LOVELY PROFESSIONAL UNIVERSITY

FINANCIAL MANAGEMENT

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SYLLABUS

Financial Management

Objectives: To make the students aware regarding the basic concepts of financial management i.e capital budgeting, cost of capital, sources of finance, capital structure etc.

FINANCIAL MANAGEMENT

Sr. No.	Description
1.	**Financial Management:** Meaning , Objective and scope, Finance functions – Investment, financing and dividend decisions, Financial goal- Profit Maximization vs. Wealth Maximization
2.	**Concept of time value of money:** Present & future value of annuities & Single Amount, perpetuity, Growth rate calculations
3.	**Source of Finance:** Short term and long term Source of Finance, Leasing as a Source of Finance
4.	Concept of economic value added
5.	**Risk and return analysis:** Risk Measurement
6.	**Cost of Capital:** Concept and its significance, Measurement of cost of capital of various source of funds, Weighted average cost of capital
7.	**Capital structure decision:** theories of Capital Structure, Optimum Capital Structure Leverage: Operating and Financial Leverage
8.	**Capital budgeting:** Meaning and Process, Methods of analyze capital budgeting decisions, Capital rationing, Capital decision under risk and uncertainty
9.	**Working Capital:** Concept and significance, Determining working capital requirements, Management of Inventory , debtors and cash, Financing of working capital needs
10.	**Management of surplus:** Retained earning and dividend policy, Theories of dividend, Forms of dividend and corporate dividend behavior.

DCOM406 FINANCIAL MANAGEMENT

Sr. No.	Description
1.	Financial management: meaning, scope and objectives Financial decision making and planning: objectives types and steps in financial planning; Investment, financing and dividend decisions
2.	Time value of money: compounding and discounting techniques.
3.	Capital Budgeting: methods, capital rationing, risk and uncertainty in capital budgeting decisions
4.	Sources of finance: short-term and long-term, leasing as a source of finance
5.	Capital structure decisions: theories of capital structure, optimum capital structure
6.	Cost of capital: Significance and computation of cost of capital equity, preference, debt and retained earnings, weighted average cost of capital
7.	Leverage: operating, financial and combined.
8.	Working capital: concept, significance and determinants, sources of working capital, Inventory Management.
9.	Cash and receivable management,
10.	Dividend Policy: theories and forms of dividend, controversy over supremacy between dividend and retention.

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Unit 1: Introduction to Financial Management

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Objectives

After studying this unit, you will be able to:

- Recognize the meaning and scope of financial management
- Describe the goals and objectives of financial management
- Explain the different Finance functions
- Discuss various significant aspects related to financial management

Introduction

Finance can be defined as the art and science of managing money. Virtually, all individuals and organizations earn or raise money and spend or invest money. Finance is concerned with the process, institutions, markets and instruments involved in the transfer of money among individuals, business and governments.

1. 1 Meaning and Scope of Financial Management

Financial management as an academic discipline has undergone fundamental changes with regard to its scope and coverage. In the earlier years, it was treated synonymously with the

