure of the company should be ideally equal to the sum total of all outflows provided they earn more than 10% along with the chosen project from amongst the mutually exclusive. Hence, in case the smaller of the two Projects i.e. Project A is selected, the implication will be of rejecting the investment of additional funds required by the larger investment. This shall lead to a reduction in the shareholders' wealth and thus, such an action shall be against the very basic tenets of Financial Management.

In the above mentioned example the larger of the two projects had the lower IRR, but nevertheless provided for the wealth maximising choice. However, it is not safe to assume that a choice can be made between mutually exclusive projects using IRR in cases where the larger project also happens to have the higher IRR. Consider the following two Projects A and B with their relevant cash flows;

Year	A		B	
	(₹)	(₹)	(₹)	(₹)
0	(9,00,000)		(8,00,000)	
1	7,00,000		62,500	
2	6,00,000		6,00,000	
3	4,00,000		6,00,000	
4	50,000		6,00,000	

In this case Project A is the larger investment and also has a higher IRR as shown below,

Year	(₹)	r = 46%	PV (₹)	(₹)	r = 35%	PV (₹)
0	(9,00,000)	1.0000	(9,00,000)	(8,00,000)	1.0000	(8,00,000)
1	7,00,000	0.6849	4,79,430	62,500	0.7407	46,294
2	6,00,000	0.4691	2,81,460	6,00,000	0.5487	3,29,220
3	4,00,000	0.3213	1,28,520	6,00,000	0.4064	2,43,840

4	50,000	0.2201	11,005	6,00,000	0.3011	1,80,660
			(415)			14
IRR of Project A = 46%						
IRR of Project B = 35%						

However, in case the relevant discounting factor is taken as 5%, the NPV of the two projects provides a different picture as follows;

Project A				Project B		
Year	(₹)	r= 5%	PV (₹)	(₹)	r= 5%	PV (₹)
0	(9,00,000)	1.0	(9,00,000)	(8,00,000)	1.0	(8,00,000)
1	7,00,000	0.9524	6,66,680	62,500	0.9524	59,525
2	6,00,000	0.9070	5,44,200	6,00,000	0.9070	5,44,200
3	4,00,000	0.8638	3,45,520	6,00,000	0.8638	5,18,280
4	50,000	0.8227	41,135	6,00,000	0.8227	4,93,620
		NPV	6,97,535			8,15,625

As may be seen from the above, Project B should be the one to be selected even though its IRR is lower than that of Project A. This decision shall need to be taken in spite of the fact that Project A has a larger investment coupled with a higher IRR as compared with Project B. This type of an anomalous situation arises because of the reinvestment assumptions implicit in the two evaluation methods of NPV and IRR.

7.9.4 Discounted Payback Period Method

Some accountants prefer to calculate payback period after discounting the cash flow by a predetermined rate and the payback period so calculated is called, '*Discounted payback period*'. One of the most popular economic criteria for evaluating capital projects also is the payback period. Payback period is the time required for cumulative cash inflows to recover the cash outflows of the project.

This is considered superior to simple payback period method because it takes into account time value of money.

For example, a ₹30,000 cash outlay for a project with annual cash inflows of ₹6,000 would have a payback of 5 years (₹30,000 / ₹6,000).

The problem with the Payback Period is that it ignores the time value of money. In order to correct this, we can use discounted cash flows in calculating the payback period. Referring back to our example, if we discount the cash inflows at 15% required rate of return we have:

Year	Cash Flow	PVF@15%	PV	Cumulative PV
1	6,000	0.870	5,220	5,220
2	6,000	0.756	4,536	9,756
3	6,000	0.658	3,948	13,704
4	6,000	0.572	3,432	17,136
5	6,000	0.497	2,982	20,118
6	6,000	0.432	2,592	22,710
7	6,000	0.376	2,256	24,966
8	6,000	0.327	1,962	26,928
9	6,000	0.284	1,704	28,632
10	6,000	0.247	1,482	30,114

←

The cumulative total of discounted cash flows after ten years is ₹30,114. Therefore, our discounted payback is approximately 10 years as opposed to 5 years under simple payback. It should be noted that as the required rate of return increases, the distortion between simple payback and discounted payback grows. Discounted Payback is more appropriate way of measuring the payback period since it considers the time value of money.

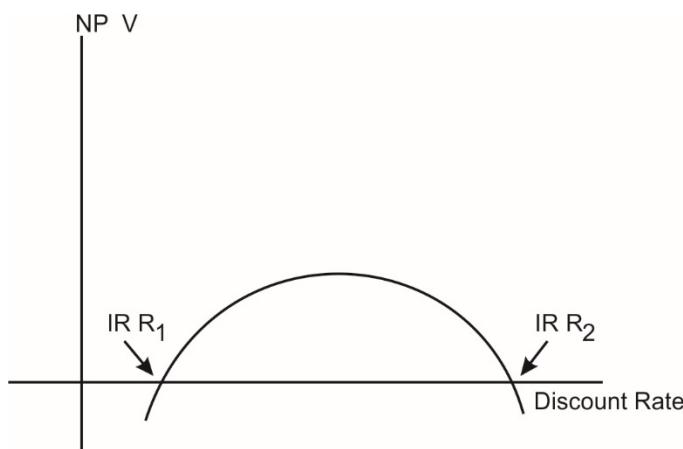
7.9.5 The Reinvestment Assumption

The Net Present Value technique assumes that all **cash flows can be reinvested** at the discount rate used for calculating the NPV. This is a logical assumption since the use of the NPV technique implies that all projects which provide a higher return than the discounting factor are accepted.

In contrast, IRR technique assumes that all cash flows are reinvested at the projects IRR. This assumption means that projects with heavy cash flows in the early years will be favoured by the IRR method vis-à-vis projects which have got heavy cash flows in the later years. This implicit reinvestment assumption means that Projects like A, with cash flows concentrated in the earlier years of life will be preferred by the method relative to Projects such as B.

7.9.6 Multiple Internal Rate of Return

In cases where project cash flows change signs or reverse during the life of a project e.g. an initial cash outflow is followed by cash inflows and subsequently followed by a major cash outflow, there may be more than one IRR. The following graph of discount rate versus NPV may be used as an illustration;



In such situations if the cost of capital is less than the two IRR's, a decision can be made easily, however otherwise the IRR decision rule may turn out to be misleading as the project should only be invested if the cost of capital is between IRR_1 and IRR_2 . To understand the concept of multiple IRR it is necessary to understand the implicit re-investment assumption in both NPV and IRR techniques.

Advantages of IRR

- This method makes use of the concept of **time value of money**.
- All the cash flows in the **project are considered**.
- IRR is easier to use as instantaneous **understanding of desirability** can be determined by comparing it with the cost of capital
- IRR technique helps in achieving the objective of maximisation of **shareholder's wealth**.

Limitations of IRR

- The calculation process is **tedious** if there are more than one cash outflows interspersed between the cash inflows, there can be multiple IRR, the interpretation of which is difficult.

- The IRR approach creates a **peculiar situation** if we compare two projects with different inflow/outflow patterns.
- It is assumed that under this method all the future cash inflows of a proposal are reinvested at a rate equal to the IRR. It is **ridiculous to imagine** that the same firm has a ability to reinvest the cash flows at a rate equal to IRR.
- If **mutually exclusive projects** are considered as investment options which have considerably different cash outlays. A project with a larger fund commitment but lower IRR contributes more in terms of absolute NPV and increases the shareholders' wealth. In such situation decisions based only on IRR criterion may not be correct.

7.9.7 Modified Internal Rate of Return (MIRR)

As mentioned earlier, there are several limitations attached with the concept of the conventional Internal Rate of Return. The MIRR addresses some of these deficiencies e.g., it eliminates multiple IRR rates; it addresses the reinvestment rate issue and produces results which are consistent with the Net Present Value method. This method is also called Terminal Value method.

Under this method, all cash flows, apart from the initial investment, are brought to the terminal value using an appropriate discount rate (usually the Cost of Capital). This results in a single stream of cash inflow in the terminal year. **The MIRR is obtained by assuming a single outflow in the zeroth year and the terminal cash inflow** as mentioned above. The discount rate which equates the present value of the terminal cash inflow to the zeroth year outflow is called the MIRR.

The decision criterion of MIRR is same as IRR i.e. you accept an investment if MIRR is larger than required rate of return and reject if it is lower than the required rate of return.

ILLUSTRATION 9

An investment of ₹1,36,000 yields the following cash inflows (profits before depreciation but after tax). DETERMINE MIRR considering 8% as cost of capital.

Year	₹
1	30,000
2	40,000
3	60,000
4	30,000
5	20,000
	1,80,000

SOLUTION

Year- 0 , Cashflow-₹1,36,000

The MIRR is calculated on the basis of investing the inflows at the cost of capital. The table below shows the value of the inflows if they are immediately reinvested at 8%.

Year	Cash flow	@ 8% reinvestment rate factor	₹
1	30,000	1.3605*	40,815
2	40,000	1.2597	50,388
3	60,000	1.1664	69,984
4	30,000	1.0800	32,400
5	20,000	1.0000	20,000
			2,13,587

* Investment of ₹ 1 at the end of the year 1 is reinvested for 4 years (at the end of 5 years) shall become $1(1.08)^4 = 1.3605$. Similarly, reinvestment rate factor for remaining years shall be calculated. Please note investment at the end of 5th year shall be reinvested for zero year hence reinvestment rate factor shall be 1.00.

The total cash outflow in year 0 (₹1,36,000) is compared with the possible inflow at year 5 and the resulting figure of $\frac{1,36,000}{2,13,587} = 0.6367$ is the discount factor in year

5. By looking at the year 5 row in the present value tables, you will see that this gives a return of 9%. This means that the ₹2,13,587 received in year 5 is equivalent to ₹1,36,000 in year 0 if the discount rate is 9%. Alternatively, we can compute MIRR as follows:

$$\text{Total return} = \frac{2,13,587}{1,36,000} = 1.5705$$

$$\text{MIRR} = \sqrt[5]{1.5705} - 1 = 9\%.$$

7.9.8 Comparison of Net Present Value and Internal Rate of Return Methods

Similarity

- Both the net present value and the internal rate of return methods are discounted cash flow methods which mean that they consider the time value of money.

- Both the techniques consider all cash flows over the expected useful life of the investment.

7.9.9 Different conclusion in the following scenarios

There are circumstances/scenarios under which the net present value method and the internal rate of return methods will reach different conclusions. Let's discuss these scenarios:-

Scenario 1 –Scale or Size Disparity

Being IRR a relative measure and NPV an absolute measure in case of disparity in scale or size both may give contradicting ranking. This can be understood with the help of following illustration:

ILLUSTRATION 10

Suppose there are two Project A and Project B are under consideration. The cash flows associated with these projects are as follows:

Year	Project A	Project B
0	(1,00,000)	(3,00,000)
1	50,000	1,40,000
2	60,000	1,90,000
3	40,000	1,00,000

Assuming Cost of Capital equal to 10% IDENTIFY which project should be accepted as per NPV Method and IRR Method.

SOLUTION

Net Present Value of Projects

Year	Cash Inflows Project A (₹)	Cash Inflows Project B (₹)	Present Value Factor @ 10%	PV of Project A (₹)	PV of Project B (₹)
0	(1,00,000)	(3,00,000)	1.000	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.909	45,450	1,27,260
2	60,000	1,90,000	0.826	49,560	1,56,940
3	40,000	1,00,000	0.751	30,040	75,100
				25,050	59,300

Internal Rate of Returns of projects

Since by discounting cash flows at 10% we are getting values very far from zero. Therefore, let us discount cash flows using 20% discounting rate.

Year	Cash Inflows Project A (₹)	Cash Inflows Project B (₹)	Present Value Factor @ 20%	PV of Project A (₹)	PV of Project B (₹)
0	(1,00,000)	(3,00,000)	1.000	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.833	41,650	1,16,620
2	60,000	1,90,000	0.694	41,640	1,31,860
3	40,000	1,00,000	0.579	23,160	57,900
				6,450	6,380

Since by discounting cash flows at 20% we are getting values far from zero. Therefore, let us discount cash flows using 25% discounting rate.

Year	Cash Inflows Project A (₹)	Cash Inflows Project B (₹)	Present Value Factor @ 25%	PV of Project A (₹)	PV of Project B (₹)
0	(1,00,000)	(3,00,000)	1.000	(1,00,000)	(3,00,000)
1	50,000	1,40,000	0.800	40,000	1,12,000
2	60,000	1,90,000	0.640	38,400	1,21,600
3	40,000	1,00,000	0.512	20,480	51,200
				(1,120)	(15,200)

The internal rate of return is, thus, more than 20% but less than 25%. The exact rate can be obtained by interpolation:

$$IRR_A = 20\% + \frac{6,450}{6,450 - (1,120)} \times (25\% - 20\%) = 20\% + \left(\frac{6,450}{7,570} \times 5\% \right) = 24.26\%$$

$$IRR_B = 20\% + \frac{6,380}{6,380 - (15,200)} \times (25\% - 20\%)$$

$$= 20\% + \left(\frac{6,380}{21,580} \times 5\% \right) = 21.48\%$$

Overall Position

	Project A	Project B
NPV @ 10%	25,050	59,300
IRR	24.26%	21.48%

Thus there is contradiction in ranking by two methods.

Scenario 2 – Time Disparity in Cash Flows

It might be possible that overall cash flows may be more or less same in the projects but there may be disparity in their flows i.e. larger part of cash inflows may be occurred in the beginning or end of the project. In such situation there may be difference in the ranking of projects as per two methods.

ILLUSTRATION 11

Suppose ABC Ltd. is considering two Project X and Project Y for investment. The cash flows associated with these projects are as follows:

Year	Project X	Project Y
0	(2,50,000)	(3,00,000)
1	2,00,000	50,000
2	1,00,000	1,00,000
3	50,000	3,00,000

Assuming Cost of Capital be 10%, IDENTIFY which project should be accepted as per NPV Method and IRR Method.

SOLUTION

Net Present Value of Projects

Year	Cash Inflows Project X (₹)	Cash Inflows Project Y (₹)	Present Value Factor @ 10%	PV of Project X (₹)	PV of Project Y (₹)
0	(2,50,000)	(3,00,000)	1.000	(2,50,000)	(3,00,000)
1	2,00,000	50,000	0.909	1,81,800	45,450

2	1,00,000	1,00,000	0.826	82,600	82,600
3	50,000	3,00,000	0.751	37,550	2,25,300
				51,950	53,350

Internal Rate of Returns of projects

Since by discounting cash flows at 10% we are getting values far from zero. Therefore, let us discount cash flows using 20% discounting rate.

Year	Cash Inflows Project X (₹)	Cash Inflows Project Y (₹)	Present Value Factor @ 20%	PV of Project X (₹)	PV of Project Y (₹)
0	(2,50,000)	(3,00,000)	1.000	(2,50,000)	(3,00,000)
1	2,00,000	50,000	0.833	1,66,600	41,650
2	1,00,000	1,00,000	0.694	69,400	69,400
3	50,000	3,00,000	0.579	28,950	1,73,700
				14,950	(15,250)

Since by discounting cash flows at 20% we are getting value of Project X is positive and value of Project Y is negative. Therefore, let us discount cash flows of Project X using 25% discounting rate and Project Y using discount rate of 1

Year	Cash Inflows Project X (₹)	Present Value Factor @ 25%	PV of Project X (₹)	Cash Inflows Project Y (₹)	Present Value Factor @ 15%	PV of Project Y (₹)
0	(2,50,000)	1.000	(2,50,000)	(3,00,000)	1.000	(3,00,000)
1	2,00,000	0.800	1,60,000	50,000	0.870	43,500
2	1,00,000	0.640	64,000	1,00,000	0.756	75,600
3	50,000	0.512	25,600	3,00,000	0.658	1,97,400
			(400)			16,500

The internal rate can be obtained by interpolation:

$$IRR_X = 20\% + \frac{14,950}{14,950 - (400)} \times (25\% - 20\%)$$

$$= 20\% + \left(\frac{14,950}{15,350} \times 5\% \right) = 24.87\%$$

$$IRR_B = 15\% + \frac{16,500}{16,500 - (15,250)} \times (20\% - 15\%)$$

$$= 15\% + \left(\frac{16,500}{31,750} \times 5\% \right) = 17.60\%$$

Overall Position

	Project A	Project B
NPV @ 10%	51,950	53,350
IRR	24.87%	17.60%

Thus there is contradiction in ranking by two methods.

Scenario 3 – Disparity in life of Proposals (Unequal Lives)

Conflict in ranking may also arise if we are comparing two projects (especially mutually exclusive) having unequal lives.

ILLUSTRATION 12

Suppose MVA Ltd. is considering two Project A and Project B for investment. The cash flows associated with these projects are as follows:

Year	Project A	Project B
0	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000
2	0	2,00,000
3	0	7,00,000

Assuming Cost of Capital equal to 12%, ANALYSE which project should be accepted as per NPV Method and IRR Method?

SOLUTION

Net Present Value of Projects

Year	Cash Inflows Project A (₹)	Cash Inflows Project B (₹)	Present Value Factor @ 12%	PV of Project A (₹)	PV of Project B (₹)
0	(5,00,000)	(5,00,000)	1.000	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000	0.893	6,69,750	1,78,600
2	0	2,00,000	0.797	0	1,59,400
3	0	7,00,000	0.712	0	4,98,400
				1,69,750	3,36,400

Internal Rate of Returns of projects

Let us discount cash flows using 50% discounting rate.

Year	Cash Inflows Project A (₹)	Cash Inflows Project B (₹)	Present Value Factor @ 50%	PV of Project A (₹)	PV of Project B (₹)
0	(5,00,000)	(5,00,000)	1.000	(5,00,000)	(5,00,000)
1	7,50,000	2,00,000	0.667	5,00,250	1,33,400
2	0	2,00,000	0.444	0	88,800
3	0	7,00,000	0.296	0	2,07,200
				250	(70,600)

Since, IRR of project A shall be 50% as NPV is very small. Further, by discounting cash flows at 50% we are getting NPV of Project B negative, let us discount cash flows of Project B using 15% discounting rate.

Year	Cash Inflows Project B (₹)	Present Value Factor @ 15%	PV of Project B (₹)
0	(5,00,000)	1.000	(5,00,000)
1	2,00,000	0.870	1,74,000
2	2,00,000	0.756	1,51,200

3	7,00,000	0.658	4,60,600
			2,85,800

The internal rate can be obtained by interpolation:

$$\begin{aligned}
 IRR_B &= 15\% + \frac{2,85,800}{2,85,800 - (70,600)} \times (50\% - 15\%) \\
 &= 15\% + \left(\frac{2,85,800}{3,56,400} \times 35\% \right) = 43.07\%
 \end{aligned}$$

Overall Position

	Project A	Project B
NPV @ 10%	1,69,750	3,36,400
IRR	50.00%	43.07%

Thus there is contradiction in ranking by two methods.



7.10 SUMMARY OF DECISION CRITERIA OF CAPITAL BUDGETING TECHNIQUES

Techniques		For Independent Project	For Mutually Exclusive Projects
Non-Discounted	Pay Back	<ul style="list-style-type: none"> (i) When Payback period \leq Maximum Acceptable Payback period: Accepted (ii) When Payback period \geq Maximum Acceptable Payback period: Rejected 	Project with least Payback period should be selected
	Accounting Rate of Return(ARR)	<ul style="list-style-type: none"> (i) When $ARR \geq$ Minimum Acceptable Rate of Return: Accepted (ii) When $ARR \leq$ Minimum Acceptable Rate of Return: Rejected 	Project with the maximum ARR should be selected.

Discounted	Net Present Value (NPV)	(i) When $NPV > 0$: Accepted (ii) When $NPV < 0$: Rejected	Project with the highest positive NPV should be selected
	Profitability Index(PI)	(i) When $PI > 1$: Accepted (ii) When $PI < 1$: Rejected	When Net Present Value is same project with Highest PI should be selected
	Internal Rate of Return (IRR)	(i) When $IRR > K$: Accepted (ii) When $IRR < K$: Rejected	Project with the maximum IRR should be selected



7.11 SPECIAL CASES

7.11.1 Capital Budgeting under Capital Rationing

As discussed earlier, if project has positive NPV it should be accepted with an objective of maximisation of wealth of shareholders. However, there may be a situation due to resource (capital) constraints (rationing) a firm may have to select some projects among various projects, all having positive $NPVs$. Broadly two scenarios may influence the method of evaluation to be adopted.

- (i) If projects are independent of each other and are divisible in nature: In such situation NPV Rule should be modified and accordingly projects should be ranked on the basis of 'NPV per rupee of Capital' method.
- (ii) If projects are not divisible: In such situation projects shall be ranked on the basis of absolute NPV and should be mixed up to the point available resources are exhausted.

ILLUSTRATION 13

Shiva Limited is planning its capital investment programme for next year. It has five projects all of which give a positive NPV at the company cut-off rate of 15 percent, the investment outflows and present values being as follows:

Project	Investment	NPV @ 15%
	₹000	₹000
A	(50)	15.4
B	(40)	18.7
C	(25)	10.1
D	(30)	11.2
E	(35)	19.3

The company is limited to a capital spending of ₹1,20,000.

You are required to ILLUSTRATE the returns from a package of projects within the capital spending limit. The projects are independent of each other and are divisible (i.e., part-project is possible).

SOLUTION

Computation of NPVs per ₹ 1 of Investment and Ranking of the Projects

Project	Investment	NPV @ 15%	NPV per ₹1 invested	Ranking
	₹'000	₹'000		
A	(50)	15.4	0.31	5
B	(40)	18.7	0.47	2
C	(25)	10.1	0.40	3
D	(30)	11.2	0.37	4
E	(35)	19.3	0.55	1

Building up of a Programme of Projects based on their Rankings

Project	Investment	NPV @ 15%
	₹000	₹000
E	(35)	19.3
B	(40)	18.7
C	(25)	10.1
D	(20)	7.5
	120	55.6

(2/3 of project total)

Thus Project A should be rejected and only two-third of Project D be undertaken. If the projects are not divisible then other combinations can be examined as:

	Investment	NPV @ 15%
	₹ 000	₹000
E + B + C	100	48.1
E + B + D	105	49.2

In this case E + B + D would be preferable as it provides a higher NPV despite D ranking lower than C.

7.11.2 Projects with unequal lives

Sometimes firm may be faced with any of the following problems:

- (i) **Retaining** an old asset or replace it with new one.
- (ii) **Choosing** one proposal among two proposals (Mutually Exclusive).

Although, while evaluating the proposals the above scenarios do not pose any special problem if they have same life period. But problem arises in case projects have unequal lives. In such situations we can deal with the problem by following any of the following method:

- (i) Replacement Chain Method
- (ii) Equivalent Annualized Criterion

These two methods can be understood with the help of following illustration.

ILLUSTRATION 14

R plc is considering modernizing its production facilities and it has two proposals under consideration. The expected cash flows associated with these projects and their NPV as per discounting rate of 12% and IRR is as follows:

Year	Cash Flow	
	Project A (₹)	Project B (₹)
0	(40,00,000)	(20,00,000)
1	8,00,000	7,00,000
2	14,00,000	13,00,000
3	13,00,000	12,00,000

4	12,00,000	0
5	11,00,000	0
6	10,00,000	0
NPV @12%	6,49,094	5,15,488
IRR	17.47%	25.20%

IDENTIFY which project should R plc accept?

SOLUTION

Although from NPV point of view Project A appears to be better but from IRR point of view Project B appears to be better. Since, both projects have unequal lives selection on the basis of these two methods shall not be proper. In such situation we shall use any of the following method:

(i) **Replacement Chain (Common Life) Method:** Since the life of the Project A is 6 years and Project B is 3 years to equalize lives we can have second opportunity of investing in project B after one time investing. The position of cash flows in such situation shall be as follows:



NPV of extended life of 6 years of Project B shall be ₹8,82,403 and IRR of 25.20%. Accordingly, with extended life NPV of Project B it appears to be more attractive.

(ii) **Equivalent Annualized Criterion:** The method discussed above has one drawback when we have to compare two projects one has a life of 3 years and other has 5 years. In such case the above method shall require analysis of a period of 15 years i.e. common multiple of these two values. The simple solution to this problem is use of Equivalent Annualised Criterion involving following steps:

- Compute NPV using the WACC or discounting rate.
- Compute Present Value Annuity Factor (PVAF) of discounting factor used above for the period of each project.
- Divide NPV computed under step (a) by PVAF as computed under step (b) and compare the values.

Accordingly, for proposal under consideration:

	Project A	Project B
NPV @ 12%	₹ 6,49,094	₹5,15,488
PVAF @12%	4.112	2.402
Equivalent Annualized Criterion	₹1,57,854	₹2,14,608

Thus, Project B should be selected.

ILLUSTRATION 15

Alpha Company is considering the following investment projects:

Projects	Cash Flows (₹)			
	C₀	C₁	C₂	C₃
A	-10,000	+ 10,000		
B	-10,000	+ 7,500	+ 7,500	
C	-10,000	+ 2,000	+ 4,000	+ 12,000
D	-10,000	+ 10,000	+ 3,000	+ 3,000

- (a) *ANALYSE the rank the projects according to each of the following methods: (i) Payback, (ii) ARR, (iii) IRR and (iv) NPV, assuming discount rates of 10 and 30 per cent.*
- (b) *Assuming the projects are independent, which one should be accepted? If the projects are mutually exclusive, IDENTIFY which project is the best?*

SOLUTION

(a) (i) Payback Period

Project A : $10,000/10,000 = 1$ year

Project B: $10,000/7,500 = 1 \frac{1}{3}$ years.

Project C: 2 years $+ \frac{10,000 - 6,000}{12,000} = 2 \frac{1}{3}$ years

Project D: 1 year.

(ii) ARR

Project A : $\frac{(10,000 - 10,000)1/2}{(10,000)1/2} = 0$

$$\text{Project B: } \frac{(15,000 - 10,000)1/2}{(10,000)1/2} = \frac{2,500}{5,000} = 50\%$$

$$\text{Project C: } \frac{(18,000 - 10,000)1/3}{(10,000)1/2} = \frac{2,667}{5,000} = 53\%$$

$$\text{Project D: } \frac{(16,000 - 10,000)1/3}{(10,000)1/2} = \frac{2,000}{5,000} = 40\%$$

Note: This net cash proceed includes recovery of investment also. Therefore, net cash earnings are found by deducting initial investment.

(iii) IRR

Project A:	The net cash proceeds in year 1 are just equal to investment. Therefore, $r = 0\%$.
Project B:	This project produces an annuity of ₹7,500 for two years. Therefore, the required PVAF is: $10,000/7,500 = 1.33$. This factor is found under 32% column. Therefore, $r = 32\%$
Project C:	Since cash flows are uneven, the trial and error method will be followed. Using 20% rate of discount the NPV is + ₹1,389. At 30% rate of discount, the NPV is -₹633. The true rate of return should be less than 30%. At 27% rate of discount it is found that the NPV is -₹86 and at 26% +₹105. Through interpolation, we find $r = 26.5\%$
Project D:	In this case also by using the trial and error method, it is found that at 37.6% rate of discount NPV becomes almost zero. Therefore, $r = 37.6\%$.

(iv) NPV

Project A:

$$\text{at 10\% } -10,000 + 10,000 \times 0.909 = -910$$

$$\text{at 30\% } -10,000 + 10,000 \times 0.769 = -2,310$$

Project B:

$$\text{at 10\% } -10,000 + 7,500(0.909 + 0.826) = 3,013$$

$$\text{at 30\% } -10,000 + 7,500(0.769 + 0.592) = +208$$

Project C:

$$\text{at 10\%} \quad -10,000 + 2,000 \times 0.909 + 4,000 \times 0.826 + 12,000 \times 0.751 = +4,134$$

$$\text{at 30\%} \quad -10,000 + 2,000 \times 0.769 + 4,000 \times 0.592 + 12,000 \times 0.455 = -633$$

Project D:

$$\text{at 10\%} \quad -10,000 + 10,000 \times 0.909 + 3,000 \times (0.826 + 0.751) = +3,821$$

$$\text{at 30\%} \quad -10,000 + 10,000 \times 0.769 + 3,000 \times (0.592 + 0.455) = +831$$

The projects are ranked as follows according to the various methods:

Ranks					
Projects	PBP	ARR	IRR	NPV (10%)	NPV (30%)
A	1	4	4	4	4
B	2	2	2	3	2
C	3	1	3	1	3
D	1	3	1	2	1

(b) Payback and ARR are theoretically unsound method for choosing between the investment projects. Between the two time-adjusted (DCF) investment criteria, NPV and IRR, NPV gives consistent results. If the projects are independent (and there is no capital rationing), either IRR or NPV can be used since the same set of projects will be accepted by any of the methods. In the present case, except Project A all the three projects should be accepted if the discount rate is 10%. Only Projects B and D should be undertaken if the discount rate is 30%.

If it is assumed that the projects are mutually exclusive, then under the assumption of 30% discount rate, the choice is between B and D (A and C are unprofitable). Both criteria IRR and NPV give the same results – D is the best. Under the assumption of 10% discount rate, ranking according to IRR and NPV conflict (except for Project A). If the IRR rule is followed, Project D should be accepted. But the NPV rule tells that Project C is the best. The NPV rule generally gives consistent results in conformity with the wealth maximization principle. Therefore, Project C should be accepted following the NPV rule.

ILLUSTRATION 16

The expected cash flows of three projects are given below. The cost of capital is 10 per cent.

(a) CALCULATE the payback period, net present value, internal rate of return and accounting rate of return of each project.

(b) IDENTIFY the rankings of the projects by each of the four methods.

(figures in '000)

Period	Project A (₹)	Project B (₹)	Project C (₹)
0	(5,000)	(5,000)	(5,000)
1	900	700	2,000
2	900	800	2,000
3	900	900	2,000
4	900	1,000	1,000
5	900	1,100	
6	900	1,200	
7	900	1,300	
8	900	1,400	
9	900	1,500	
10	900	1,600	

SOLUTION

(a) Payback Period Method:

$$A = 5 + (500/900) = 5.56 \text{ years}$$

$$B = 5 + (500/1,200) = 5.42 \text{ years}$$

$$C = 2 + (1,000/2,000) = 2.5 \text{ years}$$

Net Present Value Method:

$$NPV_A = (-5,000) + (900 \times 6.145) = (5,000) + 5,530.5 = ₹530.5$$

NPV_B is calculated as follows:

Year	Cash flow (₹)	10% discount factor	Present value (₹)
0	(5000)	1.000	(5,000)
1	700	0.909	636
2	800	0.826	661

3	900	0.751	676
4	1000	0.683	683
5	1100	0.621	683
6	1200	0.564	677
7	1300	0.513	667
8	1400	0.467	654
9	1500	0.424	636
10	1600	0.386	618
			1591

NPV_C is calculated as follows:

Year	Cash flow (₹)	10% discount factor	Present value (₹)
0	(5000)	1.000	(5,000)
1	2000	0.909	1,818
2	2000	0.826	1,652
3	2000	0.751	1,502
4	1000	0.683	683
			655

Internal Rate of Return

$$NPV \text{ at } 12\% = (5,000) + 900 \times 5.650$$

$$= (5,000) + 5085 = 85$$

$$NPV \text{ at } 13\% = (5,000) + 900 \times 5.426$$

$$= (5,000) + 4,883.40 = -116.60$$

$$IRR_A = 12 + \left[\frac{85}{85 + 116.60} \right] \times (13 - 12) = 12 + 0.42$$

$$IRR_A = 12.42\%.$$

IRR_B

Year	Cash flow (₹)	10% discount factor	Present value (₹)	20% discount factor	Present value (₹)
0	(5,000)	1.000	(5,000)	1.000	(5,000)
1	700	0.909	636	0.833	583
2	800	0.826	661	0.694	555
3	900	0.751	676	0.579	521
4	1,000	0.683	683	0.482	482
5	1,100	0.621	683	0.402	442
6	1,200	0.564	677	0.335	402
7	1,300	0.513	667	0.279	363
8	1,400	0.467	654	0.233	326
9	1,500	0.424	636	0.194	291
10	1,600	0.386	618	0.162	259
			1,591		(776)

$$\text{Interpolating: } IRR_B = 10\% + \frac{1,591}{(1,591 + 776)} \times (20\% - 10\%) = 10\% + 6.72\% = 16.72\%$$

IRR_C

Year	Cash flow (₹)	15% discount factor	Present value (₹)	18% discount factor	Present value (₹)
0	(5,000)	1.000	(5,000)	1.000	(5,000)
1	2,000	0.870	1,740	0.847	1,694
2	2,000	0.756	1,512	0.718	1,436
3	2,000	0.658	1,316	0.609	1,218
4	1,000	0.572	572	0.516	516
			140		(136)

$$\text{Interpolating: } IRR_C = 15\% + \frac{140}{(140 + 136)} \times (18\% - 15\%) = 15\% + 1.52\% = 16.52\%$$

Accounting Rate of Return:

$$\text{ARR}_A: \text{Average capital employed} = \frac{5,000}{2} = ₹ 2,500$$

$$\text{Average accounting profit} = \frac{(9,000 - 5,000)}{10} = ₹ 400$$

$$\text{ARR}_A = \frac{(400 \times 100)}{2,500} = 16 \text{ per cent}$$

$$\text{ARR}_B: \text{Average accounting profit} = \frac{(11,500 - 5,000)}{10} = ₹ 650$$

$$\text{ARR}_B = \frac{(650 \times 100)}{2,500} = 26 \text{ per cent}$$

$$\text{ARR}_C: \text{Average accounting profit} = \frac{(7,000 - 5,000)}{4} = ₹ 500$$

$$\text{ARR}_C = \frac{(500 \times 100)}{2,500} = 20 \text{ per cent}$$

(b) Summary of Results

Project	A	B	C
Payback (years)	5.5	5.4	2.5
ARR (%)	16	26	20
IRR (%)	12.42	16.72	16.52
NPV (')	530.50	1,591	655

Comparison of Rankings

Method	Payback	ARR	IRR	NPV
1	C	B	B	B
2	B	C	C	C
3	A	A	A	A

SUMMARY

- ◆ Capital budgeting is the process of evaluating and selecting long-term investments that are in line with the goal of investor's wealth maximization.
- ◆ The capital budgeting decisions are important, crucial and critical business decisions due to substantial expenditure involved; long period for the recovery of benefits; irreversibility of decisions and the complexity involved in capital investment decisions.
- ◆ One of the most important tasks in capital budgeting is estimating future cash flows for a project. The final decision we make at the end of the capital budgeting process is no better than the accuracy of our cash-flow estimates.
- ◆ Tax payments like other payments must be properly deducted in deriving the cash flows. That is, cash flows must be defined in post-tax terms.
- ◆ There are a number of capital budgeting techniques available for appraisal of investment proposals and can be classified as traditional (non-discounted) and time-adjusted (discounted).
- ◆ The most common traditional capital budgeting techniques are Payback Period and Accounting (Book) Rate of Return.

$$\text{Payback period} = \frac{\text{Total initial capital investment}}{\text{Annual expected after - tax net cash flow}}$$

$$\text{Payback Reciprocal} = \frac{\text{Average Annual cash in flow}}{\text{Initial investment}}$$

- ◆ Accounting (Book) Rate of Return (ARR) or Average Rate of Return (ARR):

$$\text{Accounting rate of return} = \frac{\text{Average annual net income}}{\text{Investment}}$$

- ◆ Net Present Value Technique (NPV):

Net present value = Present value of cash inflows - Present value of cash outflows

$$\text{NPV} = \left(\frac{C_1}{(1+k)} + \frac{C_2}{(1+k)^2} + \frac{C_3}{(1+k)^3} + \dots + \frac{C_n}{(1+k)^n} \right) - I$$

- ◆ Profitability Index /Desirability Factor/Present Value Index Method (PI):

$$\text{Profitability Index (PI)} = \frac{\text{Sum of discounted cash inflows}}{\text{Initial cash outlay or Total discounted cash outflow (as the case may be)}}$$

- ◆ Internal Rate of Return Method (IRR):

$$LR + \frac{NPV \text{ at LR}}{NPV \text{ at LR} - NPV \text{ at HR}} \times (HR - LR)$$

- ◆ Modified Internal Rate of Return (MIRR): All cash flows, apart from the initial investment, are brought to the terminal value using an appropriate discount rate (usually the Cost of Capital).

TEST YOUR KNOWLEDGE

MCQs based Questions

1. A capital budgeting technique which does not require the computation of cost of capital for decision making purposes is,
 - Net Present Value method
 - Internal Rate of Return method
 - Modified Internal Rate of Return method
 - Pay back
2. If two alternative proposals are such that the acceptance of one shall exclude the possibility of the acceptance of another then such decision making will lead to,
 - Mutually exclusive decisions
 - Accept reject decisions
 - Contingent decisions
 - None of the above
3. In case a company considers a discounting factor higher than the cost of capital for arriving at present values, the present values of cash inflows will be
 - Less than those computed on the basis of cost of capital
 - More than those computed on the basis of cost of capital
 - Equal to those computed on the basis of the cost of capital
 - None of the above
4. The pay back technique is specially useful during times
 - When the value of money is turbulent
 - When there is no inflation

(c) When the economy is growing at a steady rate coupled with minimal inflation.

(d) None of the above

5. While evaluating capital investment proposals, time value of money is used in which of the following techniques,

(a) Payback method

(b) Accounting rate of return

(c) Net present value

(d) None of the above

6. IRR would favour project proposals which have,

(a) Heavy cash inflows in the early stages of the project.

(b) Evenly distributed cash inflows throughout the project.

(c) Heavy cash inflows at the later stages of the project

(d) None of the above.

7. The re- investment assumption in the case of the IRR technique assumes that,

(a) Cash flows can be re- invested at the projects IRR

(b) Cash flows can be re- invested at the weighted cost of capital

(c) Cash flows can be re- invested at the marginal cost of capital

(d) None of the above

8. Multiple IRRs are obtained when,

(a) Cash flows in the early stages of the project exceed cash flows during the later stages.

(b) Cash flows reverse their signs during the project

(c) Cash flows are uneven

(d) None of the above.

9. Depreciation is included as a cost in which of the following techniques,

(a) Accounting rate of return

(b) Net present value

(c) Internal rate of return
(d) None of the above

10. Management is considering a ₹ 1,00,000 investment in a project with a 5 year life and no residual value . If the total income from the project is expected to be ₹ 60,000 and recognition is given to the effect of straight line depreciation on the investment, the average rate of return is :

(a) 12%
(b) 24%
(c) 60%
(d) 75%

11. Assume cash outflow equals ₹ 1,20,000 followed by cash inflows of ₹ 25,000 per year for 8 years and a cost of capital of 11%. What is the Net present value?

(a) (₹ 38,214)
(b) ₹ 9,653
(c) ₹ 8,653
(d) ₹ 38,214

12. What is the Internal rate of return for a project having cash flows of ₹ 40,000 per year for 10 years and a cost of ₹ 2,26,009?

(a) 8%
(b) 9%
(c) 10%
(d) 12%

13. While evaluating investments, the release of working capital at the end of the projects life should be considered as,

(a) Cash in flow
(b) Cash out flow
(c) Having no effect upon the capital budgeting decision
(d) None of the above.

14. Capital rationing refers to a situation where,

- Funds are restricted and the management has to choose from amongst available alternative investments.
- Funds are unlimited and the management has to decide how to allocate them to suitable projects.
- Very few feasible investment proposals are available with the management.
- None of the above

15. Capital budgeting is done for

- Evaluating short term investment decisions.
- Evaluating medium term investment decisions.
- Evaluating long term investment decisions.
- None of the above



Theoretical Questions

- DISCUSS the various technique of capital budgeting.
- DISCUSS NPV. How it is calculated?
- DISCUSS in detail the 'Capital Budgeting Process'.
- CLASSIFY various types of Capital Investment decisions known to you.
- DESCRIBE the advantage and disadvantage of profitability of index.
- DESCRIBE MIRR.

Practical Problems

- Lockwood Limited wants to replace its old machine with a new automatic machine. Two models A and B are available at the same cost of ₹5 lakhs each. Salvage value of the old machine is ₹1 lakh. The utilities of the existing machine can be used if the company purchases A. Additional cost of utilities to be purchased in that case are ₹1 lakh. If the company purchases B then all the existing utilities will have to be replaced with new utilities costing ₹2 lakhs. The salvage value of the old utilities will be ₹0.20 lakhs. The earnings after taxation are expected to be:

Year	(cash in-flows of)		
	A ₹	B ₹	P.V. Factor @ 15%
1	1,00,000	2,00,000	0.87
2	1,50,000	2,10,000	0.76
3	1,80,000	1,80,000	0.66
4	2,00,000	1,70,000	0.57
5	1,70,000	40,000	0.50
Salvage Value at the end of Year 5	50,000	60,000	

The targeted return on capital is 15%. You are required to (i) COMPUTE, for the two machines separately, net present value, discounted payback period and desirability factor and (ii) ADVISE which of the machines is to be selected?

2. Hindlever Company is considering a new product line to supplement its range of products. It is anticipated that the new product line will involve cash investments of ₹7,00,000 at time 0 and ₹10,00,000 in year 1. After-tax cash inflows of ₹2,50,000 are expected in year 2, ₹3,00,000 in year 3, ₹3,50,000 in year 4 and ₹4,00,000 each year thereafter through year 10. Although the product line might be viable after year 10, the company prefers to be conservative and end all calculations at that time.
 - (a) If the required rate of return is 15 per cent, COMPUTE net present value of the project? Is it acceptable?
 - (b) ANALYSE What would be the case if the required rate of return were 10 per cent?
 - (c) CALCULATE its internal rate of return?
 - (d) COMPUTE the project's payback period?
3. Elite Cooker Company is evaluating three investment situations: (1) produce a new line of aluminium skillets, (2) expand its existing cooker line to include several new sizes, and (3) develop a new, higher-quality line of cookers. If only the project in question is undertaken, the expected present values and the amounts of investment required are:

Project	Investment required	Present value of Future Cash-Flows
	₹	₹
1	2,00,000	2,90,000
2	1,15,000	1,85,000
3	2,70,000	4,00,000

If projects 1 and 2 are jointly undertaken, there will be no economies; the investments required and present values will simply be the sum of the parts. With projects 1 and 3, economies are possible in investment because one of the machines acquired can be used in both production processes. The total investment required for projects 1 and 3 combined is ₹4,40,000. If projects 2 and 3 are undertaken, there are economies to be achieved in marketing and producing the products but not in investment. The expected present value of future cash flows for projects 2 and 3 is ₹6,20,000. If all three projects are undertaken simultaneously, the economies noted will still hold. However, a ₹1,25,000 extension on the plant will be necessary, as space is not available for all three projects. ANALYSE which project or projects should be chosen?

- Cello Limited is considering buying a new machine which would have a useful economic life of five years, a cost of ₹1,25,000 and a scrap value of ₹30,000, with 80 per cent of the cost being payable at the start of the project and 20 per cent at the end of the first year. The machine would produce 50,000 units per annum of a new product with an estimated selling price of ₹3 per unit. Direct costs would be ₹1.75 per unit and annual fixed costs, including depreciation calculated on a straight- line basis, would be ₹40,000 per annum.

In the first year and the second year, special sales promotion expenditure, not included in the above costs, would be incurred, amounting to ₹10,000 and ₹15,000 respectively.