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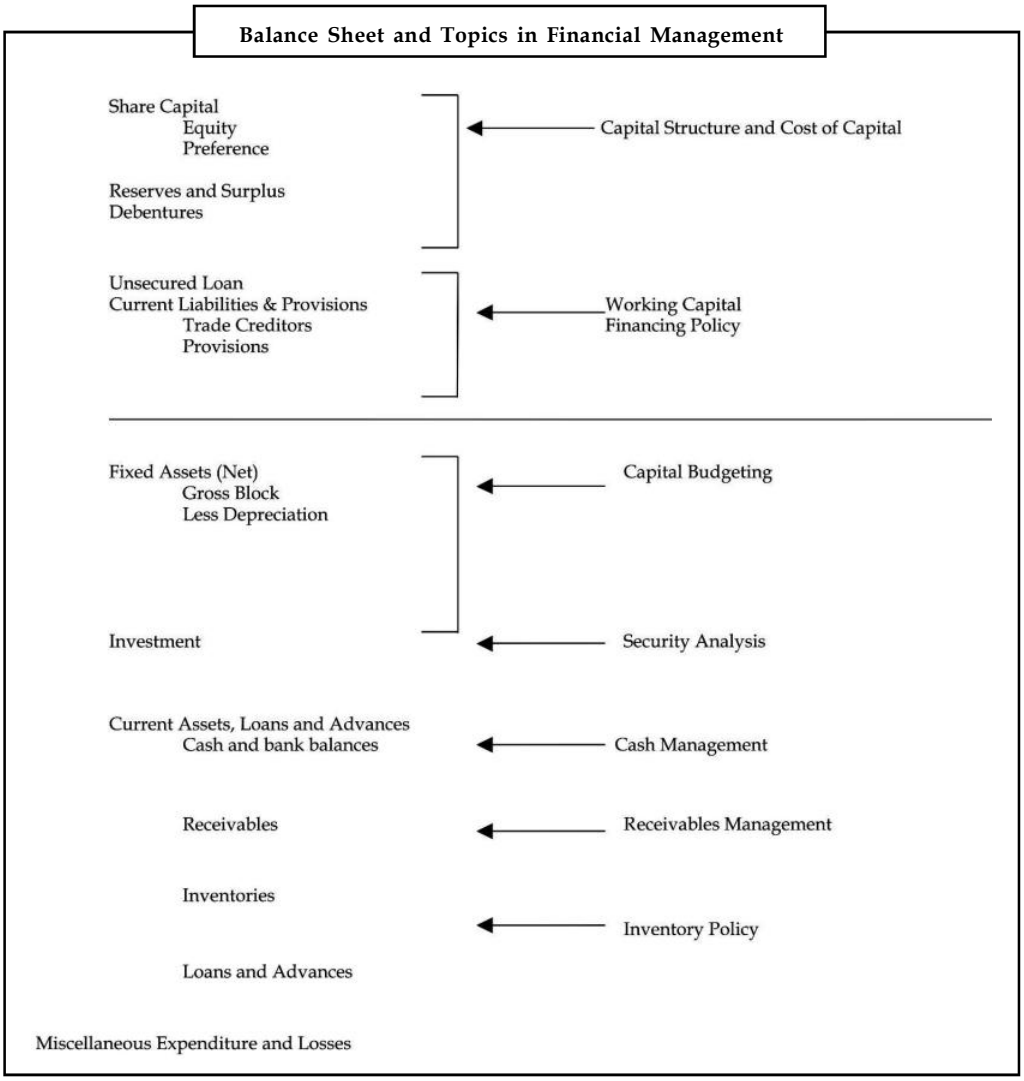
raising of funds. In the later years, its broader scope, included in addition to the procurement of funds, efficient use of resources.

1.1.1 Scope of Financial Management

Financial Management is broadly concerned with the acquisition and use of funds by a business firm. The important tasks of financial management, as related to the above, may be categorized as follows:

- Financial Analysis, Planning and Control
- Analysis of financial condition and preference
- Profit planning
- Financial forecasting
- Financial control

1.1.2 Important Topics in Financial Management



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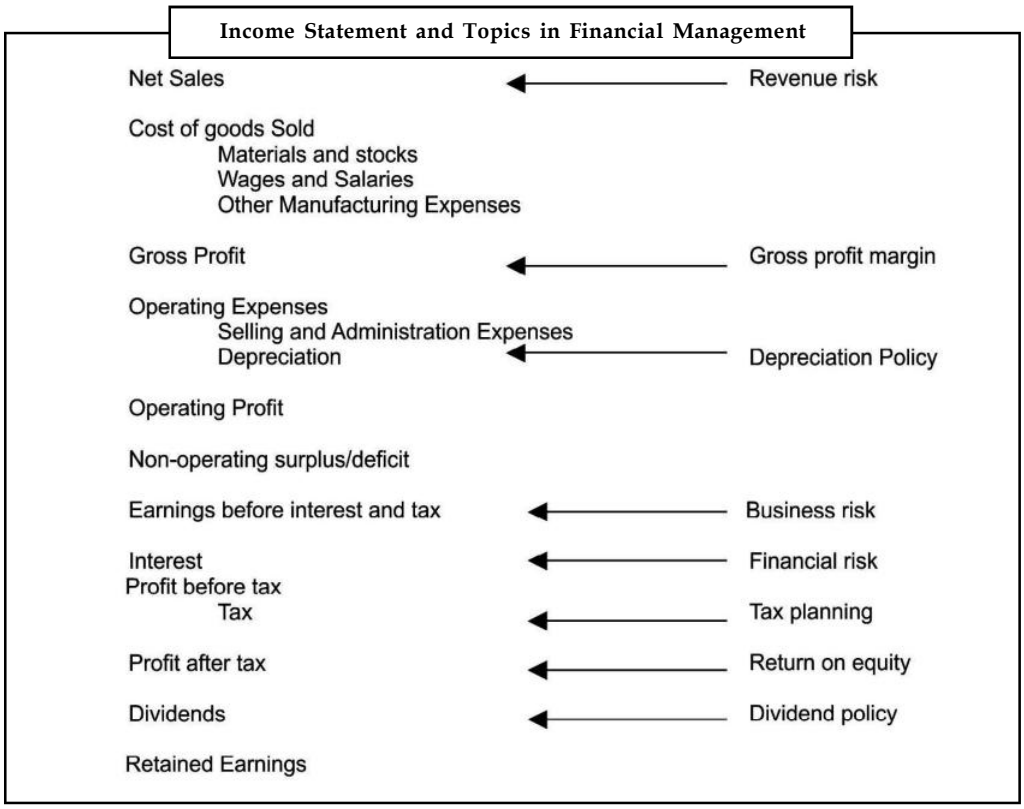