ANALYSE the project using the NPV method of investment appraisal, assuming the company's cost of capital to be 10 percent.

ANSWERS/SOLUTIONS

Answers to the MCQs based Questions

1.	(d)	2.	(a)	3.	(a)	4.	(a)	5.	(c)	6.	(a)
7.	(a)	8.	(b)	9.	(a)	10.	(b)	11.	(c)	12.	(d)
13.	(a)	14.	(a)	15.	(c)						

Answers to the Theoretical Questions

1. Please refer paragraph 7.7
2. Please refer paragraph 7.9.1
3. Please refer paragraph 7.3
4. Please refer paragraph 7.4
5. Please refer paragraph 7.9.2.
6. Please refer paragraph 7.12.

Answers to the Practical Problems

1. (i) Expenditure at year zero

(₹ in lakhs)

Particulars	A	B
Cost of Machine	5.00	5.00
Cost of Utilities	1.00	2.00
Salvage of Old Machine	(1.00)	(1.00)
Salvage of Old Utilities	–	(0.20)
Total Expenditure (Net)	5.00	5.80

1. (ii) Discounted Value of Cash inflows

(₹ in lakhs)

Year	NPV Factor @ 15%	Machine A		Machine B	
		Cash inflows	Discounted value of inflows	Cash Flows	Discounted value of inflows
0	1.00	(5.00)	(5.00)	(5.80)	(5.80)
1	0.87	1.00	0.87	2.00	1.74

2	0.76	1.50	1.14	2.10	1.60
3	0.66	1.80	1.19	1.80	1.19
4	0.57	2.00	1.14	1.70	0.97
5	0.50	1.70	0.85	0.40	0.20
Salvage	0.50	0.50	0.25	0.60	0.30
Net Present Value			5.44 (+)0.44		6.00 (+)0.20

Since the Net present Value of both the machines is positive both are acceptable.

(iii) **Discounted Pay-back Period**

(₹ in lakhs)

Year	Machine A		Machine B	
	Discounted cash inflows	Cumulative Discounted cash inflows	Discounted cash inflows	Cumulative Discounted cash inflows
1	0.87	0.87	1.74	1.74
2	1.14	2.01	1.60	3.34
3	1.19	3.20	1.19	4.53
4	1.14	4.34	0.97	5.50
5	1.10*	5.44	0.50	6.00

* Includes salvage value

Discounted Payback Period (For A and B):

$$\text{Machine A} = 4 \text{ years} + \left(\frac{0.66}{1.10} \right) = 4.6 \text{ years}$$

$$\text{Machine B} = 4 \text{ years} + \left(\frac{0.30}{0.50} \right) = 4.6 \text{ years}$$

Profitability Index (PI) = $\frac{\text{Sum of present value of net cash inflow}}{\text{Initial cash outlay}}$

$$\text{Machine A} = \frac{\text{₹ 5.44 lakhs}}{\text{₹ 5.00 lakhs}} = 1.088 \quad \text{Machine B} = \frac{\text{₹ 6.00 lakhs}}{\text{₹ 5.80 * lakhs}} = 1.034$$

*[Cost of Machine B = Purchase cost + Incremental cost (Additional utilities cost less recoverable value of utilities)] = [5,00,000 + (2,00,000 - 1,00,000 - 20,000)]

(iv) Since the absolute surplus in the case of A is more than B and also the desirability factor, it is better to choose A.

The discounted payback period in both the cases is same, also the net present value is positive in both the cases but the desirability factor (profitability index) is higher in the case of Machine A, it is therefore better to choose Machine A.

2. (a)

Year	Cash flow	Discount Factor (15%)	Present value
	(₹)		(₹)
0	(7,00,000)	1.000	(7,00,000)
1	(10,00,000)	0.870	(8,70,000)
2	2,50,000	0.756	1,89,000
3	3,00,000	0.658	1,97,400
4	3,50,000	0.572	2,00,200
5–10	4,00,000	2.163	8,65,200
		Net Present Value	(1,18,200)

As the net present value is negative, the project is unacceptable.

(b) Similarly, NPV at 10% discount rate can be computed as follows:

Year	Cash flow	Discount Factor (10%)	Present value
	(₹)		(₹)
0	(7,00,000)	1.000	(7,00,000)
1	(10,00,000)	0.909	(9,09,000)
2	2,50,000	0.826	2,06,500
3	3,00,000	0.751	2,25,300
4	3,50,000	0.683	2,39,050
5–10	4,00,000	2.974	11,89,600
		Net Present Value	2,51,450

Since $NPV = ₹2,51,450$ is positive, hence the project would be acceptable.

$$\begin{aligned}
 \text{(c) IRR} &= \text{LR} + \frac{\text{NPV at LR}}{\text{NPV at LR} - \text{NPV at HR}} \times (\text{HR} - \text{LR}) \\
 &= 10\% + \frac{\text{₹} 2,51,450}{\text{₹} 2,51,450 - (-)\text{₹} 1,18,200} \times (15\% - 10\%) \\
 &= 10\% + 3.4012 \text{ or } 13.40\%
 \end{aligned}$$

(d) Payback Period = 6 years:

$$\begin{aligned}
 -\text{₹} 7,00,000 - \text{₹} 10,00,000 + \text{₹} 2,50,000 + \text{₹} 3,00,000 + \text{₹} 3,50,000 + \text{₹} 4,00,000 + \\
 \text{₹} 4,00,000 = 0
 \end{aligned}$$

3.

Project	Investment Required	Present value of Future Cash Flows	Net Present value
	₹	₹	₹
1	2,00,000	2,90,000	90,000
2	1,15,000	1,85,000	70,000
3	2,70,000	4,00,000	1,30,000
1 and 2	3,15,000	4,75,000	1,60,000
1 and 3	4,40,000	6,90,000	2,50,000
2 and 3	3,85,000	6,20,000	2,35,000
1, 2 and 3 (Refer Working note)	6,80,000*	9,10,000	2,30,000

Working Note:

(i) Total Investment required if all the three projects are undertaken simultaneously:

	(₹)
Project 1& 3	4,40,000
Project 2	1,15,000
Plant extension cost	1,25,000
Total	6,80,000

(ii) Total of Present value of Cash flows if all the three projects are undertaken simultaneously:

	(₹)
Project 2& 3	6,20,000
Project 1	2,90,000
Total	9,10,000

Advise: Projects 1 and 3 should be chosen, as they provide the highest net present value.

4. Calculation of Net Cash flows

$$\text{Contribution} = (3.00 - 1.75) \times 50,000 = ₹ 62,500$$

$$\text{Fixed costs} = 40,000 - [(1,25,000 - 30,000)/5] = ₹ 21,000$$



Year	Capital (₹)	Contribution (₹)	Fixed costs (₹)	Adverts (₹)	Net cash flow (₹)
0	(1,00,000)				(1,00,000)
1	(25,000)	62,500	(21,000)	(10,000)	6,500
2		62,500	(21,000)	(15,000)	26,500
3		62,500	(21,000)		41,500
4		62,500	(21,000)		41,500
5	30,000	62,500	(21,000)		71,500

Calculation of Net Present Value

Year	Net cash flow (₹)	10% discount factor	Present value (₹)
0	(1,00,000)	1.000	(1,00,000)
1	6,500	0.909	5,909
2	26,500	0.826	21,889
3	41,500	0.751	31,167
4	41,500	0.683	28,345
5	71,500	0.621	44,402
			31,712

The net present value of the project is ₹ 31,712.

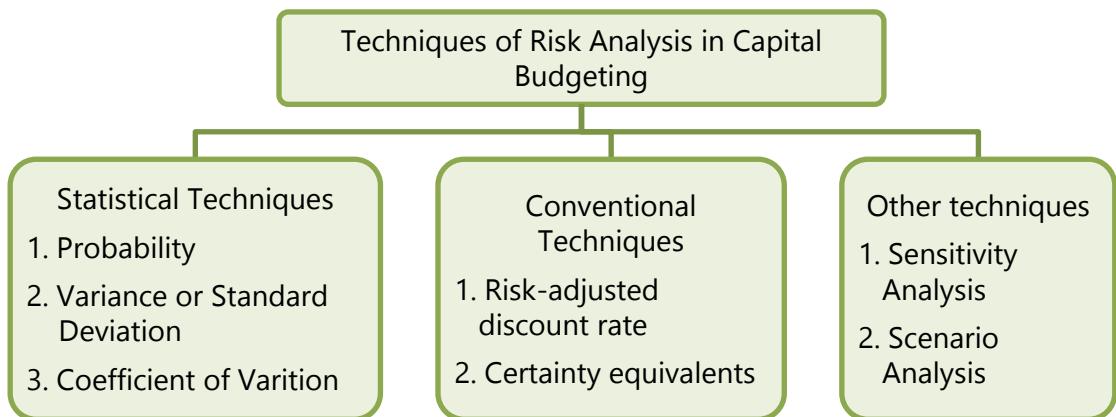
RISK ANALYSIS IN CAPITAL BUDGETING



LEARNING OUTCOMES

- Discuss the concept of risk and uncertainty in capital budgeting.
- Discuss the sources of risks
- Understand reasons for adjusting risk in capital budgeting
- Understand various techniques used in Risk Analysis.
- Discuss concepts, advantages and limitations of various techniques of risk analysis in capital budgeting.

CHAPTER OVERVIEW



8.1 INTRODUCTION TO RISK ANALYSIS IN CAPITAL BUDGETING

While discussing the capital budgeting techniques in chapter 7, we have assumed that the investment proposals do not involve any risk and cash flows of the project are known with certainty. This assumption was taken to simplify the understanding of the capital budgeting techniques. However, in practice, this assumption is not correct. Infact, **investment projects are exposed to various degrees of risk**. There can be three types of decision making:

- (i) Decision making under **certainty**: When cash flows are certain
- (ii) Decision making involving **risk**: When cash flows involve risk and probability can be assigned.
- (iii) Decision making under **uncertainty**: When the cash flows are uncertain and probability cannot be assigned.

8.1.1 Risk and Uncertainty

Risk is the variability in terms of actual returns comparing with the estimated returns. Most common techniques of risk measurement are Standard Deviation and Coefficient of variations. There is a thin difference between risk and uncertainty. In case of risk, probability distribution of cash flow is known. When no information is known to formulate probability distribution of cash flows, the

situation is referred as uncertainty. However, these two terms are used interchangeably.

8.1.2 Reasons for adjustment of Risk in Capital Budgeting decisions

Main reasons for considering risk in capital budgeting decisions are as follows

1. There is an opportunity cost involved while investing in a project for the level of risk. Adjustment of risk is necessary to help make the decision as to **whether the returns out of the project are proportionate with the risks borne** and whether it is worth investing in the project over the other investment options available.
2. Risk adjustment is required to know the **real value of the Cash Inflows**. **Higher risk** will lead to **higher risk premium** and also **expectation of higher return**.



8.2 SOURCES OF RISK

Risk arises from different sources, depending on the type of investment being considered, as well as the circumstances and the industry in which the organisation is operating. Some of the sources of risk are as follows

1. **Project-specific risk**- Risks which are related to a particular project and affects the project's cash flows, it includes completion of the project in scheduled time, error of estimation in resources and allocation, estimation of cash flows etc. For example, a nuclear power project of a power generation company has different risks than hydel projects.
2. **Company specific risk**- Risk which arise due to company specific factors like downgrading of credit rating, changes in key managerial persons, cases for violation of intellectual property rights (IPR) and other laws and regulations, dispute with workers etc. All these factors affect the cash flows of an entity and access to funds for capital investments. For example, two banks have different exposure to default risk.
3. **Industry-specific risk**- These are the risks which effect the whole industry in which the company operates. The risks include regulatory restrictions on industry, changes in technologies etc. For example, regulatory restriction imposed on leather and breweries industries.
4. **Market risk** – The risk which arise due to market related conditions like entry of substitute, changes in demand conditions, availability and access to

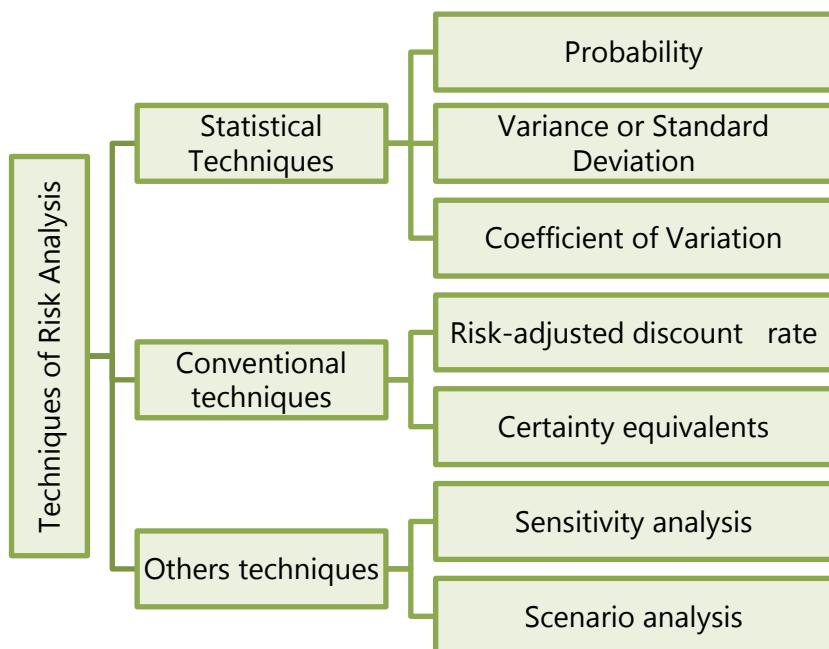
resources etc. For example, a thermal power project gets affected if the coal mines are unable to supply coal requirements of a thermal power company etc.

5. **Competition risk**- These are risks related with competition in the market in which a company operates. These risks are risk of entry of rival, product dynamism and change in taste and preference of consumers etc.
6. **Risk due to Economic conditions** – These are the risks which are related with macro-economic conditions like changes monetary policies by central banks, changes in fiscal policies like introduction of new taxes and cess, inflation, changes in GDP, changes in savings and net disposable income etc.
7. **International risk** – These are risk which are related with conditions which are caused by global economic conditions like restriction on free trade, restrictions on market access, recessions, bilateral agreements, political and geographical conditions etc. For example, restriction on outsourcing of jobs to overseas markets.



8.3 TECHNIQUES OF RISK ANALYSIS IN CAPITAL BUDGETING

Techniques of risk analysis in capital budgeting can be classified as below:





8.4 STATISTICAL TECHNIQUES

8.4.1 Probability

Meaning: Probability is a measure about the **chances** that an event will occur. When an event is certain to occur, probability will be 1 and when there is no chance of happening an event probability will be 0.

Example:

Assumption	Cash Flows (₹)	Probability
Best guess	3,00,000	0.3
High guess	2,00,000	0.6
Low guess	1,20,000	0.1

In the above example chances that cash flow will be 3,00,000, 2,00,00 and 1,00,00 are 30%, 60% and 10% respectively.

(i) Expected Net Cash Flows

Expected Cash flows are calculated as the **sum of the likely Cash flows** of the Project multiplied by the probability of cash flows. Expected Cash flows are calculated as below:

$$E(R)/ENCF = ENCF = \sum_{i=1}^n NCF_i \times P_i$$

Where, $E(R)/ENCF$ = Expected Cash flows

P_i = Probability of Cash flow

NCF_i = Cash flows

Example:

Assumption (1)	Cash Flows (₹) (2)	Probability (3)	Expected cash flow (2×3) (₹)
Best guess	3,00,000	0.3	$3,00,000 \times 0.3 = 90,000$
High guess	2,00,000	0.6	$2,00,000 \times 0.6 = 1,20,000$
Low guess	1,20,000	0.1	$1,20,000 \times 0.1 = 12,000$
Expected Net cash flow (ENCF)			2,22,000

(ii) Expected Net Present Value

Expected net present value = Sum of present values of expected net cash flows

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

Where, ENPV is the expected net present value, ENCF, expected net cash flows (including both inflows and outflows) in period t and k is the discount rate.

(a) Expected Net Present Value- Single period

ILLUSTRATION 1

Possible net cash flows of Projects A and B at the end of first year and their probabilities are given as below. Discount rate is 10 per cent. For both the project initial investment is ₹ 10,000. From the following information, CALCULATE the expected net present value for each project. State which project is preferable?

Possible Event	Project A		Project B	
	Cash Flow (₹)	Probability	Cash Flow (₹)	Probability
A	8,000	0.10	24,000	0.10
B	10,000	0.20	20,000	0.15
C	12,000	0.40	16,000	0.50
D	14,000	0.20	12,000	0.15
E	16,000	0.10	8,000	0.10

SOLUTION

Calculation of Expected Value for Project A and Project B

Project A				Project B		
Possible Event	Net Cash Flow (₹)	Probability	Expected Value (₹)	Cash Flow (₹)	Probability	Expected Value (₹)
A	8,000	0.10	800	24,000	0.10	2,400
B	10,000	0.20	2,000	20,000	0.15	3,000
C	12,000	0.40	4,800	16,000	0.50	8,000

D	14,000	0.20	2,800	12,000	0.15	1,800
E	16,000	0.10	1,600	8,000	0.10	800
ENCF			12,000			16,000

The net present value for Project A is $(0.909 \times ₹ 12,000 - ₹ 10,000) = ₹ 908$

The net present value for Project B is $(0.909 \times ₹ 16,000 - ₹ 10,000) = ₹ 4,544$.

(b) Expected Net Present Value- Multiple period

ILLUSTRATION 2

Probabilities for net cash flows for 3 years of a project are as follows:

Year 1		Year 2		Year 3	
Cash Flow (₹)	Probability	Cash Flow (₹)	Probability	Cash Flow (₹)	Probability
2,000	0.1	2,000	0.2	2,000	0.3
4,000	0.2	4,000	0.3	4,000	0.4
6,000	0.3	6,000	0.4	6,000	0.2
8,000	0.4	8,000	0.1	8,000	0.1

CALCULATE the expected net cash flows. Also calculate net present value of the project using expected cash flows using 10 per cent discount rate. Initial Investment is ₹ 10,000.

SOLUTION

Year 1			Year 2			Year 3		
Cash Flow (₹)	Probability	Expected Value (₹)	Cash Flow (₹)	Probability	Expected Value (₹)	Cash Flow (₹)	Probability	Expected Value (₹)
2,000	0.1	200	2,000	0.2	400	2,000	0.3	600
4,000	0.2	800	4,000	0.3	1200	4,000	0.4	1,600
6,000	0.3	1,800	6,000	0.4	2400	6,000	0.2	1,200
8,000	0.4	3,200	8,000	0.1	800	8,000	0.1	800
ENCF		6,000			4,800			4,200

The present value of the expected value of cash flow at 10 per cent discount rate has been determined as follows:

$$\begin{aligned}
 \text{Present Value of cash flow} &= \frac{\text{ENCF}_1}{(1+k)^1} + \frac{\text{ENCF}_2}{(1+k)^2} + \frac{\text{ENCF}_3}{(1+k)^3} \\
 &= \frac{6,000}{(1.1)} + \frac{4,800}{(1.1)^2} + \frac{4,200}{(1.1)^3} \\
 &= (6,000 \times 0.909) + (4,800 \times 0.826) + (4,200 \times 0.751) \\
 &= 12,573
 \end{aligned}$$

$$\begin{aligned}
 \text{Expected Net Present value} &= \text{Present Value of cash flow} - \text{Initial Investment} \\
 &= ₹ 12,573 - ₹ 10,000 = ₹ 2,573.
 \end{aligned}$$

8.4.2 Variance

Meaning: Variance is a **measurement of the degree of dispersion** between numbers in a data set from its average. In very simple words, variance is the measurement of difference between the average of the data set from every number of the data set. Variance is calculated as below:

$$\sigma^2 = \sum_{j=1}^n (NCF_j - ENCF)^2 P_j$$

Where,

σ^2 is variance in net cash flow, P is probability, ENCF expected net cash flow.

Variance measures the uncertainty of a value from its average. Thus, variance helps an organization to understand the level of risk it might face on investing in a project. A variance value of **zero** would indicate that the cash flows that would be generated over the life of the project would be same. This might happen in a case where the company has entered into a contract of providing services in return of a specific sum. A **large** variance indicates that there will be a large variability between the cash flows of the different years. This can happen in a case where the project being undertaken is very innovative and would require a certain time frame to market the product and enable to develop a customer base and generate revenues.

A **small** variance would indicate that the cash flows would be somewhat stable throughout the life of the project. This is possible in case of products which already have an established market.

8.4.3 Standard Deviation

Standard Deviation is a degree of variation of individual items of a set of data from its average. The square root of variance is called Standard Deviation. For Capital Budgeting decisions, Standard Deviation is used to calculate the risk associated with the estimated cash flows from the project.

ILLUSTRATION 3

CALCULATE Variance and Standard Deviation on the basis of following information:

Possible Event	Project A		Project B	
	Cash Flow (₹)	Probability	Cash Flow (₹)	Probability
A	8,000	0.10	24,000	0.10
B	10,000	0.20	20,000	0.15
C	12,000	0.40	16,000	0.50
D	14,000	0.20	12,000	0.15
E	16,000	0.10	8,000	0.10

SOLUTION

Calculation of Expected Value for Project A and Project B

Project A			Project B			
Possible Event	Net Cash Flow (₹)	Probability	Expected Value (₹)	Cash Flow (₹)	Probability	Expected Value (₹)
A	8,000	0.10	800	24,000	0.10	2,400
B	10,000	0.20	2,000	20,000	0.15	3,000
C	12,000	0.40	4,800	16,000	0.50	8,000
D	14,000	0.20	2,800	12,000	0.15	1,800
E	16,000	0.10	1,600	8,000	0.10	800
ENCF			12,000			16,000

Project A

$$\begin{aligned}
 \text{Variance } (\sigma^2) &= (8,000 - 12,000)^2 \times (0.1) + (10,000 - 12,000)^2 \times (0.2) + (12,000 - 12,000)^2 \times (0.4) + (14,000 - 12,000)^2 \times (0.2) + (16,000 - 12,000)^2 \times (0.1) \\
 &= 16,00,000 + 8,00,000 + 0 + 8,00,000 + 16,00,000 = 48,00,000
 \end{aligned}$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\text{Variance}(\sigma^2)} = \sqrt{48,00,000} = 2,190.90$$

Project B:

$$\begin{aligned}\text{Variance}(\sigma^2) &= (24,000 - 16,000)^2 \times (0.1) + (20,000 - 16,000)^2 \times (0.15) + (16,000 - 16,000)^2 \times (0.5) + (12,000 - 16,000)^2 \times (0.15) + (8,000 - 16,000)^2 \times (0.1) \\ &= 64,00,000 + 24,00,000 + 0 + 24,00,000 + 64,00,000 = 1,76,00,000\end{aligned}$$

$$\text{Standard Deviation } (\sigma) = \sqrt{1,76,00,000} = 4195.23$$

8.4.4 The Coefficient of Variation

The standard deviation is a useful measure of calculating the risk associated with the estimated cash inflows from an Investment. However, in Capital Budgeting decisions, the management is several times faced with choosing between many investments avenues. Under such situations, it becomes difficult for the management to compare the risk associated with different projects using Standard Deviation as each project has different estimated cash flow values. In such cases, the Coefficient of Variation becomes useful.

The Coefficient of Variation calculates the **risk borne for every percent of expected return**. It is calculated as:

$$\text{Coefficient of variation} = \frac{\text{Standard Deviation}}{\text{Expected Return/Expected Cash Flow}}$$

The Coefficient of Variation enables the management to calculate the risk borne by the concern for every unit of estimated return from a particular investment. Simply put, the investment avenue which has a lower ratio of standard deviation to expected return will provide a better risk – return trade off. Thus, when a selection has to be made between two projects, the management would select a project which has a lower Coefficient of Variation.

ILLUSTRATION 4

CALCULATE Coefficient of Variation based on the following information:

Possible Event	Project A		Project B	
	Cash Flow (₹)	Probability	Cash Flow (₹)	Probability
A	10000	0.10	26,000	0.10
B	12,000	0.20	22,000	0.15
C	14,000	0.40	18,000	0.50

D	16,000	0.20	14,000	0.15
E	18,000	0.10	10,000	0.10

SOLUTION**Calculation of Expected Value for Project A and Project B**

Project A				Project B		
Possible Event	Net Cash Flow (₹)	Probability	Expected Value (₹)	Cash Flow (₹)	Probability	Expected Value (₹)
A	10,000	0.10	1,000	26,000	0.10	2,600
B	12,000	0.20	2,400	22,000	0.15	3,300
C	14,000	0.40	5,600	18,000	0.50	9,000
D	16,000	0.20	3,200	14,000	0.15	2,100
E	18,000	0.10	1,800	10,000	0.10	1,000
ENCF			14,000			18,000

Project A

$$\begin{aligned}
 \text{Variance } (\sigma^2) &= (10,000 - 14,000)^2 \times (0.1) + (12,000 - 14,000)^2 \times (0.2) + (14,000 - 14,000)^2 \times (0.4) + (16,000 - 14,000)^2 \times (0.2) + (18,000 - 14,000)^2 \times (0.1) \\
 &= 16,00,000 + 8,00,000 + 0 + 8,00,000 + 16,00,000 = 48,00,000
 \end{aligned}$$

$$\text{Standard Deviation } (\sigma) = \sqrt{\text{Variance}(\sigma^2)} = \sqrt{48,00,000} = 2,190.90$$

Project B:

$$\begin{aligned}
 \text{Variance}(\sigma^2) &= (26,000 - 18,000)^2 \times (0.1) + (22,000 - 18,000)^2 \times (0.15) + (18,000 - 18,000)^2 \times (0.5) + (14,000 - 18,000)^2 \times (0.15) + (10,000 - 18,000)^2 \times (0.1) \\
 &= 64,00,000 + 24,00,000 + 0 + 24,00,000 + 64,00,000 = 1,76,00,000
 \end{aligned}$$

$$\text{Standard Deviation } (\sigma) = \sqrt{1,76,00,000} = 4195.23$$

Projects	Coefficient of variation	Risk	Expected Value
A	$\frac{2,190.90}{14,000} = 0.1565$	Less	Less

B	$\frac{4,195.23}{18,000} = 0.2331$	More	More
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In project A risk per rupee of cash flow is Rs. 0.15 while in project B it is Rs. 0.23. Therefore Project A is better than Project B.



8.5 CONVENTIONAL TECHNIQUES

8.5.1 Risk Adjusted Discount Rate

The use of risk adjusted discount rate (RADR) is based on the concept that investors demands higher returns from the risky projects. The required rate of return on any investment should include compensation for delaying consumption plus compensation for inflation equal to risk free rate of return, plus compensation for any kind of risk taken. If the 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.

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

Where,

NCF_t = Net cash flow

K = Risk adjusted discount rate.

I = Initial Investment

A risk adjusted discount rate is a **sum of risk free rate and risk premium**. The Risk Premium depends on the perception of risk by the investor of a particular investment and risk aversion of the Investor.

So Risks adjusted discount rate = Risk free rate + Risk premium

Risk Free Rate: It is the rate of return on Investments that bear no risk. For e.g., Government securities yield a return of 6 % and bear no risk. In such case, 6 % is the risk-free rate.

Risk Premium: It is the rate of return over and above the risk-free rate, expected by the Investors as a reward for bearing extra risk. For high risk project, the risk premium will be high and for low risk projects, the risk premium would be lower.

ILLUSTRATION 5

An enterprise is investing ₹ 100 lakhs in a project. The risk-free rate of return is 7%. Risk premium expected by the Management is 7%. The life of the project is 5 years. Following are the cash flows that are estimated over the life of the project.

Year	Cash flows (^ in lakhs)
1	25
2	60
3	75
4	80
5	65

CALCULATE Net Present Value of the project based on Risk free rate and also on the basis of Risks adjusted discount rate.

SOLUTION

The Present Value of the Cash Flows for all the years by discounting the cash flow at 7% is calculated as below:

Year	Cash flows ₹ in lakhs	Discounting Factor @7%	Present value of Cash Flows ₹ In Lakhs
1	25	0.935	23.38
2	60	0.873	52.38
3	75	0.816	61.20
4	80	0.763	61.04
5	65	0.713	46.35
Total of present value of Cash flow			244.34
Less: Initial investment			100.00
Net Present Value (NPV)			144.34

Now when the risk-free rate is 7% and the risk premium expected by the Management is 7%. So the risk adjusted discount rate is 7% + 7% = 14%.

Discounting the above cash flows using the Risk Adjusted Discount Rate would be as below:

Year	Cash flows ₹ in Lakhs	Discounting Factor@14%	Present Value of Cash Flows ₹ in lakhs
1	25	0.877	21.93
2	60	0.769	46.14
3	75	0.675	50.63
4	80	0.592	47.36
5	65	0.519	33.74
Total of present value of Cash flow			199.79
Initial investment			100.00
Net present value (NPV)			99.79

Advantages of Risk-adjusted discount rate

- 1) It is **easy to understand**.
- 2) It incorporates **risk premium** in the discounting factor.

Limitations of Risk-adjusted discount rate

- 1) **Difficulty** in finding risk premium and risk-adjusted discount rate.
- 2) Though NPV can be calculated but it is **not possible** to calculate Standard Deviation of a given project.

8.5.2 Certainty Equivalent (CE) Method for Risk Analysis

Certainty equivalent method –Definition: As per CIMA terminology, "An approach to dealing with risk in a capital budgeting context. It involves expressing risky future cash flows in terms of the certain cashflow which would be considered, by the decision maker, as their equivalent, that is the decision maker would be indifferent between the risky amount and the (lower) riskless amount considered to be its equivalent."

The certainty equivalent is a guaranteed return that the management would accept rather than accepting a higher but uncertain return. This approach allows the decision maker to incorporate his or her utility function into the analysis. In this approach a set of risk less cash flow is generated in place of the original cash flows.

Steps in the Certainty Equivalent (CE) approach

Step 1: Remove risks by substituting equivalent certain cash flows from risky cash flows. This can be done by multiplying each risky cash flow by the appropriate α_t value (CE coefficient)

$$\alpha_t = \frac{\text{Certain cash flow}}{\text{Risky or expected cash flow}_t}$$

Suppose on tossing out a coin, if it comes head you will get ₹10,000 and if it comes out to be tail, you will win nothing. Thus, you have 50% chance of winning and expected value is ₹5,000. In such case if you are indifferent at receiving ₹3,000 for a certain amount and not playing then ₹3,000 will be certainty equivalent and 0.3 (i.e. 3,000/10,000) will be certainty equivalent coefficient.

Step 2: Discounted value of cash flow is obtained by applying risk less rate of interest. Since you have already accounted for risk in the numerator using CE coefficient, using the cost of capital to discount cash flows will tantamount to double counting of risk.

Step 3: After that normal capital budgeting method is applied except in case of IRR method, where IRR is compared with risk free rate of interest rather than the firm's required rate of return.

Certainty Equivalent Coefficients transform expected values of uncertain flows into their Certainty Equivalents. It is important to note that the value of Certainty Equivalent Coefficient lies between 0 & 1. Certainty Equivalent Coefficient 1 indicates that the cash flow is certain or management is risk neutral. In industrial situation, cash flows are generally uncertain and managements are usually risk averse. Under this method

$$NPV = \sum_{t=1}^n \frac{\alpha_t \times NCF_t}{(1 + k)^t} - I$$

Where,

NCF_t = the forecasts of net cash flow for year 't' without risk-adjustment

α_t = the risk-adjustment factor or the certainty equivalent coefficient.

K_f = risk-free rate assumed to be constant for all periods.

I = amount of initial Investment.

ILLUSTRATION 6

If Investment proposal is ₹45,00,000 and risk free rate is 5%, CALCULATE net present value under certainty equivalent technique.

Year	Expected cash flow (₹)	Certainty Equivalent coefficient
1	10,00,000	0.90
2	15,00,000	0.85
3	20,00,000	0.82
4	25,00,000	0.78

SOLUTION

$$NPV = \frac{10,00,000 \times (0.90)}{(1.05)} + \frac{15,00,000 \times (0.85)}{(1.05)^2} + \frac{20,00,000 \times (0.82)}{(1.05)^3} + \frac{25,00,000 \times (0.78)}{(1.05)^4} - 45,00,000$$

$$= ₹ 5,34,570$$

Advantages of Certainty Equivalent Method

1. The certainty equivalent method is **simple and easy** to understand and apply.
2. It can **easily be calculated for different risk levels** applicable to different cash flows. For example, if in a particular year, a higher risk is associated with the cash flow, it can be easily adjusted and the NPV can be recalculated accordingly.

Disadvantages of Certainty Equivalent Method

1. There is **no objective** or mathematical method to estimate certainty equivalents. Certainty Equivalents are subjective and vary as per each individual's estimate.
2. Certainty equivalents are decided by the management based on their perception of risk. However, the **risk perception of the shareholders** who are the money lenders for the project is **ignored**. Hence it is not used often in corporate decision making.

Risk-adjusted Discount Rate Vs. Certainty-Equivalent

Certainty Equivalent Method is superior to Risk Adjusted Discount Rate Method as it does not assume that risk increases with time at constant rate. Each year's Certainty Equivalent Coefficient is based on level of risk impacting its cash flow. Despite its soundness, it is not preferable like Risk Adjusted Discount Rate Method. It is difficult to specify a series of Certainty Equivalent Coefficients but simple to adjust discount rates.



8.6 OTHER TECHNIQUES

8.6.1 Sensitivity Analysis

Definition of sensitivity analysis: As per CIMA terminology, "A modeling and risk assessment procedure in which changes are made to significant variables in order to determine the effect of these changes on the planned outcome. Particular attention is thereafter paid to variables identified as being of special significance"

Sensitivity analysis put in simple terms is a modeling technique which is used in Capital Budgeting decisions which is used to study the **impact of changes in the variables on the outcome of the project**. In a project, several variables like weighted average cost of capital, consumer demand, price of the product, cost price per unit etc. operate simultaneously. The changes in these variables impact the outcome of the project. It therefore becomes very difficult to assess change in which variable impacts the project outcome in a significant way. In Sensitivity Analysis, the project outcome is studied after taking into **change in only one variable**. The more sensitive is the NPV, the more critical is that variable. So, Sensitivity analysis is a way of finding impact in the project's NPV (or IRR) for a given change in one of the variables.

Steps involved in Sensitivity Analysis

Sensitivity Analysis is conducted by following the steps as below:

1. Finding variables, which have an influence on the NPV (or IRR) of the project
2. Establishing mathematical relationship between the variables.
3. Analysis the effect of the change in each of the variables on the NPV (or IRR) of the project.

ILLUSTRATION 7

X Ltd is considering its New Product 'with the following details

Sr. No.	Particulars	Figures
1	<i>Initial capital cost</i>	₹ 400 Cr
2	<i>Annual unit sales</i>	5 Cr
3	<i>Selling price per unit</i>	₹ 100
4	<i>Variable cost per unit</i>	₹ 50
5	<i>Fixed costs per year</i>	₹ 50 Cr
6	<i>Discount Rate</i>	6%

Required:

1. *CALCULATE the NPV of the project.*
2. *COMPUTE the impact on the project's NPV of a 2.5 per cent adverse variance in each variable. Which variable is having maximum effect .Consider Life of the project as 3 years.*

SOLUTION

1. **Calculation of Net Cash Inflow per year:**

	Particulars	Amount (₹)
A	Selling Price Per Unit (A)	100
B	Variable Cost Per Unit (B)	50
C	Contribution Per Unit (C = A-B)	50
D	Number of Units Sold Per Year	5 Cr.
E	Total Contribution (E = C × D)	₹ 250 Cr.
F	Fixed Cost Per Year	₹ 50 Cr.
G	Net Cash Inflow Per Year (G = E - F)	₹ 200 Cr.

Calculation of Net Present Value (NPV) of the Project:

Year	Year Cash Flow (₹ in Cr.)	Discounting @ 6%	Present Value (PV) (₹ in Cr.)
0	(400.00)	1.000	(400.00)
1	200.00	0.943	188.60
2	200.00	0.890	178.00
3	200.00	0.840	168.00
Net Present Value (188.60 + 178 + 168) - 400=			134.60

Here NPV represent the most likely outcomes and not the actual outcomes. The actual outcome can be lower or higher than the expected outcome.

2. Sensitivity Analysis considering 2.5 % Adverse Variance in each variable

	Changes in variable	Base	Initial Cash Flow increased to ₹ 410 crore	Selling Price per Unit Reduced to ₹ 97.5	Variable Cost Per Unit increased to ₹ 51.25	Fixed Cost Per Unit increased to ₹ 51.25	Units sold per year reduced to 4.875 crore
	Particulars	Amount ₹	Amount ₹	Amount ₹	Amount ₹	Amount ₹	Amount ₹
A	Selling Price Per Unit (A)	100	100	97.5	100	100	100
B	Variable Cost Per Unit (B)	50	50	50	51.25	50	50
C	Contribution Per Unit (C = A-B)	50	50	47.5	48.75	50	50
D	Number of Units Sold Per Year (in)	5	5	5	5	5	4.875

	<i>Crores)</i>						
E	Total Contribution ($E = C \times D$)	250	250	237.5	243.75	250	243.75
F	Fixed Cost Per Year (in Crores)	50	50	50	50	51.25	50
G	Net Cash Inflow Per Year ($G = E - F$)	200	200	187.5	193.75	198.75	193.75
H	($G \times 2.673$)	534.60	534.60	501.19	517.89	531.26	517.89
I	Initial Cash Flow	400	410	400	400	400	400
J	NPV	134.60	124.60	101.19	117.89	131.26	117.89
K	Percentage Change in NPV		-7.43%	-24.82%	-12.41%	-2.48%	-12.41%

The above table shows that by varying one variable at a time by 2.5% while keeping the others constant, the impact in percentage terms on the NPV of the project. Thus it can be seen that the change in selling price has the maximum effect on the NPV by 24.82 %.

Advantages of Sensitivity Analysis:

Following are main advantages of Sensitivity Analysis

- 1) **Critical Issues:** This analysis identifies critical factors that impinge on a project's success or failure.
- 2) **Simplicity:** It is a simple technique.

Disadvantage of Sensitivity Analysis:

Following are main disadvantages of Sensitivity Analysis

- (1) **Assumption of Independence:** This analysis assumes that all variables are independent i.e. they are not related to each other, which is unlikely in real life.
- (2) **Ignore probability:** This analysis does not look to the probability of changes in the variables.

8.6.2 Scenario Analysis

Although sensitivity analysis is probably the most widely used risk analysis technique, it does have limitations. Therefore, we need to extend sensitivity analysis to deal with the probability distributions of the inputs. In addition, it would be useful to vary more than one variable at a time so we could see the combined effects of changes in the variables.

Scenario analysis provides answer to these situations of extensions. This analysis brings in the probabilities of changes in key variables and also allows us to change more than one variable at a time.

This analysis begins with base case or most likely set of values for the input variables. Then, go for worst case scenario (low unit sales, low sale price, high variable cost and so on) and best case scenario. Alternatively scenarios analysis is possible where some factors are changed positively and some factors are changed negatively.

So, in a nutshell Scenario analysis examine the risk of investment, to analyse the impact of alternative combinations of variables, on the project's NPV (or IRR).

ILLUSTRATION 8

XYZ Ltd. is considering a project "A" with an initial outlay of ₹ 14,00,000 and the possible three cash inflow attached with the project as follows:

Particular	Year 1	Year 2	Year 3	(₹ 000)
Worst case	450	400	700	
Most likely	550	450	800	
Best case	650	500	900	

Assuming the cost of capital as 9%, determine NPV in each scenario. If XYZ Ltd is certain about the most likely result but uncertain about the third year's cash flow, ANALYSE what will be the NPV expecting worst scenario in the third year.

SOLUTION

The possible outcomes will be as follows:

Year	PVF @ 9%	Worst Case		Most likely		Best case	
		Cash Flow ₹000	PV ₹000	Cash Flow ₹000	PV ₹000	Cash Flow ₹000	PV ₹000
0	1	(1400)	(1400)	(1400)	(1400)	(1400)	(1400)
1	0.917	450	412.65	550	504.35	650	596.05
2	0.842	400	336.80	450	378.90	500	421.00
3	0.772	700	540.40	800	617.60	900	694.80
NPV			-110.15		100.85		311.85

Now suppose that CEO of XYZ Ltd. is bit confident about the estimates in the first two years, but not sure about the third year's high cash inflow. He is interested in knowing what will happen to traditional NPV if 3rd year turn out the bad contrary to his optimism.

The NPV in such case will be as follows:

$$\begin{aligned}
 &= -₹14,00,000 + \frac{5,50,000}{(1+0.09)} + \frac{4,50,000}{(1+0.09)^2} + \frac{7,00,000}{(1+0.09)^3} \\
 &= -₹14,00,000 + ₹ 5,04,587 + ₹ 3,78,756 + ₹ 5,40,528 = ₹ 23,871
 \end{aligned}$$

Scenario Analysis Vs Sensitivity Analysis

Sensitivity analysis and Scenario analysis both help to understand the impact of the change in input variable on the outcome of the project. However, there are certain basic differences between the two.

Sensitivity analysis calculates the impact of the change of a **single** input variable on the outcome of the project viz., NPV or IRR. The sensitivity analysis thus enables to identify that single critical variable that can impact the outcome in a huge way and the range of outcomes of the project given the change in the input variable.

Scenario analysis, on the other hand, is based on a **scenario**. The scenario may be recession or a boom wherein depending on the scenario, all input variables change. Scenario Analysis calculates the outcome of the project considering this scenario where the variables have changed simultaneously. Similarly, the outcome of the project would also be considered for the normal and recessionary situation.

The variability in the outcome under the three different scenarios would help the management to assess the risk a project carries. Higher deviation in the outcome can be assessed as higher risk and lower to medium deviation can be assessed accordingly.

Scenario analysis is far more complex than sensitivity analysis because in scenario analysis all inputs are changed simultaneously considering the situation in hand while in sensitivity analysis only one input is changed and others are kept constant.

Miscellaneous Illustration

ILLUSTRATION 9

Shivam Ltd. is considering two mutually exclusive projects A and B. Project A costs ₹ 36,000 and project B ₹ 30,000. You have been given below the net present value probability distribution for each project.

Project A		Project B	
NPV estimates (₹)	Probability	NPV estimates (₹)	Probability
15,000	0.2	15,000	0.1
12,000	0.3	12,000	0.4
6,000	0.3	6,000	0.4
3,000	0.2	3,000	0.1

- (i) COMPUTE the expected net present values of projects A and B.
- (ii) COMPUTE the risk attached to each project i.e. standard deviation of each probability distribution.
- (iii) COMPUTE the profitability index of each project.
- (iv) IDENTIFY which project do you recommend? State with reasons.