Self Assessment

Fill in the blanks:

1. In the earlier years, financial manageemnt was treated synonymously with the .....
2. Financial management broader scope includes efficient use of resources in addition to the .....
3. Current liabilities are associated with ..... financing policy.
4. ..... profit margin is obtained by deducting cost of goods sold from net sales.

1.2 Goals/Objectives of Financial Management—Profit Maximization vs. Wealth Maximization

Traditional Approach—Profit Maximization

It has been traditionally argued that the objective of a company is to earn profit. This means that the finance manager has to make decision in a manner that the profit is maximised. Each alternative, therefore, is to be seen as to whether or not it gives maximum profit.

Profit maximization objective gives rise to a number of problems as below:

1. Profit maximization concept should be considered in relation to 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 maximization is the only goal, then risk factor is altogether ignored.

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2. Profit maximization, as an objective does not take into account time pattern of return.

Example: Proposal A may give a higher amount of profits compared to proposal B, yet if the returns begin to flow say, 10 years later, proposal B may be preferred, which may have lower overall profits but the returns flow is more early and quick.

3. Profit maximization, 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. Further, most business leaders believe that adoption of ethical standards strengthen their competitive positions.

4. Profits do not necessarily result in cash flows available to the stockholder. Owners receive cash flow in the form of either cash dividends paid to them or proceeds from selling their shares for a higher price than paid initially.

Modern Approach—Wealth Maximization

The alternative to profit maximization is wealth maximization. This is also known as Value Maximization or Net Present Worth Maximization. Value is represented by the market price of the company's equity shares. Prices in the share market at a given point of time, are the result of many factors like general economic outlook, particularly if the companies are under consideration, technical factors and even mass psychology. However, taken on a long-term basis, the share market prices of a company's shares do reflect the value, which the various parties put on a company. Normally, the value is a function of two factors:

1. The likely rate of earnings per share (EPS) of a company and
2. The capitalization rate

EPS are calculated by dividing the periods total earnings available for the firm's common shares by the number of shares of common shares outstanding. The likely rate of earnings per share (EPS) depends on the assessment as to how profitably a company is going to operate in the future.

Caution The capitalisation rate reflects the liking of the investors for a company.

If the company earns a higher rate of earning per share through risky operations or risky financing pattern, the investors will not look upon its shares with favour. To that extent, the market value of the shares of such a company will be low. If a company invests its fund in risky ventures, the investors will put in their money if they get higher return as compared to that from a low risk share.

The market value of a firm is a function of the earning per share and the capitalisation rate.

Example: Suppose the earning per share is expected to be ₹ 7 for a share, and the capitalisation rate expected by the shareholder is 20 per cent, the market value of the share is likely to be

$$\frac{7}{20\%} = \frac{7 \times 100}{20} = ₹35$$

This is so because at this price, the investors have an earning of 20%, something they expect from a company with this degree of risk.

Notes

The important issues relating to maximizing share prices are Economic Value Added (EVA) and the focus on stakeholders.

Notes Economic Value Added (EVA) is a popular measure used by many firms to determine whether an investment – proposed or existing – contribute positively to the owner's wealth. EVA is calculated by subtracting, the cost of funds used to finance or investment from its after-tax-operations profits. Investments with positive EVA increase shareholder value as those with negative EVA reduce shareholders value.

Example: The EVA of an investment with after tax operations profits of ₹ 510,000 and associated financing costs of ₹ 475,000 would be ₹ 35,000 (i.e. ₹ 410,000 – 375,000). Because this EVA is positive, the investment is expected to increase owner's wealth and is, therefore, acceptable.

What about Stakeholders?

Stakeholders are groups such as employees, customers, suppliers, creditors, owners and others who have a direct economic link to the firm. A firm with a stakeholder focus, consciously avoids actions that would prove detrimental to stakeholders. The goal is not to maximize stakeholder well being but to preserve it. It is expected to provide long-run benefit to shareholders by maintaining positive stakeholder relationships. Such relationship should minimize stakeholder turnover, conflicts and litigation. Clearly, the firm can better achieve its goal of shareholder wealth maximization by maintaining cooperation with other stakeholders rather than having conflict with them.

Did u know? Besides the above basic objectives, the following are the other objectives of financial management:

1. Building up reserves for growth and expansion.
2. Ensuring maximum operational efficiency by efficient and effective utilization of finance.
3. Ensuring financial discipline in the management.

The Role of Ethics

Ethics is standards of conduct or moral judgment. Today, the business community in general and the financial community in particular are developing and enforcing ethical standards, purpose being to motivate business and market participants to adhere to both the letter and the spirit of laws and regulations concerned with business and professional practice. An effective ethics programme is believed to enhance corporate value. An ethics programme can reduce potential litigation and judgment costs, maintain a positive corporate image, and build shareholders' confidence, and gain the loyalty, commitment and respect of the firms stakeholders. Such actions, by maintaining and enhancing cash flow and reducing perceived risk, can positively affect the firm's share prices. Ethical behaviour is, therefore, viewed as necessary for achieving the firm's goal of owner wealth maximization.

Notes

Self Assessment

Fill in the blanks:

5. There is a ……..relationship between risk and profit.
6. ……is also known as Value maximization or Net Present Worth maximization.
7. A firm with a stakeholder focus, consciously avoids actions that would prove ……to stakeholders.
8. Ethics programme reduces potential litigation and ……..costs and gain the loyalty, commitment and respect of the firms stakeholders.

1.3 Finance Functions

Financial Management is indeed, the key to successful business operations. Without proper administration and effective utilization of finance, no business enterprise can utilize its potentials for growth and expansion.

Financial management is concerned with the acquisition, financing and management of assets with some overall goals in mind. In the contents of modern approach, the discussions on financial management can be divided into three major decisions viz., (1) Investing; (2) Financing; and (3) Dividend decision. A firm takes these decisions simultaneously and continuously in the normal course of its business. Firm may not take these decisions in a sequence, but decisions have to be taken with the objective of maximizing shareholders' wealth.

Investing

1. Management of current assets (cash, marketable securities, receivables and inventories)
2. Capital budgeting (identification, selection and implementation of capital projects)
3. Managing of mergers, reorganizations and divestments

Financing

1. Identification of sources of finance and determination of financing mix
2. Cultivating sources of funds and raising funds

Dividend Decision

This is the third financial decision, which relates to dividend policy. Dividend is a part of profits, that are available for distribution, to equity shareholders. Payment of dividends should be analyzed in relation to the financial decision of a firm. There are two options available in dealing with the net profits of a firm, viz., distribution of profits as dividends to the ordinary shareholders' where, there is no need of retention of earnings or they can be retained in the firm itself if they require, for financing of any business activity. But distribution of dividends or retaining should be determined in terms of its impact on the shareholders' wealth. The Financial manager should determine optimum dividend policy, which maximizes market value of the share thereby market value of the firm. Considering the factors to be considered while determining dividends is another aspect of dividend policy.

Notes

1.3.1 Place of Finance Function in the Organizational Structure

The finance function is almost the same in most enterprises. The details may differ but the important features are universal in nature. The finance function occupies such a major place that it cannot be the sole responsibility of the executive. The important aspects of the finance function have to be carried on by the top management i.e., the Managing Director and the Board of Directors. It is the Board of Directors, which makes all the material final decisions involving finance.

Financial management in many ways is an integral part of the jobs of managers who are involved in planning, allocation of resources and control. The responsibilities for financial management are disposed throughout the organization.

Example:

1. The engineer, who proposes a new plant, shapes the investment policy of the firm.
2. The marketing analyst provides inputs in the process of forecasting and planning.
3. The purchase manager influences the level of investment in inventories.
4. The sales manager has a say in the determination of receivable policy.
5. Departmental managers, in general, are important links in the financial control system of the firm.

The Chief Financial Officer (CFO) is basically to assist the top management. He has an important role to contribute to good decision-making on issues that involve all the functional areas of the business. He must clearly bring out financial implications of all decisions and make them understood.

CFO (his designation varies from company to company) works directly under the President or the Managing Director of the company. Besides routine work, he keeps the Board of Directors informed about all the phases of business activity, including economic, social and political developments affecting the business behaviour. He also furnishes information about the financial status of the company by reviewing from time-to-time. The CFO may have different officers under him to carry out his functions. Broadly, the functions are divided into two parts.