SOLUTION

- (i) Statement showing computation of expected net present value of Projects A and B:

Project A			Project B		
NPV Estimate (₹)	Probability	Expected Value	NPV Estimate	Probability	Expected Value
15,000	0.2	3,000	15,000	0.1	1,500
12,000	0.3	3,600	12,000	0.4	4,800
6,000	0.3	1,800	6,000	0.4	2,400
3,000	0.2	600	3,000	0.1	300
	1.0	EV = 9,000		1.0	EV = 9,000

(ii) Computation of Standard deviation of each project

Project A

P	X	(X – EV)	P (X- EV) ²
0.2	15,000	6,000	72,00,000
0.3	12,000	3,000	27,00,000
0.3	6,000	- 3,000	27,00,000
0.2	3,000	- 6,000	72,00,000
			Variance = 1,98,00,000

$$\text{Standard Deviation of Project A} = \sqrt{1,98,00,000} = ₹ 4,450$$

Project B

P	X	(X – EV)	P (X- EV) ²
0.1	15,000	6,000	36,00,000
0.4	12,000	3,000	36,00,000
0.4	6,000	3,000	36,00,000
0.1	3,000	6,000	36,00,000
			Variance = 1,44,00,000

$$\text{Standard Deviation of Project B} = \sqrt{1,44,00,000} = ₹ 3,795$$

(iii) Computation of profitability of each project

Profitability index = Discount cash inflow / Initial outlay

$$\text{In case of Project A: PI} = \frac{9,000 + 36,000}{36,000} = \frac{45,000}{36,000} = 1.25$$

$$\text{In case of Project B: PI} = \frac{9,000 + 30,000}{30,000} = \frac{39,000}{30,000} = 1.30$$

(iv) In the selection of one of the two projects A and B, Project B is preferable because the possible profit which may occur is subject to less variation (or dispersion). Much higher risk is lying with project A.

ILLUSTRATION 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%

IDENTIFY which of the three factors, the project is most sensitive if the variable is adversely affected by 10%? (Use annuity factors: for 10% 3.169 and 11% ... 3.103).

SOLUTION

Calculation of NPV through Sensitivity Analysis

	₹
PV of cash inflows (₹ 45,000 × 3.169)	1,42,605
Initial Project Cost	1,20,000
NPV	22,605

Situation	NPV	Changes in NPV
Base (present)	₹ 22,605	
If initial project cost is varied adversely by 10%	(₹1,42,605 - ₹1,32,000) = ₹10,605	(₹ 22,605 - ₹ 10,605) / ₹ 22,605 = (53.08%)
If annual cash inflow is varied adversely by 10%	[₹40,500 (revised cash flow) × 3.169] - (₹ 1,20,000)] = ₹ 8,345	(₹ 22,605 - ₹ 8,345) / ₹ 22,605 = 63.08%

If cost of capital is varied adversely by 10% i.e. it becomes 11%	$(₹ 45,000 \times 3.103) - ₹ 1,20,000 = ₹ 19,635$	$(₹ 22,605 - ₹ 19,635) / ₹ 22,605 = 13.14\%$
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Conclusion: Project is most sensitive to 'annual cash inflow'

SUMMARY

- **Risk-** Risk denotes variability of possible outcomes from what was expected. Standard Deviation is perhaps the most commonly used tool to measure risk. It measures the dispersion around the mean of some possible outcome.
- **Risk Adjusted Discount Rate Method-** 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.
- **Certainty Equivalent Approach-** This approach allows the decision maker to incorporate his or her utility function into the analysis. In this approach a set of risk less cash flow is generated in place of the original cash flows.
- **Sensitivity Analysis:** Also known as "What if" Analysis. This analysis determines how the distribution of possible NPV or internal rate of return for a project under consideration is affected consequent to a change in one particular input variable. This is done by changing one variable at one time, while keeping other variables (factors) unchanged.
- **Scenario Analysis:** Although sensitivity analysis is probably the most widely used risk analysis technique, it does have limitations. Therefore, we need to extend sensitivity analysis to deal with the probability distributions of the inputs. In addition, it would be useful to vary more than one variable at a time so we could see the combined effects of changes in the variables.

TEST YOUR KNOWLEDGE

MCQs based Questions

1. Risk arises from various sources such as
 - Market Risk
 - Competition Risk

(c) International Risk

(d) All of the above

2. Expected cash flows are calculated as

(a) Sum of likely cash flow of the project

(b) Sum of likely cash flow of project multiplied by probability of cash flow

(c) Sum of likely cash flow of project divided by probability of cash flow

(d) None of the above

3. Variance Measures

(a) How far each number in the set is from the mean

(b) The mean of a given data set

(c) Return on Investment

(d) level of risk borne for every percent of expected return

4. Certainty Equivalent

(a) Is a guaranteed return from an Investment after adjusting for risk

(b) Is the return that is expected over the lifetime of a project

(c) Is equivalent to Net Present Value

(d) Is an important component in Decision Tree Analysis

5. The firm expects an NPV of Rs 10,000 if the economy is exceptionally strong (30% probability), an NPV of Rs 4,000 if the economy is normal (40% probability), and an NPV of Rs 2,000 if the economy is exceptionally weak (30% probability). Expected Net present value is _____

(a) ₹ 5,200

(b) ₹ 6,000

(c) ₹ 5,000

(d) ₹ 6,200

6. Risk Premium

(a) is the extra rate of return expected by the Investors as a reward for bearing extra risk

- (b) is equivalent to the rate of Government Securities
- (c) is the return provided to equity shareholders
- (d) is over and above expected rate of return

7. Calculation of Coefficient of Variance depends on

- (a) Standard Deviation
- (b) Expected Return
- (c) Expected cash flow
- (d) All of the above

8. Scenario Analysis is considered under scenarios such as

- (a) Worst Case Scenario
- (b) Base Case Scenario
- (c) Best Case Scenario
- (d) All of the above

9. Sensitivity analysis is useful in decision making because

- (a) It shows the probabilities associated with each outcome
- (b) It tells the user how much critical each input is for the Output value
- (c) It allows to calculate the probable results under different scenarios
- (d) The results of Sensitivity Analysis are reliable

10. When the risk is high, the certainty equivalent coefficient is

- (a) Higher
- (b) Lower
- (c) No impact
- (d) None of the above

Theoretical Questions

1. EXPLAIN Certainty Equivalent.
2. STATE Risk Adjusted Discount rate.
3. EXPLAIN Scenario Analysis.

4. EXPLAIN the different scenarios under which Scenario Analysis is considered.
5. STATE the two approaches to Sensitivity Analysis.
6. STATE Sensitivity Analysis used for.
7. DISTINGUISH between Scenario Analysis & Sensitivity Analysis.

Practical Problems

1. 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.

Required:

- (i) ANALYSE which project should be accepted?
- (ii) If risk adjusted discount rate method is used, IDENTIFY which project would be appraised with a higher rate and why?

2. DETERMINE the risk adjusted net present value of the following projects:

	X	Y	Z
Net cash outlays (₹)	2,10,000	1,20,000	1,00,000
Project life	5 years	5 years	5 years
Annual Cash inflow (₹)	70,000	42,000	30,000
Coefficient of variation	1.2	0.8	0.4

The Company selects the risk-adjusted rate of discount on the basis of the coefficient of variation:

Coefficient of Variation	Risk-Adjusted Rate of Return	P.V. Factor 1 to 5 years At risk adjusted rate of discount
0.0	10%	3.791
0.4	12%	3.605
0.8	14%	3.433
1.2	16%	3.274
1.6	18%	3.127
2.0	22%	2.864
More than 2.0	25%	2.689

ANSWERS/SOLUTIONS

Answers to the MCQs based Questions

1. (d) 2. (b) 3. (a) 4. (d) 5. (d) 6. (b)
 7. (b) 8. (d) 9. (b) 10. (b)

Answers to the Theoretical Questions

1. Please refer paragraph 8.5.2
 2. Please refer paragraph 8.5.1
 3. Please refer paragraph 8.6.2
 4. Please refer paragraph 8.6.2
 5. Please refer paragraph 8.6.1
 6. Please refer paragraph 8.6.1
 7. Please refer paragraph 8.6.2

Answers to the Practical Problems

1. (i) Statement Showing the Net Present Value of Project M

Year end	Cash Flow (₹) (a)	C.E. (b)	Adjusted Cash flow (₹) (c) = (a) × (b)	Present value factor at 6% (d)	Total Present value (₹) (e) = (c) × (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
					8,60,980
<i>Less: Initial Investment</i>					8,50,000
<i>Net Present Value</i>					10,980

Statement Showing the Net Present Value of Project N

Year end	Cash Flow (₹) (a)	C.E. (b)	Adjusted Cash flow (₹) (c) = (a) × (b)	Present value factor (d)	Total Present value (₹) (e) = (c) × (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
					9,96,315
<i>Less: Initial Investment</i>					8,25,000
<i>Net Present Value</i>					1,71,315

Decision : Since the net present value of Project N is higher, so the project N should be accepted.

(ii) Certainty - Equivalent (C.E.) Co-efficient of Project M (2.0) is lower than Project N (2.4). This means Project M is riskier than Project N as "higher the riskiness of a cash flow, the lower will be the CE factor". If risk adjusted discount rate (RADR) method is used, Project M would be analysed with a higher rate.

2. Statement showing the determination of the risk adjusted net present value

Projects	Net cash outlays	Coefficient of variation	Risk adjusted discount rate	Annual cash inflow	PV factor 1-5 years	Discounted cash inflow	Net present value
	(₹)			(₹)		(₹)	(₹)
X	2,10,000	1.20	16%	70,000	3.274	2,29,180	19,180
Y	1,20,000	0.80	14%	42,000	3.433	1,44,186	24,186
Z	1,00,000	0.40	12%	30,000	3.605	1,08,150	8,150

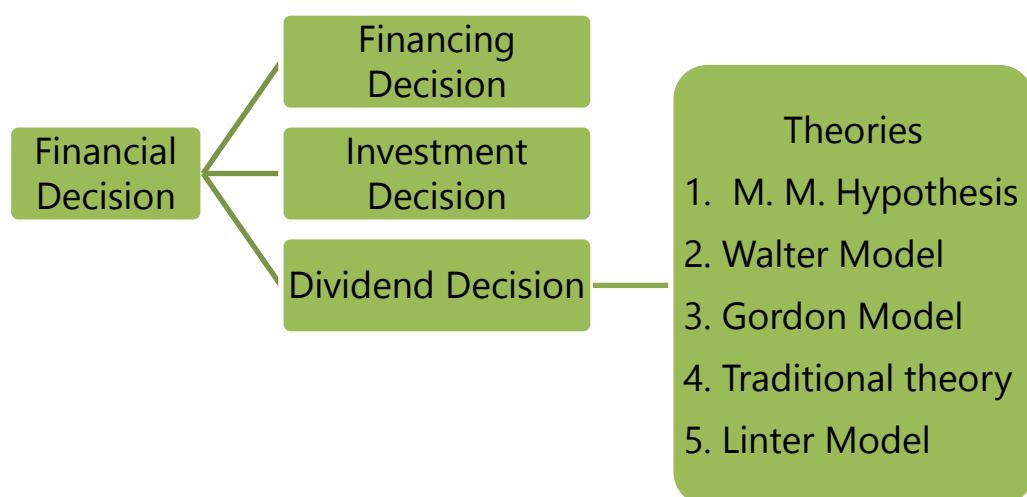
DIVIDEND DECISIONS



LEARNING OUTCOMES

- Understand the Meaning of Dividend Decision
- Understand the importance of Dividend Decision
- Discuss various Forms of Dividend
- Discuss various Determinants of Dividend
- Explain various theories of Dividend Decisions.

CHAPTER OVERVIEW





9.1 INTRODUCTION

Financial management is the process of making financial decisions. Financial decision broadly covers three areas:

- i. Financing decision
- ii. Investment decision
- iii. Dividend decision

Dividend decision is one of the **most important areas of management decisions**. It is easy to understand but difficult to implement. Let's understand this with the help of an example, suppose a company, say X limited, which is continuously paying the dividend at a normal growth rate, earns huge profits this year. Now the management has to decide whether continue to pay dividend at normal rate or to pay at an increasing rate? Why this dilemma?

The reason is that, if the management decides to pay higher dividend, then it might be possible that next year, the company will not achieve such higher growth rate, resulting the next year's dividend will be low as compared to last year's. However, if the company decides to stay on the normal rate of dividend then surplus amount of retained earnings would remain idle which will result in over capitalization, if no opportunity existing to utilize the funds.

Also there are more factors which will affect the dividend decision (will be discussed later).

There are few theories which put light on the complexities involved in dividend decision. These theories will be discussed under two categories

Irrelevance theory: MM approach

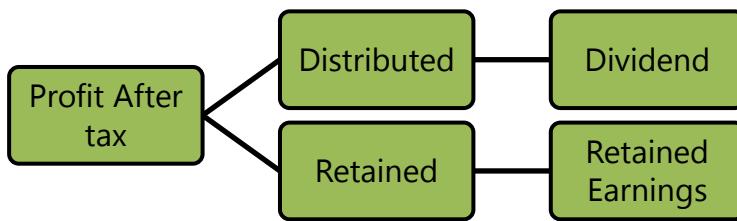
Relevance theories: Walter model & Gordon Model



9.2 MEANING OF DIVIDEND

Dividend is that part of profit after tax which is **distributed to the shareholders** of the company. In other words, the profit earned by a company after paying taxes can be used for:

- i. Distribution of dividend or
- ii. Can be retained as surplus for future growth



9.3 SIGNIFICANCE OF DIVIDEND POLICY

Dividend policy of a firm is governed by:

(i) Long Term Financing Decision:

As we know that one of the financing option is 'Equity'. Equity can be raised externally through issue of equity shares or can be generated internally through retained earnings. But retained earnings are preferable because they do not involve floatation costs.

But whether to retain or distribute the profits forms the basis of this decision. Since payment of cash dividend reduces the amount of funds necessary to finance profitable investment opportunities thereby restricting it to find other avenues of finance.

Under this purview, the decision is based on the following:

1. Whether the organization has opportunities in hand to invest the amount of profits, if retained?
2. Whether the return on such investment (ROI) will be higher than the expectations of shareholders i.e. K_e .

(ii) Wealth Maximization Decision:

Under this head, we are facing the problem of amount of dividend to be distributed i.e. the Dividend Payout ratio (D/P) in relation to Market price of the shares (MPS).

1. Because of market imperfections and uncertainty, shareholders give higher value to near dividends than future dividends and capital gains. Payment of dividends influences the market price of the share. Higher dividends increase value of shares and low dividends decrease it. A proper balance has to be struck between the two approaches.

- When the firm increases retained earnings, shareholders' dividends decrease and consequently market price is affected. Use of retained earnings to finance profitable investments increases future earnings per share.

On the other hand, increase in dividends may cause the firm to forego investment opportunities for lack of funds and thereby decrease the future earnings per share.

Thus, management should develop a dividend policy **which divides net earnings into dividends and retained earnings** in an optimum way so as to achieve the objective of wealth maximization for shareholders. Such policy will be influenced by investment opportunities available to the firm and value of dividends as against capital gains to shareholders.



9.4 FORMS OF DIVIDEND

Generally, the dividend can take any of the following forms (depending upon some factors will be discussed later):

1. Cash dividend: It is the most **common form of dividend**. Cash here means cash, cheque, warrant, demand draft, pay order or directly through Electronic Clearing Service (ECS) but not in kind.

2. Stock dividend (Bonus Shares): It is a **distribution of shares in lieu of cash dividend** to existing shareholders. When the company issues further shares to its existing shareholders without consideration it is called bonus shares. Such shares are distributed proportionately thereby retaining proportionate ownership of the company. If a shareholder owns 100 shares at a time, when 10% dividend is declared he will have 10 additional shares thereby increasing the equity share capital and reducing reserves and surplus (retained earnings). The total net worth is not affected by bonus issue.

Advantages of Stock Dividend

There are many advantages both to the shareholders and to the company. Some of the important ones are listed as under:

(1) *To Share Holders:*

- Tax benefit –At present there is no tax on dividend received from a domestic company.
- Policy of paying fixed dividend per share and its continuation even after declaration of stock dividend will increase total cash dividend of the shareholders in future.

(2) *To Company:*

- (a) Conservation of cash for meeting profitable investment opportunities.
- (b) Cash deficiency and restrictions imposed by lenders to pay cash dividend.

Limitations of Stock Dividend

Limitations of stock dividend to shareholders and to company are as follows:

1. **To Shareholders:** Stock dividend does not affect the wealth of shareholders and therefore it has no value for them. This is because the declaration of stock dividend is a method of capitalising the past earnings of the shareholders and is a formal way of recognising earnings which the shareholders already own. It merely divides the company's ownership into a large number of share certificates. James Porterfield regards stock dividends as a division of corporate pie into a larger number of pieces. Stock dividend does not give any extra or special benefit to the shareholder. His proportionate ownership in the company does not change at all. Stock dividend creates a favourable psychological impact on the shareholders and is greeted by them on the ground that it gives an indication of the company's growth.
2. **To Company:** Stock dividends are more costly to administer than cash dividend. It is disadvantageous if periodic small stock dividends are declared by the company as earnings. This result in the measured growth in earnings per share being less than the growth based on per share for small issues of stock dividends are not adjusted at all and only significant stock dividends are adjusted. Also, companies have to pay tax on distribution.



9.5 RELATIONSHIP BETWEEN RETAINED EARNINGS AND GROWTH

It can be illustrated with the help of the following equation:

$$\text{Growth (g)} = \text{br}$$

Where,

g = growth rate of the firm

b = retention ratio

r = rate of return on investment

Let's explain this situation with the help of an example:

Suppose, there are two companies, A Ltd & B Ltd, having a capital employed of ₹ 50,00,000 in terms of Equity shares of ₹100 each are earning @ 20%. Both have same capital structure and same ROI but different dividend policy.

A Ltd. distributes 100% of its earnings whereas B Ltd only 50%.

Now, considering the other things remain same, the position of both the companies during the next year will be:

A Ltd	(₹)	B Ltd	(₹)
Previous year		Previous year	
Earnings	₹ 10,00,000	Earnings	₹ 10,00,000
Dividend	₹ 10,00,000	Dividend	₹ 5,00,000
Retained Earnings	Nil	Retained Earnings	₹ 5,00,000

Current year		Current year	
Existing capital	₹ 50,00,000	Existing capital	₹ 50,00,000
Retained Earnings	Nil	Retained Earnings	₹ 5,00,000
Total capital employed	₹ 50,00,000	Total capital employed	₹ 55,00,000
Earnings@ 20%	₹ 10,00,000	Earnings@ 20%	₹ 11,00,000

Hence with the help of above example, it is easy to understand that how retained earnings will lead to growth.



9.6 DETERMINANTS OF DIVIDEND DECISIONS

The dividend policy is affected by the following factors:

- Availability of funds:** If the business is in requirement of funds, then retained earnings could be a good source. Since it saves the floatation cost and further the control will not be diluted as in case of further issue of share capital.
- Cost of capital:** If the financing requirements can be financed through debt (relatively cheaper source of finance), then it should be preferred to distribute more dividend but if the financing is to be done through fresh issue of equity shares, it is better to use retained earnings as much as possible.

3. **Capital structure:** An optimum Debt equity ratio should also be under consideration for the dividend decision.
4. **Stock price:** Stock price here means market price of the shares. Generally, higher dividends increase value of shares and low dividends decrease it.
5. **Investment opportunities in hand:** The dividend decision is also affected, if there are investment opportunities in hand, the company may prefer to retain more from the earnings
6. **Internal rate of return:** If the internal rate of return is more than the cost of retained earnings, it's better to distribute the earnings as much as possible.
7. **Trend of industry:** Few industries have been seen by investors for regular income, hence in such cases, the firm will have to pay dividend for survival.
8. **Expectation of shareholders:** The shareholders can be categorised in two categories: (i) those who invests for regular income, & (ii) those who invests for growth. Generally, the investor prefers current dividend over the future growth.
9. **Legal constraints:** Section 123 of the Companies Act, 2013 came into force from 1st April, 2014 which provides for declaration of dividend. According to this section:
 - (i) *Dividend shall be declared or paid by a company for any financial year only:*
 - (a) out of the profits of the company for that year arrived at after providing for depreciation in accordance with the provisions of section 123(2), or
 - (b) out of the profits of the company for any previous financial year or years arrived at after providing for depreciation in accordance with the provisions of that sub-section and remaining undistributed, or
 - (c) out of both; or
 - (d) out of money provided by the Central Government or a State Government for the payment of dividend by the company in pursuance of a guarantee given by that Government.
10. **Taxation:** As per Section 115-O of Income Tax Act, 1961, dividend is subject to dividend distribution tax (DDT) in the hands of the company. Under the existing provisions of Section 10(34) of the Act dividend which suffer DDT under section 115-O is exempt in the hands of the shareholder.

Further, any income by way of dividend in excess of ₹ 10 lakhs shall be chargeable to tax in the case of an individual, HUF or a firm who is resident in India, at the rate of ten percent.



9.7 PRACTICAL CONSIDERATIONS IN DIVIDEND POLICY

A discussion on internal financing ultimately turns to practical considerations which determine the dividend policy of a company. The formulation of dividend policy depends upon answers to the questions:

- whether there should be a stable pattern of dividends over the years or
- whether the company should treat each dividend decision completely independent. The practical considerations in dividend policy of a company are briefly discussed below:

(a) Financial Needs of The Company: Retained earnings can be a source of finance for creating profitable investment opportunities. As we discussed earlier, when internal rate of return of a company is greater than return required by shareholders, it would be advantageous for the shareholders to re-invest their earnings.

Risk and financial obligations increase if a company raises capital through issue of new shares where floatation costs are involved.

Mature Companies	Growth Companies
1. Mature companies having few investment opportunities will show high payout ratios;	1. Growth companies, on the other hand, have low payout ratios. They are in need of funds to finance fast growing fixed assets.
2. Share prices of such companies are sensitive to dividend charges.	2. Distribution of earnings reduces the funds of the company. They retain all the earnings and declare bonus shares to offset the dividend requirements of the shareholders.
3. So a small portion of the earnings are kept to meet emergent and occasional financial needs.	3. These companies increase the amount of dividends gradually as the profitable investment opportunities start falling.

(b) Constraints on Paying Dividends

(i) **Legal:** Under Section 123 of the Companies Act 2013, Dividend shall be declared or paid by a company for any financial year only:

- Out of the profits of the company for that year arrived at after providing for depreciation in accordance with the provisions of section 123(2), or
- Out of the profits of the company for any previous financial year or years arrived at after providing for depreciation in accordance with the provisions of that sub-section and remaining undistributed, or
- Out of both; or
- Out of money provided by the Central Government or a State Government for the payment of dividend by the company in pursuance of a guarantee given by that Government.

(ii) **Liquidity:** Payment of dividends means outflow of cash. Ability to pay dividends depends on cash and liquidity position of the firm. A mature company does not have much investment opportunities, nor are funds tied up in permanent working capital and, therefore has a sound cash position. For a growth oriented company in spite of good profits, it will need funds for expanding activities and permanent working capital and therefore it is not in a position to declare dividends.

(iii) **Access to the Capital Market:** By paying large dividends, cash position is affected. If new shares have to be issued to raise funds for financing investment programmes and if the existing shareholders cannot buy additional shares, control is diluted. Payment of dividends may be withheld and earnings are utilised for financing firm's investment opportunities.

(iv) **Investment Opportunities:** If investment opportunities are inadequate, it is better to pay dividends and raise external funds whenever necessary for such opportunities.

(c) **Desire of Shareholders:** The desire of shareholders (whether they prefer regular income by way of dividend or maximize their wealth by way of gaining on sale of the shares). In this connection it is to be noted that as per the current provisions of the Income Tax Act, 1961, tax on dividend is borne by the companies as dividend distribution tax and shareholders need not pay any tax on income received by way of dividend from domestic companies. The small shareholders are concerned with regular dividend income hence select shares of companies paying regular and liberal dividend.

As compared to those shareholders who prefer regular dividend as source of income, there are shareholders who prefer to gain on sale of shares at times when shares command higher price in the market. However capital gain on sale of shares attracts tax on such gain and rate vary on the basis of holding period.

The dividend policy, thus pursued by the company should strike a balance on the desires of the shareholders. Also the dividend policy once established should be continued as long as possible without interfering with the needs of the company to create clientele effect.

(d) Stability of Dividends: Stability in dividend can be maintained either fixing amount or rate of dividend irrespective of earnings of the company. The stable dividend policies may include:

(i) Constant Dividend per Share: Shareholders are given fixed amount of dividend irrespective of actual earnings. The amount of dividend may increase or decrease later on depending upon the financial health of the company but it will be maintained for a considerable period.

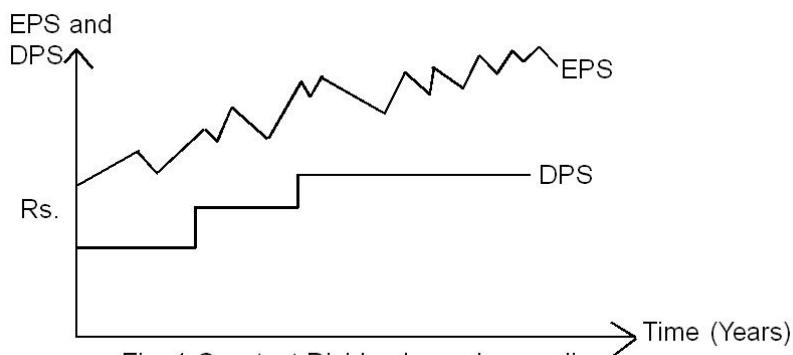


Fig. 1 Constant Dividend per share policy

To maintain a constant dividend amount, it is necessary to create a reserve like Dividend Equalisation Reserve Fund earmarked by marketable securities for accumulation of surplus earnings and to use for paying dividends in bad years. This policy treats common shareholders at par with preference shareholders without giving them any preferred opportunities within the firm. It is preferred by persons and institutions that depend on dividend income to meet living and operating expenses.

(ii) Constant Percentage of Net Earnings: The ratio of dividend to earnings is known as Payout ratio. Some companies follow a policy of constant Payout ratio i.e. paying fixed percentage on net earnings every year. To quote from Page 74 of the annual report 2011 of Infosys Technologies Limited,

"The Dividend Policy is to distribute up to 30% of the Consolidated Profit after Tax (PAT) of the Infosys Group as Dividend."

Contrast to this Warren Buffet (amongst the richest persons of the world) says:

"We will either pay large dividends or none at all if we can't obtain more money through re-investment (of those funds). There is no logic to regularly paying out 10% or 20% of earnings as dividends every year."

Such a policy envisages that the amount of dividend fluctuates in direct proportion to earnings. If a company adopts 40% payout ratio, then 40% of every rupee of net earnings will be paid out. If a company earns ₹ 2/- per share, dividend per share will be 80 paise and if it earns ₹ 1.50 per share, dividend per share will be 60 paise.

Such a policy is related to company's ability to pay dividends. For losses incurred, no dividend shall be paid. Internal financing with retained earnings is automatic. At any given payout ratio, amount of dividends and any additions to retained earnings increase with increased earnings and decrease with decreased earnings. This policy has a conservative approach and provides a guarantee against over/underpayment. Management is not allowed to pay dividend if profits are not earned in current year and at the same time, dividend is not allowed to forego if profits are earned.

(iii) ***Small Constant Dividend per Share plus Extra Dividend:*** The amount of dividend is set at high level and the policy is adopted for companies with stable earnings. For companies with fluctuating earnings, the policy is to pay a minimum dividend per share with a step up feature. The small amount of dividend is fixed to reduce the possibility of missing dividend payment. By paying extra dividend in period of prosperity, it enables the company to pay constant amount of dividend regularly without default and allows flexibility for supplementing shareholders' income when company's earnings are higher than usual, without committing to make larger payments as part of further fixed dividend. This policy allows some shareholders to plan on set amounts of cash and at the same time be pleased when extra dividends are announced.

A firm following policy of stable dividend in Figure 1 will command higher market price for shares than firm which varies dividend with cyclical fluctuation in earnings as in Figure 2.

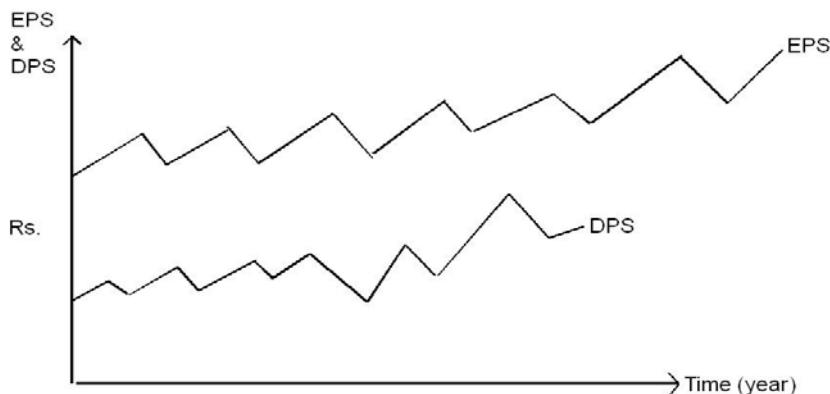
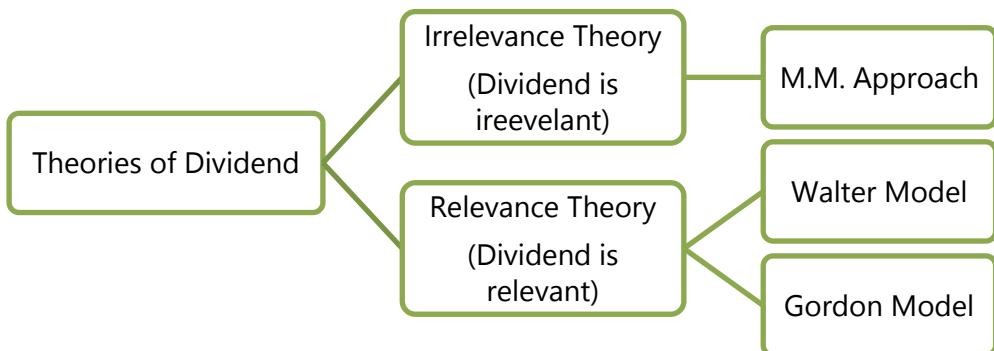


Fig. 2 Dividend policy at Constant Payout ratio

There is, however, a danger of a company with a pattern of stable dividends missing dividend payment in a year as this break will have severe effect on investors than failure to pay dividend by a company with unstable dividend policy. It is prudent for companies to maintain stability of dividends during lean periods. The dividend rate is to be fixed at a conservative figure so that it can be maintained even in such periods. To give benefit of company's prosperity extra dividend can be declared. When the company fails to pay extra dividend, it does not have a depressing effect on investors.



9.8 THEORIES OF DIVIDEND



9.8.1 Dividend's Irrelevance Theory

1. MODIGLIANI and MILLER (M.M) HYPOTHESIS:

Modigliani – Miller theory was proposed by Franco Modigliani and Merton Miller in 1961. MM approach is in support of the irrelevance of dividends i.e. firm's dividend policy has no effect on either the price of a firm's stock or its cost of capital.

Assumptions of M.M Hypothesis

MM hypothesis is based on the following assumptions:

- **Perfect capital markets:** The firm operates in a market in which all investors are rational and information is freely available to all.
- **No taxes or no tax discrimination** between dividend income and capital appreciation (capital gain): This assumption is necessary for the universal applicability of the theory, since, the tax rates or provisions to tax income may be different in different countries.
- **Fixed investment policy:** It is necessary to assume that all investment should be financed through equity only, since, implication after using debt as a source of finance may be difficult to understand. Further, the impact will be different in different cases.
- **No floatation or transaction cost:** Similarly, these costs may differ country to country or market to market.
- **Risk of uncertainty does not exist.** Investors are able to forecast future prices and dividend with certainty and one discount rate is appropriate for all securities and all time periods.

According to MM hypothesis

- Market value of equity shares of its firm depends solely on its earning power and is not influence by the manner in which its earnings are split between dividends and retained earnings.
- **Market value of equity shares is not affected by dividend size.**

MM hypothesis is primarily based on the arbitrage argument. Through the arbitrage process, MM hypothesis discusses how the value of the firm remains same whether the firm pays dividend or not. Here

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

Where,

P_0 = Price in the beginning of the period.

P_1 = Price at the end of the period.

D_1 = Dividend at the end of the period.

K_e = Cost of equity/ rate of capitalization/ discount rate.

As per MM hypothesis, the value of firm will remain unchanged due to dividend decision. This can be computed with the help of the following formula:

$$V_f \text{ or } nP_0 = \frac{(n + \Delta n)P_1 - I + E}{1 + K_e}$$

Where,

V_f = Value of firm in the beginning of the period

n = number of shares in the beginning of the period

Δn = number of shares issued to raise the funds required

I = Amount required for investment

E = total earnings during the period

For Understanding purpose:

$$P_o = \frac{P_1 + D_1}{1 + K_e}$$

The above equation is for one share. Let's multiply it with n i.e. existing number of shares on both sides:

$$nP_o = \frac{nP_1 + nD_1}{1 + K_e}$$

now add ΔnP_1 and subtract ΔnP_1 at numerator of the right hand side equation

$$nP_o = \frac{nP_1 + nD_1 + \Delta nP_1 - \Delta nP_1}{1 + K_e}$$

retained earnings could be represented with the help of following:

Retained earnings = $E - nD_1$

Δn i.e. number of shares issued to raise the funds required can be represented as follows:

$$\Delta n = \frac{\text{Funds required}}{\text{Price at end } (P_1)} = \frac{1 - (E - nD_1)}{P_1}$$

$$\Delta nP_1 = I - (E - nD_1)$$

Now let's use this for the equation

$$nP_o = \frac{nD_1 + (NP_1 + \Delta nP_1) - [1 - (E - nD_1)]}{1+K_e}$$

$$nP_o = \frac{nD_1 + (n + \Delta n)P_1 - I + E - nD_1}{1+K_e}$$

$$nP_o = \frac{(n + \Delta n)P_1 - I + E}{1+K_e}$$

Advantages of MM Hypothesis

Various advantages of MM Hypothesis are as follows

1. This model is **logically consistent**.
2. It provides a **satisfactory framework** on dividend policy with the the concept of Arbitrage process.

Limitations of MM Hypothesis

Various Limitations of MM Hypothesis are as follows

1. Validity of various **assumptions is questionable**.
2. This model **may not be valid under uncertainty**.

ILLUSTRATION 1

AB Engineering Ltd. belongs to a risk class for which the capitalization rate is 10%. It currently has outstanding 10,000 shares selling at ₹ 100 each. The firm is contemplating the declaration of a dividend of ₹ 5/ share at the end of the current financial year. It expects to have a net income of ₹ 1,00,000 and has a proposal for making new investments of ₹ 2,00,000. CALCULATE the value of the firms when dividends (i) are not paid (ii) are paid

SOLUTION

CASE 1: Value of the firm when dividends are not paid.

Step 1: Calculate price at the end of the period

$$K_e = 10\%, \quad P_0 = 100, \quad D_1 = 0$$

$$P_o = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 0}{1 + 0.10} \Rightarrow P_1 = 110$$

Step 2: Calculation of funds required for investment

Earning	₹ 1,00,000
Dividend distributed	Nil
Fund available for investment	₹ 1,00,000
Total Investment	₹ 2,00,000
Balance Funds required	₹ 2,00,000 - ₹ 1,00,000 = ₹ 1,00,000

Step 3: No. of shares required to be issued for balance fund

$$\text{No. of shares} = \frac{\text{Funds required}}{\text{Price at end}(P_1)}$$

$$\Delta n = \frac{1,00,000}{110}$$

Step 4: Calculation of value of firm

$$nP_o = \frac{(n + \Delta n)P_1 - I + E}{1 + K_e}$$

$$nP_o = \frac{\left(10,000 + \frac{₹ 1,00,000}{₹ 110}\right) \times ₹ 110 - ₹ 2,00,000 + ₹ 1,00,000}{(1 + 0.10)}$$

$$= ₹ 10,00,000$$

CASE 2: Value of the firm when dividends are paid.

Step 1: Calculate price at the end of the period

$$K_e = 10\%, \quad P_0 = 100, \quad D_1 = 5$$

$$P_o = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 5}{1 + 0.10} \Rightarrow P_1 = 105$$

Step 2: Calculation of funds required for investment

Earning	₹ 1,00,000
Dividend distributed	₹ 50,000
Fund available for investment	₹ 50,000
Total Investment	₹ 2,00,000
Balance Funds required	₹ 2,00,000 - ₹ 50,000 = ₹ 1,50,000

Step 3: No. of shares required to be issued for balance fund

$$\text{No. of shares} = \frac{\text{Funds required}}{\text{Price at end}(P_1)}$$

$$\Delta n = \frac{₹ 1,50,000}{₹ 105}$$

Step 4: Calculation of value of firm

$$n P_0 = \frac{(n + \Delta n) P_1 - I + E}{1 + K_e}$$

$$n P_0 = \frac{\left(10,000 + \frac{₹ 1,50,000}{₹ 105}\right) \times ₹ 105 - ₹ 2,00,000 + ₹ 1,00,000}{(1 + 0.10)}$$

$$= ₹ 10,00,000$$

Thus, it can be seen from the example that the value of the firm remains the same in either case.

9.8.2 Dividend's Relevance Theory

1. WALTER'S MODEL

Assumptions of Walter's Model

Walter's approach is based on the following assumptions:

- All investment proposals of the firm are to be financed **through retained earnings** only
- 'r' rate of return & 'K_e' cost of **capital are constant**
- **Perfect capital markets:** The firm operates in a market in which all investors are rational and information is freely available to all.

- **No taxes or no tax discrimination** between dividend income and capital appreciation (capital gain): This assumption is necessary for the universal applicability of the theory, since, the tax rates or provisions to tax income may be different in different countries.
- **No floatation or transaction cost**: Similarly, these costs may differ country to country or market to market.
- The firm has **perpetual life**

The relationship between dividend and share price based on Walter's formula is shown below:

$$\text{Market Price (P)} = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

Where,

P = Market Price of the share.

E = Earnings per share.

D = Dividend per share.

K_e = Cost of equity/ rate of capitalization/ discount rate.

r = Internal rate of return/ return on investment

The above formula is given by Prof. James E. Walter shows how dividend can be used to maximise the wealth of equity holders. He argues that in the long run, share prices reflect only the present value of expected dividends. Retentions influence stock prices only through their effect on further dividends.

A close study of the formula indicates that Professor Walter emphasises two factors which influence the market price of a share.

- 1) Dividend per share
- 2) Relationship between Internal Rate of Return (IRR) and Cost of capital (K_e)/ Market capitalization rate

If the internal return of retained earnings is higher than market capitalization rate, the value of ordinary shares would be high even if dividends are low. However, if the internal return within the business is lower than what the market expects, the value of the share would be low. In such a case, shareholders would prefer a higher

dividend so that they can utilise the funds so obtained elsewhere in more profitable opportunities.

Walter's Model explains why market prices of shares of growing companies are high even though the dividend paid out is low. It also explains why the market price of shares of certain companies which pay higher dividends and retain very low profits is also high.

As explained above, market price is dependent upon two factors; firstly, the quantum of dividend and secondly, profitable opportunities available to the company in investing the earnings retained. It is obvious that when a company retains a part of its profits, it has to think in terms of the cost of such retention. Retention of profits depends upon whether it is cheaper and more profitable for shareholders of the company to have corporate earnings retained in the business or get the same in the form of cash dividend. This involves a comparison between the cost of retained earnings and the cost of distributing them. The cost of retained earnings, therefore, involves an opportunity cost, i.e., the benefits which shareholders forego in terms of leaving the funds in the business.

IRR, K_e and optimum payout

As we know Walter approach consider two factors, following is the conclusion of Walter's model

Company	Condition of r vs K_e	Correlation between Size of Dividend and Market Price of share	Optimum dividend payout ratio
Growth	$r > K_e$	Negative	Zero
Constant	$r = K_e$	No correlation	Every payout ratio is optimum
Decline	$r < K_e$	Positive	100%

Growth Company: In this condition company is able to invest/utilize the fund in a better manner. In this case shareholders can accept low dividend because their value of share would be higher.

Decline Company: In this case company is not in a position to cover the cost of capital; in such case shareholders would prefer a higher dividend so that they can utilize their funds elsewhere in more profitable opportunities.

Advantages of Walter's Model

1. The formula is **simple to understand** and easy to compute.
2. It can envisage **different possible market prices** in different situations and considers internal rate of return, market capitalisation rate and dividend payout ratio in the determination of market value of shares.

Limitations of Walter's Model

1. The formula **does not consider all the factors** affecting dividend policy and share prices. Moreover, determination of market capitalisation rate is difficult.
2. Further, the formula **ignores such factors as taxation**, various legal and contractual obligations, management policy and attitude towards dividend policy and so on.

ILLUSTRATION 2

XYZ Ltd. earns ₹ 10/ share. Capitalization rate and return on investment are 10% and 12% respectively.

DETERMINE the optimum dividend payout ratio and the price of the share at the payout.

SOLUTION

Since $r > K_e$, the optimum dividend pay-out ratio would 'Zero' (i.e. $D = 0$),

Accordingly, value of a share:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

$$P = \frac{0 + \frac{0.12}{0.10}(10 - 0)}{0.10} = ₹120$$

The optimality of the above payout ratio can be proved by using 25%, 50%, 75% and 100% as pay- out ratio:

At 25% pay-out ratio

$$P = \frac{2.5 + \frac{0.12}{0.10}(10 - 2.5)}{0.10} = ₹115$$

At 50% pay-out ratio

$$P = \frac{5 + \frac{0.12}{0.10}(10 - 5)}{0.10} = ₹110$$

At 75% pay-out ratio

$$P = \frac{7.5 + \frac{0.12}{0.10}(10 - 7.5)}{0.10} = ₹105$$

At 100% pay-out ratio

$$P = \frac{10 + \frac{0.12}{0.10}(10 - 10)}{0.10} = ₹100$$

ILLUSTRATION 3

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	₹ 30 lakhs
Outstanding 12% preference shares	₹ 100 lakhs
No. of equity shares	3 lakhs
Return on Investment	20%
Cost of capital i.e. (K _e)	16%

COMPUTE the approximate dividend pay-out ratio so as to keep the share price at ₹42 by using Walter's model?

SOLUTION

	₹ in lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Therefore earning per share	18/3 = ₹ 6.00

Let, the dividend per share be D to get share price of ₹42

$$\begin{aligned}
 P &= \frac{D + \frac{r}{K_e}(E - D)}{K_e} \\
 \text{₹42} &= \frac{D + \frac{0.20}{0.16}(6 - D)}{0.16} \\
 6.72 &= \frac{0.16D + 1.2 - 0.20D}{0.16} \\
 0.04D &= 1.2 - 1.0752 \\
 D &= 3.12 \\
 \text{D/P ratio} &= \frac{\text{DPS}}{\text{EPS}} \times 100 = \frac{3.12}{6} \times 100 = 52\%
 \end{aligned}$$

So, the required dividend payout ratio will be = 52%

2. GORDON'S MODEL

According to Gordon's model dividend is relevant and dividend policy of a company affects its value.

Assumptions of Gordon's Model

This model is based on the following assumptions:

- Firm is an all equity firm i.e. **no debt**.
- **IRR will remain constant**, because change in IRR will change the growth rate and consequently the value will be affected. Hence this assumption is necessary.
- **K_e will remains constant**, because change in discount rate will affect the present value.
- **Retention ratio** (b), once decide upon, is **constant** i.e. constant dividend payout ratio will be followed.
- **Growth rate** ($g = br$) is also **constant**, since retention ratio and IRR will remain unchanged and growth, which is the function of these two variable will remain unaffected.

- $K_e > g$, this assumption is necessary and based on the principles of series of sum of geometric progression for 'n' number of years.
- All investment proposals of the firm are to be **financed through retained earnings** only.

The following formula is used by Gordon to find out price per share:

$$P_0 = \frac{E_1(1-b)}{K_e - br}$$

Where,

P_0 = Price per share

E_1 = Earnings per share

b = Retention ratio; ($1 - b$ = Payout ratio)

K_e = Cost of capital

r = IRR

br = Growth rate (g)

According to Gordon's model, when **IRR is greater than cost of capital, the price per share increases and dividend pay-out decreases**. On the other hand when IRR is lower than the cost of capital, the price per share decreases and dividend pay-out increases.

Following is the conclusion of Gordon's model

Company	Condition of r vs K_e	Optimum dividend payout ratio
Growth	$r > K_e$	Zero
Constant	$r = K_e$	There is no optimum ratio
Declining	$r < K_e$	100%

ILLUSTRATION 4

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	₹ 30 lakhs
Outstanding 12% preference shares	₹ 100 lakhs

No. of equity shares	3 lakhs
Return on Investment	20%
Cost of capital i.e. (K_e)	16%

CALCULATE price per share using Gordon's Model when dividend pay-out is (i) 25%; (ii) 50% and (iii) 100%.

SOLUTION

	₹ in lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Therefore earning per share	18/3 = ₹ 6.00

Price per share according to Gordon's Model is calculated as follows:

$$P_0 = \frac{E_1(1-b)}{K_e - br}$$

Here, $E_1 = 6$, $K_e =$

(i) When dividend pay-out is 25%

$$P_0 = \frac{6 \times 0.25}{0.16 - (0.75 \times 0.2)} = \frac{1.5}{0.16 - 0.15} = 150$$

(ii) When dividend pay-out is 50%

$$P_0 = \frac{6 \times 0.5}{0.16 - (0.5 \times 0.2)} = \frac{3}{0.16 - 0.10} = 50$$

(iii) When dividend pay-out is 100%

$$P_0 = \frac{6 \times 1}{0.16 - (0 \times 0.2)} = \frac{6}{0.16} = 37.50$$

The "Bird-in-hand theory"

Myron Gordon revised his dividend model and considered the risk and uncertainty in his model. The Bird-in-hand theory of Gordon has two arguments:

(i) Investors are **risk averse** and

(ii) Investors put a **premium on certain return** and discount on uncertain return.

Gordon argues that what is available at present is preferable to what may be available in the future. As investors are rational, they want to avoid risk and uncertainty. They would prefer to pay a higher price for shares on which current dividends are paid. Conversely, they would discount the value of shares of a firm which postpones dividends. The discount rate would vary with the retention rate.

The relationship between dividend and share price on the basis of Gordon's formula is shown as:

$$\text{Market price per share (P}_0\text{)} = \left[\frac{D_0(1+g)}{K_e - g} \right]$$

Where,

P_0 = Market price per share (ex-dividend)

D_0 = Current year dividend

g = Constant annual growth rate of dividends

K_e = Cost of equity capital (expected rate of return).

The formula given by Gordon shows that when the rate of return (r) is greater than the discount rate (K_e), the price per share increases as the dividend ratio decreases and if the return (r) is less than discount rate (K_e) it is vice-versa. The price per share remains unchanged where the rate of return and discount rate are equal.

DIVIDEND DISCOUNT MODEL (DDM)

It is a financial model that values shares at the discounted value of the future dividend payments. Under this model, the price of a share will be traded is calculated by the PV of all expected future dividend payment discounted by an appropriate risk- adjusted rate. The dividend discount model price is the intrinsic value of the stock i.e.

Intrinsic value = Sum of PV of future cash flows

Intrinsic value = Sum of PV of Dividends + PV of Stock Sale Price

$$\text{Stock Intrinsic Value} = \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \dots + \frac{D_n}{(1+K_e)^n} + \frac{RV_n}{(1+K_e)^n}$$

In the above equation, it is assumed that dividend is paid at the end of each year and that the stock is sold at the end of the n th year.

Dividend Discount Model (DDM)

There can three possible situations:



(a) Zero growth rates: assumes all dividend paid by a stock remains same. In this case the stock price would be equal to:

$$\text{Stock's intrinsic Value} = \frac{\text{Annual dividend}}{\text{Required rate of return}}$$

$$\text{i.e. } P_0 = \frac{D}{K_e}$$

Where,

D = Annual dividend

K_e = Cost of capital

P_0 = Current Market price of share

ILLUSTRATION 5

X Ltd. is a no growth company, pays a dividend of ₹ 5 per share. If the cost of capital is 10%, COMPUTE the current market price of the share?

SOLUTION

$$P_0 = \frac{D}{K_e} = \frac{5}{0.10} = ₹ 50$$

(b) Constant Growth Rate (Gordon's Growth Model): The relationship between dividend and share price on the basis of Gordon's formula is:

$$\text{Market price per share (P)} = \frac{D_0(1+g)}{K_e - g}$$

Where

P = Market price per share

D_0 = current year dividend

g = growth rate of dividends

K_e = cost of equity capital/ expected rate of return

Notes:

$g = b \times r$

b = proportion of retained earnings or (1- dividend payout ratio)

ILLUSTRATION 6

XYZ is a company having share capital of ₹10 lakhs of ₹10 each. It distributed current dividend of 20% per annum. Annual growth rate in dividend expected is 2%. The expected rate of return on its equity capital is 15%. CALCULATE price of share applying Gordons growth Model.

SOLUTION

$$P = \frac{D_0(1+g)}{K_e - g}$$

$$D_0 = 10 \times 20\% = ₹2$$

$$g = 2\% \text{ or } 0.02$$

$$K_e = 15\% \text{ or } 0.15$$

$$P = \frac{2(1+0.02)}{0.15 - 0.02}$$

$$= ₹15.69$$

(c) Variable growth rate : Variable-growth rate models (multi-stage growth models) can take many forms, even assuming the growth rate is different for every year. However, the most common form is one that assumes 3 different rates of growth: an initial high rate of growth, a transition to slower growth, and lastly, a sustainable, steady rate of growth. Basically, the constant-growth rate model is extended, with each phase of growth calculated using the constant-growth method, but using 3 different growth rates of the 3 phases. The present values of each stage are added together to derive the intrinsic value of the stock. Sometimes, even the capitalization rate, or the required rate of return, may be varied if changes in the rate are projected.

ILLUSTRATION 7

A firm had been paid dividend at ₹2 per share last year. The estimated growth of the dividends from the company is estimated to be 5% p.a. DETERMINE the estimated market price of the equity share if the estimated growth rate of dividends (i) rises to 8%, and (ii) falls to 3%. Also FIND OUT the present market price of the share, given that the required rate of return of the equity investors is 15%.

SOLUTION

In the present situation, the current MPS is as follows:

$$P = \frac{D_0(1+g)}{K_e - g}$$

$$P = \frac{2(1+0.05)}{0.15 - 0.05}$$

$$= ₹ 21$$

(i) The impact of changes in growth rate to 8% on MPS will be as follows:

$$P = \frac{2(1+0.08)}{0.15 - 0.08}$$

$$= ₹ 30.86$$

(ii) The impact of changes in growth rate to 3% on MPS will be as follows:

$$P = \frac{2(1+0.03)}{0.15 - 0.03}$$

$$= ₹ 17.17$$

So, the market price of the share is expected to vary in response to change in expected growth rate of dividends.

Advantages of Gordon's Model

1. The dividend discount model is a **useful heuristic model** that relates the present stock price to the present value of its future cash flows.
2. This Model is **easy to understand**.

Limitations of Gordon's Model

1. The dividend discount model **depends** on projections about company growth rate and future capitalization rates of the remaining cash flows, which may be **difficult to calculate accurately**.
2. The **true intrinsic value** of a stock is **difficult to determine** realistically.

9.8.3. Traditional Model

1. Graham & Dodd Model

According to the traditional position expounded by Graham & Dodd, the stock market places considerably more weight on dividends than on retained earnings. Their view is expressed quantitatively in the following valuation model:

$$P = m \left(D + \frac{E}{3} \right)$$

Where,

P = Market price per share

D = Dividend per share

E = Earnings per share

m = a multiplier

ILLUSTRATION 8

The earnings per share of a company is ₹ 30 and dividend payout ratio is 60%. Multiplier is 2.

DETERMINE the price per share as per Graham & Dodd model.

SOLUTION

$$\text{Price per share (P)} = m \left(D + \frac{E}{3} \right)$$

$$P = 2 \left(30 \times 0.6 + \frac{30}{3} \right)$$

$$P = 2(18 + 10) = ₹ 56$$

ILLUSTRATION 9

The following information regarding the equity shares of M Ltd. is given below:

Market price	₹ 58.33
Dividend per share	₹ 5
Multiplier	7

According to the Graham & Dodd approach to the dividend policy, COMPUTE the EPS.

SOLUTION

$$\text{Price per share (P)} = m \left(D + \frac{E}{3} \right)$$

$$\text{₹}58.33 = 7 \left(5 + \frac{E}{3} \right)$$

$$105 + 7E = 175$$

$$\text{Or, } 7E = 175 - 105 = \text{₹}10$$

$$\text{Therefore, EPS} = \text{₹}10$$

2. Linter's Model

Linter's model has two parameters:

- The target payout ratio,
- The spread at which current dividends adjust to the target.

John Linter based his model on a series of interviews which he conducted with corporate managers in the mid 1950's. While developing the model, he considers the following assumptions:

- Firm have a **long term dividend payout ratio**. They maintain a fixed dividend payout over a long term. Mature companies with stable earnings may have high payouts and growth companies usually have low payouts.
- Managers are more concerned with changes in dividends than the absolute amounts of dividends. A manager may easily decide to pay a dividend of ₹ 2 per share if last year too it was ₹ 2 but paying ₹ 3 dividend if last year dividend was ₹ 2 is an important financial management decision.
- Dividend changes follow changes in long run sustainable earnings.
- Managers are **reluctant to affect dividend changes** that may have to be reversed.

Under Linter's model, the current year's dividend is dependent on current year's earnings and last year's dividend.

$$D_1 = D_0 + [(EPS \times \text{Target payout}) - D_0] \times Af$$

Where

D_1 = Dividend in year 1

D_0 = Dividend in year 0 (last year dividend)

EPS = Earnings per share

Af = Adjustment factor or Speed of adjustment

ILLUSTRATIONS 10

Given the last year's dividend is ₹9.80, speed of adjustment = 45%, target payout ratio 60% and EPS for current year ₹20. COMPUTE current year's dividend using Linter's model.

SOLUTION

$$D_1 = D_0 + [(EPS \times \text{Target payout}) - D_0] \times Af$$

$$D_1 = 9.80 + [(20 \times 60\%) - 9.80] \times 0.45$$

$$D_1 = 9.80 + 0.99 = ₹10.79$$

Criticism of Linter's Model:

- This model **does not offer a market price** for the shares.
- The **adjustment factor is an arbitrary number** and not based on any scientific criterion or method.



9.9 STOCK SPLITS

9.9.1 Meaning of Stock Split:

Stock split means splitting **one share into many**, say, one share of ₹500 into 5 shares of ₹100. Stock splits is a tool used by the companies to regulate the prices of shares i.e. if a share price increases beyond a limit, it may become less tradable, for e.g. suppose a company's share price increases from ₹50 to ₹1000 over the years, it is possible that it might go out of range of many investors.

9.9.2 Advantages of Stock Splits

Various advantages of Stock Splits are as follows:

1. It makes the **share affordable** to small investors.
2. **Number of shares may increase** the number of shareholders; hence the potential of investment may increase.

9.9.3 Limitations of Stock Splits

Various limitations of Stock Splits are as follows:

1. **Additional expenditure** need to be incurred on the process of stock split.
2. **Low share price may attract speculators** or short term investors, which are generally not preferred by any company.

Miscellaneous Illustration

ILLUSTRATION 11

RST Ltd. has a capital of ₹ 10,00,000 in equity shares of ₹ 100 each. The shares are currently quoted at par. The company proposes to declare a dividend of ₹ 10 per share at the end of the current financial year. The capitalization rate for the risk class of which the company belongs is 12%. COMPUTE market price of the share at the end of the year, if

- (i) *dividend is not declared ?*
- (ii) *dividend is declared ?*
- (iii) *assuming that the company pays the dividend and has net profits of ₹5,00,000 and makes new investments of ₹10,00,000 during the period, how many new shares must be issued? Use the MM model.*

SOLUTION

Given,

Cost of Equity (K_e)	12%
Number of shares in the beginning (n)	10,000
Current Market Price (P_0)	₹100
Net Profit (E)	₹ 5,00,000
Expected Dividend	₹10 per share
Investment (I)	₹10,00,000

Computation of market price per share, when:

(i) No dividend is declared:

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 0}{1 + 0.12}$$

$$P_1 = 112 - 0 = ₹112$$

(ii) Dividend is declared:

$$100 = \frac{P_1 + 10}{1 + 0.12}$$

$$P_1 = 112 - 10 = ₹102$$

(iii) Calculation of funds required for investment

Earning	5,00,000
Dividend distributed	1,00,000
Fund available for investment	4,00,000
Total Investment	10,00,000
Balance Funds required	10,00,000 - 4,00,000 = ₹6,00,000

$$\text{No. of shares} = \frac{\text{Funds required}}{\text{Price at end}(P_1)}$$

$$\Delta n = \frac{6,00,000}{102} = 5882.35 \text{ or } 5883 \text{ Shares}$$

ILLUSTRATION 12

The following information pertains to M/s XY Ltd.

Earnings of the Company	₹ 5,00,000
Dividend Payout ratio	60%
No. of shares outstanding	1,00,000
Equity capitalization rate	12%
Rate of return on investment	15%

CALCULATE:

- (i) What would be the market value per share as per Walter's model?
- (ii) What is the optimum dividend payout ratio according to Walter's model and the market value of Company's share at that payout ratio?

SOLUTION

(i) Walter's model is given by

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

Where

P = Market price per share.

E = Earnings per share = ₹ 5

D = Dividend per share = ₹ 3

R = Return earned on investment = 15%

K_e = Cost of equity capital = 12%

$$P = \frac{3 + \frac{0.15}{0.12}(5 - 3)}{0.12} = ₹ 45.83$$

(ii) According to Walter's model when the return on investment is more than the cost of equity capital, the price per share increases as the dividend pay-out ratio decreases. Hence, the optimum dividend pay-out ratio in this case is nil.

So, at a pay-out ratio of zero, the market value of the company's share will be:

$$P = \frac{0 + \frac{0.15}{0.12}(5 - 0)}{0.12} = ₹ 52.08$$

ILLUSTRATION 13

Again taking an example of three different firms i.e. growth, normal and declining firm. CALCULATE the Gordon's model with the help of a following example:

Factors	Growth Firm $r > K_e$	Normal Firm $r = K_e$	Declining Firm $r < K_e$
r (rate of return on retained earnings)	15%	10%	8%
K_e (Cost of Capital)	10%	10%	10%
E (Earning Per Share)	₹ 10	₹ 10	₹ 10
b (Retained Earnings)	0.6	0.6	0.6
1- b	0.4	0.4	0.4

SOLUTION

$$P_0 = \frac{E_1(1-b)}{K_e - br}$$

(i) Situation-1: Growth Firm $r > K_e$

$$P_0 = \frac{10(1-0.6)}{0.10 - 0.15 \times 0.6} = \frac{4}{0.10 - 0.09} = ₹400$$

(ii) Situation-2: Normal Firm $r = K_e$

$$P_0 = \frac{10(1-0.6)}{0.10 - 0.10 \times 0.6} = \frac{4}{0.10 - 0.09} = ₹100$$

(iii) Situation-3: Normal Firm $r < K_e$

$$P_0 = \frac{10(1-0.6)}{0.10 - 0.08 \times 0.6} = \frac{4}{0.10 - 0.048} = ₹76.92$$

If the retention ratio (b) is changed from 0.6 to 0.4, the new share price will be as follows:

Growth Firm

$$P_0 = \frac{10(1-0.4)}{0.10 - 0.15 \times 0.4} = \frac{6}{0.10 - 0.06} = ₹150$$

Normal Firm

$$P_0 = \frac{10(1-0.4)}{0.10 - 0.10 \times 0.4} = \frac{6}{0.10 - 0.04} = ₹100$$

Declining Firm

$$P_0 = \frac{10(1-0.4)}{0.10-0.08 \times 0.4} = \frac{6}{0.10-0.032} = ₹ 88.24$$

From the above analysis it can be concluded that.

When $r > k$, the market value increases with retention ratio.

When $r < k$, the market value of share stands to decrease.

When $r = k$, the market value is not affected by dividend policy.

The conclusion of the Gordon's model is similar to that of Walter's model.

SUMMARY

Dividend decision is one of the most important areas of management decisions. It is easy to understand but difficult to implement. Generally, the dividend can be in the form of Cash Dividend and Stock Dividend.

Dividend policy is generally governed by long term financing decision and wealth maximization decision. Some other factors also play major role in this decision like growth opportunities, expectation of shareholders, trend of the industry, legal constraints etc.

The three major theories of dividend decision are classified under irrelevance (M.M. Hypothesis) and relevance category (Walter's model & Gordon's Model). However, few other theories studied in this chapter are Graham & Dodd's model, Linter model, and residual payment policy.

Further, we studied stock splits as a tool to maintain price range so that it does not move too high to become unaffordable for a wide range of investors.

TEST YOUR KNOWLEDGE

MCQs based Questions

- 1 Which one of the following is the assumption of Gordon's Model:
 - (a) $Ke > g$
 - (b) Retention ratio (b), once decide upon, is constant
 - (c) Firm is an all equity firm
 - (d) All of the above



2 What should be the optimum Dividend pay-out ratio, when $r = 15\%$ & $K_e = 12\%$:

- (a) 100%
- (b) 50%
- (c) Zero
- (d) None of the above.

3 Which of the following is the irrelevance theory?

- (a) Walter model
- (b) Gordon model
- (c) M.M. hypothesis
- (d) Linter's model

4 If the company's D/P ratio is 60% & ROI is 16%, what should be the growth rate:

- (a) 5%
- (b) 7%
- (c) 6.4%
- (d) 9.6%

5 If the shareholders prefer regular income, how does this affect the dividend decision:

- (a) It will lead to payment of dividend
- (b) It is the indicator to retain more earnings
- (c) It has no impact on dividend decision
- (d) Can't say

6 Mature companies having few investment opportunities will show high payout ratios, this statement is:

- (a) False
- (b) True
- (c) Partial true
- (d) None of these

7 Which of the following is the limitation of Linter's model:

- (a) This model does not offer a market price for the shares
- (b) The adjustment factor is an arbitrary number and not based on any scientific criterion or methods
- (c) Both a) & b)
- (d) None of the above.

Theoretical based Questions

1. STATE dividend decision? Briefly EXPLAIN the factors which govern this decision.
2. EXPLAIN the advantages and disadvantages of the stock dividend.
3. DISCUSS the practical considerations in dividend policy.
4. LIST out the assumptions of irrelevance theory.
5. EXPLAIN the parameters Linter's model of dividend policy. Also explain the reasons of its criticism.



Practical Problem

1. M Ltd. belongs to a risk class for which the capitalization rate is 10%. It has 25,000 outstanding shares and the current market price is ₹ 100. It expects a net profit of ₹ 2,50,000 for the year and the Board is considering dividend of ₹ 5 per share. M Ltd. requires to raise ₹ 5,00,000 for an approved investment expenditure. ILLUSTRATE, how the MM approach affects the value of M Ltd. if dividends are paid or not paid.
2. The following information is supplied to you:

	₹
Total Earnings	2,00,000
No. of equity shares (of ₹ 100 each)	20,000
Dividend paid	1,50,000
Price/ Earnings ratio	12.5

Applying Walter's Model

- (i) ANALYSE whether the company is following an optimal dividend policy.
- (ii) COMPUTE P/E ratio at which the dividend policy will have no effect on the value of the share.

(iii) Will your decision change, if the P/E ratio is 8 instead of 12.5? ANALY

3. With the help of following figures CALCULATE the market price of a share of a company by using:

- Walter's formula
- Dividend growth model (Gordon's formula)

Earnings per share (EPS)	₹ 10
Dividend per share (DPS)	₹ 6
Cost of capital (K_e)	20%
Internal rate of return on investment	25%
Retention Ratio	40%

4. The dividend payout ratio of H Ltd. is 40%. If the company follows traditional approach to dividend policy with a multiplier of 9, COMPUTE P/E ratio.

ANSWERS/SOLUTIONS

Answers to the MCQs based Questions

1. (d) 2. (c) 3. (c) 4. (c) 5. (a) 6. (b)
7. (c)

Answers to Theoretical based Questions

- Please refer paragraph 10.2
- Please refer paragraph 10.4
- Please refer paragraph 10.3
- Please refer paragraph 10.8.1
- Please refer paragraph 10.8.3 (2)

Answer of Practical Problems

1. Given,

Cost of Equity (K_e)	10%
Number of shares in the beginning (n)	25,000
Current Market Price (P_0)	₹100

Net Profit (E)	₹2,50,000
Expected Dividend	₹5 per share
Investment (I)	₹5,00,000

Case 1 - When dividends are paid	Case 2 - When dividends are not paid
Step 1	Step 1
$P_o = \frac{P_1 + D_1}{1 + K_e}$ $100 = \frac{P_1 + 5}{1 + 0.10}$ $P_1 = 110 - 5 = 105$	$P_o = \frac{P_1 + D_1}{1 + K_e}$ $100 = \frac{P_1 + 0}{1 + 0.10}$ $P_1 = 110 - 0 = 110$
Step 3	Step 3
No. of shares required to be issued for balance fund	No. of shares required to be issued for balance fund
No. of shares = $\frac{\text{Funds required}}{\text{Price at end}(P_1)}$	No. of shares = $\frac{\text{Funds required}}{\text{Price at end}(P_1)}$
$\Delta n = \frac{3,75,000}{105}$ $= 3,571.4285$	$\Delta n = \frac{2,50,000}{110}$ $= 2,272.73$
Step 4	Step 4
Calculation of value of firm	Calculation of value of firm
$Vf = \frac{(n + \Delta n)P_1 - I + E}{(1 + k_e)}$ $Vf = \frac{\left(25,000 + \frac{3,75,000}{105}\right)105 - 5,00,000 + 2,50,000}{(1 + .10)}$ $= ₹ 25,00,000$	$Vf = \frac{(n + \Delta n)P_1 - I + E}{(1 + k_e)}$ $Vf = \frac{\left(25,000 + \frac{2,50,000}{110}\right)110 - 5,00,000 + 2,50,000}{(1 + 0.10)}$ $= ₹ 25,00,000$

2. (i) The EPS of the firm is ₹ 10 (i.e., ₹ 2,00,000/ 20,000). $r = 2,00,000/ (20,000 \text{ shares} \times ₹ 100) = 10\%$. The P/E Ratio is given at 12.5 and the cost of capital, K_e , may be taken at the inverse of P/E ratio. Therefore, K_e is 8 (i.e., 1/12.5). The firm is distributing total dividends of ₹ 1,50,000 among 20,000 shares, giving a dividend per share of ₹ 7.50. the value of the share as per Walter's model may be found as follows:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e} = \frac{7.5 + \frac{0.1}{0.08}(10 - 7.5)}{0.08} = ₹ 132.81$$

The firm has a dividend payout of 75% (i.e., ₹ 1,50,000) out of total earnings of ₹ 2,00,000. since, the rate of return of the firm, r , is 10% and it is more than the K_e of 8%, therefore, by distributing 75% of earnings, the firm is not following an optimal dividend policy. The optimal dividend policy for the firm would be to pay zero dividend and in such a situation, the market price would be

$$\frac{0 + \frac{0.1}{0.08}(10 - 0)}{0.08} = ₹ 156.25$$

So, theoretically the market price of the share can be increased by adopting a zero payout.

- (ii) The P/E ratio at which the dividend policy will have no effect on the value of the share is such at which the K_e would be equal to the rate of return, r , of the firm. The K_e would be 10% ($= r$) at the P/E ratio of 10. Therefore, at the P/E ratio of 10, the dividend policy would have no effect on the value of the share.
- (iii) If the P/E is 8 instead of 12.5, then the K_e which is the inverse of P/E ratio, would be 12.5 and in such a situation $k_e > r$ and the market price, as per Walter's model would be:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e} = \frac{7.5 + \frac{0.1}{0.125}(10 - 7.5)}{0.125} = ₹ 76$$

3. Market price per share by

(i) **Walter's model:**

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

$$= \frac{6 + \frac{0.25}{0.20}(10 - 6)}{0.20} = ₹ 55$$

(ii) **Gordon's model (Dividend Growth model):** When the growth is incorporated in earnings and dividend, the present value of market price per share (P_0) is determined as follows

Gordon's theory:



$$\text{Present market price per share } (P_0) = \frac{E(1-b)}{k - br}$$

Where,

P_0 = Present market price per share.

E = Earnings per share

b = Retention ratio (i.e. % of earnings retained)

r = Internal rate of return (IRR)

Hint:

Growth rate (g) = br

$$P_0 = \frac{10(1-0.40)}{0.20 - (0.4 \times 0.25)}$$

$$= ₹ \frac{6}{0.1}$$

$$= ₹60$$

4. The P/E ratio i.e. price earnings ratio can be computed with the help of the following formula:

$$\text{P/E ratio} = \frac{\text{MPS}}{\text{EPS}}$$

Since the D/P ratio is 40%,

$D = 40\% \text{ of } E \text{ i.e. } 0.4E$

Hence,

Market price per share (P) using Graham & Dodd's model =

$$P_0 = m \left(D + \frac{E}{3} \right)$$

Where,

P_0 = Market price per share

D = Dividend per share

E = Earnings per share

m = a multiplier

$$P_0 = 9 \left(0.4E + \frac{E}{3} \right)$$

$$P_0 = 9 \left(\frac{1.2E + E}{3} \right) = 3 (2.2E)$$

$$P_0 = 6.6E$$

$$\frac{P}{E} = 6.6 \text{ i.e. P/E ratio is 6.6 times}$$

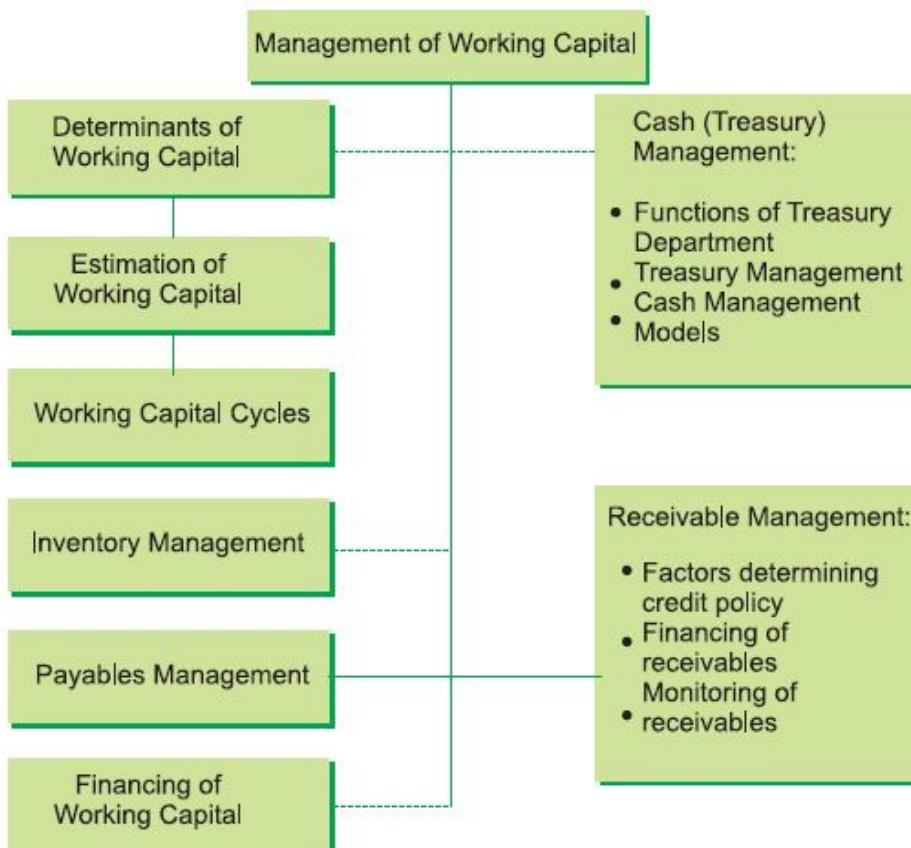
MANAGEMENT OF WORKING CAPITAL



LEARNING OUTCOMES

- Understanding the meaning, need and importance of working capital for smooth functioning of an entity.
- Understanding the factors which determine the working capital.
- Learning the methods of estimating working capital.
- Understanding the various components of working capital with its management.
- Understanding methods of receivable management.
- Learning the methods of evaluating receivables and implementation of credit policy.
- Learning the importance and management of treasury (cash) in an entity.
- Learning the various sources of working capital finance.
- Learning the importance of optimal inventory level and management of payables.

CHAPTER OVERVIEW



This chapter is Divided into Six Units:

UNIT I: Introduction to Working Capital Management

UNIT II: Treasury and Cash Management

UNIT III: Management of Inventory

UNIT IV: Management of Receivables

UNIT V: Management of Payables

UNIT VI: Financing of Working Capital

UNIT-I

INTRODUCTION TO WORKING CAPITAL MANAGEMENT



10.1 MEANING AND CONCEPT OF WORKING CAPITAL

In accounting term working capital is the difference between current assets and current liabilities. If we break down the components of working capital we will find working capital as follows:

$$\text{Working Capital} = \text{Current Assets} - \text{Current Liabilities}$$

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

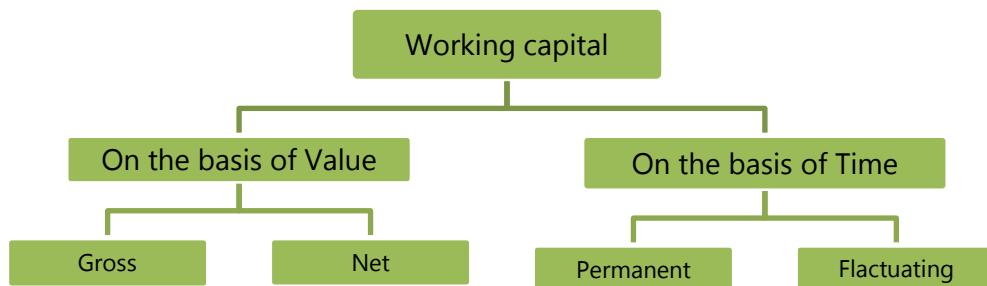
Generally current liabilities of an entity, for the purpose of working capital management can be grouped into the following main heads:

- (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.

The concept of working capital can also be explained through two angles.



(a) Value: From the value point of view, Working Capital can be defined as Gross Working Capital or Net Working Capital.

Gross working capital refers to the firm's investment in current assets.

Net working capital refers to the difference between current assets and current liabilities.

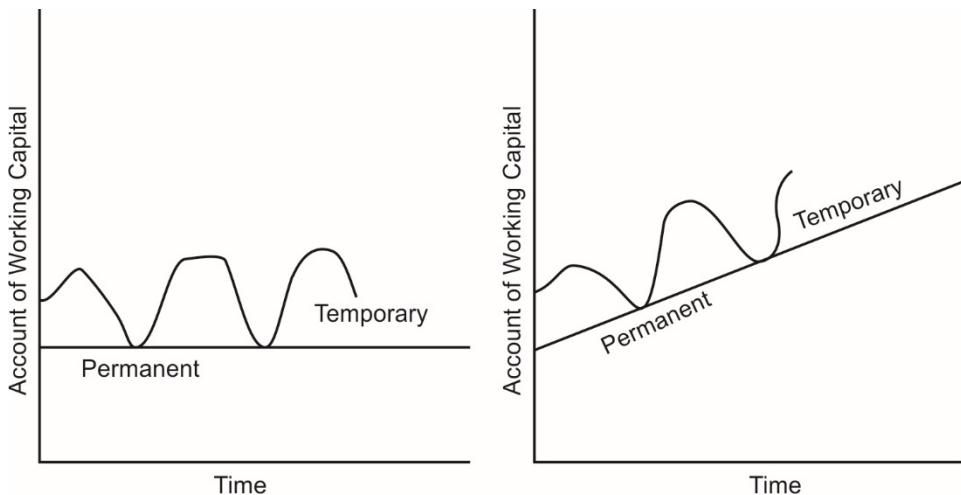
A positive working capital indicates the company's ability to pay its short-term liabilities. On the other hand a negative working capital shows inability of an entity to meet its short-term liabilities.

(b) Time: From the point of view of time, working capital can be divided into two categories viz., Permanent and Fluctuating (temporary).

Permanent working capital refers to the base working capital, which is the minimum level of investment in the current assets that is carried by the entity at all times to carry its day to day activities.

Temporary working capital refers to that part of total working capital, which is required by an entity in addition to the permanent working capital. It is also called variable working capital which is used to finance the short term working capital requirements which arises due to fluctuation in sales volume.

The following diagrams shows Permanent and Temporary or Fluctuating or variable working capital:



Both kinds of working capital i.e. permanent and fluctuating (temporary) are necessary to facilitate production and sales through the operating cycle.



10.2 SIGNIFICANCE OF WORKING CAPITAL

11.2.1 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 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.

10.2.2 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.



10.3 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 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. **Cash** – Identify the cash balance which allows for the business to **meet day-to-day expenses**, but reduces cash holding costs.
2. **Inventory** – Identify the **level of inventory** which allows for uninterrupted production but reduces the investment in raw materials and hence increases cash flow; the techniques like Just in Time (JIT) and Economic order quantity (EOQ) are used for this.
3. **Receivables** – Identify the **appropriate credit policy**, i.e., credit terms which will attract customers, such that any impact on cash flows and the cash conversion cycle will be offset by increased revenue and hence Return on Capital (or vice versa). The tools like Discounts and allowances are used for this.
4. **Short-term Financing Options** – Inventory is ideally financed by credit granted by the supplier; dependent on the cash conversion cycle, it may however, be necessary to utilize a bank loan (or overdraft), or to “convert debtors to cash” through “factoring” in order to finance working capital requirements.

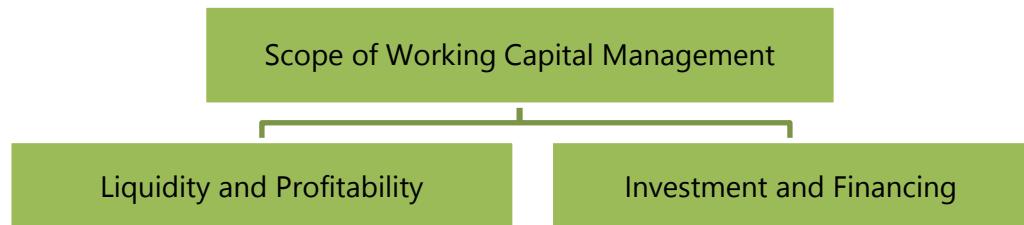
5. **Nature of Business** - For e.g. in a business of restaurant, most of the sales are in Cash. Therefore, need for working capital is very less.
6. **Market and Demand Conditions** - For e.g. if an item's demand far exceeds its production, the working capital requirement would be less as investment in finished goods inventory would be very less.
7. **Technology and Manufacturing Policies** - For e.g. in some businesses the **demand for goods is seasonal**, in that case a business may follow a policy for steady production through out over the whole year or instead may choose policy of production only during the demand season.
8. **Operating Efficiency** – A company can reduce the working capital requirement by **eliminating waste, improving coordination** etc.
9. **Price Level Changes** – For e.g. **rising prices necessitate the use of more funds** for maintaining an existing level of activity. For the same level of current assets, higher cash outlays are required. Therefore, the effect of rising prices is that a higher amount of working capital is required.



10.4 MANAGEMENT OF WORKING CAPITAL

The working capital of an entity can be termed as for example, life blood if an entity is compared with a living body; lubricant/ fuel if is an entity is compared with an engine. Working capital is required for smooth functioning of the business of an entity as lack of this may interrupt the ordinary activities. Hence, the working capital needs adequate attention and efficient management. When we talk about the management it involves 3 Es i.e. Economy, Efficiency and Effectiveness and all these three are required for the working capital management.

The scope of working capital management can be grouped into two broad areas (i) Profitability and Liquidity and (ii) Investment and Financing Decision.



10.4.1 Liquidity and Profitability

For uninterrupted and smooth functioning of the day to day business of an entity it is important to maintain liquidity of funds evenly. As we have already learnt in previous chapters that each rupee of capital bears some cost. So, while maintaining liquidity the cost aspect needs to be borne in mind. Unnecessary tying up of funds in idle assets not only reduces the liquidity but also reducing the opportunity to earn better return from a productive asset. Hence, a trade-off is required between the liquidity and profitability which increases the profitability without disturbing the day to day functioning. This requires **3Es** as discussed above i.e. **economy in financing, efficiency in utilisation and effectiveness in achieving** the intended objectives.

The trade-off between the components of working capital can be summarised as follows:

Component of Working Capital	Advantages of higher side (Profitability)	Trade-off (between Profitability and Liquidity)	Advantages of lower side (Liquidity)
Inventory	Fewer stock-outs increase the profitability.	Use techniques like EOQ, JIT etc. to carry optimum level of inventory.	Lower inventory requires less capital but endangered stock-out and loss of goodwill.
Receivables	Higher Credit period attract customers and increase revenue	Evaluate the credit policy; use the services of debt management (factoring) agencies.	Cash sales provide liquidity but fails to boost sales and revenue
Pre-payment of expenses	Reduces uncertainty and profitable in inflationary environment.	Cost-benefit analysis required	Improves or maintains liquidity.
Cash and Cash	Payables are honoured in time, improves the	Cash budgets and other cash management	Cash can be invested in some other

equivalents	goodwill and helpful in getting future discounts.	techniques can be used	investment avenues
Payables and Expenses	Capital can be used in some other investment avenues	Evaluate the credit policy and related cost.	Payables are honoured in time, improves the goodwill and helpful in getting future discounts.

10.4.2 Investment and Financing

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 unit 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:

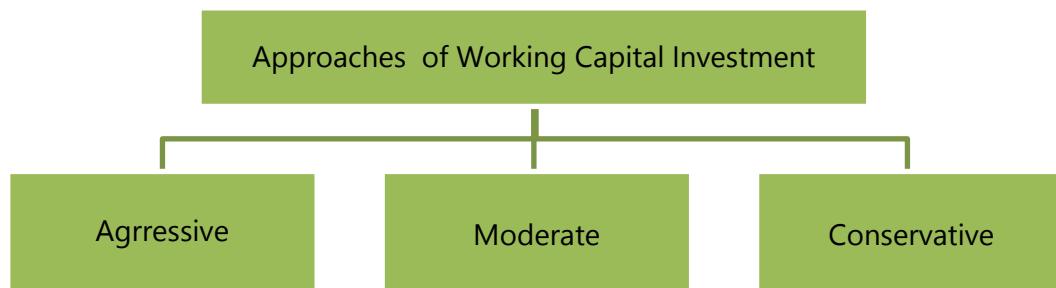
- (a) **Nature of Industry:** Construction companies, breweries etc. requires large investment in working capital due long gestation period.
- (b) **Types of products:** Consumer durable has large inventory as compared to perishable products.
- (c) **Manufacturing Vs Trading Vs Service:** A manufacturing 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.

10.4.3 Approaches of working capital investment

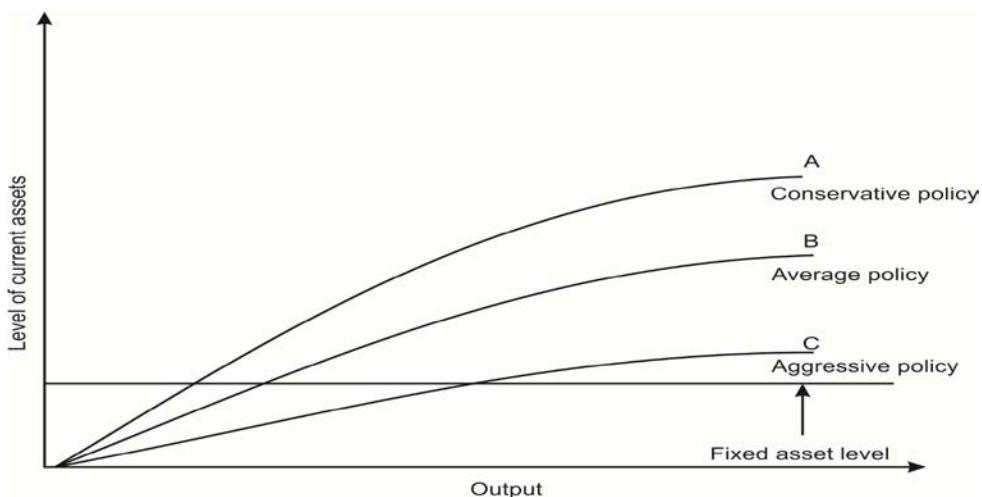
Based on the organisational policy and risk-return trade off, working capital investment decisions are categorised into three approaches i.e. aggressive, conservative and moderate.



(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.



10.4.4 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.

ILLUSTRATION 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. ANALYSE the effect of the three alternative current assets policies.

SOULTUION

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.



10.5 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.



10.6 OPERATING OR WORKING CAPITAL CYCLE

A useful tool for managing working capital is the operating cycle.

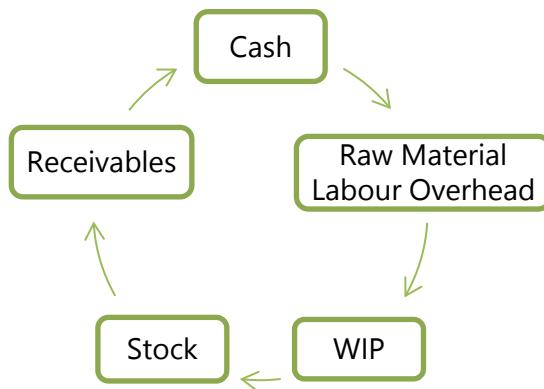
The operating cycle analyzes the accounts receivable, inventory and accounts payable cycles in terms of number of days. For example:

- Accounts receivables are analyzed by the average number of days it takes to collect an account.
- Inventory is analyzed by the average number of days it takes to turn over the sale of a product (from the point it comes in the store to the point it is converted to cash or an account receivable).
- Accounts payables are analyzed by the average number of days it takes to pay a supplier invoice.

Operating/Working Capital Cycle Definition

Working Capital cycle indicates the length of time between a company's paying for materials, entering into stock and receiving the cash from sales of finished goods. It can be determined by adding the number of days required for each stage in the cycle. For example, a company holds raw materials on an average for 60 days, it gets credit from the supplier for 15 days, production process needs 15 days, finished goods are held for 30 days and 30 days credit is extended to debtors. The total of all these, 120 days, i.e., $60 - 15 + 15 + 30 + 30$ days is the total working capital cycle.

Working Capital Cycle



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 faster a business expands the more cash it will need for working capital and investment. The cheapest and best sources of cash exist as working capital right within business. Good management of working capital will generate cash which will help improve profits and reduce risks. Bear in mind that the cost of providing credit to customers and holding stocks can represent a substantial proportion of a firm's total profits.