1. Treasury function
2. Control function

Treasury function (headed by financial manager) is commonly responsible for handling financial activities, such as financial planning and fund raising, making capital expenditures decisions, managing cash, managing credit activities, managing the pension fund and managing foreign exchange.

Notes The control function (headed by Chief Accountant/Financial Controller) typically handles the accounting activities such as corporate accounting, tax management, financial accounting and cost accounting.

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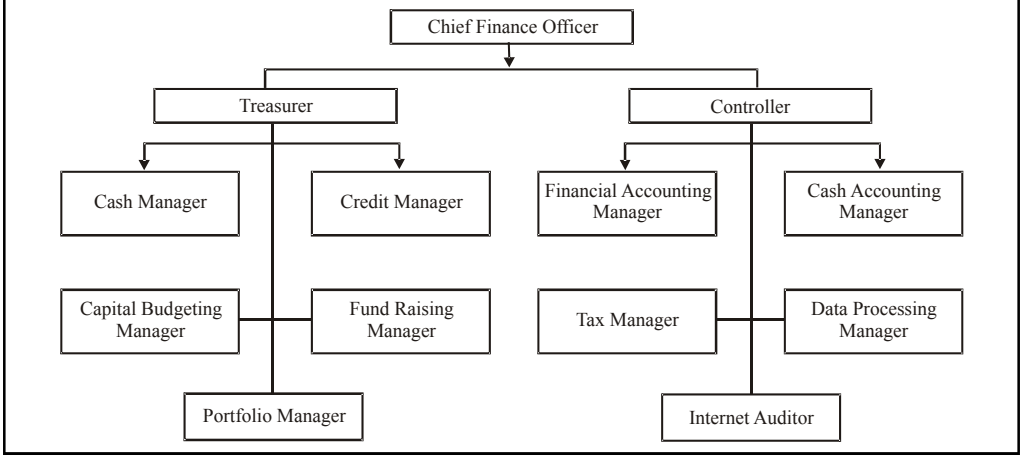
The treasurer's focus tends to be more external, the controllers' focus is more internal:

Figure 1.1: Organizational chart of Finance function



1.3.2 Relation of Finance with Economics

The field of finance is closely related to economics. Financial managers must be able to use economic theories as guidance for efficient business operation.

Example: supply-demand analysis, profit-maximizing strategies, and price theory.

The primary economic principle used in managerial function is marginal analysis, the principle that financial decisions should be made and actions taken only when the added benefits exceed the added costs. Nearly all financial decisions ultimately come down to an assessment of their marginal benefits and marginal costs.

Caution Financial managers must understand the economic framework and be alert to the consequences of varying levels of economic activity and changes in economic policy.

1.3.3 Relation to Accounting

The firm's finance (treasurer) and accounting (controller) activities are closely related and generally overlapped. Normally, managerial finance and accounting are not often easily distinguishable. In small firms, the controller often carries out the finance function and in large firms many accountants are also involved in various finance activities. There are two basic differences between finance and accounting:

1. ***Emphasis on cash flows:*** The accountant's primary function is to develop and report data for measuring the performance of the firm, assuming its financial position and paying taxes using certain standardized and generally accepted principles. The accountant prepares financial statements based on accrual basis. The financial manager places primary emphasis on cash flows, the inflow and outflow of cash.

2. ***Relating to decision-making:*** Accountants devote most of their operation to the collection and presentation of financial data. The primary activities of the financial manager in addition to ongoing involvement in financial analysis and planning are making investment decisions and making financing decisions. Investment decisions determine both the mix and the type of assets held by the firm. Financing decisions determine both the mix and

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the type of financing used by the firm. However, the decisions are actually made on the basis of cash flow effects on the overall value of the firm.

1.3.4 Interface with other Functions

Finance is defined as the lifeblood of an organization. It is a common thread, which binds all the organizational functions as each function when carried out creates financial implications. The interface between finance and other functions can be described as follows:

Manufacturing Finance

1. Manufacturing function necessitates a large investment. Productive use of resources ensures a cost advantage for the firm.
2. Optimum investment in inventories improves profit margin.
3. Many parameters of the production cost having effect on production cost are possible to control through internal management thus improving profits.
4. Important production decisions like make or buy can be taken only after financial implications have been considered.

Marketing Finance

1. Many aspects of marketing management have financial implications e.g., hold inventories to provide off the shelf service to customers and thus increase sales; extension of credit facility to customers to increase sales.
2. Marketing strategies to increase sales have additional cost impact, which needs to be weighed carefully against incremental revenue.

Personnel Finance

In the global competitive scenario, business firms are moving to leaner and flat organizations. Investments in Human Resource Development are also bound to increase. Restructuring of remuneration structure, voluntary retirement schemes, sweat equity etc., has become major financial decisions in the area of human resource management.

Task Which of the following functions should be the responsibility of a finance manager?

1. Maintaining the books of account.
2. Negotiating loans with banks.
3. Conducting of internal audit.
4. Deciding about change in the policies regarding recruitment.
5. Change in marketing and advertising techniques routine.

Strategic Planning – Finance

Finance function is an important tool in the hands of management for strategic planning and control on two counts:

1. The decision variables when converted into monetary terms are easier to grasp.
2. Finance function has strong inter-linkages with other functions. Controlling other functions through finance route is possible.

Notes

Self Assessment

Fill in the blanks:

9. Financial management can be divided into three major decisions which are investing; Financing; and ……decision.
10. Identification of sources of finance and determination of financing mix is a part of …… decision.
11. Finance is defined as the ……of an organization.
12. ……decisions determine both the mix and the type of assets held by the firm.

1.4 Supplementary noteworthy Aspects related to Financial Management

Modern financial management has come a long way from the traditional corporate finance.

The finance manager is working in a challenging environment, which changes continuously. As the economy is opening up and global resources are being tapped, the opportunities available to finance manager have no limits. At the same time one must understand the risk in the decisions. Financial management is passing through an era of experimentation and excitement, as a large part of the finance activities carried out today were not heard of a few years ago.

A few instances are enumerated below:

1. Interest rates have been deregulated. Further, interest rates are fluctuating, and minimum cost of capital necessitates anticipating interest rate movements.
2. The rupee has become freely convertible in current account.
3. Optimum debt equity mix is possible. Firms have to take advantage of the financial leverage to increase the shareholders wealth. However, financial leverage entails financial risk. Hence a correct trade off between risk and improved rate of return to shareholders is a challenging task.
4. With free pricing of issues, the optimum price of new issue is a challenging task, as overpricing results in under subscription and loss of investor confidence, whereas underpricing leads to unwarranted increase in a number of shares and also reduction of earnings per share.
5. Maintaining share prices is crucial. In the liberalized scenario, the capital markets are the important avenue of funds for business. The dividend and bonus policies framed have a direct bearing on the share prices.
6. Ensuring management control is vital, especially in the light of foreign participation in equity (which is backed by huge resources) making the firm an easy takeover target. Existing managements may lose control in the eventuality of being unable to take up the share entitlements. Financial strategies to prevent this are vital to the present management.

1.4.1 Methods and Tools of Financial Management

1. In the area of financing, funds are procured from long-term sources as well as short-term sources. Long-term funds may be made available by owners, i.e., shareholders, lenders through issue of debentures/bonds, from financial institutions, banks and public at large. Short-term funds may be procured from commercial banks, suppliers of goods, public deposits etc. The finance manager has to decide on optimum capital structure with a view

Notes

to maximize shareholder's wealth. Financial leverage or trading on equity is an important method by which return to shareholders can be increased.

2. For evaluating capital expenditure (investment) decisions, a finance manager uses various methods such as average rate of return, payback, internal rate of return, net present value and profitability index.

3. In the area of working capital management, there are various methods for efficient utilization of current resources at the disposal of the firm, thus increasing profitability. The centralized method of cash management is considered a better method of managing liquid resources of the firm.

4. In the area of dividend decision, a firm is faced with the problem of declaring dividend or postponing dividend declaration, a problem of internal financing. There are tools to tackle such situation.

5. For the evaluation of a firm's performance, there are different methods.

   Example: Ratio analysis is a popular technique to evaluate different aspects of a firm.

6. The main concern of the finance manager is to provide adequate funds from the best possible source, at the right time and the minimum cost and to ensure that the funds so acquired are put to best possible use through various methods/techniques are used to determine that funds have been procured from the best possible available services and the funds have been used in the best possible way. Funds flow and cash flow statements and projected financial statements help a lot in this regard.

Task Which of the following statements do you agree with?

1. Financial management is essential only in private sector enterprises.
2. Only capitalists have to bother about money. The bureaucrat is to administer and not to manage funds.
3. The public administrators in our country must be given a basic understanding of essentials of finance.
4. A state-owned transport company must immediately deposit in the bank all its takings.
5. "Financial Management is counting pennies. We do not believe in such miserly attitude".

1.4.2 Forms of Business Organization

The three most common forms of business organization are sole proprietorship, partnership and the company. Other specialized forms of business organizations also exist. Sole proprietorship is the most in terms of total receipts and in net profits the corporate form of business dominates.