Each component of working capital (namely inventory, receivables and payables) has two dimensions Time and Money, when it comes to managing working capital then time is money. If you can get money to move faster around the cycle (e.g. collect monies due from debtors more quickly) or reduce the amount of money tied up (e.g. reduce inventory levels relative to sales), the business will generate

more cash or it will need to borrow less money to fund working capital. Similarly, if you can negotiate improved terms with suppliers e.g. get longer credit or an increased credit limit; you are effectively creating free finance to help fund future sales.

If you.....	Then
Collect receivables (debtors) faster	You release cash from the cycle
Collect receivables (debtors) slower	Your receivables soak up cash.
Get better credit (in terms of duration or amount) from suppliers.	You increase your cash resources.
Shift inventory (stocks) faster	You free up cash.
Move inventory (stocks) slower.	You consume more cash.

The determination of operating capital cycle helps in the forecast, control and management of working capital. The length of operating cycle is the indicator of performance of management. The net operating cycle represents the time interval for which the firm has to negotiate for Working Capital from its bankers. It enables to determine accurately the amount of working capital needed for the continuous operation of business activities.

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:

$$\text{Operating Cycle} = R + W + F + D - C$$

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 various components of Operating Cycle may be calculated as shown below:

(1)	Raw Material Storage Period	$= \frac{\text{Average stock of raw material}}{\text{Average Cost of Raw Material Consumption per day}}$
(2)	Work-in-Progress holding period	$= \frac{\text{Average Work-in-progress inventory}}{\text{Average Cost of Production per day}}$
(3)	Finished Goods storage period	$= \frac{\text{Average stock of finished goods}}{\text{Average Cost of Goods Sold per day}}$
(4)	Receivables (Debtors) collection period	$= \frac{\text{Average Receivables}}{\text{Average Credit Sales per day}}$
(5)	Credit period allowed by suppliers (Creditors)	$= \frac{\text{Average Payables}}{\text{Average Credit Purchases per day}}$

10.6.1 Working Capital Based on Operating Cycle

One of the methods for forecasting working capital requirement is based on the concept of operating cycle. The calculation of operating cycle and the formula for estimating working capital on its basis has been demonstrated with the help of following illustration:

ILLUSTRATION 2

From the following information of XYZ Ltd., you are required to CALCULATE:

- (a) Net operating cycle period.
- (b) Number of operating cycles in a year.

	(₹)
(i) Raw material inventory consumed during the year	6,00,000
(ii) Average stock of raw material	50,000
(iii) Work-in-progress inventory	5,00,000
(iv) Average work-in-progress inventory	30,000
(v) Finished goods inventory	8,00,000
(vi) Average finished goods stock held	40,000
(vii) Average collection period from debtors	45 days

(viii) Average credit period availed	30 days
(ix) No. of days in a year	360 days

SOLUTION

(a) Calculation of Net Operating Cycle period of XYZ Ltd.

$$\begin{aligned}
 & \text{Raw} \quad \text{Material} \quad \text{storage} \quad \text{period} \quad (R) = \\
 & \frac{\text{Average stock of raw material}}{\text{Average Cost of Raw Material Consumption per day}} \\
 & = \frac{\text{₹ } 50,000}{\text{₹ } 6,00,000 \div 360 \text{ days}} = \frac{\text{₹ } 50,000}{1,667} = 30 \text{ days}
 \end{aligned}$$

$$\begin{aligned}
 \text{Work-in-progress holding period (W)} &= \frac{\text{Average Work-in-progress inventory}}{\text{Average Cost of Production per day}} \\
 &= \frac{\text{₹ } 30,000}{\text{₹ } 5,00,000 \div 360 \text{ days}} = \frac{\text{₹ } 30,000}{1,389} \\
 &= 22 \text{ days}
 \end{aligned}$$

$$\begin{aligned}
 \text{Finished Goods storage period (F)} &= \frac{\text{Average stock of finished goods}}{\text{Average Cost of Goods Sold per day}} \\
 &= \frac{\text{₹ } 40,000}{\text{₹ } 8,00,000 \div 360 \text{ days}} = \frac{\text{₹ } 40,000}{2,222} \\
 &= 18 \text{ days}
 \end{aligned}$$

Receivables (Debtors) collection period (D) = 45 days

Credit Period allowed by creditors (C) = 30 days

Net Operating Cycle = R + W + F + D - C = 30 + 22 + 18 + 45 - 30 = 85 days

$$\begin{aligned}
 \text{(b) Number of Operating Cycles in a year} &= \frac{\text{No. of days in a year}}{\text{Operating Cycle period}} \\
 &= \frac{360 \text{ days}}{85 \text{ days}} = 4.23 \text{ times}
 \end{aligned}$$

10.6.2 Estimation of Amount of Different Components of Current Assets and Current Liabilities

The various constituents of current assets and current liabilities have a direct bearing on the computation of working capital and the operating cycle. The holding

period of various constituents of Current Assets and Current Liabilities cycle may either contract or expand the net operating cycle period.

Shorter the operating cycle period, lower will be the requirement of working capital and *vice-versa*.

Estimation of Current Assets

The estimates of various components of working capital may be made as follows:

(i) Raw Materials Inventory: The funds to be invested in raw materials inventory may be estimated on the basis of production budget, the estimated cost per unit and average holding period of raw material inventory by using the following formula:

$$\frac{\text{Estimated Production (units)}}{12 \text{ months} / 365 \text{ days}^*} \times \text{Estimated cost per unit} \times \text{Average raw material storage period}$$

(ii) Work-in-Progress Inventory: The funds to be invested in work-in-progress can be estimated by the following formula:

$$\frac{\text{Estimated Production (units)}}{12 \text{ months} / 365 \text{ days}^*} \times \text{Estimated WIP cost per unit} \times \text{Average WIP holding period} \times$$

(iii) Finished Goods: The funds to be invested in finished goods inventory can be estimated with the help of following formula:

$$\frac{\text{Estimated Production (units)}}{12 \text{ months} / 365 \text{ days}^*} \times \text{Estimated cost of production per unit} \times \text{Average finished goods storage period}$$

(iv) Receivables (Debtors): Funds to be invested in trade receivables (debtors) may be estimated with the help of following formula:

$$\frac{\text{Estimated Credit sales (units)}}{12 \text{ months} / 365 \text{ days}^*} \times \text{Estimated cost of sales (Excl. Dep.) per unit} \times \text{Average receivable collection period}$$

(v) Cash and Cash equivalents: Minimum desired Cash and Bank balance to be maintained by the firm has to be added in the current assets for the computation of working capital.

Estimation of Current Liabilities

Current liabilities are deducted from the current assets to get working capital. Hence, the amount of working capital is lowered to the extent of current liabilities (other than bank credit) arising in the normal course of business. The important current liabilities like trade payables, wages and overheads can be estimated as follows:

(i) Trade Payables: Trade payable can be estimated on the basis of material purchase budget and the credit purchase.

$$\frac{\text{Estimated credit purchase}}{12 \text{ months} / 365 \text{ days}^*} \times \text{Credit period allowed by suppliers}$$

(ii) Direct Wages: It is estimated with the help of direct wages budget.

$$\frac{\text{Estimated labour hours} \times \text{wages rate per hour}}{12 \text{ months} / 365 \text{ days}^*} \times \text{Average time lag in payment of wages}$$

(iii) Overheads (other than depreciation and amortization):

$$\frac{\text{Estimated Overheads}}{12 \text{ months} / 360 \text{ days}^*} \times \text{Average time lag in payment of overheads}$$

**Number of days in a year may be taken as 365 or 360 days.*

Estimation of Working Capital Requirements

		Amount	Amount	Amount
I.	Current Assets:			
	Inventories:			
	-Raw Materials	---		
	-Work-in-process	---		
	-Finished goods	---	---	
	Receivables:			
	-Trade debtors	---		
	-Bills	---	---	
	Minimum Cash Balance		---	
	Gross Working Capital		---	---

II.	Current Liabilities:			
	Trade Payables		---	
	Bills Payables		---	
	Wages Payables		---	
	Payables for overheads		---	---
III.	Excess of Current Assets over Current Liabilities [I – II]			---
IV.	Add: Safety Margin			---
V.	Net Working Capital [III + IV]			---

The following illustration shows the process of working capital estimation:

ILLUSTRATION 3

On 1st January, the Managing Director of Naureen Ltd. wishes to know the amount of working capital that will be required during the year. From the following information PREPARE the working capital requirements forecast.

Production during the previous year was 60,000 units. It is planned that this level of activity would be maintained during the present year.

The expected ratios of the cost to selling prices are Raw materials 60%, Direct wages 10% and Overheads 20%.

Raw materials are expected to remain in store for an average of 2 months before issue to production.

Each unit is expected to be in process for one month, the raw materials being fed into the pipeline immediately and the labour and overhead costs accruing evenly during the month.

Finished goods will stay in the warehouse awaiting dispatch to customers for approximately 3 months.

Credit allowed by creditors is 2 months from the date of delivery of raw material.

Credit allowed to debtors is 3 months from the date of dispatch.

Selling price is ₹5 per unit.

There is a regular production and sales cycle.

Wages and overheads are paid on the 1st of each month for the previous month.

The company normally keeps cash in hand to the extent of ₹20,000.

SOLUTION**Working Notes:**

1. **Raw material inventory:** The cost of materials for the whole year is 60% of the Sales value.

Hence it is $60,000 \text{ units} \times ₹ 5 \times \frac{60}{100} = ₹ 1,80,000$. The monthly consumption of raw material would be ₹ 15,000. Raw material requirements would be for two months; hence raw materials in stock would be ₹ 30,000.

2. **Work-in-process:** (Students may give special attention to this point). It is stated that each unit of production is expected to be in process for one month).

		(₹)
(a)	Raw materials in work-in-process (being one month's raw material requirements)	15,000
(b)	Labour costs in work-in-process (It is stated that it accrues evenly during the month. Thus, on the first day of each month it would be zero and on the last day of month the work-in-process would include one month's labour costs. On an average therefore, it would be equivalent to $\frac{1}{2}$ of the month's labour costs) $\left(\frac{10\% \text{ of } (60,000 \times ₹ 5)}{12 \text{ months}} \times 0.5 \text{ month} \right)$	1,250
(c)	Overheads (For $\frac{1}{2}$ month as explained above) $\left(\frac{20\% \text{ of } (60,000 \times ₹ 5)}{12 \text{ months}} \times 0.5 \text{ month} \right)$	2,500
	Total work-in-process	18,750

3. **Finished goods inventory:** (3 month's cost of production)

Raw materials $\left(\frac{60\% \text{ of } (60,000 \times ₹ 5)}{12 \text{ months}} \times 3 \text{ months} \right)$	45,000
---	--------

Labour $\left(\frac{10\% \text{ of } (60,000 \times ₹5)}{12 \text{ months}} \times 3 \text{ months} \right)$	7,500
Overheads $\left(\frac{20\% \text{ of } (60,000 \times ₹5)}{12 \text{ months}} \times 3 \text{ months} \right)$	15,000
	67,500

4. **Debtors:** The total cost of sales = 2,70,000.

$$\text{Therefore, debtors} = ₹2,70,000 \times \frac{3}{12} = ₹67,500$$

Total Cost of Sales = RM + Wages + Overheads + Opening Finished goods inventory – Closing finished goods inventory.

$$= ₹1,80,000 + ₹30,000 + ₹60,000 + ₹67,500 - ₹67,500 = ₹2,70,000.$$

5. **Creditors:** Suppliers allow a two months' credit period. Hence, the average amount of creditors would be two months consumption of raw materials i.e. $\left(\frac{60\% \text{ of } (60,000 \times ₹5)}{12 \text{ months}} \times 2 \text{ months} \right) = ₹30,000.$

6. **Direct Wages payable:** $\left(\frac{10\% \text{ of } (60,000 \times ₹5)}{12 \text{ months}} \times 1 \text{ month} \right) = ₹2,500$

7. **Overheads Payable:** $\left(\frac{20\% \text{ of } (60,000 \times ₹5)}{12 \text{ months}} \times 1 \text{ month} \right) = ₹5,000$

Here it has been assumed that inventory level is uniform throughout the year, therefore opening inventory equals closing inventory.

Statement of Working Capital Required:

	(₹)	(₹)
Current Assets:		
Raw materials inventory (Refer to working note 1)	30,000	
Working-in-process (Refer to working note 2)	18,750	
Finished goods inventory (Refer to working note 3)	67,500	
Debtors (Refer to working note 4)	67,500	

Cash	20,000	2,03,750
Current Liabilities:		
Creditors (Refer to working note 5)	30,000	
Direct wages payable (Refer to working note 6)	2,500	
Overheads payable (Refer to working note 7)	5,000	(37,500)
Estimated working capital requirements		1,66,250

10.6.3 Working Capital Requirement Estimation based on Cash Cost

We have already seen that working capital is the difference between current assets and current liabilities. To estimate requirements of working capital, we have to forecast the amount required for each item of current assets and current liabilities.

In practice another approach may also be useful in estimating working capital requirements. This approach is based on the fact that in **the case of current assets, like sundry debtors and finished goods, etc., the exact amount of funds blocked is less than the amount of such current assets**. For example:

- If we have sundry debtors worth ₹ 1 lakh and our cost of production is ₹ 75,000, the actual amount of funds blocked in sundry debtors is ₹ 75,000 the cost of sundry debtors, the rest (₹ 25,000) is profit.
- Again some of the cost items also are non-cash costs; depreciation is a non-cash cost item. Suppose out of ₹ 75,000, ₹ 5,000 is depreciation; then it is obvious that the actual funds blocked in terms of sundry debtors totalling ₹ 1 lakh is only ₹ 70,000. In other words, ₹ 70,000 is the amount of funds required to finance sundry debtors worth ₹ 1 lakh.
- Similarly, in the case of finished goods which are valued at cost, non-cash costs may be excluded to work out the amount of funds blocked.

Many experts, therefore, calculate the working capital requirements by working out the cash costs of finished goods and sundry debtors. Under this approach, the debtors are calculated not as a percentage of sales value but as a percentage of cash costs. Similarly, finished goods are valued according to cash costs.

ILLUSTRATION 4

The following annual figures relate to XYZ Co.,

	(₹)
Sales (at two months' credit)	36,00,000
Materials consumed (suppliers extend two months' credit)	9,00,000
Wages paid (1 month lag in payment)	7,20,000
Cash manufacturing expenses (expenses are paid one month in arrear)	9,60,000
Administrative expenses (1 month lag in payment)	2,40,000
Sales promotion expenses (paid quarterly in advance)	1,20,000

The company sells its products on gross profit of 25%. Depreciation is considered as a part of the cost of production. It keeps one month's stock each of raw materials and finished goods, and a cash balance of ₹ 1,00,000.

Assuming a 20% safety margin, COMPUTE the working capital requirements of the company on cash cost basis. Ignore work-in-process.

SOLUTION

Statement of Working Capital requirements (cash cost basis)

	(₹)	(₹)
A. Current Asset		
Inventory:		
Raw materials $\left(\frac{\text{₹} 9,00,000}{12 \text{months}} \times 1 \text{month} \right)$	75,000	
Finished Goods $\left(\frac{\text{₹} 25,80,000}{12 \text{months}} \times 1 \text{month} \right)$	2,15,000	
Receivables (Debtors) $\left(\frac{\text{₹} 29,40,000}{12 \text{months}} \times 2 \text{months} \right)$	4,90,000	
Sales Promotion expenses paid in advance $\left(\frac{\text{₹} 1,20,000}{12 \text{months}} \times 3 \text{months} \right)$	30,000	
Cash balance	1,00,000	9,10,000
Gross Working Capital		9,10,000
B. Current Liabilities:		
Payables:		

Creditors for materials $\left(\frac{\text{₹ } 9,00,000}{12 \text{months}} \times 2 \text{ month} \right)$	1,50,000	
Wages outstanding $\left(\frac{\text{₹ } 7,20,000}{12 \text{months}} \times 1 \text{ month} \right)$	60,000	
Manufacturing expenses outstanding $\left(\frac{\text{₹ } 9,60,000}{12 \text{months}} \times 1 \text{ month} \right)$	80,000	
Administrative expenses outstanding $\left(\frac{\text{₹ } 2,40,000}{12 \text{months}} \times 1 \text{ month} \right)$	20,000	3,10,000
Net working capital (A - B)		6,00,000
Add: Safety margin @ 20%		1,20,000
Total Working Capital requirements		7,20,000

Working Notes:

(i) Computation of Annual Cash Cost of Production	(₹)
Material consumed	9,00,000
Wages	7,20,000
Manufacturing expenses	9,60,000
Total cash cost of production	25,80,000
(ii) Computation of Annual Cash Cost of Sales:	(₹)
Cash cost of production as in (i) above	25,80,000
Administrative Expenses	2,40,000
Sales promotion expenses	1,20,000
Total cash cost of sales	29,40,000

Since, the cash manufacturing expenses is already given in the question hence, the amount of depreciation need not to be computed. However, if it were required to be then it could be computed as follows:

	(₹)
Sales	36,00,000

Less: Gross profit (25% of ₹36,00,000)	(9,00,000)
Cost of Production (including depreciation)	27,00,000
Less: Cash Cost of Production (as calculated above)	(25,80,000)
Depreciation (Balancing figure)	1,20,000

10.6.4 Effect of Double Shift Working on Working Capital Requirements

The greatest economy in introducing double shift is the greater use of fixed assets. Though production increases but little or very marginal funds may be required for additional assets.

But increase in the number of hours of production has an effect on the working capital requirements. Let's see the **impact of double shift** on some of the components of working capital:-

- It is obvious that in double shift working, an increase in stocks will be required as the production rises. However, it is quite possible that the increase may not be proportionate to the rise in production since the minimum level of stocks may not be very much higher. Thus, it is quite likely that the level of stocks may not be required to be doubled as the production goes up two-fold.
- The amount of materials in process will not change due to double shift working since work started in the first shift will be completed in the second; hence, capital tied up in materials in process will be the same as with single shift working. As such the cost of work-in-process will not change unless the second shift's workers are paid at a higher rate.

ILLUSTRATION 5

Samreen Enterprises has been operating its manufacturing facilities till 31.3.2017 on a single shift working with the following cost structure:

	Per unit (₹)
Cost of Materials	6.00
Wages (out of which 40% fixed)	5.00
Overheads (out of which 80% fixed)	5.00
Profit	<u>2.00</u>
Selling Price	<u>18.00</u>
<i>Sales during 2016-17 – ₹4,32,000.</i>	

As at 31.3.2017 the company held:

	(₹)
Stock of raw materials (at cost)	36,000
Work-in-progress (valued at prime cost)	22,000
Finished goods (valued at total cost)	72,000
Sundry debtors	1,08,000

In view of increased market demand, it is proposed to double production by working an extra shift. It is expected that a 10% discount will be available from suppliers of raw materials in view of increased volume of business. Selling price will remain the same. The credit period allowed to customers will remain unaltered. Credit availed of from suppliers will continue to remain at the present level i.e., 2 months. Lag in payment of wages and expenses will continue to remain half a month.

You are required to PREPARE the additional working capital requirements, if the policy to increase output is implemented.

SOLUTION

This question can be solved using two approaches:

- (i) To assess the impact of double shift for long term as a matter of production policy.
- (ii) To assess the impact of double shift to mitigate the immediate demand for next year only.

The first approach is more appropriate and fulfilling the requirement of the question.

Workings:

- (1) Statement of cost at single shift and double shift working

	24,000 units		48,000 Units	
	Per unit (₹)	Total (₹)	Per unit (₹)	Total (₹)
Raw materials	6.00	1,44,000	5.40	2,59,200
Wages - Variable	3.00	72,000	3.00	1,44,000
Fixed	2.00	48,000	1.00	48,000
Overheads - Variable	1.00	24,000	1.00	48,000
Fixed	4.00	96,000	2.00	96,000
Total cost	16.00	3,84,000	12.40	5,95,200
Profit	2.00	48,000	5.60	2,68,800
	18.00	4,32,000	18.00	8,64,000

$$(2) \text{ Sales in units 2016-17} = \frac{\text{Sales}}{\text{Unit selling price}} = \frac{\text{₹ 4,32,000}}{\text{₹ 18}} = 24,000 \text{ units}$$

$$(3) \text{ Stock of Raw Materials in units on 31.3.2017} = \frac{\text{Value of stock}}{\text{Cost per unit}} = \frac{\text{₹ 36,000}}{6} \\ = 6,000 \text{ units}$$

(4) Stock of work-in-progress in units on 31.3.2017

$$= \frac{\text{Value of work-in-progress}}{\text{Prime Cost per unit}} = \frac{\text{₹ 22,000}}{(\text{₹ 6} + \text{₹ 5})} = 2,000 \text{ units}$$

(5) Stock of finished goods in units 2016-17

$$= \frac{\text{Value of stock}}{\text{Total Cost per unit}} = \frac{\text{₹ 72,000}}{\text{₹ 16}} = 4,500 \text{ units.}$$

(i) **Assessment of impact of double shift for long term as a matter of production policy:**

Comparative Statement of Working Capital Requirement

	Single Shift			Double Shift		
	Unit	Rate (₹)	Amount (₹)	Unit	Rate (₹)	Amount (₹)
Current Assets						
Inventories :						
Raw Materials	6,000	6.00	36,000	12,000	5.40	64,800
Work-in-Progress	2,000	11.00	22,000	2,000	9.40	18,800
Finished Goods	4,500	16.00	72,000	9,000	12.40	1,11,600
Sundry Debtors	6,000	16.00	96,000	12,000	12.40	1,48,800
Total Current Assets: (A)			2,26,000			3,44,000
Current Liabilities						
Creditors for Materials	4,000	6.00	24,000	8,000	5.40	43,200
Creditors for Wages	1,000	5.00	5,000	2,000	4.00	8,000
Creditors for Expenses	1,000	5.00	5,000	2,000	3.00	6,000
Total Current Liabilities: (B)			34,000			57,200
Working Capital: (A) – (B)			1,92,000			2,86,800

Additional Working Capital requirement = ₹ 2,86,800 – ₹ 1,92,000 = ₹ 94,800

(ii) Assessment of the impact of double shift to mitigate the immediate demand for next year only.

Workings:

(6) Calculation of no. of units to be sold:

No. of units to be Produced	48,000
Add: Opening stock of finished goods	4,500
Less: Closing stock of finished goods	(9,000)
No. of units to be Sold	43,500

(7) Calculation of Material to be consumed and materials to be purchased in units:

No. of units Produced	48,000
Add: Closing stock of WIP	2,000
Less: Opening stock of finished goods	(2,000)
Raw Materials to be consumed in units	48,000
Add: Closing stock of Raw material	12,000
Less: Opening stock of Raw material	(6,000)
Raw Materials to be purchased (in units)	54,000

(8) Credit allowed by suppliers:

$$\frac{\text{No. of units to purchase} \times \text{Cost per unit}}{12 \text{ months}} \times 2 \text{ months} = \frac{54,000 \times ₹ 5.40}{12 \text{ months}} \times 2 \text{ months}$$

$$= ₹ 48,600$$

Comparative Statement of Working Capital Requirement

	Single Shift			Double Shift		
	Unit	Rate (₹)	Amount (₹)	Unit	Rate (₹)	Amount (₹)
Current Assets						
Inventories:						
Raw Materials	6,000	6.00	36,000	12,000	5.40	64,800
Work-in-Progress	2,000	11.00	22,000	2,000	9.40	18,800
Finished Goods	4,500	16.00	72,000	9,000	12.40	1,11,600
Sundry Debtors	6,000	16.00	96,000	12,000	12.40	1,48,800
Total Current Assets: (A)			2,26,000			3,44,000

Current Liabilities						
Creditors for Materials	4,000	6.00	24,000	9,000	5.40	48,600
Creditors for Wages	1,000	5.00	5,000	2,000	4.00	8,000
Creditors for Expenses	1,000	5.00	5,000	2,000	3.00	6,000
Total Current Liabilities: (B)			34,000			62,600
Working Capital: (A) – (B)			1,92,000			2,81,400

Additional Working Capital requirement = ₹ 2,81,400 – ₹ 1,92,000 = ₹ 89,400

Notes:

- (i) The quantity of material in process will not change due to double shift working since work started in the first shift will be completed in the second shift.
- (ii) It is given in the question that the WIP is valued at prime cost hence, it is assumed that the WIP is 100% complete in respect of material and labour.
- (iii) In absence of any information on proportion of credit sales to total sales, debtors quantity has been doubled for double shift.
- (iv) It is assumed that all purchases are on credit.
- (v) The valuation of work-in-progress based on prime cost as per the policy of the company is as under.

	Single shift (₹)	Double shift (₹)
Materials	6.00	5.40
Wages – Variable	3.00	3.00
Fixed	2.00	1.00
	11.00	9.40

UNIT-II

TREASURY AND CASH MANAGEMENT

**10.7 TREASURY MANAGEMENT: MEANING**

In the wake of the competitive business environment resulting from the liberalization of the economy, there is a pressure to manage cash scientifically. The demand for funds for expansions coupled with high interest rates, foreign exchange volatility and the growing volume of financial transactions have necessitated efficient management of money.

Treasury management is defined as 'the corporate handling of all financial matters, the generation of external and internal funds for business, the management of currencies and cash flows and the complex, strategies, policies and procedures of corporate finance.'

The treasury management mainly deals with:-

- Working capital management; and
- Financial risk management (It includes forex and interest rate management).

The key goals of treasury management are:-

- Maximize the return on the available cash;
- Minimize interest cost on borrowings;
- Mobilise as much cash as possible for corporate ventures (in case of need); and
- Effective dealing in forex, money and commodity markets to reduce risks arising because of fluctuating exchange rates, interest rates and prices which can affect the profitability of the organization.

**10.8 FUNCTIONS OF TREASURY DEPARTMENT**

1. **Cash Management:** It involves efficient cash collection process and managing payment of cash both inside the organisation and to third parties.

There may be complete centralization within a group treasury or the treasury may simply advise subsidiaries and divisions on policy matter viz., collection/payment periods, discounts, etc.

Treasury will also manage surplus funds in an investment portfolio. Investment policy will consider future needs for liquid funds and acceptable levels of risk as determined by company policy.

2. **Currency Management:** The treasury department manages the foreign currency risk exposure of the company. In a large multinational company (MNC) the first step will usually be to set off intra-group indebtedness. The use of matching receipts and payments in the same currency will save transaction costs. Treasury might advise on the currency to be used when invoicing overseas sales.

The treasury will manage any net exchange exposures in accordance with company policy. If risks are to be minimized then forward contracts can be used either to buy or sell currency forward.

3. **Fund Management:** Treasury department is responsible for planning and sourcing the company's short, medium and long-term cash needs. Treasury department will also participate in the decision on capital structure and forecast future interest and foreign currency rates.
4. **Banking:** It is important that a company maintains a good relationship with its bankers. Treasury department carry out negotiations with bankers and act as the initial point of contact with them. Short-term finance can come in the form of bank loans or through the sale of commercial paper in the money market.
5. **Corporate Finance:** Treasury department is involved with both acquisition and divestment activities within the group. In addition, it will often have responsibility for investor relations. The latter activity has assumed increased importance in markets where share-price performance is regarded as crucial and may affect the company's ability to undertake acquisition activity or, if the price falls drastically, render it vulnerable to a hostile bid.



10.9 MANAGEMENT OF CASH

Management of cash is an important function of the finance manager. It is concerned with the managing of:-

- (i) Cash flows into and out of the firm;
- (ii) Cash flows within the firm; and
- (iii) Cash balances held by the firm at a point of time by financing deficit or investing surplus cash.

The main objectives of cash management for a business are:-

- Provide adequate cash to each of its units;
- No funds are blocked in idle cash; and
- The surplus cash (if any) should be invested in order to maximize returns for the business.

A cash management scheme therefore, is a delicate balance between the twin objectives of liquidity and costs.

10.9.1 The Need for Cash

The following are three basic considerations in determining the amount of cash or liquidity as have been outlined by Lord Keynes:

- *Transaction need:* Cash facilitates the meeting of the day-to-day expenses and other debt payments. Normally, inflows of cash from operations should be sufficient for this purpose. But sometimes this inflow may be temporarily blocked. In such cases, it is only the reserve cash balance that can enable the firm to make its payments in time.
- *Speculative needs:* Cash may be held in order to take advantage of profitable opportunities that may present themselves and which may be lost for want of ready cash/settlement.
- *Precautionary needs:* Cash may be held to act as for providing safety against unexpected events. Safety as is explained by the saying that a man has only three friends an old wife, an old dog and money at bank.

10.9.2 Cash Planning

Cash Planning is a technique to plan and control the use of cash. This protects the financial conditions of the firm by developing a projected cash statement from a forecast of expected cash inflows and outflows for a given period. This may be done periodically either on daily, weekly or monthly basis. The period and frequency of cash planning generally depends upon the size of the firm and philosophy of management. As firms grows and business operations become complex, cash planning becomes inevitable for continuing success.

The very first step in this direction is to estimate the requirement of cash. For this purpose, cash flow statements and cash budget are required to be prepared. The technique of preparing cash flow and funds flow statements have been discussed in Accounting paper at Intermediate level of CA course. The preparation of cash budget has however, been demonstrated here.

10.9.3 Cash Budget

Cash Budget is the most significant device to plan for and control cash receipts and payments. This represents cash requirements of business during the budget period.

The various purposes of cash budgets are:-

- Coordinate the timings of cash needs. It identifies the period(s) when there might either be a shortage of cash or an abnormally large cash requirement;
- It also helps to pinpoint period(s) when there is likely to be excess cash;
- It enables firm which has sufficient cash to take advantage like cash discounts on its accounts payable; and
- Lastly it helps to plan/arrange adequately needed funds (avoiding excess/shortage of cash) on favorable terms.

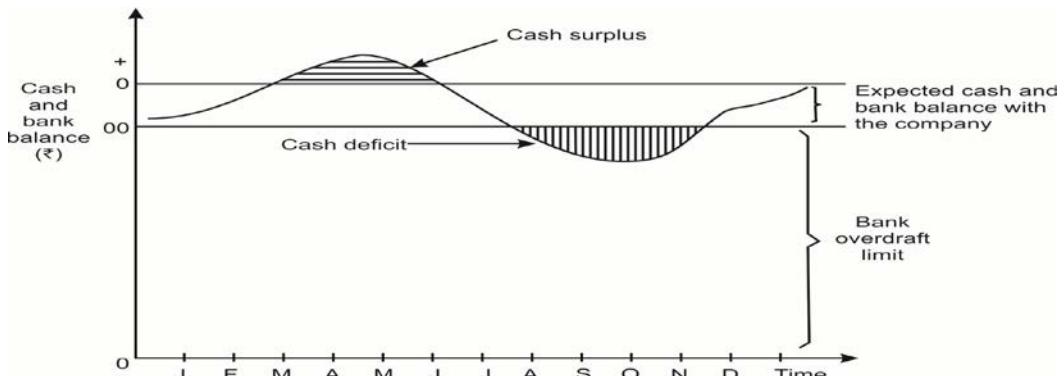
On the basis of cash budget, the firm can decide to invest surplus cash in marketable securities and earn profits.

Main Components of Cash Budget

Preparation of cash budget involves the following steps:-

- (a) Selection of the period of time to be covered by the budget. It is also defining the planning horizon.
- (b) Selection of factors that have a bearing on cash flows. The factors that generate cash flows are generally divided into following two categories:-
 - (i) Operating (cash flows generated by operations of the firm); and
 - (ii) Financial (cash flows generated by financial activities of the firm).

The following figure highlights the cash surplus and cash shortage position over the period of cash budget for preplanning to take corrective and necessary steps.





10.10 METHODS OF CASH FLOW BUDGETING

A cash budget can be prepared in the following ways:

1. **Receipts and Payments Method:** In this method all the expected receipts and payments for budget period are considered. All the cash inflow and outflow of all functional budgets including capital expenditure budgets are considered. Accruals and adjustments in accounts will not affect the cash flow budget. Anticipated cash inflow is added to the opening balance of cash and all cash payments are deducted from this to arrive at the closing balance of cash. This method is commonly used in business organizations.
2. **Adjusted Income Method:** In this method the annual cash flows are calculated by adjusting the sales revenues and cost figures for delays in receipts and payments (change in debtors and creditors) and eliminating non-cash items such as depreciation.
3. **Adjusted Balance Sheet Method:** In this method, the budgeted balance sheet is predicted by expressing each type of asset and short-term liabilities as percentage of the expected sales. The profit is also calculated as a percentage of sales, so that the increase in owner's equity can be forecasted. Known adjustments, may be made to long-term liabilities and the balance sheet will then show if additional finance is needed.

It is important to note that the capital budget will also be considered in the preparation of cash flow budget because the annual budget may disclose a need for new capital investments and also, the costs and revenues of any new projects coming on stream will need to be incorporated in the short-term budgets.

The Cash Budget can be prepared for short period or for long period.

10.10.1 Cash budget for short period

Preparation of cash budget month by month would require the following estimates:

- (a) *As regards receipts:*
 1. Receipts from debtors;
 2. Cash Sales; and
 3. Any other source of receipts of cash (say, dividend from a subsidiary company)

(b) *As regards payments:*

1. Payments to be made for purchases;
2. Payments to be made for expenses;
3. Payments that are made periodically but not every month;
 - (i) **Debenture interest;**
 - (ii) **Income tax paid in advance;**
 - (iii) **Sales tax etc.**
4. Special payments to be made in a particular month, for example, dividends to shareholders, redemption of debentures, repayments of loan, payment of assets acquired, etc.

Format of Cash Budget

_____ Co. Ltd.

Cash Budget

Period _____

	Month 1	Month 2	Month 3		Month 12
<i>Receipts:</i>					
1. Opening balance					
2. Collection from debtors					
3. Cash sales					
4. Loans from banks					
5. Share capital					
6. Miscellaneous receipts					
7. Other items					
Total					
<i>Payments:</i>					
1. Payments to creditors					
2. Wages					
3. Overheads					
(a)					

(b)					
(c)					
4. Interest					
5. Dividend					
6. Corporate tax					
7. Capital expenditure					
8. Other items					
Total					
Closing balance					
[Surplus (+)/Shortfall (-)]					

Students are required to do good practice in preparing the cash budgets. The following illustration will show how short term cash budgets can be prepared.

ILLUSTRATION 6

PREPARE monthly cash budget for six months beginning from April 2017 on the basis of the following information:-

(i) *Estimated monthly sales are as follows:-*

	₹		₹
January	1,00,000	June	80,000
February	1,20,000	July	1,00,000
March	1,40,000	August	80,000
April	80,000	September	60,000
May	60,000	October	1,00,000

(ii) *Wages and salaries are estimated to be payable as follows:-*

	₹		₹
April	9,000	July	10,000
May	8,000	August	9,000
June	10,000	September	9,000

(iii) *Of the sales, 80% is on credit and 20% for cash. 75% of the credit sales are collected within one month and the balance in two months. There are no bad debt losses.*

- (iv) Purchases amount to 80% of sales and are made on credit and paid for in the month preceding the sales.
- (v) The firm has 10% debentures of ₹ 1,20,000. Interest on these has to be paid quarterly in January, April and so on.
- (vi) The firm is to make an advance payment of tax of ₹ 5,000 in July, 2017.
- (vii) The firm had a cash balance of ₹ 20,000 on April 1, 2017, which is the minimum desired level of cash balance. Any cash surplus/deficit above/below this level is made up by temporary investments/liquidation of temporary investments or temporary borrowings at the end of each month (interest on these to be ignored).

SOLUTION

Workings:

Collection from debtors:

(Amount in ₹)

	February	March	April	May	June	July	August	September
Total sales	1,20,000	1,40,000	80,000	60,000	80,000	1,00,000	80,000	60,000
Credit sales (80% of total sales)	96,000	1,12,000	64,000	48,000	64,000	80,000	64,000	48,000
Collections:								
One month		72,000	84,000	48,000	36,000	48,000	60,000	48,000
Two months			24,000	28,000	16,000	12,000	16,000	20,000
Total collections			1,08,000	76,000	52,000	60,000	76,000	68,000

Monthly Cash Budget for Six months, April to September, 2017

(Amount in ₹)

Receipts:		April	May	June	July	August	September
Opening balance		20,000	20,000	20,000	20,000	20,000	20,000
Cash sales		16,000	12,000	16,000	20,000	16,000	12,000

Collection from debtors	1,08,000	76,000	52,000	60,000	76,000	68,000
Total cash available (A)	1,44,000	1,08,000	88,000	1,00,000	1,12,000	1,00,000
Payments:						
Purchases	48,000	64,000	80,000	64,000	48,000	80,000
Wages & salaries	9,000	8,000	10,000	10,000	9,000	9,000
Interest on debentures	3,000	---	----	3,000	---	----
Tax payment	---	---	----	5,000	----	----
Total payments (B)	60,000	72,000	90,000	82,000	57,000	89,000
Minimum cash balance desired	20,000	20,000	20,000	20,000	20,000	20,000
Total cash needed (C)	80,000	92,000	1,10,000	1,02,000	77,000	1,09,000
Surplus - deficit (A-C)	64,000	16,000	(22,000)	(2,000)	35,000	(9,000)
Investment/financing						
Temporary Investments	(64,000)	(16,000)	----		(35,000)	-----
Liquidation of temporary investments or temporary borrowings	----	----	22,000	2,000	----	9,000
Total effect of investment/financing (D)	(64,000)	(16,000)	22,000	2,000	(35,000)	9,000
Closing cash balance (A+D-B)	20,000	20,000	20,000	20,000	20,000	20,000

ILLUSTRATION 7

From the following information relating to a departmental store, you are required to PREPARE for the three months ending 31st March, 2019:-

- Month-wise cash budget on receipts and payments basis; and
- Statement of Sources and uses of funds for the three months period.

It is anticipated that the working capital at 1st January, 2019 will be as follows:-

			₹ in '000's
Cash in hand and at bank			545

<i>Short term investments</i>			300
<i>Debtors</i>			2,570
<i>Stock</i>			1,300
<i>Trade creditors</i>			2,110
<i>Other creditors</i>			200
<i>Dividends payable</i>			485
<i>Tax due</i>			320
<i>Plant</i>			800
<i>Budgeted Profit Statement:</i>	₹ in '000's		
	January	February	March
<i>Sales</i>	2,100	1,800	1,700
<i>Cost of sales</i>	1,635	1,405	1,330
<i>Gross Profit</i>	465	395	370
<i>Administrative, Selling and Distribution Expenses</i>	315	270	255
<i>Net Profit before tax</i>	150	125	115

<i>Budgeted balances at the end of each months:</i>	₹ in '000's		
	31st Jan.	28th Feb.	31st March
<i>Short term investments</i>	700	---	200
<i>Debtors</i>	2,600	2,500	2,350
<i>Stock</i>	1,200	1,100	1,000
<i>Trade creditors</i>	2,000	1,950	1,900
<i>Other creditors</i>	200	200	200
<i>Dividends payable</i>	485	--	--
<i>Tax due</i>	320	320	320
<i>Plant (depreciation ignored)</i>	800	1,600	1,550

Depreciation amount to ₹ 60,000 is included in the budgeted expenditure for each month.

SOLUTION

Workings:		₹ in '000'		
(1)	<i>Payments to creditors:</i>	Jan. 2019	Feb. 2019	March, 2019
	Cost of Sales	1,635	1,405	1,330
	Add Closing Stocks	1,200	1,100	1,000
		2,835	2,505	2,330
	<i>Less:</i> Opening Stocks	1,300	1,200	1,100
	Purchases	1,535	1,305	1,230
	<i>Add:</i> Trade Creditors, Opening balance	2,110	2,000	1,950
		3,645	3,305	3,180
	<i>Less:</i> Trade Creditors, closing balance	2,000	1,950	1,900
	Payment	1,645	1,355	1,280
(2)	<i>Receipts from debtors:</i>			
	Debtors, Opening balances	2,570	2,600	2,500
	<i>Add:</i> Sales	2,100	1,800	1,700
		4,670	4,400	4,200
	<i>Less:</i> Debtors, closing balance	2,600	2,500	2,350
	Receipt	2,070	1,900	1,850

CASH BUDGET**(a) 3 months ending 31st March, 2019**

	(₹, in 000's)		
	January, 2019	Feb. 2019	March, 2019
Opening cash balances	545	315	65
<i>Add:</i> Receipts:			
From Debtors	2,070	1,900	1,850
Sale of Investments	---	700	----
Sale of Plant	---	---	50
Total (A)	2,615	2,915	1,965

<i>Deduct: Payments</i>			
Creditors	1,645	1,355	1,280
Expenses	255	210	195
Capital Expenditure	---	800	---
Payment of dividend	---	485	---
Purchase of investments	400	---	200
Total payments (B)	2,300	2,850	1,675
Closing cash balance (A-B)	315	65	290

(b) Statement of Sources and uses of Funds for the Three Month Period Ending 31st March, 2019

Sources:	₹'000	₹'000
Funds from operation:		
Net profit (150+125+115)	390	
<i>Add: Depreciation (60×3)</i>	180	570
Sale of plant		50
		620
Decrease in Working Capital (Refer Statement of changes in working capital)		665
Total		1,285
Uses:		
Purchase of plant		800
Payment by dividends		485
Total		1,285

Statement of Changes in Working Capital

	January, 19	March, 19	Increase	Decrease
	₹'000	₹'000	₹'000	₹'000
<i>Current Assets</i>				
Cash in hand and at Bank	545	290		255
Short term Investments	300	200		100

Debtors	2,570	2,350		220
Stock	1,300	1,000		300
	4,715	3,840		
<i>Current Liabilities</i>				
Trade Creditors	2,110	1,900	210	---
Other Creditors	200	200	---	---
Tax Due	320	320	---	---
	2,630	2,420		
Working Capital	2,085	1,420		
Decrease		665	665	
	2,085	2,085	875	875

10.10.2 Cash Budget for long period

Long-range cash forecast often resemble the projected sources and application of funds statement. The following procedure may be adopted to prepare long-range cash forecasts:

- (i) **Take the cash at bank and in the beginning of the year:**
- (ii) **Add:**
 - (a) Trading profit (before tax) expected to be earned;
 - (b) Depreciation and other development expenses incurred to be written off;
 - (c) Sale proceeds of assets';
 - (d) Proceeds of fresh issue of shares or debentures; and
 - (e) Reduction in working capital that is current assets (except cash) less current liabilities.
- (iii) **Deduct:**
 - (a) Dividends to be paid.
 - (b) Cost of assets to be purchased.
 - (c) Taxes to be paid.
 - (d) Debentures or shares to be redeemed.
 - (e) Increase in working capital.

ILLUSTRATION 8

You are given below the Profit & Loss Accounts for two years for a company:

Profit and Loss Account

	Year 1	Year 2	<i>By Sales</i>	Year 1	Year 2
	₹	₹		₹	₹
To Opening stock	80,00,000	1,00,00,000		8,00,00,000	10,00,00,000
To Raw materials	3,00,00,000	4,00,00,000	<i>By Closing stock</i>	1,00,00,000	1,50,00,000
To Stores	1,00,00,000	1,20,00,000	<i>By Misc. Income</i>	10,00,000	10,00,000
To Manufacturing Expenses	1,00,00,000	1,60,00,000			
To Other Expenses	1,00,00,000	1,00,00,000			
To Depreciation	1,00,00,000	1,00,00,000			
To Net Profit	1,30,00,000	1,80,00,000		-	-
	9,10,00,000	11,60,00,000		9,10,00,000	11,60,00,000

Sales are expected to be ₹ 12,00,00,000 in year 3.

As a result, other expenses will increase by ₹ 50,00,000 besides other charges. Only raw materials are in stock. Assume sales and purchases are in cash terms and the closing stock is expected to go up by the same amount as between year 1 and 2. You may assume that no dividend is being paid. The Company can use 75% of the cash generated to service a loan. COMPUTE how much cash from operations will be available in year 3 for the purpose? Ignore income tax.

SOLUTION**Projected Profit and Loss Account for the year 3**

	Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)		Year 2 Actual (₹ in lakhs)	Year 3 Projected (₹ in lakhs)
To Materials consumed	350	420	By Sales	1,000	1,200
To Stores	120	144	By Misc. Income	10	10

To Mfg. Expenses	160	192			
To Other expenses	100	150			
To Depreciation	100	100			
To Net profit	180	204			
	1,010	1,210		1,010	1,210

Cash Flow:

	(₹ in lakhs)
Profit	204
Add: Depreciation	100
	304
Less: Cash required for increase in stock	50
Net cash inflow	254

Available for servicing the loan: 75% of ₹ 2,54,00,000 or ₹ 1,90,50,000

Working Notes:

(i) Material consumed in year 2: 35% of sales.

Likely consumption in year 3: ₹1,200 $\times \frac{35}{100}$ or ₹420 (lakhs)

(ii) Stores are 12% of sales, as in year 2.

(iii) Manufacturing expenses are 16% of sales.

Note: The above also shows how a projected profit and loss account is prepared.

10.10.3 Managing Cash Collection and Disbursements

Having prepared the cash budget, the finance manager should ensure that there is not a significant deviation between projected cash flows and actual cash flows.

To achieve this cash management efficiency will have to be improved through a proper control of cash collection and disbursement.

The twin objectives in managing the cash flows should be:-

- Accelerate cash collections as much as possible; and

- Decelerate or delay cash disbursements.

Let's discuss each of the two objectives individually.

10.10.4 Accelerating Cash Collections

A firm can conserve cash and reduce its requirements for cash balances if it can speed up its cash collections by issuing invoices quickly or by reducing the time lag between a customer pays bill and the cheque is collected and funds become available for the firm's use.

A firm can use decentralized collection system known as concentration banking and lock box system to speed up cash collection and reduce float time.

(i) **Concentration Banking:** In concentration banking the company establishes a number of strategic collection centres in different regions instead of a single collection centre at the head office. This system reduces the period between the time a customer mails in his remittances and the time when they become spendable funds with the company. Payments received by the different collection centers are deposited with their respective local banks which in turn transfer all surplus funds to the concentration bank of head office. The concentration bank with which the company has its major bank account is generally located at the headquarters. Concentration banking is one important and popular way of reducing the size of the float.

(ii) **Lock Box System:** Another means to accelerate the flow of funds is a lock box system. While concentration banking, remittances are received by a collection centre and deposited in the bank after processing. The purpose of lock box system is to eliminate the time between the receipts of remittances by the company and deposited in the bank. A lock box arrangement usually is on regional basis which a company chooses according to its billing patterns.

Under this arrangement, the company rents the local post-office box and authorizes its bank at each of the locations to pick up remittances in the boxes. Customers are billed with instructions to mail their remittances to the lock boxes. The bank picks up the mail several times a day and deposits the cheques in the company's account. The cheques may be micro-filmed for record purposes and cleared for collection. The company receives a deposit slip and lists all payments together with any other material in the envelope. This procedure frees the company from handling and depositing the cheques.

The main advantage of lock box system is that cheques are deposited with the banks sooner and become collected funds sooner than if they were

processed by the company prior to deposit. In other words lag between the time cheques are received by the company and the time they are actually deposited in the bank is eliminated.

The main drawback of lock box system is the cost of its operation. The bank provides a number of services in addition to usual clearing of cheques and requires compensation for them. Since the cost is almost directly proportional to the number of cheques deposited. Lock box arrangements are usually not profitable if the average remittance is small. The appropriate rule for deciding whether or not to use a lock box system or for that matter, concentration banking, is simply to compare the added cost of the most efficient system with the marginal income that can be generated from the released funds. If costs are less than income, the system is profitable, if the system is not profitable, it is not worth undertaking.

Different Kinds of Float with reference to Management of Cash: The term float is used to refer to the periods that affect cash as it moves through the different stages of the collection process. Four kinds of float with reference to management of cash are:

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

10.10.5 Controlling Payments

An effective control over payments can also cause faster turnover of cash. This is possible only by making payments on the due date, making excessive use of draft (bill of exchange) instead of cheques.

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

Also company may make payment to its outstation suppliers by a cheque and send it through mail. The delay in transit and collection of the cheque, will be used to increase the float.

ILLUSTRATION 9

Prachi Ltd is a manufacturing company producing and selling a range of cleaning products to wholesale customers. It has three suppliers and two customers. Prachi Ltd relies on its cleared funds forecast to manage its cash.

You are an accounting technician for the company and have been asked to prepare a cleared funds forecast for the period Monday 7 August to Friday 11 August 2019 inclusive. You have been provided with the following information:

(1) Receipts from customers

	Credit terms	Payment method	7 Aug 2019 sales	7 Jul 2019 sales
W Ltd	1 calendar month	BACS	₹ 150,000	₹ 130,000
X Ltd	None	Cheque	₹ 180,000	₹ 160,000

- (a) Receipt of money by BACS (Bankers' Automated Clearing Services) is instantaneous.
- (b) X Ltd's cheque will be paid into Prachi Ltd's bank account on the same day as the sale is made and will clear on the third day following this (excluding day of payment).

(2) Payments to suppliers

Supplier name	Credit terms	Payment method	7 Aug 2019 purchases	7 Jul 2019 purchases	7 Jun 2019 purchases
A Ltd	1 calendar month	Standing order	₹ 65,000	₹ 55,000	₹ 45,000
B Ltd	2 calendar months	Cheque	₹ 85,000	₹ 80,000	₹ 75,000
C Ltd	None	Cheque	₹ 95,000	₹ 90,000	₹ 85,000

- (a) Prachi Ltd has set up a standing order for ₹ 45,000 a month to pay for supplies from A Ltd. This will leave Prachi's bank account on 7 August.

Every few months, an adjustment is made to reflect the actual cost of supplies purchased (you do NOT need to make this adjustment).

(b) *Prachi Ltd will send out, by post, cheques to B Ltd and C Ltd on 7 August. The amounts will leave its bank account on the second day following this (excluding the day of posting).*

(3) Wages and salaries

	July 2019	August 2019
Weekly wages	₹ 12,000	₹ 13,000
Monthly salaries	₹ 56,000	₹ 59,000

(a) *Factory workers are paid cash wages (weekly). They will be paid one week's wages, on 11 August, for the last week's work done in July (i.e. they work a week in hand).*

(b) *All the office workers are paid salaries (monthly) by BACS. Salaries for July will be paid on 7 August.*

(4) Other miscellaneous payments

(a) *Every Monday morning, the petty cashier withdraws ₹ 200 from the company bank account for the petty cash. The money leaves Prachi's bank account straight away.*

(b) *The room cleaner is paid ₹ 30 from petty cash every Wednesday morning.*

(c) *Office stationery will be ordered by telephone on Tuesday 8 August to the value of ₹ 300. This is paid for by company debit card. Such payments are generally seen to leave the company account on the next working day.*

(d) *Five new softwares will be ordered over the Internet on 10 August at a total cost of ₹ 6,500. A cheque will be sent out on the same day. The amount will leave Prachi Ltd's bank account on the second day following this (excluding the day of posting).*

(5) Other information

The balance on Prachi's bank account will be ₹ 200,000 on 7 August 2019. This represents both the book balance and the cleared funds.

PREPARE a cleared funds forecast for the period Monday 7 August to Friday 7 August 2019 inclusive using the information provided. Show clearly the uncleared funds float each day.

SOLUTION**Cleared Funds Forecast**

	7 Aug 19 (Monday) ₹	8 Aug 19 (Tuesday) ₹	9 Aug 19 (Wednesday) ₹	10 Aug 19 (Thursday) ₹	11 Aug 19 (Friday) ₹
Receipts					
W Ltd	1,30,000	0	0	0	0
X Ltd	0	0	0	1,80,000	0
(a)	1,30,000	0	0	1,80,000	0
Payments					
A Ltd	45,000	0	0	0	0
B Ltd	0	0	75,000	0	0
C Ltd	0	0	95,000	0	0
Wages	0	0	0	0	12,000
Salaries	56,000	0	0	0	0
Petty Cash	200	0	0	0	0
Stationery	0	0	300	0	0
(b)	1,01,200	0	1,70,300	0	12,000
Cleared excess Receipts					
over payments (a) – (b)	28,800	0	(1,70,300)	1,80,000	(12,000)
Cleared balance b/f	<u>2,00,000</u>	<u>2,28,800</u>	<u>2,28,800</u>	<u>58,500</u>	<u>2,38,500</u>
Cleared balance c/f (c)	<u>2,28,800</u>	<u>2,28,800</u>	<u>58,500</u>	<u>2,38,500</u>	<u>2,26,500</u>
Uncleared funds float					
Receipts	1,80,000	1,80,000	1,80,000	0	0
Payments	(1,70,300)	(1,70,300)	0	(6,500)	(6,500)
(d)	10,000	9,700	180,000	(6,500)	(6,500)
Total book balance c/f	2,38,800	2,38,500	2,38,500	2,32,000	2,20,000
(c) + (d)					

10.10.6 Determining the Optimum Cash Balance

A firm should maintain optimum cash balance to cater to the day-to-day operations. It may also carry additional cash as a buffer or safety stock. The amount of cash balance will depend on the risk-return trade off. The firm should maintain an optimum level i.e. just enough, i.e. neither too much nor too little cash balance. This, however, poses a question. How to determine the optimum cash balance if cash flows are predictable and if they are not predictable?



10.11 CASH MANAGEMENT MODELS

In recent years several types of mathematical models have been developed which helps to determine the optimum cash balance to be carried by a business organization.

The purpose of all these models is to ensure that cash does not remain idle unnecessarily and at the same time the firm is not confronted with a situation of cash shortage.

All these models can be put in two categories:-

Inventory type models; and Stochastic models.

Inventory type models have been constructed to aid the finance manager to determine optimum cash balance of his firm. William J. Baumol's economic order quantity model applies equally to cash management problems under conditions of certainty or where the cash flows are predictable.

However, in a situation where the EOQ Model is not applicable, stochastic model of cash management helps in determining the optimum level of cash balance. It happens when the demand for cash is stochastic and not known in advance.

10.11.1 William J. Baumol's Economic Order Quantity Model, (1952)

According to this model, **optimum cash level is that level of cash where the carrying costs and transactions costs are the minimum.**

The carrying costs refer to the cost of holding cash, namely, the interest foregone on marketable securities. The transaction costs refer to the cost involved in getting the marketable securities converted into cash. This happens when the firm falls short of cash and has to sell the securities resulting in clerical, brokerage, registration and other costs.

The optimum cash balance according to this model will be that point where these two costs are minimum. The formula for determining optimum cash balance is:

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

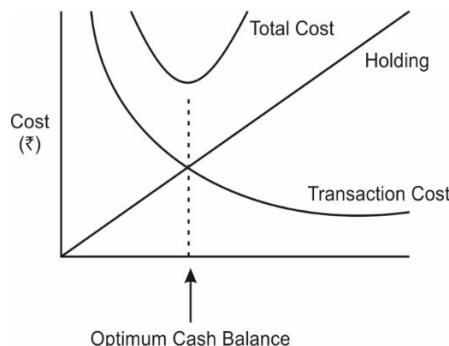
Where, C = Optimum cash balance

U = Annual (or monthly) cash disbursement

P = Fixed cost per transaction.

S = Opportunity cost of one rupee p.a. (or p.m.)

This can be explained with the following diagram:



The model is based on the following assumptions:

- (i) Cash needs of the firm are known with certainty.
- (ii) The cash is used uniformly over a period of time and it is also known with certainty.
- (iii) The holding cost is known and it is constant.
- (iv) The transaction cost also remains constant.

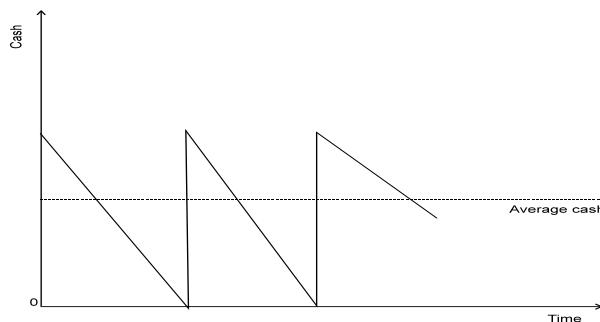
ILLUSTRATION 10

A firm maintains a separate account for cash disbursement. Total disbursement are ₹ 1,05,000 per month or ₹ 12,60,000 per year. Administrative and transaction cost of transferring cash to disbursement account is ₹ 20 per transfer. Marketable securities yield is 8% per annum.

DETERMINE the optimum cash balance according to William J. Baumol model.

SOLUTION

$$\text{The optimum cash balance } C = \sqrt{\frac{2 \times ₹ 12,60,000 \times ₹ 20}{0.08}} = ₹ 25,100$$



The limitation of the Baumol's model is that it does not allow the cash flows to fluctuate. Firms in practice do not use their cash balance uniformly nor are they able to predict daily cash inflows and outflows. The Miller-Orr (MO) model overcomes this shortcoming and allows for daily cash flow variation.

10.11.2 Miller-Orr Cash Management Model (1966)

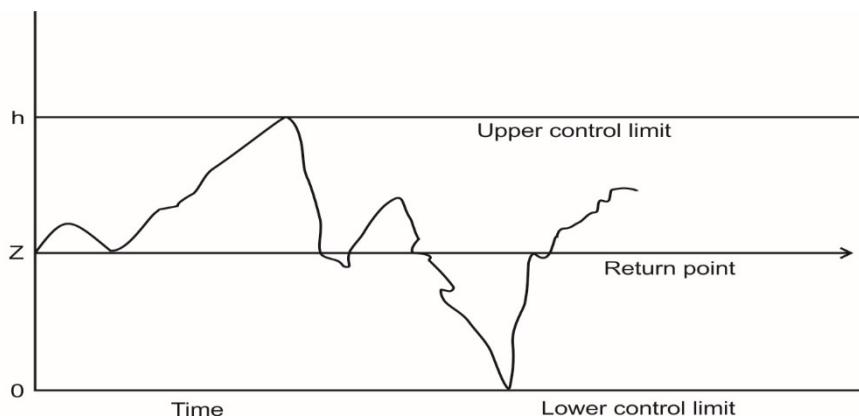
According to this model the net **cash flow is completely stochastic**.

When changes in cash balance occur randomly the application of control theory serves a useful purpose. The Miller-Orr model is one of such control limit models.

This model is designed to determine the time and size of transfers between an investment account and cash account. In this model control limits are set for cash balances. These limits may consist of h as upper limit, z as the return point; and zero as the lower limit.

- When the cash balance reaches the upper limit, the transfer of cash equal to $h - z$ is invested in marketable securities account.
- When it touches the lower limit, a transfer from marketable securities account to cash account is made.
- During the period when cash balance stays between (h, z) and $(z, 0)$ i.e. high and low limits no transactions between cash and marketable securities account is made.

The high and low limits of cash balance are set up on the basis of fixed cost associated with the securities transactions, the opportunity cost of holding cash and the degree of likely fluctuations in cash balances. These limits satisfy the demands for cash at the lowest possible total costs. The following diagram illustrates the Miller-Orr model.



The MO Model is more realistic since it allows variations in cash balance within lower and upper limits. The finance manager can set the limits according to the firm's liquidity requirements i.e., maintaining minimum and maximum cash balance.



10.12 RECENT DEVELOPMENTS IN CASH MANAGEMENT

It is important to understand the latest developments in the field of cash management, since it has a great impact on how we manage our cash. Both technological advancement and desire to reduce cost of operations has led to some innovative techniques in managing cash. Some of them are:-

10.12.1 Electronic Fund Transfer

With the developments which took place in the Information technology, the present banking system is switching over to the computerisation of banks branches to offer efficient banking services and cash management services to their customers. The network will be linked to the different branches, banks. This will help the customers in the following ways:

- Instant updation of accounts.
- The quick transfer of funds.
- Instant information about foreign exchange rates.

10.12.2 Zero Balance Account

For efficient cash management some firms employ an extensive policy of substituting marketable securities for cash by the use of zero balance accounts. Every day the firm totals the cheques presented for payment against the account.

The firm transfers the balance amount of cash in the account if any, for buying marketable securities. In case of shortage of cash the firm sells the marketable securities.

10.12.3 Money Market Operations

One of the tasks of '*treasury function*' of larger companies is the investment of surplus funds in the money market. The chief characteristic of money market banking is one of size. Banks obtain funds by competing in the money market for the deposits by the companies, public authorities, High Net worth Investors (HNI), and other banks. Deposits are made for specific periods ranging from overnight to one year; highly competitive rates which reflect supply and demand on a daily, even hourly basis are quoted. Consequently, the rates can fluctuate quite dramatically, especially for the shorter-term deposits. Surplus funds can thus be invested in money market easily.

10.12.4 Petty Cash Imprest System

For better control on cash, generally the companies use petty cash imprest system wherein the day-to-day petty expenses are estimated taking into account past experience and future needs and generally a week's requirement of cash will be kept separate for making petty expenses. Again, the next week will commence with the pre-determined balance. This will reduce the strain of the management in managing petty cash expenses and help in the managing cash efficiently.

10.12.5 Management of Temporary Cash Surplus

Temporary cash surpluses can be profitably invested in the following:

- Short-term deposits in Banks and financial institutions.
- Short-term debt market instruments.
- Long-term debt instruments.
- Shares of Blue chip listed companies.

10.12.6 Electronic Cash Management System

Most of the cash management systems now-a-days are electronically based, since 'speed' is the essence of any cash management system. Electronically, transfer of data as well as funds play a key role in any cash management system. Various elements in the process of cash management are linked through a satellite. Various places that are interlinked may be the place where the instrument is collected, the

place where cash is to be transferred in company's account, the place where the payment is to be transferred etc.

Certain networked cash management system may also provide a very limited access to third parties like parties having very regular dealings of receipts and payments with the company etc. A finance company accepting deposits from public through sub-brokers may give a limited access to sub-brokers to verify the collections made through him for determination of his commission among other things.

Electronic-scientific cash management results in:

- Significant saving in time.
- Decrease in interest costs.
- Less paper work.
- Greater accounting accuracy.
- More control over time and funds.
- Supports electronic payments.
- Faster transfer of funds from one location to another, where required.
- Speedy conversion of various instruments into cash.
- Making available funds wherever required, whenever required.
- Reduction in the amount of 'idle float' to the maximum possible extent.
- Ensures no idle funds are placed at any place in the organization.
- It makes inter-bank balancing of funds much easier.
- It is a true form of centralised 'Cash Management'.
- Produces faster electronic reconciliation.
- Allows for detection of book-keeping errors.
- Reduces the number of cheques issued.
- Earns interest income or reduce interest expense.

10.12.7 Virtual Banking

The practice of banking has undergone a significant change in the nineties. While banks are striving to strengthen customer base and relationship and move towards relationship banking, customers are increasingly moving away from the confines of traditional branch banking and are seeking the convenience of remote electronic banking services. And even within the broad spectrum of electronic banking the virtual banking has gained prominence

Broadly virtual banking denotes the provision of banking and related services through extensive use of information technology without direct recourse to the bank by the customer. The origin of virtual banking in the developed countries can be traced back to the seventies with the installation of Automated Teller Machines (ATMs). Subsequently, driven by the competitive market environment as well as various technological and customer pressures, other types of virtual banking services have grown in prominence throughout the world.

The Reserve Bank of India has been taking a number of initiatives, which will facilitate the active involvement of commercial banks in the sophisticated cash management system. One of the pre-requisites to ensure faster and reliable mobility of funds in a country is to have an efficient payment system. Considering the importance of speed in payment system to the economy, the RBI has taken numerous measures since mid-Eighties to strengthen the payments mechanism in the country.

Introduction of computerized settlement of clearing transactions, use of Magnetic Ink Character Recognition (MICR) technology, provision of inter-city clearing facilities and high value clearing facilities, Electronic Clearing Service Scheme (ECSS), Electronic Funds Transfer (EFT) scheme, Delivery vs. Payment (DVP) for Government securities transactions, setting up of Indian Financial Network (INFINET) are some of the significant developments.

Introduction of Centralised Funds Management System (CFMS), Securities Services System (SSS), Real Time Gross Settlement System (RTGS) and Structured Financial Messaging System (SFMS) are the other top priority items on the agenda to transform the existing system into a state-of-the art payment infrastructure in India.

The current vision envisaged for the payment systems reforms is one, which contemplates linking up of at least all important bank branches with the domestic payment systems network thereby facilitating cross border connectivity. With the help of the systems already put in place in India and which are coming into being, both banks and corporates can exercise effective control over the cash management.

Advantages of Virtual Banking

The advantages of virtual banking services are as follows:

- Lower cost of handling a transaction.
- The increased speed of response to customer requirements.
- The lower cost of operating branch network along with reduced staff costs

leads to cost efficiency.

- Virtual banking allows the possibility of improved and a range of services being made available to the customer rapidly, accurately and at his convenience.

The popularity which virtual banking services have won among customers is due to the speed, convenience and round the clock access they offer.



10.13 MANAGEMENT OF MARKETABLE SECURITIES

Management of marketable securities is an integral part of investment of cash as this may serve both the purposes of liquidity and cash, provided choice of investment is made correctly. As the working capital needs are fluctuating, it is possible to park excess funds in some short term securities, which can be liquidated when need for cash is felt. The selection of securities should be guided by three principles.

- *Safety*: Return and risks go hand in hand. As the objective in this investment is ensuring liquidity, minimum risk is the criterion of selection.
- *Maturity*: Matching of maturity and forecasted cash needs is essential. Prices of long term securities fluctuate more with changes in interest rates and are therefore, more risky.
- *Marketability*: It refers to the convenience, speed and cost at which a security can be converted into cash. If the security can be sold quickly without loss of time and price it is highly liquid or marketable.

The choice of marketable securities is mainly limited to Government treasury bills, Deposits with banks and Inter-corporate deposits. Units of Unit Trust of India and commercial papers of corporates are other attractive means of parking surplus funds for companies along with deposits with sister concerns or associate companies.

Besides this Money Market Mutual Funds (MMMFs) have also emerged as one of the avenues of short-term investment.

ILLUSTRATION 11

The following information is available in respect of Sai trading company:

- (i) *On an average, debtors are collected after 45 days; inventories have an average holding period of 75 days and creditor's payment period on an average is 30 days.*

(ii) The firm spends a total of ₹ 120 lakhs annually at a constant rate.

(iii) It can earn 10 per cent on investments.

From the above information, you are required to CALCULATE:

(a) The cash cycle and cash turnover,

(b) Minimum amounts of cash to be maintained to meet payments as they become due,

(c) Savings by reducing the average inventory holding period by 30 days.

SOLUTION

(a) Cash cycle = 45 days + 75 days – 30 days = 90 days (3 months)

Cash turnover = 12 months (360 days)/3 months (90 days) = 4.

(b) Minimum operating cash = Total operating annual outlay/cash turnover, that is, ₹ 120 lakhs/4 = ₹ 30 lakhs.

(c) Cash cycle = 45 days + 45 days – 30 days = 60 days (2 months).

Cash turnover = 12 months (360 days)/2 months (60 days) = 6.

Minimum operating cash = ₹ 120 lakhs/6 = ₹ 20 lakhs.

Reduction in investments = ₹ 30 lakhs – ₹ 20 lakhs = ₹ 10 lakhs.

Savings = $0.10 \times ₹ 10 \text{ lakhs} = ₹ 1 \text{ lakh.}$

UNIT-III

MANAGEMENT OF INVENTORY



10.14 INVENTORY MANAGEMENT

Inventories constitute a major element of working capital. It is, therefore, important that investment in inventory is properly controlled. The objectives of inventory management are, to a great extent, similar to the objectives of cash management. Inventory management covers a large number of problems including fixation of minimum and maximum levels, determining the size of inventory to be carried, deciding about the issues, receipts and inspection procedures, determining the economic order quantity, proper storage facilities, keeping check over obsolescence and ensuring control over movement of inventories.

Inventory Management have been discussed in details in chapter 2 (Material) Paper 3:Cost and Management Accounting.

Some illustrations are given just for reference.

ILLUSTRATION 12

A company's requirements for ten days are 6,300 units. The ordering cost per order is ₹ 10 and the carrying cost per unit is ₹ 0.26. You are required to CALCULATE the economic order quantity.

SOLUTION

The economic order quantity is:

$$EOQ = \sqrt{\frac{2 \times 6,300 \times 10}{0.26}} = \sqrt{\frac{1,26,000}{0.26}} = 700 \text{ units (approx).}$$

ILLUSTRATION 13

Marvel Limited uses a large quantity of salt in its production process. Annual consumption is 60,000 tonnes over a 50-week working year. It costs ₹ 100 to initiate and process an order and delivery follows two weeks later. Storage costs for the salt are estimated at ₹ 0.10 per tonne per annum. The current practice is to order twice a year when the stock falls to 10,000 tonnes. IDENTIFY an appropriate ordering policy for Marvel Limited, and contrast it with the cost of the current policy.

SOLUTION

The recommended policy should be based on the EOQ model.

$F = ₹ 100$ per order

$S = 60,000$ tonnes per year

$H = ₹ 0.10$ per tonne per year

$$\text{Substituting : EOQ} = \sqrt{\frac{2 \times 100 \times 60,000}{0.10}} = 10,954 \text{ tonnes per order}$$

$$\text{Number of orders per year} = 60,000/10,954 = 5.5 \text{ orders}$$

$$\text{Re-order level} = 2 \times 60,000/50 = 2,400 \text{ tonnes}$$

$$\text{Total cost of optimum policy} = \text{holding costs} + \text{ordering costs}$$

$$= (0.1 \times 10954)/2 + (100 \times 60,000)/10,954$$

$$= 547.70 + 547.74 = ₹ 1,095$$

To compare the optimum policy with the current policy, the average level of stock under the current policy must be found. An order is placed when stock falls to 10,000 tonnes, but the lead time is two weeks. The stock used in that time is $(60,000 \times 2)/50 = 2,400$ tonnes. Before delivery, inventory has fallen to $(10,000 - 2,400) = 7,600$ tonnes. Orders are made twice per year, and so the order size = $60,000/2 = 30,000$ tonnes. The order will increase stock level to $30,000 + 7,600 = 37,600$ tonnes. Hence the average stock level = $7,600 + (30,000/2) = 22,600$ tonnes. Total costs of current policy = $(0.1 \times 22,600) + (100 \times 2) = ₹ 2,460$ per year.

Advise: The recommended policy should be adopted as the costs (₹ 1,365 per year) are less than the current policy.

ILLUSTRATION 14

Pureair Company is a distributor of air filters to retail stores. It buys its filters from several manufacturers. Filters are ordered in lot sizes of 1,000 and each order costs ₹ 40 to place. Demand from retail stores is 20,000 filters per month, and carrying cost is ₹ 0.10 a filter per month.

- COMPUTE the optimal order quantity with respect to so many lot sizes?*
- CALCULATE the optimal order quantity if the carrying cost were ₹ 0.05 a filter per month?*
- COMPUTE the optimal order quantity if ordering costs were ₹ 10?*

SOLUTION

(a) $EOQ^* = \sqrt{\frac{2(20)(40)}{100}} = 4$

Carrying costs = ₹ 0.10 × 1,000 = ₹ 100. The optimal order size would be 4,000 filters, which represents five orders a month.

(b) $EOQ^* = \sqrt{\frac{2(20)(40)}{50}} = 5.66$

Since the lot size is 1,000 filters, the company would order 6,000 filters each time. The lower the carrying cost, the more important ordering costs become relatively, and the larger the optimal order size.

(c) $EOQ^* = \sqrt{\frac{2(20)(10)}{100}} = 2$

The lower the order cost, the more important carrying costs become relatively and the smaller the optimal order size.

UNIT- IV

MANAGEMENT OF RECEIVABLES



10.15 MEANING AND OBJECTIVE

Management of receivables refers to planning and controlling of 'debt' owed to the firm from customer on account of credit sales. It is also known as trade credit management.

The basic objective of management of receivables (debtors) is to optimise the return on investment on these assets.

Large amounts are tied up in receivables, there are chances of bad debts and there will be cost of collection of debts. On the contrary, if the investment in receivables is low, the sales may be restricted, since the competitors may offer more liberal terms. Therefore, management of receivables is an important issue and requires proper policies and their implementation.



10.16 ASPECTS OF MANAGEMENT OF DEBTORS

There are basically three aspects of management of receivables:

1. **Credit Policy:** The credit policy is to be determined. Decision of Credit standards, Credit terms and collection efforts is included in Credit policy. It involves a trade-off between the profits on additional sales that arise due to credit being extended on the one hand and the cost of carrying those debtors and bad debt losses on the other. This seeks to decide credit period, cash discount and other relevant matters. The credit period is generally stated in terms of net days. For example if the firm's credit terms are "net 50". It is expected that customers will repay credit obligations not later than 50 days.

Further, the cash discount policy of the firm specifies:

- The rate of cash discount.
- The cash discount period; and
- The net credit period.

For example, the credit terms may be expressed as "3/15 net 60". This means that a 3% discount will be granted if the customer pays within 15 days; if he does not avail the offer he must make payment within 60 days.

2. **Credit Analysis:** This requires the finance manager to determine as to how risky it is to advance credit to a particular party.
3. **Control of Receivable:** This requires finance manager to follow up debtors and decide about a suitable credit collection policy. It involves both laying down of credit policies and execution of such policies.

There is always cost of maintaining receivables which comprises of following costs:

- (i) The company requires additional funds as resources are blocked in receivables which involves a cost in the form of interest (loan funds) or opportunity cost (own funds)
- (ii) Administrative costs which include record keeping, investigation of credit worthiness etc.
- (iii) Collection costs.
- (iv) Defaulting costs.



10.17 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.



10.18 FACTORS UNDER THE CONTROL OF THE FINANCE MANAGER

The finance manager has operating responsibility for the management of the investment in receivables. His involvement includes:-

- (a) **Supervising** the administration of credit;
- (b) **Contribute** to top management decisions relating to the best credit policies of the firm;
- (c) **Deciding** the criteria for selection of credit applications; and
- (d) **Speed up** the conversion of receivables into cash by aggressive collection policy.

In summary the finance manager has to strike a balance between the cost of increased investment in receivables and profits from the higher levels of sales.



10.19 APPROACHES TO EVALUATION OF CREDIT POLICIES

There are basically two methods of evaluating the credit policies to be adopted by a Company – Total Approach and Incremental Approach. The formats for the two approaches are given as under:

Statement showing the Evaluation of Credit Policies (based on Total Approach)

Particulars	Present Policy	Proposed Policy I	Proposed Policy II	Proposed Policy III
	₹	₹	₹	₹
A. Expected Profit:				
(a) Credit Sales

(b) Total Cost other than Bad Debts				
(i) Variable Costs	.....	.....	.....	.....
(ii) Fixed Costs	.....	.....	.....	.....

(c) Bad Debts	.....	.....	.....	.....
(d) Cash discount				
(e) Expected Net Profit before Tax (a-b-c-d)	.....	.....	.....	.....
(f) Less: Tax	.....	.....	.....	.....
(g) Expected Profit after Tax	.....	.....	.....	.....
B. Opportunity Cost of Investments in Receivables locked up in Collection Period	.....	.....	.....	.....
Net Benefits (A – B)	.....	.....	.....	.....

Advise: The Policy..... should be adopted since the net benefits under this policy are higher as compared to other policies.

Here

- (i) Total Fixed Cost = [Average Cost per unit – Variable Cost per unit] × No. of units sold on credit under Present Policy
- (ii) Opportunity Cost = Total Cost of Credit Sales ×
$$\frac{\text{Collection period (Days)}}{365 \text{ (or } 360)} \times \frac{\text{Required Rate of Return}}{100}$$

Statement showing the Evaluation of Credit Policies (based on Incremental Approach)

Particulars	Present Policy days	Proposed Policy I days	Proposed Policy II days	Proposed Policy III days
	₹	₹	₹	₹
A. Incremental Expected Profit:				
Credit Sales

(a) Incremental Credit Sales	.....	.....	.....	.....
(b) Less: Incremental Costs of Credit Sales				
(i) Variable Costs	.....	.....	.....	.....
(ii) Fixed Costs	.....	.....	.....	.....
(c) Incremental Bad Debt Losses	.....	.....	.....	.....
(d) Incremental Cash Discount	.....	.....	.....	.....
(e) Incremental Expected Profit (a-b-c-d)	.....	.....	.....	.....
(f) Less: Tax	.....	.....	.....	.....
(g) Incremental Expected Profit after Tax	.....	.....	.....	.....

B. Required Return on Incremental Investments:				
(a) Cost of Credit Sales	.....	.....	.....	.....
(b) Collection Period (in days)	.....	.....	.....	.....
(c) Investment in Receivable ($a \times b / 365$ or 360)	.....	.....	.....	.....
(d) Incremental Investment in Receivables	.....	.....	.....	.....
(e) Required Rate of Return (in %)	.....	.....	.....	.....
(f) Required Return on Incremental Investments ($d \times e$)	.....	.....	.....	.....
Incremental Net Benefits (A - B)				

Advise: The Policyshould be adopted since net benefits under this policy are higher as compared to other policies.

Here:

(i) Total Fixed Cost = [Average Cost per unit – Variable Cost per unit] × No. of units sold on credit under Present Policy

(ii) Opportunity Cost = Total Cost of Credit Sales ×
$$\frac{\text{Collection period (Days)}}{365 \text{ (or 360)}} \times \frac{\text{Required Rate of Return}}{100}$$

ILLUSTRATION 15

A trader whose current sales are in the region of ₹6 lakhs per annum and an average collection period of 30 days wants to pursue a more liberal policy to improve sales. A study made by a management consultant reveals the following information:-

Credit Policy	Increase in collection period	Increase in sales	Present default anticipated
A	10 days	₹ 30,000	1.5%
B	20 days	₹ 48,000	2%
C	30 days	₹ 75,000	3%
D	45 days	₹ 90,000	4%

The selling price per unit is ₹3. Average cost per unit is ₹2.25 and variable costs per unit are ₹2. The current bad debt loss is 1%. Required return on additional investment is 20%. Assume a 360 days year.

ANALYSE which of the above policies would you recommend for adoption?

SOLUTION**A. Statement showing the Evaluation of Debtors Policies (Total Approach)**

Particulars		Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
		₹	₹	₹	₹	₹
A.	Expected Profit:					
	(a) Credit Sales	6,00,000	6,30,000	6,48,000	6,75,000	6,90,000
	(b) Total Cost other than Bad Debts					

	(i) Variable Costs [Sales × 2/3]	4,00,000	4,20,000	4,32,000	4,50,000	4,60,000
	(ii) Fixed Costs	50,000	50,000	50,000	50,000	50,000
		4,50,000	4,70,000	4,82,000	5,00,000	5,10,000
	(c) Bad Debts	6,000	9,450	12,960	20,250	27,600
	(d) Expected Profit [(a) – (b) – (c)]	1,44,000	1,50,550	1,53,040	1,54,750	1,52,400
B.	Opportunity Cost of Investments in Receivables	7,500	10,444	13,389	16,667	21,250
C.	Net Benefits (A – B)	1,36,500	1,40,106	1,39,651	1,38,083	1,31,150

Recommendation: The Proposed Policy A (i.e. increase in collection period by 10 days or total 40 days) should be adopted since the net benefits under this policy are higher as compared to other policies.

Working Notes:

(i) **Calculation of Fixed Cost** = [Average Cost per unit – Variable Cost per unit] × No. of Units sold

$$\begin{aligned}
 &= [\text{₹ } 2.25 - \text{₹ } 2.00] \times (\text{₹ } 6,00,000/3) \\
 &= \text{₹ } 0.25 \times 2,00,000 = \text{₹ } 50,000
 \end{aligned}$$

(ii) **Calculation of Opportunity Cost of Average Investments**

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection period}}{360} \times \frac{\text{Rate of Return}}{100}$$

$$\text{Present Policy} = 4,50,000 \times \frac{30}{360} \times \frac{20}{100} = 7,500$$

$$\text{Policy A} = 4,70,000 \times \frac{40}{360} \times \frac{20}{100} = 10,444$$

$$\text{Policy B} = 4,82,000 \times \frac{50}{360} \times \frac{20}{100} = 13,389$$

$$\text{Policy C} = 5,00,000 \times \frac{60}{360} \times \frac{20}{100} = 16,667$$

$$\text{Policy D} = 5,10,000 \times \frac{75}{360} \times \frac{20}{100} = 21,250$$

B. Another method of solving the problem is **Incremental Approach**. Here we assume that sales are all credit sales.

Particulars		Present Policy 30 days	Proposed Policy A 40 days	Proposed Policy B 50 days	Proposed Policy C 60 days	Proposed Policy D 75 days
		₹	₹	₹	₹	₹
A. Incremental Expected Profit:						
(a) Incremental Credit Sales		0	30,000	48,000	75,000	90,000
(b) Incremental Costs						
(i) Variable Costs	4,00,000	20,000	32,000	50,000	60,000	
(ii) Fixed Costs	50,000	-	-	-	-	
(c) Incremental Bad Debt Losses	6,000	3,450	6,960	14,250	21,600	
(d) Incremental Expected Profit (a - b - c)]		6,550	9,040	10,750	8,400	
B. Required Return on Incremental Investments:						
(a) Cost of Credit Sales	4,50,000	4,70,000	4,82,000	5,00,000	5,10,000	
(b) Collection period	30	40	50	60	75	
(c) Investment in Receivable (a × b/360)	37,500	52,222	66,944	83,333	1,06,250	
(d) Incremental Investment in Receivables	-	14,722	29,444	45,833	68,750	
(e) Required Rate of		20	20	20	20	

	Return (in %)					
(f) Required Return on Incremental Investments (d × e)	-	2,944	5,889	9,167	13,750	
C. Net Benefits (A – B)	-	3,606	3,151	1,583	5,350	

Recommendation: The Proposed Policy A should be adopted since the net benefits under this policy are higher than those under other policies.

C. Another method of solving the problem is by computing the **Expected Rate of Return**.

$$\text{Expected Rate of Return} = \frac{\text{Incremental Expected Profit}}{\text{Incremental Investment in Receivables}} \times 100$$

$$\text{For Policy A} = \frac{\text{₹ 6,550}}{\text{₹ 14,722}} \times 100 = 44.49\%$$

$$\text{For Policy B} = \frac{\text{₹ 9,040}}{\text{₹ 29,444}} \times 100 = 30.70\%$$

$$\text{For Policy C} = \frac{\text{₹ 10,750}}{\text{₹ 45,833}} \times 100 = 23.45\%$$

$$\text{For Policy D} = \frac{\text{₹ 8,400}}{\text{₹ 68,750}} \times 100 = 12.22\%$$

Recommendation: The Proposed Policy A should be adopted since the Expected Rate of Return (44.49%) is more than the Required Rate of Return (20%) and is highest among the given policies compared.

ILLUSTRATION 16

XYZ Corporation is considering relaxing its present credit policy and is in the process of evaluating two proposed policies. Currently, the firm has annual credit sales of ₹ 50 lakhs and accounts receivable turnover ratio of 4 times a year. The current level of loss due to bad debts is ₹ 1,50,000. The firm is required to give a return of 25% on the investment in new accounts receivables. The company's variable costs are 70% of the selling price. Given the following information, IDENTIFY which is the better option?

(Amount in ₹)

	Present Policy	Policy Option I	Policy Option II
Annual credit sales	50,00,000	60,00,000	67,50,000
Accounts receivable turnover ratio	4 times	3 times	2.4 times
Bad debt losses	1,50,000	3,00,000	4,50,000

SOLUTION**Statement showing the Evaluation of Debtors Policies**

	Particulars	Present Policy	Proposed Policy I	Proposed Policy II
		₹	₹	₹
A	Expected Profit:			
(a)	Credit Sales	50,00,000	60,00,000	67,50,000
(b)	Total Cost other than Bad Debts:			
(i)	Variable Costs	35,00,000	42,00,000	47,25,000
(c)	Bad Debts	1,50,000	3,00,000	4,50,000
(d)	Expected Profit [(a) – (b) – (c)]	13,50,000	15,00,000	15,75,000
B	Opportunity Cost of Investments in Receivables	2,18,750	3,50,000	4,92,188
C	Net Benefits (A – B)	11,31,250	11,50,000	10,82,812

Recommendation: The Proposed Policy I should be adopted since the net benefits under this policy are higher as compared to other policies.

Working Note: Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection period}}{12} \times \frac{\text{Rate of Return}}{100}$$

$$\text{Present Policy} = ₹ 35,00,000 \times 3/12 \times 25\% = ₹ 2,18,750$$

$$\text{Proposed Policy I} = ₹ 42,00,000 \times 4/12 \times 25\% = ₹ 3,50,000$$

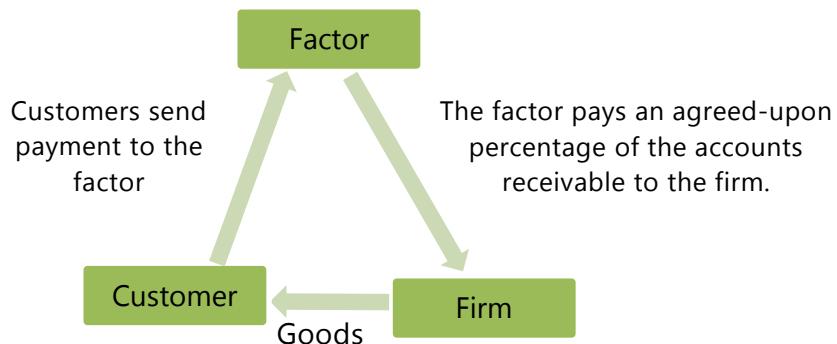
$$\text{Proposed Policy II} = ₹ 47,25,000 \times 5/12 \times 25\% = ₹ 4,92,188$$



10.20 FINANCING RECEIVABLES

Pledging of accounts receivables and Factoring have emerged as the important sources of financing of accounts receivables now-a-days.

- (i) **Pledging:** This refers to the use of a firm's receivable to secure a short term loan. A firm's receivables can be termed as its most liquid assets and this serve as prime collateral for a secured loan. The lender scrutinizes the quality of the accounts receivables, selects acceptable accounts, creates a lien on the collateral and fixes the percentage of financing receivables which ranges around 50 to 90%. The major advantage of pledging accounts receivables is the ease and flexibility it provides to the borrower. Moreover, financing is done regularly. This, however, suffers on account of high cost of financing.
- (ii) **Factoring:** Factoring is a relatively new concept in financing of accounts receivables. This refers to outright sale of accounts receivables to a factor or a financial agency. A factor is a firm that acquires the receivables of other firms. The factoring lays down the conditions of the sale in a factoring agreement. The factoring agency bears the right of collection and services the accounts for a fee.