Sole Proprietorship

A sole proprietorship is a business owned by one person who runs for his own profit. Majority of the business firms are sole proprietorships. The typical sole proprietorship is a small business

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Example: bakeshop, personal trainer or plumber.

The majority of sole proprietorship are found in the wholesale, retail, service and construction industries.

Typically, the proprietor along with a few employees runs the business. He raises capital from personal resources or by borrowing and is responsible for all business decisions. The sole proprietor has unlimited liability, towards creditors not restricted to the amount originally invested. The key strengths and weaknesses of sole proprietorship are given in Table 1.1 below.

Partnership

A partnership firm is a business run by two or more persons for profit. Partnership accounts for the next majority of business and they are typically larger than sole proprietorship. Finance, legal and real estate firms often have large number of partners.

Most partnerships are established by a written contract known as 'Deed of Partnership'. In partnership, all partners have unlimited liability for all the debts of the partnership. The strengths and weaknesses or partnerships are summarized in Table below.

Did u know? Which is the governing act for partnership in India?

In India, partnership is governed by the Partnership Act, 1932.

Company Form

A company form of business is a legal entity, separated from the owners, with perpetual succession. Just like an individual, the company can sue and be sued, make and be party to contracts and acquire property in its own name. The company form of organization is the dominant form of business organization in terms of receipts and profits. Although, corporations are involved in all types of business, manufacturing corporation account for the largest portion of corporate business receipts and net profits. The key strengths and weaknesses of corporate form are summarized in Table below.

The owners of the company are its shareholders, whose ownership is evidenced by either common shares or preference shares. Shareholders get a return by receiving dividends i.e., periodic distribution of earnings or gains through increase in share price. The owner's liability is limited to the amount paid on their shares. Shareholder elects the Board of Directors through vote. The Board of Directors has the ultimate authority in running the organization including making the general policy.

The President or Chief Executive Office (CEO) is responsible for managing day-to-day operations and carrying out the policies established by the Board. The CEO is required to report periodically to the firm's board of directors.

The corporate form of business is subject to strict control by Regulatory Agencies including Companies Act, 1956, SEBI, etc.

Notes

Table 1.1: Strengths and Weaknesses of the Common Forms of Business Organizations

	Sole Proprietorship	Partnership	Company
Strengths	Owners receive all profits and incur all losses.	Can raise more funds than sole proprietorship.	Owner's liability is limited to the extent paid on their shares.
	Low organizational costs	Borrowing powers enhanced by more owners.	Can achieve large size via sale of shares.
	Income is included and taxed on owners personal tax return.	More available manpower and managerial skill.	Owners hip (share) is readily transferable.
	Independence	Income included and mixed on individual partner's tax return.	Long life of the firm.
	Secrecy		Can have professional managers.
	Ease of dissolution		Has better access to financing.
			Receives some tax advantage.
	Owner has unlimited liability towards debt of the firm	Owners have unlimited liability and may have to cover debts of other partners.	Taxes generally higher, because corporate income is taxed and dividends paid to owners are also axed (the latter has been exempted at the hands of the shareholders in India).
Weaknesses	Limited fund raising power limits growth	Partnership is dissolved when partner dies.	More expensive to organize than other forms of business.
	Proprietor must be jack-of-all trades.	Difficult to liquidate or transfer partnership.	Subject to greater control by regulating authorities.
	Difficult to give employees long-run career opportunities.		Lacks secrecy since the shareholders must receive financial reports at periodic intervals.
	Lacks continuity when proprietor dies or unable to operate.		

Self Assessment

Fill in the Blanks:

13. In the area of financing, funds are procured from ……..sources as well as …… sources.

14. The three most common forms of business organization are sole proprietorship, partnership and the…….

15. The …….method of cash management is considered a better method of managing liquid resources of the firm.

16. The dividend and bonus policies framed have a direct bearing on the……...

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Case Study

Case: Bhatt Industries Basic Planning

This case will help the reader, develop an approach to structuring a case solution. It requires a logical approach to solving a general financial problem.

Bhatt Industries has been manufacturing fireworks at a small facility just outside Greensboro, North Carolina. The firm is known for the high level of quality control in its production process and is generally respected by distributors in the states, where fireworks are legalized. Its selling market is fairly well defined; it has the capacity to produce 800,000 cases annually, with peak consumption in the summer. The firm is fairly confident, that the whole of next year's production can be sold for ₹ 25 a case.

On September 7, the company has ₹ 8,000,000 in cash. The firm has a policy against borrowing, to finance its production, a policy first established by William Bhatt, the owner of the firm. Mr. Bhatt keeps a tight rein on the firm's cash and invests any excess cash in treasury bonds, that pays a 12 per cent return and involve no risk of default.