Normally, factoring is the arrangement on a non-recourse basis where in the event of default the loss is borne by the factor. However, in a factoring arrangement with recourse, in such situation, the accounts receivables will be turned back to the firm by the factor for resolution.

There are a number of financial institutions providing factoring services in India. Some commercial banks and other financial agencies provide this service. The biggest advantages of factoring are the immediate conversion of receivables into cash and predicted pattern of cash flows. Financing receivables with the help of factoring can help a company having liquidity without creating a net liability on its financial condition. Besides, factoring is a flexible financial tool providing timely funds, efficient

record keepings and effective management of the collection process. This is not considered to be as a loan. There is no debt repayment, no compromise to balance sheet, no long term agreements or delays associated with other methods of raising capital. Factoring allows the firm to use cash for the growth needs of business.

The basic format of evaluating factoring proposal is given as under:

Statement showing the Evaluation of Factoring Proposal

	<i>Particulars</i>	<i>₹</i>
A.	Annual Savings (Benefit) on taking Factoring Service	
	Cost of credit administration saved	.....
	Bad debts avoided	.....
	Interest saved due to reduction in average collection period (Wherever applicable) [Cost of Annual Credit Sales × Rate of Interest × (Present Collection Period – New Collection Period)/360* days]	.....
	Total	.....
B.	Annual Cost of Factoring to the Firm:	
	Factoring Commission [Annual credit Sales × % of Commission (or calculated annually)]	.....
	Interest Charged by Factor on advance (or calculated annually)	.....
	[Amount available for advance or (Annual Credit Sales – Factoring Commission – Factoring Reserve)] × [$\frac{\text{Collection Period (days)}}{360^*} \times \text{Rate of Interest}$]	
	Total	.....
C.	Net Annual Benefits/Cost of Factoring to the Firm:	
	Rate of Effective Cost of Factoring to the Firm = $\frac{\text{Net Annual cost of Factoring}}{\text{Amount available for advance}} \times 100$ or Net annual Cost of Factoring $\times 100$ Advances to be paid Advances to be paid = (Amount available for advance – Interest deducted by factor)	.....

*1 Year is taken as 360 days

Advise:

1. The company should avail Factoring services if rate of effective Cost of Factoring to the firm is less than the existing cost of borrowing or if availing services of factoring results in to positive Net Annual Benefits.
2. The company should not avail Factoring services if the Rate of Effective Cost of Factoring to the Firm is more than the existing cost of borrowing.

ILLUSTRATION 17

A Factoring firm has credit sales of ₹ 360 lakhs and its average collection period is 30 days. The financial controller estimates, bad debt losses are around 2% of credit sales. The firm spends ₹ 1,40,000 annually on debtors administration. This cost comprises of telephonic and fax bills along with salaries of staff members. These are the avoidable costs. A Factoring firm has offered to buy the firm's receivables. The factor will charge 1% commission and will pay an advance against receivables on an interest @15% p.a. after withholding 10% as reserve. ANALYSE what should the firm do?

Assume 360 days in a year.

SOLUTION**Working notes:**

$$\text{Average level of receivables} = ₹ 360 \text{ lakhs} \times \frac{30}{360} = 30 \text{ lakhs}$$

$$\text{Factoring Commission} = 1\% \text{ of ₹ 30,00,000} \quad = \quad ₹ 30,000$$

$$\text{Reserve} = 10\% \text{ of ₹ 30,00,000} \quad = \quad ₹ 3,00,000$$

$$\text{Total (i)} \quad = \quad ₹ 3,30,000$$

Thus, the amount available for advance is

$$\text{Average level of receivables} \quad ₹ 30,00,000$$

$$\text{Less: Total (i) from above} \quad ₹ 3,30,000$$

$$(ii) \quad ₹ 26,70,000$$

$$\text{Less: Interest @ 15% p.a. for 30 days} \quad ₹ 33,375$$

$$\text{Net Amount of Advance available.} \quad ₹ 26,36,625$$

Evaluation of Factoring Proposal

	Particulars	₹	₹
A.	Savings (Benefit) to the firm		
	Cost of Credit administration	₹ 1,40,000	₹ 1,40,000
	Cost of bad-debt losses	(0.02 × 360 lakhs)	₹ 7,20,000
	Total		₹ 8,60,000
B.	Cost to the Firm:		
	Factoring Commission [Annual credit Sales × % of Commission (or calculated annually)]	$₹ 30,000 \times \frac{360}{30}$	₹ 3,60,000
	Interest Charges	$₹ 33,375 \times \frac{360}{30}$	₹ 4,00,500
	Total		₹ 7,60,500
C.	Net Benefits to the Firm: (A-B)		₹ 99,500

Advice: Since the savings to the firm exceeds the cost to the firm on account of factoring, therefore, the proposal is acceptable.



10.21 INNOVATIONS IN RECEIVABLE MANAGEMENT

During the recent years, a number of tools, techniques, practices and measures have been invented to increase effectiveness in accounts receivable management.

Following are the major determinants for significant innovations in accounts receivable management and process efficiency.

1. Re-engineering Receivable Process: In some of the organizations real cost reductions and performance improvements have been achieved by re-engineering in accounts receivable process. Re-engineering is a fundamental re-think and re-design of business processes by incorporating modern business approaches. The nature of accounts receivables is such that decisions made elsewhere in the organization are likely to affect the level of resources that are expended on the management of accounts receivables.

The following aspects provide an opportunity to improve the management of accounts receivables:

(a) **Centralisation:** Centralisation of high nature transactions of accounts receivables and payable is one of the practice for better efficiency. This focuses attention on specialized groups for speedy recovery.

(b) **Alternative Payment Strategies:** Alternative payment strategies in addition to traditional practices result into efficiencies in the management of accounts receivables. It is observed that payment of accounts outstanding is likely to be quicker where a number of payment alternatives are made available to customers. Besides, this convenient payment method is a marketing tool that is of benefit in attracting and retaining customers. The following alternative modes of payment may also be used alongwith traditional methods like Cheque Book etc., for making timely payment, added customer service, reducing remittance processing costs and improved cash flows and better debtor turnover.

- (i) **Direct debit:** I.e., authorization for the transfer of funds from the purchaser's bank account.
- (ii) **Integrated Voice Response (IVR):** This system uses human operators and a computer based system to allow customers to make payment over phone. This system has proved to be beneficial in the organisations processing a large number of payments regularly.
- (iii) **Collection by a third party:** The payment can be collected by an authorized external firm. The payments can be made by cash, cheque, credit card or Electronic fund transfer. Banks may also be acting as collecting agents of their customers and directly depositing the collections in customers' bank accounts.
- (iv) **Lock Box Processing:** Under this system an outsourced partner captures cheques and invoice data and transmits the file to the client firm for processing in that firm's systems.
- (v) Payments via Internet using fund transfer methods like RTGS, NEFT, IPMS UPIs, App based payment like PayTm, Phone Pe, etc.

(c) **Customer Orientation:** Where individual customers or a group of customers have some strategic importance to the firm a case study approach may be followed to develop good customer relations. A critical study of this group may lead to formation of a strategy for prompt settlement of debt.

2. **Evaluation of Risk:** Risk evaluation is a major component in the establishment of an effective control mechanism. Once risks have been properly assessed controls can be introduced to either contain the risk to an acceptable level or to eliminate them entirely. This also provides an opportunity for removing inefficient practices. This involves a re-think of processes and questioning the way that tasks are performed. This also opens the way for efficiency and effectiveness benefits in the management of accounts receivables.
3. **Use of Latest Technology:** Technological developments now-a-days provides an opportunity for improvement in accounts receivables process. The major innovations available are the integration of systems used in the management of accounts receivables, the automation and the use of e-commerce.
 - (a) **E-commerce** refers to the use of computer and electronic telecommunication technologies, particularly on an inter-organisational level, to support trading in goods and services. It uses technologies such as Electronic Data Inter-change (EDI), Electronic Mail, Electronic Funds Transfer (EFT) and Electronic Catalogue Systems to allow the buyer and seller to transact business by exchange of information between computer application systems.
 - (b) **Automated Accounts Receivable Management Systems:** Now-a-days all the big companies develop and maintain automated receivable management systems. Manual systems of recording the transactions and managing receivables are not only cumbersome but ultimately costly also. These integrated systems automatically update all the accounting records affected by a transaction. For example, if a transaction of credit sale is to be recorded, the system increases the amount the customer owes to the firm, reduces the inventory for the item purchased, and records the sale. This system of a company allows the application and tracking of receivables and collections, using the automated receivables system allows the company to store important information for an unlimited number of customers and transactions, and accommodate efficient processing of customer payments and adjustments.
4. **Receivable Collection Practices:** The aim of debtors' collection should be to reduce, monitor and control the accounts receivable at the same time maintain customer goodwill. The fundamental rule of sound receivable

management should be to reduce the time lag between the sale and collection. Any delays that lengthen this span causes receivables to unnecessary build up and increase the risk of bad debts. This is equally true for the delays caused by billing and collection procedures as it is for delays caused by the customer.

The following are major receivable collection procedures and practices:

- (i) Issue of Invoice.
- (ii) Open account or open-end credit.
- (iii) Credit terms or time limits.
- (iv) Periodic statements.
- (v) Use of payment incentives and penalties.
- (vi) Record keeping and Continuous Audit.
- (vii) Export Factoring: Factors provide comprehensive credit management, loss protection collection services and provision of working capital to the firms exporting internationally.
- (viii) Business Process Outsourcing: This refers to a strategic business tool whereby an outside agency takes over the entire responsibility for managing a business process.

5. Use of Financial tools/techniques: The finance manager while managing accounts receivables uses a number of financial tools and techniques. Some of them have been described hereby as follows:

- (i) **Credit analysis:** While determining the credit terms, the firm has to evaluate individual customers in respect of their credit worthiness and the possibility of bad debts. For this purpose, the firm has to ascertain credit rating of prospective customers.

Credit rating: An important task for the finance manager is to rate the various debtors who seek credit facility. This involves decisions regarding individual parties so as to ascertain how much credit can be extended and for how long. In foreign countries specialized agencies are engaged in the task of providing rating information regarding individual parties. Dun and Broad street is one such source.

The finance manager has to look into the credit-worthiness of a party and sanction credit limit only after he is convinced that the party is

sound. This would involve an analysis of the financial status of the party, its reputation and previous record of meeting commitments.

The credit manager here has to employ a number of sources to obtain credit information. The following are the important sources:

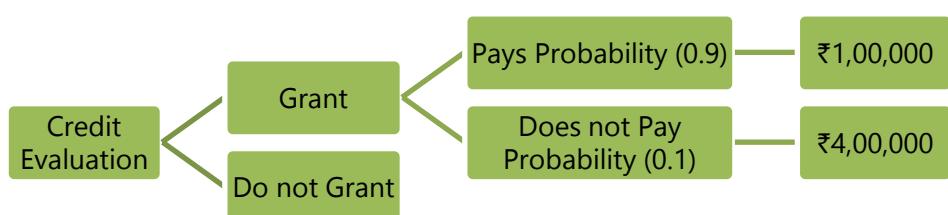
Trade references; Bank references; Credit bureau reports; Past experience; Published financial statements; and Salesman's interview and reports.

Once the credit-worthiness of a client is ascertained, the next question is to set a limit of the credit. In all such enquiries, the credit manager must be discreet and should always have the interest of high sales in view.

(ii) **Decision tree analysis of granting credit:** The decision whether to grant credit or not is a decision involving costs and benefits. When a customer pays, the seller makes profit but when he fails to pay the amount of cost going into the product is also gone. If the relative chances of recovering the dues can be decided it can form a probability distribution of payment or non-payment. If the chances of recovery are 9 out of 10 then probability of recovery is 0.9 and that of default is 0.1.

Credit evaluation of a customer shows that the probability of recovery is 0.9 and that of default is 0.1 the revenue from the order is ₹ 5 lakhs and cost is ₹ 4 lakhs. The decision is whether credit should be granted or not.

The analysis is presented in the following diagram.



The weighted net benefit is ₹ $[1,00,000 \times 0.9 - 0.1 \times 4,00,000]$ i.e. 50,000. So credit should be granted.

(iii) **Control of receivables:** Another aspect of management of debtors is the control of receivables. Merely setting of standards and framing a credit policy is not sufficient; it is, equally important to control receivables.

(iv) **Collection policy:** Efficient and timely collection of debtors ensures that the bad debt losses are reduced to the minimum and the average collection period is shorter. If a firm spends more resources on collection of debts, it is likely to have smaller bad debts. Thus, a firm must work out the optimum amount that it should spend on collection of debtors. This involves a trade-off between the level of expenditure on the one hand and decrease in bad debt losses and investment in debtors on the other.

The collection cell of a firm has to work in a manner that it does not create too much resentment amongst the customers. On the other hand, it has to keep the amount of the outstanding in check. Hence, it has to work in a very smoothen manner and diplomatically.

It is important that clear-cut procedures regarding credit collection are set up. Such procedures must answer questions like the following:

- How long should a debtor balance be allowed to exist before collection process is started?
- What should be the procedure of follow up with defaulting customer? How reminders are to be sent and how should each successive reminder be drafted?
- Should there be collection machinery whereby personal calls by company's representatives are made?
- What should be the procedure for dealing with doubtful accounts? Is legal action to be instituted? How should account be handled?



10.22 MONITORING OF RECEIVABLES

- Computation of average age of receivables:** It involves **computation of average collection period**.
- Ageing Schedule:** When receivables **are analysed according to their age**, the process is known as preparing the ageing schedules of receivables. The computation of average age of receivables is a quick and effective method of comparing the liquidity of receivables with the liquidity of receivables in the past and also comparing liquidity of one firm with the liquidity of the other competitive firm. It also helps the firm to predict collection pattern of receivables in future. This comparison can be made periodically. The purpose of classifying receivables by age groups is to have a closer control over the quality of individual accounts. It requires going back to the receivables ledger where the dates of

each customer's purchases and payments are available. The ageing schedule, by indicating a tendency for old accounts to accumulate, provides a useful supplement to average collection period of receivables/sales analysis. Because an analysis of receivables in terms of associated dates of sales enables the firm to recognise the recent increases, and slumps in sales. To ascertain the condition of receivables for control purposes, it may be considered desirable to compare the current ageing schedule with an earlier ageing schedule in the same firm and also to compare this information with the experience of other firms. The following is an illustration of the ageing schedule of receivables:-

Ageing Schedule

Age Classes (Days)	As on 30 th June, 2016			As on 30 th September, 2016		
	Month of Sale	Balance of Receivables	Percentage to total	Month of Sale	Balance of Receivables	Percentage to total
		(₹)			(₹)	
1-30	June	41,500	11.9	September	1,00,000	22.7
31-60	May	74,200	21.4	August	2,50,000	56.8
61-90	April	1,85,600	53.4	July	48,000	10.9
91-120	March	35,300	10.2	June	40,000	9.1
121 and more	Earlier	10,800	3.1	Earlier	2,000	0.5
		3,47,400	100		4,40,000	100

The above ageing schedule shows a substantial improvement in the liquidity of receivables for the quarter ending September, 2016 as compared with the liquidity of receivables for the quarter ending June, 2016. It could be possible due to greater collection efforts of the firm.

(iii) Collection Programme:

- Monitoring** the state of receivables.
- Intimation** to customers when due date approaches.
- E-mail and telephonic** advice to customers on the due date.
- Reminding** the legal recourse on overdue A/cs.
- Legal action** on overdue A/cs.

The following diagram shows the relationship between collection expenses and bad debt losses which have to be established as initial increase in collection expenses may have only a small impact on bad debt losses.

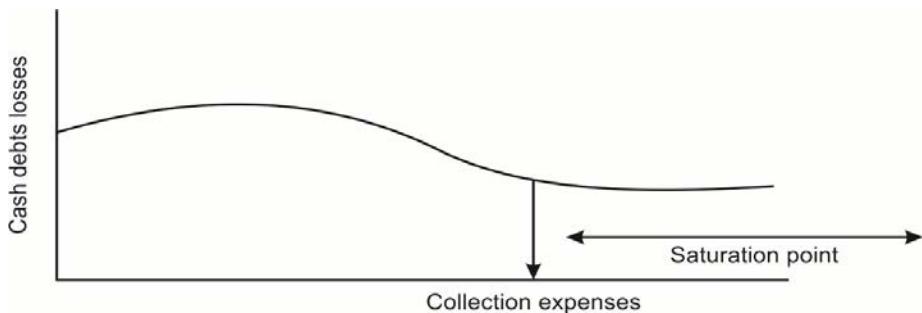


ILLUSTRATION 18

Mosaic Limited has current sales of ₹ 15 lakhs per year. Cost of sales is 75 per cent of sales and bad debts are one per cent of sales. Cost of sales comprises 80 per cent variable costs and 20 per cent fixed costs, while the company's required rate of return is 12 per cent. Mosaic Limited currently allows customers 30 days' credit, but is considering increasing this to 60 days' credit in order to increase sales.

It has been estimated that this change in policy will increase sales by 15 per cent, while bad debts will increase from one per cent to four per cent. It is not expected that the policy change will result in an increase in fixed costs and creditors and stock will be unchanged.

Should Mosaic Limited introduce the proposed policy? ANALYSE (Assume a 360 days year)

SOLUTION

New level of sales will be $15,00,000 \times 1.15 = ₹ 17,25,000$

Variable costs are $80\% \times 75\% = 60\%$ of sales

Contribution from sales is therefore 40% of sales

Fixed Cost are $20\% \times 75\% = 15\%$ of sales

Particulars	₹	₹
Proposed investment in debtors = Variable Cost + Fixed Cost* = $(17,25,000 \times 60\%) + (15,00,000 \times 15\%)$ $= (10,35,000 + 2,25,000) \times \frac{60}{360}$		2,10,000
Current investment in debtors = $[(15,00,000 \times 60\%) + (15,00,000 \times 15\%)] \times \frac{30}{360}$		93,750
Increase in investment in debtors		1,16,250
Increase in contribution = $15\% \times 15,00,000 \times 40\%$		90,000
New level of bad debts = $(17,25,000 \times 4\%)$	69,000	

Current level of bad debts ($15,00,000 \times 1\%$)	<u>15,000</u>	
Increase in bad debts		(54,000)
Additional financing costs = $1,16,250 \times 12\% =$		(13,950)
Savings by introducing change in policy		<u>22,050</u>

* Fixed Cost is taken at existing level in case of proposed investment as well

Advise: Mosaic Limited should introduce the proposed policy.

ILLUSTRATION 19

The Dolce Company purchases raw materials on terms of 2/10, net 30. A review of the company's records by the owner, Mr. Gautam, revealed that payments are usually made 15 days after purchases are made. When asked why the firm did not take advantage of its discounts, the accountant, Mr. Rohit, replied that it cost only 2 per cent for these funds, whereas a bank loan would cost the company 12 per cent.

- (a) *ANALYSE what mistake is Rohit making?*
- (b) *If the firm could not borrow from the bank and was forced to resort to the use of trade credit funds, what suggestion might be made to Rohit that would reduce the annual interest cost? IDENTIFY.*

SOLUTION

- (a) Rohit's argument of comparing 2% discount with 12% bank loan rate is not rational as 2% discount can be earned by making payment 5 days in advance i.e. within 10 days rather 15 days as payments are made presently. Whereas 12% bank loan rate is for a year.

Assume that the purchase value is ₹100, the discount can be earned by making payment within 10 days is ₹2. The interest cost on bank loan for 10 days would be ₹0.33 ($100 \times 12\% \times 10/365$ days). The net benefit of ₹1.67 ($2 - 0.33$).

- (b) If the bank loan facility could not be available then in this case the company should resort to utilise maximum credit period as possible.

The maximum possible repayment period would be lower of two:

- (i) 30 days as allowed by supplier

- (ii)
$$\frac{\text{No.of days}}{365\text{days}} \times ₹100 \times 12\% = ₹1.67 \text{ Or, No. of days} = 50.79 \text{ or } 51 \text{ days}$$

Therefore, payment should be made in 30 days to reduce the interest cost.

UNIT - V

MANAGEMENT OF PAYABLES (CREDITORS)



10.23 INTRODUCTION

There is an old age saying in business that if you can buy well then you can sell well. Management of your creditors and suppliers is just as important as the management of your debtors.

Trade creditor is a spontaneous source of finance in the sense that it arises from ordinary business transaction. But it is also important to look after your creditors - slow payment by you may create ill-feeling and your supplies could be disrupted and also create a bad image for your company.

Creditors are a vital part of effective cash management and should be managed carefully to enhance the cash position.



10.24 COST AND BENEFITS OF TRADE CREDIT

(a) Cost of Availing Trade Credit

Normally it is considered that the trade credit does not carry any cost. However, it carries the following costs:

- (i) **Price:** There is often a discount on the price that the firm undergoes when it uses trade credit, since it can take advantage of the discount only if it pays immediately. This discount can translate into a high implicit cost.
- (ii) **Loss of goodwill:** If the credit is overstepped, suppliers may discriminate against delinquent customers if supplies become short. As with the effect of any loss of goodwill, it depends very much on the relative market strengths of the parties involved.
- (iii) **Cost of managing:** Management of creditors involves administrative and accounting costs that would otherwise be incurred.
- (iv) **Conditions:** Sometimes most of the suppliers insist that for availing the credit facility the order should be of some minimum size or even on regular basis.

(b) Cost of Not Taking Trade Credit

On the other hand the costs of not availing credit facilities are as under:

- (i) **Impact of Inflation:** If inflation persists then the borrowers are favoured over the lenders with the levels of interest rates not seeming totally to redress the balance.
- (ii) **Interest:** Trade credit is a type of interest free loan, therefore failure to avail this facility has an interest cost. This cost is further increased if interest rates are higher.
- (iii) **Inconvenience:** Sometimes it may also cause inconvenience to the supplier if the supplier is geared to the deferred payment.



10.25 COMPUTATION OF COST OF PAYABLES

By using the trade credit judiciously, a firm can reduce the effect of growth or burden on investments in Working Capital.

Now question arises how to calculate the cost of not taking the discount.

The following equation can be used to calculate nominal cost, on an annual basis of not taking the discount:

$$\frac{d}{100-d} \times \frac{365 \text{ days}}{t}$$

However the above formula does not take into account the compounding effect and therefore, the cost of credit shall be even higher. The cost of lost cash discount can be estimated by the formula:

$$\left(\frac{100}{100-d} \right)^{\frac{365}{t}} - 1$$

Where,

d = Size of discount i.e. for 6% discount, $d = 6$

t = The reduction in the payment period in days, necessary to obtain the early discount or Days Credit Outstanding – Discount Period.

ILLUSTRATION 20

Suppose ABC Ltd. has been offered credit terms from its major supplier of 2/10, net 45. Hence the company has the choice of paying ₹ 10 per ₹ 100 or to invest ₹ 98 for an additional 35 days and eventually pay the supplier ₹ 100 per ₹ 100. The decision

as to whether the discount should be accepted depends on the opportunity cost of investing ₹98 for 35 days. ANALYSE what should the company do?

SOLUTION

If the company does not avail the cash discount and pays the amount after 45 days, the implied cost of interest per annum would be approximately:

$$\left(\frac{100}{100-2} \right)^{\frac{365}{35}} - 1 = 23.5\%$$

Now let us assume that ABC Ltd. can invest the additional cash and can obtain an annual return of 25% and if the amount of invoice is ₹ 10,000. The alternatives are as follows:

	Refuse discount	Accept discount
	₹	₹
Payment to supplier	10,000	9,800
Return from investing ₹ 9,800 between day 10 and day 45: $\frac{35}{365} \times ₹ 9,800 \times 25\%$	(235)	
Net Cost	9,765	9,800

Advise : Thus it is better for the company to refuse the discount, as return on cash retained is more than the saving on account of discount.

UNIT - VI

FINANCING OF WORKING CAPITAL



10.26 INTRODUCTION

After determining the amount of working capital required, the next step to be taken by the finance manager is to arrange the funds.

As discussed earlier, it is advisable that the finance manager bifurcate the working capital requirements between the permanent working capital and temporary working capital.

The permanent working capital is always needed irrespective of sales fluctuation, hence it should be financed by the long-term sources such as debt and equity. On the contrary the temporary working capital may be financed by the short-term sources of finance.

Broadly speaking, the working capital finance may be classified between the two categories:

- (i) Spontaneous sources; and
- (ii) Negotiable sources.

Spontaneous Sources: Spontaneous sources of finance are those which naturally arise in the course of business operations. Trade credit, credit from employees, credit from suppliers of services, etc. are some of the examples which may be quoted in this respect.

Negotiated Sources: On the other hand the negotiated sources, as the name implies, are those which have to be specifically negotiated with lenders say, commercial banks, financial institutions, general public etc.

The finance manager has to be very careful while selecting a particular source, or a combination thereof for financing of working capital. Generally, the following parameters will guide his decisions in this respect:

- (i) Cost factor
- (ii) Impact on credit rating
- (iii) Feasibility
- (iv) Reliability

- (v) Restrictions
- (vi) Hedging approach or matching approach i.e., Financing of assets with the same maturity as of assets.



10.27 SOURCES OF FINANCE

10.27.1 Spontaneous Sources of Finance

(a) Trade Credit: As outlined above trade credit is a spontaneous source of finance which is normally extended to the purchaser organization by the sellers or services providers. This source of financing working capital is more important since it contributes to about one-third of the total short-term requirements. The dependence on this source is higher due to lesser cost of finance as compared with other sources. Trade credit is guaranteed when a company acquires supplies, merchandise or materials and does not pay immediately. If a buyer is able to get the credit without completing much formality, it is termed as 'open account trade credit.'

(b) Bills Payable: On the other hand in the case of "Bills Payable" the purchaser will have to give a written promise to pay the amount of the bill/invoice either on demand or at a fixed future date to the seller or the bearer of the note.

Due to its simplicity, easy availability and lesser explicit cost, the dependence on this source is much more in all small or big organizations. Especially, for small enterprises this form of credit is more helpful to small and medium enterprises. The amount of such financing depends on the volume of purchases and the payment timing.

(c) Accrued Expenses: Another spontaneous source of short-term financing is the accrued expenses or the outstanding expenses liabilities. The accrued expenses refer to the services availed by the firm, but the payment for which has yet to be made. It is a built in and an automatic source of finance as most of the services like wages, salaries, taxes, duties etc., are paid at the end of the period. The accrued expenses represent an interest free source of finance. There is no explicit or implicit cost associated with the accrued expenses and the firm can ensure liquidity by accruing these expenses.

10.27.2 Inter-corporate Loans and Deposits

Sometimes, organizations having surplus funds invest for short-term period with other organizations. The rate of interest will be higher than the bank rate of interest

and depends on the financial soundness of the borrower company. This source of finance reduces dependence on bank financing.

10.27.3 Commercial Papers

Commercial Paper (CP) is an unsecured promissory note issued by a firm to raise funds for a short period. This is an instrument that enables highly rated corporate borrowers for short-term borrowings and provides an additional financial instrument to investors with a freely negotiable interest rate. The maturity period ranges from minimum 7 days to less than 1 year from the date of issue. CP can be issued in denomination of ₹ 5 lakhs or multiples thereof.

Advantages of CP: From the point of the issuing company, CP provides the following benefits:

- (a) CP is sold on an unsecured basis and does not contain any restrictive conditions.
- (b) Maturing CP can be repaid by selling new CP and thus can provide a continuous source of funds.
- (c) Maturity of CP can be tailored to suit the requirement of the issuing firm.
- (d) CP can be issued as a source of fund even when money market is tight.
- (e) Generally, the cost of CP to the issuing firm is lower than the cost of commercial bank loans.

However, CP as a source of financing has its own limitations:

- (i) Only highly credit rating firms can use it. New and moderately rated firm generally are not in a position to issue CP.
- (ii) CP can neither be redeemed before maturity nor can be extended beyond maturity.

10.27.4 Funds Generated from Operations

Funds generated from operations, during an accounting period, increase working capital by an equivalent amount. The two main components of funds generated from operations are profit and depreciation. Working capital will increase by the extent of funds generated from operations. Students may refer to funds flow statement given earlier in this chapter.

10.27.5 Public Deposits

Deposits from the public are one of the important sources of finance particularly for well established big companies with huge capital base for short and medium-term.

10.27.6 Bills Discounting

Bill discounting is recognized as an important short term Financial Instrument and it is widely used method of short term financing. In a process of bill discounting, the supplier of goods draws a bill of exchange with direction to the buyer to pay a certain amount of money after a certain period, and gets its acceptance from the buyer or drawee of the bill.

10.27.7 Bill Rediscounting Scheme

The Bill rediscounting Scheme was introduced by Reserve Bank of India with effect from 1st November, 1970 in order to extend the use of the bill of exchange as an instrument for providing credit and the creation of a bill market in India with a facility for the rediscounting of eligible bills by banks. Under the bills rediscounting scheme, all licensed scheduled banks are eligible to offer bills of exchange to the Reserve Bank for rediscount.

10.27.8 Factoring

Students may refer to the unit on Receivable Management wherein the concept of factoring has been discussed. Factoring is a method of financing whereby a firm sells its trade debts at a discount to a financial institution. In other words, factoring is a continuous arrangement between a financial institution, (namely the factor) and a firm (namely the client) which sells goods and services to trade customers on credit. As per this arrangement, the factor purchases the client's trade debts including accounts receivables either with or without recourse to the client, and thus, exercises control over the credit extended to the customers and administers the sales ledger of his client. To put it in a layman's language, a factor is an agent who collects the dues of his client for a certain fee.

The differences between Factoring and Bills discounting are as follows:

- (i) Factoring is called as 'Invoice factoring' whereas bills discounting is known as "Invoice discounting".
- (ii) In factoring the parties are known as client, factor and debtor whereas in bills discounting they are known as Drawer, Drawee and Payee.

- (iii) Factoring is a sort of management of book debts whereas bills discounting is a sort of borrowing from commercial banks.
- (iv) For factoring there is no specific Act; whereas in the case of bills discounting, the Negotiable Instrument Act is applicable.



10.28 WORKING CAPITAL FINANCE FROM BANKS

Banks in India today constitute the major suppliers of working capital credit to any business activity. Recently, some term lending financial institutions have also announced schemes for working capital financing. The two committees viz., Tandon Committee and Chore Committee have evolved definite guidelines and parameters in working capital financing, which have laid the foundations for development and innovation in the area.

10.28.1 Instructions on Working Capital Finance by Banks

Assessment of Working Capital

- Reserve Bank of India has withdrawn the prescription, in regard to assessment of working capital needs, based on the concept of Maximum Permissible Bank Finance, in April 1997. Banks are now free to evolve, with the approval of their Boards, methods for assessing the working capital requirements of borrowers, within the prudential guidelines and exposure norms prescribed. Banks, however, have to take into account Reserve Bank's instructions relating to directed credit (such as priority sector, export, etc.), and prohibition of credit (such as bridge finance, rediscounting of bills earlier discounted by NBFCs) while formulating their lending policies.
- With the above liberalizations, all the instructions relating to MPBF issued by RBI from time to time stand withdrawn. Further, various instructions/guidelines issued to banks with objective of ensuring lending discipline in appraisal, sanction, monitoring and utilization of bank finance cease to be mandatory. However, banks have the option of incorporating such of the instructions/guidelines as are considered necessary in their lending policies/procedures.



10.29 FORMS OF BANK CREDIT

The bank credit will generally be in the following forms:

- **Cash Credit:** This facility will be given by the banker to the customers by giving certain amount of credit facility on continuous basis. The borrower will not be allowed to exceed the limits sanctioned by the bank.
- **Bank Overdraft:** It is a short-term borrowing facility made available to the companies in case of urgent need of funds. The banks will impose limits on the amount they can lend. When the borrowed funds are no longer required they can quickly and easily be repaid. The banks issue overdrafts with a right to call them in at short notice.
- **Bills Discounting:** The Company which sells goods on credit will normally draw a bill on the buyer who will accept it and sends it to the seller of goods. The seller, in turn discounts the bill with his banker. The banker will generally earmark the discounting bill limit.
- **Bills Acceptance:** To obtain finance under this type of arrangement a company draws a bill of exchange on bank. The bank accepts the bill thereby promising to pay out the amount of the bill at some specified future date.
- **Line of Credit:** Line of Credit is a commitment by a bank to lend a certain amount of funds on demand specifying the maximum amount.
- **Letter of Credit:** It is an arrangement by which the issuing bank on the instructions of a customer or on its own behalf undertakes to pay or accept or negotiate or authorizes another bank to do so against stipulated documents subject to compliance with specified terms and conditions.
- **Bank Guarantees:** Bank guarantee is one of the facilities that the commercial banks extend on behalf of their clients in favour of third parties who will be the beneficiaries of the guarantees.



10.30 MAXIMUM PERMISSIBLE BANK FINANCE (MPBF)- TANDON COMMITTEE

The Reserve Bank of India set up in 1974 a study group under the chairmanship of Mr. P.L. Tandon, popularly referred to as The Tandon Committee.

Recommendations of the Committee

1. A proper fund discipline has to be observed by the borrowers. They should supply to the banker information regarding his operational plans well in advance. The banker must carry out a realistic appraisal of such plans.

2. The main function of the banker as a lender is to supplement the borrower's resources to carry on acceptable level of current assets. This has two implications: (a) current assets must be reasonable and based on norms, and (b) a part of funds requirement for carrying out current assets must be financed from long term funds.
3. The bank should know the end use of bank credit so that it is used only for purposes for which it was made available.
4. The bank should follow inventory and receivable norms and also leading norms. It has suggested inventory and receivable norms for fifteen major industries. It has also suggested three lending norms which are as follows:

Lending Norms

1st Method	
Total current assets required	xxx
Less: Current Liabilities	xxx
Working Capital Gap	xxx
Less: 25% from Long-term sources	xxx
Maximum permissible bank borrowings	xxx
2nd Method	
Current assets required	xxx
Less: 25% to be provided term long-term funds	xxx
	xxx
Less: Current Liabilities	xxx
Maximum permissible bank borrowings	xxx
3rd Method	
Current assets	xxx
Less: Core Current assets	xxx
	xxx
Less: 25% to be provided from long-term funds	xxx
	xxx
Less: Current Liabilities	xxx
Maximum permissible bank borrowings	xxx

- I. The borrower has to contribute a minimum of 25% of working capital gap from long term funds.

MPBF = 75% of [Current Assets Less Current Liabilities] i.e. 75% of Net Working Capital

- II. The borrower has to contribute a minimum of 25% of the total current assets from long term funds.

MPBF = [75% of Current Assets] Less Current Liabilities

- III. The borrower has to contribute the entire hard core current assets and a minimum of 25% of the balance of the current assets from long term funds.

MPBF = [75% of Soft Core Current Assets] Less Current Liabilities

The RBI vide its credit policy (beginning of 1997) scrapped the concept of MPBF. The salient features of new credit system were:

For borrowers with requirements of upto ₹ 25 lakhs credit limit will be computed after detailed discussions with the borrower, without going into detailed evaluation.

For borrowers with requirements above ₹ 25 lakhs, but upto ₹ 5 crore, credit limit can be offered upto 20% of the projected gross sales of the borrower.

For borrowers not falling in the above categories, the cash budget systems may be used to identify the working capital needs.

Core current assets is permanent component of current assets which are required throughout the year for a company to run continuously and to stay viable. The term "Core Current Assets" was framed by Tandon Committee while explaining the amount of stock a company can hold in its current assets. Generally, such assets are financed by long term funds. Sometimes core current assets are also referred to as "*Hardcore Working Capital*".

These assets are not liquid and so when companies are in need of money, they initially sell off non-core assets (assets which are not important for continuous functioning of a business) to raise money. If a company is ready to raise cash by selling its core current assets, then this implies that the company is in dire situation or close to bankruptcy.

Examples of Core Current Assets are Raw materials, Work in Progress, Finished Goods, Cash in Hand and at Bank etc.

Examples of Non-Core Assets are natural resources, bonds, options and so on.

Example: From the following data, calculate the maximum permissible bank finance under the three methods suggested by the Tandon Committee:

Liabilities	₹ in lakhs
Creditors	120
Other current liabilities	40
Bank borrowing	250
Total	410
Current Assets	₹ in lakhs
Raw material	180
Work-in-progress	60
Finished goods	100
Receivables	150
Other current assets	20
Total current assets	510
The total Core Current Assets (CCA) are ₹ 200 lakhs	

Solution

The maximum permissible bank finance for the firm, under three methods may be ascertained as follows:

$$\begin{aligned}
 \text{Method I:} &= 0.75 (\text{CA} - \text{CL}) \\
 &= 0.75 (510 - 160) \\
 &= ₹ 262.50 \text{ lakhs}
 \end{aligned}$$

$$\begin{aligned}
 \text{Method II:} &= 0.75 \text{ CA} - \text{CL} \\
 &= 0.75 \times 510 - 160 \\
 &= ₹ 222.50 \text{ lakhs}
 \end{aligned}$$

$$\begin{aligned}
 \text{Method III:} &= 0.75 (\text{CA} - \text{CCA}) - \text{CL} \\
 &= 0.75 (510 - 200) - 160 \\
 &= ₹ 72.50 \text{ lakhs}
 \end{aligned}$$

So, it may be noted that the MPBF decreases gradually from the first method to second method and then to third method. As the firm, has already availed the bank loan of 250 lakhs, it can still avail a loan of ₹ 12.50 lakhs as per the first method. However, as per the second and third method, it is eligible to get finance of ₹ 222.50 lakhs and ₹ 72.50 lakhs only whereas its present bank borrowings are ₹ 250 lakhs.

SUMMARY

- ◆ Working Capital Management involves managing the balance between firm's short-term assets and its short-term liabilities.
- ◆ From the value point of view, Working Capital can be defined as Gross Working Capital or Net Working Capital.
- ◆ From the point of view of time, the term working capital can be divided into two categories viz., Permanent and temporary.
- ◆ 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.
- ◆ Some of the items/factors which need to be considered while planning for working capital requirement are nature of business, market and demand conditions, operating efficiency, credit policy etc.
- ◆ Finance manager has to pay particular attention to the levels of current assets and their financing. To decide the levels and financing of current assets, the risk return trade off must be taken into account.
- ◆ In determining the optimum level of current assets, the firm should balance the profitability – Solvency tangle by minimizing total costs.
- ◆ Working Capital cycle indicates the length of time between a company's paying for materials, entering into stock and receiving the cash from sales of finished goods. It can be determined by adding the number of days required for each stage in the cycle.
- ◆ Treasury management is defined as 'the corporate handling of all financial matters, the generation of external and internal funds for business, the management of currencies and cash flows and the complex, strategies, policies and procedures of corporate finance.'
- ◆ The main objectives of cash management for a business are:-

Provide adequate cash to each of its units;

No funds are blocked in idle cash; and

- ◆ The surplus cash (if any) should be invested in order to maximize returns for the business.
- ◆ Large amounts are tied up in sundry debtors, there are chances of bad debts and there will be cost of collection of debts. On the contrary, if the investment in sundry debtors is low, the sales may be restricted, since the competitors may offer more liberal terms. Therefore, management of sundry debtors is an important issue and requires proper policies and their implementation.
- ◆ There are basically three aspects of management of sundry debtors: Credit policy, Credit Analysis and Control of receivable.
- ◆ Trade creditor is a spontaneous source of finance in the sense that it arises from ordinary business transaction. But it is also important to look after your creditors - slow payment by you may create ill-feeling and your supplies could be disrupted and also create a bad image for your company.
- ◆ Creditors are a vital part of effective cash management and should be managed carefully to enhance the cash position.
- ◆ As discussed earlier, it is advisable that the finance manager bifurcates the working capital requirements between the permanent working capital and temporary working capital.
- ◆ The permanent working capital is always needed irrespective of sales fluctuations, hence should be financed by the long-term sources such as debt and equity. On the contrary the temporary working capital may be financed by the short-term sources of finance.

TEST YOUR KNOWLEDGE

MCQs based Questions

1. The credit terms may be expressed as "3/15 net 60". This means that a 3% discount will be granted if the customer pays within 15 days, if he does not avail the offer he must make payment within 60 days.
 - (a) I agree with the statement
 - (b) I do not agree with the statement
 - (c) I cannot say.

2. The term 'net 50' implies that the customer will make payment.

- (a) Exactly on 50th day
- (b) Before 50th day
- (c) Not later than 50th day
- (d) None of the above.

3. Trade credit is a source of :

- (a) Long-term finance
- (b) Medium term finance
- (c) Spontaneous source of finance
- (d) None of the above.

4. The term float is used in

- (a) Inventory Management
- (b) Receivable Management
- (c) Cash Management
- (d) Marketable securities.

5. William J Baumol's model of Cash Management determines optimum cash level where the carrying cost and transaction cost are:

- (a) Maximum
- (b) Minimum
- (c) Medium
- (d) None of the above.

6. In Miller – ORR Model of Cash Management:

- (a) The lower, upper limit, and return point of Cash Balances are set out
- (b) Only upper limit and return point are decided
- (c) Only lower limit and return point are decided
- (d) None of the above are decided.

7. Working Capital is defined as

- (a) Excess of current assets over current liabilities

- (b) Excess of current liabilities over current assets
- (c) Excess of Fixed Assets over long-term liabilities
- (d) None of the above.

8. Working Capital is also known as "Circulating Capital, fluctuating Capital and revolving capital". The aforesaid statement is;

- (a) Correct
- (b) Incorrect
- (c) Cannot say.

9. The basic objectives of Working Capital Management are:

- (a) Optimum utilization of resources for profitability
- (b) To meet day-to-day current obligations
- (c) Ensuring marginal return on current assets is always more than cost of capital
- (d) Select any one of the above statement.

10. The term Gross Working Capital is known as:

- (a) The investment in current liabilities
- (b) The investment in long-term liability
- (c) The investment in current assets
- (d) None of the above.

11. The term net working capital refers to the difference between the current assets minus current liabilities.

- (a) The statement is correct
- (b) The statement is incorrect
- (c) I cannot say.

12. The term "Core current assets' was coined by

- (a) Chord Committee
- (b) Tandon Committee
- (c) Jilani Committee

(d) None of the above.

13. The concept operating cycle refers to the average time which elapses between the acquisition of raw materials and the final cash realization. This statement is

(a) Correct

(b) Incorrect

(c) Partially True

(d) I cannot say.

14. As a matter of self-imposed financial discipline can there be a situation of zero working capital now-a-days in some of the professionally managed organizations.

(a) Yes

(b) No

(c) Impossible

(d) Cannot say.

15. Over trading arises when a business expands beyond the level of funds available. The statement is

(a) Incorrect

(b) Correct

(c) Partially correct

(d) I cannot say.

16. A Conservative Working Capital strategy calls for high levels of current assets in relation to sales.

(a) I agree

(b) Do not agree

(c) I cannot say.

17. The term Working Capital leverage refer to the impact of level of working capital on company's profitability. This measures the responsiveness of ROCE for changes in current assets.

(a) I agree

(b) Do not agree
(c) The statement is partially true.

18. The term spontaneous source of finance refers to the finance which naturally arise in the course of business operations. The statement is
(a) Correct
(b) Incorrect
(c) Partially Correct
(d) I cannot say.

19. Under hedging approach to financing of working capital requirements of a firm, each asset in the balance sheet assets side would be offset with a financing instrument of the same approximate maturity. This statement is
(a) Incorrect
(b) Correct
(c) Partially correct
(d) I cannot say.

20. Trade credit is a
(a) Negotiated source of finance
(b) Hybrid source of finance
(c) Spontaneous source of finance
(d) None of the above.

21. Factoring is a method of financing whereby a firm sells its trade debts at a discount to a financial institution. The statement is
(a) Correct
(b) Incorrect
(c) Partially correct
(d) I cannot say.

22. A factoring arrangement can be both with recourse as well as without recourse:
(a) True

(b) False
(c) Partially correct
(d) Cannot say.

23. The Bank financing of working capital will generally be in the following form. Cash Credit, Overdraft, bills discounting, bills acceptance, line of credit; Letter of credit and bank guarantee.

(a) I agree
(b) I do not agree
(c) I cannot say.

24. When the items of inventory are classified according to value of usage, the technique is known as:

(a) XYZ Analysis
(b) ABC Analysis
(c) DEF Analysis
(d) None of the above.

25. When a firm advises its customers to mail their payments to special Post Office collection centers, the system is known as.

(a) Concentration banking
(b) Lock Box system
(c) Playing the float
(d) None of the above.

Theoretical Questions

1. DISCUSS the factors to be taken into consideration while determining the requirement of working capital.
2. DISCUSS the liquidity vs. profitability issue in management of working capital.
3. DISCUSS the estimation of working capital need based on operating cycle process.
4. EXPLAIN briefly the functions of Treasury Department.
5. EXPLAIN Baumol's Model of Cash Management.

6. STATE the advantage of Electronic Cash Management System.
7. EXPLAIN with example the formula used for determining optimum cash balance according to Baumol's cash management model.
8. DISCUSS Miller-Orr Cash Management model.
9. EXPLAIN briefly the accounts receivable systems.
10. DESCRIBE Factoring.
11. DESCRIBE the various forms of bank credit in financing the working capital of a business organization.

Practical Problems

1. PQ Ltd., a company newly commencing business in 2019 has the following projected Profit and Loss Account:

	(₹)	(₹)
Sales		2,10,000
Cost of goods sold		<u>1,53,000</u>
Gross Profit		57,000
Administrative Expenses	14,000	
Selling Expenses	<u>13,000</u>	27,000
Profit before tax		30,000
Provision for taxation		<u>10,000</u>
Profit after tax		<u>20,000</u>
The cost of goods sold has been arrived at as under:		
Materials used	84,000	
Wages and manufacturing Expenses	62,500	
Depreciation	<u>23,500</u>	
	1,70,000	
Less: Stock of Finished goods (10% of goods produced not yet sold)	<u>17,000</u>	
	1,53,000	

The figure given above relate only to finished goods and not to work-in-progress. Goods equal to 15% of the year's production (in terms of physical units) will be in process on the average requiring full materials but only 40%

of the other expenses. The company believes in keeping materials equal to two months' consumption in stock.

All expenses will be paid one month in advance. Suppliers of materials will extend 1-1/2 months credit. Sales will be 20% for cash and the rest at two months' credit. 70% of the Income tax will be paid in advance in quarterly instalments. The company wishes to keep ₹ 8,000 in cash. 10% has to be added to the estimated figure for unforeseen contingencies.

PREPARE an estimate of working capital.

Note: All workings should form part of the answer.

2. M.A. Limited is commencing a new project for manufacture of a plastic component. The following cost information has been ascertained for annual production of 12,000 units which is the full capacity.

	Costs per unit (₹)
Materials	40.00
Direct labour and variable expenses	20.00
Fixed manufacturing expenses	6.00
Depreciation	10.00
Fixed administration expenses	4.00
	80.00

The selling price per unit is expected to be ₹ 96 and the selling expenses ₹ 5 per unit, 80% of which is variable.

In the first two years of operations, production and sales are expected to be as follows:

Year	Production (No. of units)	Sales (No. of units)
1	6,000	5,000
2	9,000	8,500

To assess the working capital requirements, the following additional information is available:

- (a) Stock of materials 2.25 months' average consumption
- (b) Work-in-process Nil

(c)	Debtors	1 month's average sales.
(d)	Cash balance	₹ 10,000
(e)	Creditors for supply of materials	1 month's average purchase during the year.
(f)	Creditors for expenses	1 month's average of all expenses during the year.

PREPARE, for the two years:

- (i) A projected statement of Profit/Loss (Ignoring taxation); and
- (ii) A projected statement of working capital requirements.

3. Aneja Limited, a newly formed company, has applied to a commercial bank for the first time for financing its working capital requirements. The following information is available about the projections for the current year:

Estimated level of activity: 1,04,000 completed units of production plus 4,000 units of work-in-progress. Based on the above activity, estimated cost per unit is:

Raw material	₹ 80 per unit
Direct wages	₹ 30 per unit
Overheads (exclusive of depreciation)	₹ 60 per unit
Total cost	₹ 170 per unit
Selling price	₹ 200 per unit

Raw materials in stock: Average 4 weeks consumption, work-in-progress (assume 50% completion stage in respect of conversion cost) (materials issued at the start of the processing).

Finished goods in stock	8,000 units
Credit allowed by suppliers	Average 4 weeks
Credit allowed to debtors/receivables	Average 8 weeks
Lag in payment of wages	Average 1.5 weeks
Cash at banks (for smooth operation) is expected to be ₹ 25,000.	

Assume that production is carried on evenly throughout the year (52 weeks) and wages and overheads accrue similarly. All sales are on credit basis only.

You are required to CALCULATE the net working capital required.

4. The following information relates to Zeta Limited, a publishing company:

The selling price of a book is ₹15, and sales are made on credit through a book club and invoiced on the last day of the month.

Variable costs of production per book are materials (₹5), labour (₹4), and overhead (₹2)

The sales manager has forecasted the following volumes:

Month	No. of Books
November	1,000
December	1,000
January	1,000
February	1,250
March	1,500
April	2,000
May	1,900
June	2,200
July	2,200
August	2,300

Customers are expected to pay as follows:

One month after the sale	40%
Two months after the sale	60%

The company produces the books two months before they are sold and the creditors for materials are paid two months after production.

Variable overheads are paid in the month following production and are expected to increase by 25% in April; 75% of wages are paid in the month of production and 25% in the following month. A wage increase of 12.5% will take place on 1st March.

The company is going through a restructuring and will sell one of its freehold properties in May for ₹25,000, but it is also planning to buy a new printing press in May for ₹10,000. Depreciation is currently ₹1,000 per month, and will rise to ₹1,500 after the purchase of the new machine.

The company's corporation tax (of ₹10,000) is due for payment in March.

The company presently has a cash balance at bank on 31 December 20X3, of ₹1,500.

You are required to PREPARE a cash budget for the six months from January to June, 20X4.

5. From the information and the assumption that the cash balance in hand on 1st January 2017 is ₹ 72,500 PREPARE a cash budget.

Assume that 50 per cent of total sales are cash sales. Assets are to be acquired in the months of February and April. Therefore, provisions should be made for the payment of ₹ 8,000 and ₹ 25,000 for the same. An application has been made to the bank for the grant of a loan of ₹ 30,000 and it is hoped that the loan amount will be received in the month of May.

It is anticipated that a dividend of ₹ 35,000 will be paid in June. Debtors are allowed one month's credit. Creditors for materials purchased and overheads grant one month's credit. Sales commission at 3 per cent on sales is paid to the salesman each month.

Month	Sales (₹)	Materials Purchases (₹)	Salaries & Wages (₹)	Production Overheads (₹)	Office and Selling Overheads (₹)
January	72,000	25,000	10,000	6,000	5,500
February	97,000	31,000	12,100	6,300	6,700
March	86,000	25,500	10,600	6,000	7,500
April	88,600	30,600	25,000	6,500	8,900
May	1,02,500	37,000	22,000	8,000	11,000
June	1,08,700	38,800	23,000	8,200	11,500

6. Consider the balance sheet of Maya Limited as on 31 December, 20X8. The company has received a large order and anticipates the need to go to its bank to increase its borrowings. As a result, it has to forecast its cash requirements for January, February and March, 20X9. Typically, the company collects 20 per cent of its sales in the month of sale, 70 per cent in the subsequent month, and 10 per cent in the second month after the sale. All sales are credit sales.

Equity & liabilities	Amount (₹ in '000)	Assets	Amount (₹ in '000)
Equity shares capital	100	Net fixed assets	1,836
Retained earnings	1,439	Inventories	545
Long-term borrowings	450	Accounts receivables	530
Accounts payables	360	Cash and bank	50
Loan from banks	400		
Other liabilities	212		
	2,961		2,961

Purchases of raw materials are made in the month prior to the sale and amounts to 60 per cent of sales. It is paid in the subsequent month. Payments for these purchases occur in the month after the purchase. Labour costs, including overtime, are expected to be ₹ 1,50,000 in January, ₹ 2,00,000 in February, and ₹ 1,60,000 in March. Selling, administrative, taxes, and other cash expenses are expected to be ₹ 1,00,000 per month for January through March. Actual sales in November and December and projected sales for January through April are as follows (in thousands):

Month	₹	Month	₹	Month	₹
November	500	January	600	March	650
December	600	February	1,000	April	750

On the basis of this information:

- (a) PREPARE a cash budget for the months of January, February, and March.
- (b) DETERMINE the amount of additional bank borrowings necessary to maintain a cash balance of ₹ 50,000 at all times.
- (c) PREPARE a pro forma balance sheet for March 31.

7. PQR Ltd. having an annual sales of ₹ 30 lakhs, is re-considering its present collection policy. At present, the average collection period is 50 days and the bad debt losses are 5% of sales. The company is incurring an expenditure of ₹ 30,000 on account of collection of receivables. Cost of funds is 10 percent.

The alternative policies are as under:

	Alternative I	Alternative II
Average Collection Period	40 days	30 days
Bad Debt Losses	4% of sales	3% of sales
Collection Expenses	₹ 60,000	₹ 95,000

DETERMINE the alternatives on the basis of incremental approach and state which alternative is more beneficial.

8. As a part of the strategy to increase sales and profits, the sales manager of a company proposes to sell goods to a group of new customers with 10% risk of non-payment. This group would require one and a half months credit and is likely to increase sales by ₹ 1,00,000 p.a. Production and Selling expenses amount to 80% of sales and the income-tax rate is 50%. The company's minimum required rate of return (after tax) is 25%.

Should the sales manager's proposal be accepted? ANALYSE

Also COMPUTE the degree of risk of non-payment that the company should be willing to assume if the required rate of return (after tax) were (i) 30%, (ii) 40% and (iii) 60%.

9. Slow Payers are regular customers of Goods Dealers Ltd. and have approached the sellers for extension of credit facility for enabling them to purchase goods. On an analysis of past performance and on the basis of information supplied, the following pattern of payment schedule emerges in regard to Slow Payers:

Pattern of Payment Schedule	
At the end of 30 days	15% of the bill
At the end of 60 days	34% of the bill.
At the end of 90 days	30% of the bill.
At the end of 100 days	20% of the bill.
Non-recovery	1% of the bill.

Slow Payers want to enter into a firm commitment for purchase of goods of ₹ 15 lakhs in 20X7, deliveries to be made in equal quantities on the first day of each quarter in the calendar year. The price per unit of commodity is ₹ 150 on which a profit of ₹ 5 per unit is expected to be made. It is anticipated by

Goods Dealers Ltd., that taking up of this contract would mean an extra recurring expenditure of ₹ 5,000 per annum. If the opportunity cost of funds in the hands of Goods Dealers is 24% per annum, would you as the finance manager of the seller recommend the grant of credit to Slow Payers? ANALYSE. Workings should form part of your answer. Assume year of 365 days.

ANSWERS/SOLUTIONS

Answers to the MCQs based Questions

1. (a)	2. (c)	3. (c)	4. (c)	5. (b)	6. (a)
7. (a)	8. (a)	9. (b)	10. (c)	11. (a)	12. (b)
13. (a)	14. (a)	15. (b)	16. (a)	17. (a)	18. (a)
19. (b)	20. (c)	21. (a)	22. (a)	23. (a)	24. (b)
25. (b)					

Answers to the Theoretical Questions

1. Please refer paragraph 11.3
2. Please refer paragraph 11.4.1
3. Please refer paragraph 11.5
4. Please refer paragraph 11.8
5. Please refer paragraph 11.11.1
6. Please refer paragraph 11.12.6
7. Please refer paragraph 11.11.1
8. Please refer paragraph 11.11.2
9. Please refer paragraph 11.21
10. Please refer paragraph 11.20
11. Please refer paragraph 11.29

Answers to the Practical Problems

1. Statement showing the requirements of Working Capital

Particulars	(₹)	(₹)
A. Current Assets:		
Inventory:		
Stock of Raw material ($\text{₹ } 96,600 \times 2/12$)	16,100	
Stock of Work-in-progress (As per Working Note)	16,350	
Stock of Finished goods ($\text{₹ } 1,46,500 \times 10/100$)	14,650	
Receivables (Debtors) ($\text{₹ } 1,27,080 \times 2/12$)	21,180	
Cash in Hand	8,000	● ● ●
Prepaid Expenses:		
Wages & Mfg. Expenses ($\text{₹ } 66,250 \times 1/12$)	5,521	
Administrative expenses ($\text{₹ } 14,000 \times 1/12$)	1,167	
Selling & Distribution Expenses ($\text{₹ } 13,000 \times 1/12$)	1,083	
Advance taxes paid $\{(70\% \text{ of } \text{₹ } 10,000) \times 3/12\}$	1,750	
Gross Working Capital	85,801	85,801
B. Current Liabilities:		
Payables for Raw materials ($\text{₹ } 1,12,700 \times 1.5/12$)	14,088	
Provision for Taxation (Net of Advance Tax) ($\text{₹ } 10,000 \times 30/100$)	3,000	
Total Current Liabilities	17,088	17,088
C. Excess of CA over CL		68,713
Add: 10% for unforeseen contingencies		6,871
Net Working Capital requirements		75,584

Working Notes:

(i) Calculation of Stock of Work-in-progress

Particulars	(₹)
Raw Material ($\text{₹ } 84,000 \times 15\%$)	12,600

Wages & Mfg. Expenses ($\text{₹ } 62,500 \times 15\% \times 40\%$)	3,750
Total	16,350

(ii) Calculation of Stock of Finished Goods and Cost of Sales

Particulars	(₹)
Direct material Cost [$\text{₹ } 84,000 + \text{₹ } 12,600$]	96,600
Wages & Mfg. Expenses [$\text{₹ } 62,500 + \text{₹ } 3,750$]	66,250
Depreciation	0
Gross Factory Cost	1,62,850
<i>Less: Closing W.I.P</i>	(16,350)
Cost of goods produced	1,46,500
<i>Add: Administrative Expenses</i>	14,000
	1,60,500
<i>Less: Closing stock</i>	(14,650)
Cost of Goods Sold	1,45,850
<i>Add: Selling and Distribution Expenses</i>	13,000
Total Cash Cost of Sales	1,58,850
Debtors (80% of cash cost of sales)	1,27,080

(iii) Calculation of Credit Purchase

Particulars	(₹)
Raw material consumed	96,600
<i>Add: Closing Stock</i>	16,100
<i>Less: Opening Stock</i>	-
Purchases	1,12,700

2. (i)

M.A. Limited

**Projected Statement of Profit / Loss
(Ignoring Taxation)**

	Year 1	Year 2
Production (Units)	6,000	9,000

Sales (Units)	5,000	8,500
	(₹)	(₹)
Sales revenue (A) (Sales unit × ₹ 96)	4,80,000	8,16,000
Cost of production:		
Materials cost (Units produced × ₹ 40)	2,40,000	3,60,000
Direct labour and variable expenses (Units produced × ₹ 20)	1,20,000	1,80,000
Fixed manufacturing expenses (Production Capacity: 12,000 units × ₹ 6)	72,000	72,000
Depreciation (Production Capacity : 12,000 units × ₹ 10)	1,20,000	1,20,000
Fixed administration expenses (Production Capacity : 12,000 units × ₹ 4)	48,000	48,000
Total Costs of Production	6,00,000	7,80,000
<i>Add: Opening stock of finished goods (Year 1 : Nil; Year 2 : 1,000 units)</i>	---	1,00,000
Cost of Goods available for sale (Year 1: 6,000 units; Year 2: 10,000 units)	6,00,000	8,80,000
<i>Less: Closing stock of finished goods at average cost (year 1: 1000 units, year 2 : 1500 units) (Cost of Production × Closing stock/ units produced)</i>	(1,00,000)	(1,32,000)
Cost of Goods Sold	5,00,000	7,48,000
<i>Add: Selling expenses – Variable (Sales unit × ₹ 4)</i>	20,000	34,000
<i>Add: Selling expenses -Fixed (12,000 units × ₹1)</i>	12,000	12,000
Cost of Sales : (B)	5,32,000	7,94,000
Profit (+) / Loss (-): (A - B)	(-) 52,000	(+) 22,000

Working Notes:**1. Calculation of creditors for supply of materials:**

	Year 1 (₹)	Year 2 (₹)
Materials consumed during the year	2,40,000	3,60,000
<i>Add: Closing stock (2.25 month's average consumption)</i>	45,000	67,500
	2,85,000	4,27,500
<i>Less: Opening Stock</i>	---	45,000
Purchases during the year	2,85,000	3,82,500
Average purchases per month (Creditors)	23,750	31,875

2. Creditors for expenses:

	Year 1 (₹)	Year 2 (₹)
Direct labour and variable expenses	1,20,000	1,80,000
Fixed manufacturing expenses	72,000	72,000
Fixed administration expenses	48,000	48,000
Selling expenses (variable + fixed)	32,000	46,000
Total (including	2,72,000	3,46,000
Average per month	22,667	28,833

(ii) Projected Statement of Working Capital requirements

	Year 1 (₹)	Year 2 (₹)
Current Assets:		
Inventories:		
- Stock of materials (2.25 month's average consumption)	45,000	67,500
- Finished goods	1,00,000	1,32,000
Debtors (1 month's average sales) (including profit)	40,000	68,000
Cash	10,000	10,000
Total Current Assets/ Gross working capital (A)	1,95,000	2,77,500

Current Liabilities:		
Creditors for supply of materials (Refer to working note 1)	23,750	31,875
Creditors for expenses (Refer to working note 2)	22,667	28,833
Total Current Liabilities: (B)	46,417	60,708
Estimated Working Capital Requirements: (A-B)	1,48,583	2,16,792

Projected Statement of Working Capital Requirement (Cash Cost Basis)

	Year 1 (₹)	Year 2 (₹)
(A) Current Assets		
Inventories:		
- Stock of Raw Material (6,000 units × ₹ 40 × 2.25/12); (9,000 units × ₹ 40 × 2.25 /12)	45,000	67,500
- Finished Goods (Refer working note 3)	80,000	1,11,000
Receivables (Debtors) (Refer working note 4)	36,000	56,250
Minimum Cash balance	10,000	10,000
Total Current Assets/ Gross working capital (A)	1,71,000	2,44,750
(B) Current Liabilities		
Creditors for raw material (Refer working note 1)	23,750	31,875
Creditors for Expenses (Refer working note 2)	22,667	28,833
Total Current Liabilities	46,417	60,708
Net Working Capital (A – B)	1,24,583	1,84,042

Working Note:

3. Cash Cost of Production:

	Year 1 (₹)	Year 2 (₹)
Cost of Production as per projected Statement of P&L	6,00,000	7,80,000
Less: Depreciation	1,20,000	1,20,000
Cash Cost of Production	4,80,000	6,60,000
Add: Opening Stock at Average Cost:	--	80,000

Cash Cost of Goods Available for sale	4,80,000	7,40,000
Less : Closing Stock at Avg. Cost $\left(\frac{\text{₹ } 4,80,000 \times 1,000}{6,000} \right); \left(\frac{\text{₹ } 7,40,000 \times 1,500}{10,000} \right)$	(80,000)	(1,11,000)
Cash Cost of Goods Sold	4,00,000	6,29,000

4. Receivables (Debtors)

	Year 1 (₹)	Year 2 (₹)
Cash Cost of Goods Sold	4,00,000	6,29,000
Add : Variable Expenses @ ₹ 4	20,000	34,000
Add : Total Fixed Selling expenses (12,000 units × ₹1)	12,000	12,000
Cash Cost of Debtors	4,32,000	6,75,000
Average Debtors	36,000	56,250

3. Calculation of Net Working Capital requirement:

	(₹)	(₹)
A. Current Assets:		
Inventories:		
- Raw material stock (Refer to Working note 3)	6,64,615	
- Work in progress stock (Refer to Working note 2)	5,00,000	
- Finished goods stock (Refer to Working note 4)	13,60,000	
Receivables (Debtors) (Refer to Working note 5)	25,40,769	
Cash and Bank balance	25,000	
Gross Working Capital	50,60,384	50,60,384
B. Current Liabilities:		
Creditors for raw materials (Refer to Working note 6)	7,15,740	

Creditors for wages (Refer to Working note 7)	91,731	
	8,07,471	8,07,471
Net Working Capital (A - B)		42,52,913

Working Notes:

1. Annual cost of production

	(₹)
Raw material requirements $\{(1,04,000 \text{ units} \times ₹ 80) + ₹ 3,20,000\}$	86,40,000
Direct wages $\{(1,04,000 \text{ units} \times ₹ 30) + ₹ 60,000\}$	31,80,000
Overheads (exclusive of depreciation) $\{(1,04,000 \times ₹ 60) + ₹ 1,20,000\}$	63,60,000
Gross Factory Cost	1,81,80,000
Less: Closing W.I.P	(5,00,000)
Cost of Goods Produced	1,76,80,000
Less: Closing Stock of Finished Goods $(₹ 1,76,80,000 \times 8,000/1,04,000)$	(13,60,000)
Total Cash Cost of Sales	1,63,20,000

2. Work in progress stock

	(₹)
Raw material requirements $(4,000 \text{ units} \times ₹ 80)$	3,20,000
Direct wages $(50\% \times 4,000 \text{ units} \times ₹ 30)$	60,000
Overheads $(50\% \times 4,000 \text{ units} \times ₹ 60)$	1,20,000
	5,00,000

3. Raw material stock

It is given that raw material in stock is average 4 weeks consumption. Since, the company is newly formed, the raw material requirement for production and work in progress will be issued and consumed during the year.

Hence, the raw material consumption for the year (52 weeks) is as follows:

	(₹)
For Finished goods ($1,04,000 \times ₹ 80$)	83,20,000
For Work in progress ($4,000 \times ₹ 80$)	3,20,000
	86,40,000

$$\text{Raw material stock } \frac{₹ 86,40,000}{52 \text{ weeks}} \times 4 \text{ weeks} \quad \text{i.e. ₹ 6,64,615}$$

4. **Finished goods stock:** 8,000 units @ ₹ 170 per unit = ₹ 13,60,000

5. **Debtors for sale:** $1,63,20,000 \times \frac{8}{52} = ₹ 25,10,769$

6. **Creditors for raw material:**

$$\text{Material Consumed } (₹ 83,20,000 + ₹ 3,20,000) \quad ₹ 86,40,000$$

$$\text{Add: Closing stock of raw material} \quad ₹ 6,64,615$$

$$₹ 93,04,615$$

$$\text{Credit allowed by suppliers} = \frac{₹ 93,04,615}{52 \text{ weeks}} \times 4 \text{ weeks} = ₹ 7,15,740$$

7. Creditors for wages

$$\text{Outstanding wage payment} = \frac{₹ 31,80,000}{52 \text{ weeks}} \times 1.5 \text{ weeks} = ₹ 91,731$$

4. Workings:

1. Sale receipts

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Forecast sales (S)	1,000	1,000	1,000	1,250	1,500	2,000	1,900	2,200
	₹	₹	₹	₹	₹	₹	₹	₹
S × 15	15,000	15,000	15,000	18,750	22,500	30,000	28,500	33,000
Debtors pay: 1 month 40%		6,000	6,000	6,000	7,500	9,000	12,000	11,400
2 month 60%		-	9,000	9,000	9,000	11,250	13,500	18,000
	-	-	15,000	15,000	16,500	20,250	25,500	29,400

2. Payment for materials – books produced two months before sale

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹	₹
Materials (Q×5)	5,000	6,250	7,500	10,000	9,500	11,000	11,000	11,500
Paid (2 months after)	-	-	5,000	6,250	7,500	10,000	9,500	11,000

3. Variable overheads

Month	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,000	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹	₹
Var. overhead (Q×2)	2,000	2,500	3,000	4,000	3,800			
Var. overhead (Q×2.50)						5,500	5,500	5,750
Paid one month later		2,000	2,500	3,000	4,000	3,800	5,500	5,500

4. Wages payments

Month	Dec	Jan	Feb	Mar	Apr	May	Jun
Qty produced (Q)	1,250	1,500	2,000	1,900	2,200	2,200	2,300
	₹	₹	₹	₹	₹	₹	₹
Wages (Q × 4)	5,000	6,000	8,000				
Wages (Q × 4.50)				8,550	9,900	9,900	10,350
75% month this	3,750	4,500	6,000	6,412	7,425	7,425	7,762
25% month this		1,250	1,500	2,000	2,137	2,475	2,475
	5,750	7,500	8,412	9,562	9,900	10,237	

Cash budget – six months ended June

	Jan ₹	Feb ₹	Mar ₹	Apr ₹	May ₹	Jun ₹
Receipts:						
Sales receipts	15,000	15,000	16,500	20,250	25,500	29,400
Freehold property	-	-	-	-	25,000	-
	15,000	15,000	16,500	20,250	50,500	29,400
Payments:						
Materials	5,000	6,250	7,500	10,000	9,500	11,000
Var. overheads	2,500	3,000	4,000	3,800	5,500	5,500
Wages	5,750	7,500	8,412	9,562	9,900	10,237
Printing press	-	-	-	-	10,000	-
Corporation tax	-	-	10,000	-	-	-
	13,250	16,750	29,912	23,362	34,900	26,737
Net cash flow	1,750	(1,750)	(13,412)	(3,112)	15,600	2,663
Balance b/f	1,500	3,250	1,500	(11,912)	(15,024)	576
Cumulative cash flow	3,250	1,500	(11,912)	(15,024)	576	3,239

5.

Cash Budget

	Jan ₹	Feb ₹	Mar ₹	Apr ₹	May ₹	June ₹	Total ₹
Receipts							
Cash sales	36,000	48,500	43,000	44,300	51,250	54,350	2,77,400
Collections from debtors	-	36,000	48,500	43,000	44,300	51,250	2,23,050
Bank loan	-	-	-	-	30,000	-	30,000
Total	36,000	84,500	91,500	87,300	1,25,550	1,05,600	5,30,450
Payments							
Materials	-	25,000	31,000	25,500	30,600	37,000	1,49,100
Salaries and wages	10,000	12,100	10,600	25,000	22,000	23,000	1,02,700
Production overheads	-	6,000	6,300	6,000	6,500	8,000	32,800

Office & selling overheads	-	5,500	6,700	7,500	8,900	11,000	39,600
Sales commission	2,160	2,910	2,580	2,658	3,075	3,261	16,644
Capital expenditure	-	8,000	-	25,000	-	-	33,000
Dividend	-	-	-	-	-	35,000	35,000
Total	12,160	59,510	57,180	91,658	71,075	1,17,261	4,08,844
Net cash flow	23,840	24,990	34,320	(4,358)	54,475	(11,661)	1,21,606
Balance, beginning of month	72,500	96,340	1,21,330	1,55,650	1,51,292	2,05,767	1,94,106
Balance, end of month	96,340	1,21,330	1,55,650	1,51,292	2,05,767	1,94,106	3,15,712

6. (a) **Cash Budget** *(in thousands)*

	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
		₹	₹	₹	₹	₹
Sales	500	600	600	1,000	650	750
Collections, current month's sales			120	200	130	
Collections, previous month's sales			420	420	700	
Collections, previous 2 month's sales			50	60	60	
Total cash receipts			590	680	890	
Purchases	360	600	390	450		
Payment for purchases		360	600	390		
Labour costs		150	200	160		
Other expenses		100	100	100		
Total cash disbursements		610	900	650		
Receipts less disbursements		(20)	(220)	240		

(b)

	Jan. ₹	Feb. ₹	Mar. ₹
Additional borrowings	20	220	(240)
Cumulative borrowings	420	640	400

The amount of financing peaks in February owing to the need to pay for purchases made the previous month and higher labour costs. In March, substantial collections are made on the prior month's billings, causing large net cash inflow sufficient to pay off the additional borrowings.

(c)

Pro forma Balance Sheet, 31st March, 20X9

Equity & liabilities	Amount (₹ in '000)	Assets	Amount (₹ in '000)
Equity shares capital	100	Net fixed assets	1,836
Retained earnings	1,529	Inventories	635
Long-term borrowings	450	Accounts receivables	620
Accounts payables	450	Cash and bank	50
Loan from banks	400		
Other liabilities	212		
	3,141		3,141

Accounts receivable = Sales in March × 0.8 + Sales in February × 0.1

Inventories = ₹545 + Total purchases from January to March
– Total sales from January to March × 0.6

Accounts payable = Purchases in March

Retained earnings = ₹ 1,439 + Sales – Payment for purchases –
Labour costs and – Other expenses, all for
January to March

7. Evaluation of Alternative Collection Programmes

	Present Policy	Alternative I	Alternative II
	₹	₹	₹
Sales Revenues	30,00,000	30,00,000	30,00,000

Average Collection Period (ACP) (days)	50	40	30
Receivables	4,16,667	3,33,333	2,50,000
(₹) $\left(\text{Sales} \times \frac{\text{ACP}}{360} \right)$			
Reduction in Receivables from Present Level (₹)	–	83,334	1,66,667
Savings in Interest @ 10% p.a. (A)	–	₹ 8,333	₹ 16,667
% of Bad Debt Loss	5%	4%	3%
Amount (₹)	1,50,000	1,20,000	90,000
Reduction in Bad Debts from Present Level (B)	–	30,000	60,000
Incremental Benefits from Present Level (C) = (A) + (B)	–	38,333	76,667
Collection Expenses (₹)	30,000	60,000	95,000
Incremental Collection Expenses from Present Level (D)	–	<u>30,000</u>	<u>65,000</u>
Incremental Net Benefit (C – D)	–	₹ 8,333	₹ 11,667

Conclusion: From the analysis it is apparent that Alternative I has a benefit of ₹ 8,333 and Alternative II has a benefit of ₹ 11,667 over present level. Alternative II has a benefit of ₹ 3,334 more than Alternative I. Hence Alternative II is more viable.

(Note: In absence of Cost of Sales, sales has been taken for purpose of calculating investment in receivables. 1 year = 360 days.)

8. Statement showing the Evaluation of Proposal

Particulars	₹
A. Expected Profit:	
Net Sales	1,00,000
Less: Production and Selling Expenses @ 80%	(80,000)
Profit before providing for Bad Debts	20,000

Less: Bad Debts @10%	(10,000)
Profit before Tax	10,000
Less: Tax @ 50%	(5,000)
Profit after Tax	5,000
B. Opportunity Cost of Investment in Receivables	(2,500)
C. Net Benefits (A – B)	2,500

Advise: The sales manager's proposal should be accepted.

Working Note: Calculation of Opportunity Cost of Funds

$$\text{Opportunity Cost} = \frac{\text{Total Cost of Credit Sales} \times \text{Collection period}}{\text{Required Rate of Return} \times 100}$$

$$= ₹ 80,000 \times \frac{1.5}{12} \times \frac{25}{100} = ₹ 2,500$$

Statement showing the Acceptable Degree of Risk of Non-payment

Particulars	Required Rate of Return		
	30%	40%	60%
Sales	1,00,000	1,00,000	1,00,000
Less: Production and Sales Expenses	80,000	80,000	80,000
Profit before providing for Bad Debts	20,000	20,000	20,000
Less: Bad Debts (assume X)	X	X	X
Profit before tax	20,000 – X	20,000 – X	20,000 – X
Less: Tax @ 50%	(20,000 – X) 0.5	(20,000 – X) 0.5	(20,000 – X) 0.5
Profit after Tax	10,000 – 0.5X	10,000 – 0.5X	10,000 – 0.5X
Required Return (given)	30% of 10,000*	40% of 10,000*	60% of 10,000*
	= ₹ 3,000	= ₹ 4,000	= ₹ 6,000

$$\begin{aligned} \text{*Average Debtors} &= \text{Total Cost of Credit Sales} \times \frac{\text{Collection period}}{12} \\ &= ₹ 80,000 \times \frac{1.5}{12} = ₹ 10,000 \end{aligned}$$

Computation of the value and percentage of X in each case is as follows:

$$\text{Case I} \quad 10,000 - 0.5x = 3,000$$

$$\begin{aligned} 0.5x &= 7,000 \\ X &= 7,000/0.5 = ₹ 14,000 \end{aligned}$$

$$\text{Bad Debts as \% of sales} = ₹ 14,000/₹ 1,00,000 \times 100 = 14\%$$

$$\begin{aligned} \text{Case II} \quad 10,000 - 0.5x &= 4,000 \\ 0.5x &= 6,000 \\ X &= 6,000/0.5 = ₹ 12,000 \end{aligned}$$

$$\text{Bad Debts as \% of sales} = ₹ 12,000/₹ 1,00,000 \times 100 = 12\%$$

$$\begin{aligned} \text{Case III} \quad 10,000 - 0.5x &= 6,000 \\ 0.5x &= 4,000 \\ X &= 4,000/0.5 = ₹ 8,000 \end{aligned}$$

$$\text{Bad Debts as \% of sales} = ₹ 8,000/₹ 1,00,000 \times 100 = 8\%$$

Thus, it is found that the Acceptable Degree of risk of non-payment is 14%, 12% and 8% if required rate of return (after tax) is 30%, 40% and 60% respectively.

9. Statement showing the Evaluation of Debtors Policies

Particulars	Proposed Policy ₹
A. Expected Profit:	
(a) Credit Sales	15,00,000
(b) Total Cost	
(i) Variable Costs	14,50,000
(ii) Recurring Costs	5,000
	14,55,000
(c) Bad Debts	15,000

(d) Expected Profit [(a) – (b) – (c)]	30,000
B. Opportunity Cost of Investments in Receivables	68,787
C. Net Benefits (A – B)	(38,787)

Recommendation: The Proposed Policy should not be adopted since the net benefits under this policy are negative

Working Note: Calculation of Opportunity Cost of Average Investments

$$\text{Opportunity Cost} = \text{Total Cost} \times \frac{\text{Collection period}}{365} \times \frac{\text{Rate of Return}}{100}$$

Particulars	15%	34%	30%	20%	Total
A. Total Cost	2,18,250	4,94,700	4,36,500	2,91,000	14,40,450
B. Collection period	30/365	60/365	90/365	100/365	
C. Required Rate of Return	24%	24%	24%	24%	
D. Opportunity Cost (A × B × C)	4,305	19,517	25,831	19,134	68,787

APPENDIX

Future value interest factor of ₹1 per period at i% for n periods, FVIF(i,n).

(The Compound Sum of One Rupee)

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100
2	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188	1.210
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.063	13.268	17.449
35	1.417	2.000	2.814	3.946	5.516	7.686	10.677	14.785	20.414	28.102
40	1.489	2.208	3.262	4.801	7.040	10.286	14.974	21.725	31.409	45.259
50	1.645	2.692	4.384	7.107	11.467	18.420	29.457	46.902	74.358	117.391

Contd.....

Period	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	1.110	1.120	1.130	1.140	1.150	1.160	1.170	1.180	1.190	1.200
2	1.232	1.254	1.277	1.300	1.323	1.346	1.369	1.392	1.416	1.440
3	1.368	1.405	1.443	1.482	1.521	1.561	1.602	1.643	1.685	1.728
4	1.518	1.574	1.630	1.689	1.749	1.811	1.874	1.939	2.005	2.074
5	1.685	1.762	1.842	1.925	2.011	2.100	2.192	2.288	2.386	2.488
6	1.870	1.974	2.082	2.195	2.313	2.436	2.565	2.700	2.840	2.986
7	2.076	2.211	2.353	2.502	2.660	2.826	3.001	3.185	3.379	3.583
8	2.305	2.476	2.658	2.853	3.059	3.278	3.511	3.759	4.021	4.300
9	2.558	2.773	3.004	3.252	3.518	3.803	4.108	4.435	4.785	5.160
10	2.839	3.106	3.395	3.707	4.046	4.411	4.807	5.234	5.695	6.192
11	3.152	3.479	3.836	4.226	4.652	5.117	5.624	6.176	6.777	7.430
12	3.498	3.896	4.335	4.818	5.350	5.936	6.580	7.288	8.064	8.916
13	3.883	4.363	4.898	5.492	6.153	6.886	7.699	8.599	9.596	10.699
14	4.310	4.887	5.535	6.261	7.076	7.988	9.007	10.147	11.420	12.839
15	4.785	5.474	6.254	7.138	8.137	9.266	10.539	11.974	13.590	15.407
16	5.311	6.130	7.067	8.137	9.358	10.748	12.330	14.129	16.172	18.488
17	5.895	6.866	7.986	9.276	10.761	12.468	14.426	16.672	19.244	22.186
18	6.544	7.690	9.024	10.575	12.375	14.463	16.879	19.673	22.901	26.623
19	7.263	8.613	10.197	12.056	14.232	16.777	19.748	23.214	27.252	31.948
20	8.062	9.646	11.523	13.743	16.367	19.461	23.106	27.393	32.429	38.338
25	13.585	17.000	21.231	26.462	32.919	40.874	50.658	62.669	77.388	95.396
30	22.892	29.960	39.116	50.950	66.212	85.850	111.065	143.371	184.675	237.376
35	38.575	52.800	72.069	98.100	133.176	180.314	243.503	327.997	440.701	590.668
40	65.001	93.051	132.782	188.884	267.864	378.721	533.869	750.378	1,051.668	1,469.772
50	184.565	289.002	450.736	700.233	1,083.657	1,670.704	2,566.215	3,927.357	5,988.914	9,100.438

Present value interest factor of Re 1 per period at i% for n periods, PVIF(i,n).

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057
35	0.706	0.500	0.355	0.253	0.181	0.130	0.094	0.068	0.049	0.036
40	0.672	0.453	0.307	0.208	0.142	0.097	0.067	0.046	0.032	0.022
50	0.608	0.372	0.228	0.141	0.087	0.054	0.034	0.021	0.013	0.009

Contd....

Period	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065
16	0.188	0.163	0.141	0.123	0.107	0.093	0.081	0.071	0.062	0.054
17	0.170	0.146	0.125	0.108	0.093	0.080	0.069	0.060	0.052	0.045
18	0.153	0.130	0.111	0.095	0.081	0.069	0.059	0.051	0.044	0.038
19	0.138	0.116	0.098	0.083	0.070	0.060	0.051	0.043	0.037	0.031
20	0.124	0.104	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026
25	0.074	0.059	0.047	0.038	0.030	0.024	0.020	0.016	0.013	0.010
30	0.044	0.033	0.026	0.020	0.015	0.012	0.009	0.007	0.005	0.004
35	0.026	0.019	0.014	0.010	0.008	0.006	0.004	0.003	0.002	0.002
40	0.015	0.011	0.008	0.005	0.004	0.003	0.002	0.001	0.001	0.001
50	0.005	0.003	0.002	0.001	0.001	0.001	0.000	0.000	0.000	0.000

**Future value interest factor of an ordinary annuity of Re 1 per period at i% for n periods,
FVIFA(i,n). (The Compound Value of an Annuity of One Rupee)**

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716
7	7.214	7.434	7.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019	27.975
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361	31.772
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974	40.545
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347
30	34.785	40.568	47.575	56.085	66.439	79.058	94.461	113.28	136.31	164.49
35	41.660	49.994	60.462	73.652	90.320	111.43	138.24	172.32	215.71	271.02
40	48.886	60.402	75.401	95.026	120.80	154.76	199.64	259.06	337.88	442.59
50	64.463	84.579	112.80	152.67	209.35	290.34	406.53	573.77	815.08	1,163.9

Contd....

Period	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.110	2.120	2.130	2.140	2.150	2.160	2.170	2.180	2.190	2.200
3	3.342	3.374	3.407	3.440	3.473	3.506	3.539	3.572	3.606	3.640
4	4.710	4.779	4.850	4.921	4.993	5.066	5.141	5.215	5.291	5.368
5	6.228	6.353	6.480	6.610	6.742	6.877	7.014	7.154	7.297	7.442
6	7.913	8.115	8.323	8.536	8.754	8.977	9.207	9.442	9.683	9.930
7	9.783	10.089	10.405	10.730	11.067	11.414	11.772	12.142	12.523	12.916
8	11.859	12.300	12.757	13.233	13.727	14.240	14.773	15.327	15.902	16.499
9	14.164	14.776	15.416	16.085	16.786	17.519	18.285	19.086	19.923	20.799
10	16.722	17.549	18.420	19.337	20.304	21.321	22.393	23.521	24.709	25.959
11	19.561	20.655	21.814	23.045	24.349	25.733	27.200	28.755	30.404	32.150
12	22.713	24.133	25.650	27.271	29.002	30.850	32.824	34.931	37.180	39.581
13	26.212	28.029	29.985	32.089	34.352	36.786	39.404	42.219	45.244	48.497
14	30.095	32.393	34.883	37.581	40.505	43.672	47.103	50.818	54.841	59.196
15	34.405	37.280	40.417	43.842	47.580	51.660	56.110	60.965	66.261	72.035
16	39.190	42.753	46.672	50.980	55.717	60.925	66.649	72.939	79.850	87.442
17	44.501	48.884	53.739	59.118	65.075	71.673	78.979	87.068	96.022	105.93
18	50.396	55.750	61.725	68.394	75.836	84.141	93.406	103.74	115.27	128.12
19	56.939	63.440	70.749	78.969	88.212	98.603	110.28	123.41	138.17	154.74
20	64.203	72.052	80.947	91.025	102.44	115.38	130.03	146.63	165.42	186.69
25	114.41	133.33	155.62	181.87	212.79	249.21	292.10	342.60	402.04	471.98
30	199.02	241.33	293.20	356.79	434.75	530.31	647.44	790.95	966.71	1,181.9
35	341.59	431.66	546.68	693.57	881.17	1,120.7	1,426.5	1,816.7	2,314.2	2,948.3
40	581.83	767.09	1,013.7	1,342.0	1,779.1	2,360.8	3,134.5	4,163.2	5,529.8	7,343.9
50	1,668.8	2,400.0	3,459.5	4,994.5	7,217.7	10,436	15,090	21,813	31,515	45,497

**Present value interest factor of an (ordinary) annuity of Re 1 per period at $i\%$ for n periods,
PVIFA(i, n).**

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.129	8.514
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077
30	25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.427
35	29.409	24.999	21.487	18.665	16.374	14.498	12.948	11.655	10.567	9.644
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.915

Contd....

Period	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	7.379	6.974	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730
17	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	7.839	7.366	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870
25	8.422	7.843	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948
30	8.694	8.055	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979
35	8.855	8.176	7.586	7.070	6.617	6.215	5.858	5.539	5.251	4.992
40	8.951	8.244	7.634	7.105	6.642	6.233	5.871	5.548	5.258	4.997
50	9.042	8.304	7.675	7.133	6.661	6.246	5.880	5.554	5.262	4.999