The firm's production cycle revolves around the seasonal nature of the fireworks business. Production begins right after Labour Day and runs through May. The firms sales occur in February through May; the firm closes from June 1 to Labour Day, when its employees return to farming. During this time, Mr. Bhatt visits his grandchildren in New York and Pennsylvania. As a result of this scheduling, the firm pays all its expenses during September and in May receives, all its revenues from its distributors within 6 weeks after the 4th of July. The customers send their checks directly to Kenmy National Bank, where the money is deposited in Bhatt's account.

Mr. Bhatt is the only full-time employee of his company and he and his family hold all the common stock. Thus, the company's only costs are directly related to the production of fireworks. The costs are affected by the law of variable proportions, depending on the production level. The first 100,000 cases cost ₹ 16 each; the second 100,000 cases, ₹ 17 each; the third 100,000 cases, ₹ 18 each and the fourth 100,000 cases, ₹ 19 each ; the fifth 100,000 cases, ₹ 20 each; the sixth 100,000 cases, ₹ 21 each. As an example, the total of 200,000 cases would be ₹ 1,600,000 plus ₹ 1,700,000 or ₹ 3,300,000.

BHATT INDUSTRIES—INCOME STATEMENT
(August 31, fiscal year just ended)

	₹
Revenues from operations	50,00,000
Revenues from interest on government bonds	9,20,000
Total revenues	59,20,000
Operating expenses	40,50,000
Earnings before taxes	18,70,000
Taxes	9,48,400
Net income after taxes	9,21,600

Contd...

Notes

Bhatt Industries is a corporation and pays a 30 per cent tax on income, because of the paperwork involved. Mr. Bhatt invests his excess cash on September 6 in one year treasury bonds. He does not invest for shorter periods.

Questions

1. How does this level affect long-term prospects of wealth maximization?
2. What should be the level of production to maximize the profit?

1.5 Summary

- Financial Management is broadly concerned with the acquisition and use of funds by a business firm.
- It has been traditionally argued that the objective of a company is to earn profit. This means that the finance manager has to make decision in a manner that the profit is maximised.
- The alternative to profit maximization is wealth maximization. This is also known as Value maximization or Net Present Worth maximization.
- The important aspects of the finance function have to be carried on by the top management i.e., the Managing Director and the Board of Directors.
- Finance is defined as the lifeblood of an organization. It is a common thread, which binds all the organizational functions as each function when carried out creates financial implications.
- The three most common forms of business organization are sole proprietorship, partnership and the company.
- In the area of financing, funds are procured from long-term sources as well as short-term sources.
- For evaluating investment decisions, a finance manager uses various methods such as average rate of return, payback, internal rate of return, net present value and profitability index.
- In the area of dividend decision, a firm is faced with the problem of declaring dividend or postponing dividend declaration, a problem of internal financing.

1.6 Keywords

Corporate Finance: Corporate finance is the activity concerned with planning, raising, controlling and administering of the funds used in the business.

Dividend: Dividend is a part of profits that are available for distribution to shareholders.

Financial Management: It is the operational activity of a business that is responsible for obtaining and effectively utilising the funds necessary for efficient operations.

Financing Decision: It is related to the financing mix or capital structure or leverage and the determination of the proportion of debt and equity.

Investment Decision: Investment decision is related with the selection of assets, that a firm will invert.

Wealth Maximization: It is maximizing the present value of a course of action (i.e. NPV = GPC of benefits—Investment).

Notes

1.7 Review Questions

1. What are the tasks of Financial Management?
2. Discuss the salient features of the traditional approach to corporation finance.
3. Discuss the distinctive features of modern approach to corporation finance.
4. What is the normative goal of Financial Management?
5. "Financial Management is an integral part of the jobs of all managers. Hence, it cannot be entrusted to a staff department". Discuss.
6. Discuss some of the problems financial managers in a developing country like India have to grapple with.
7. Draw a typical organization chart highlighting the finance function of a company.
8. "The profit maximization is not an operationally feasible criterion." Do you agree? Justify.
9. 'Finance is considered to be the blood of the enterprise'. Justify.
10. You are the finance manager of a firm and asked to organize all the financial decisions of the firm. Elucidate the ways in which you will do it.

Answers: Self Assessment

1.	raising of funds	2.	procurement of funds
3.	working capital	4.	Gross
5.	direct	6.	Wealth maximization
7.	detrimental	8.	judgment
9.	Dividend	10.	financing
11.	lifeblood	12.	Investment
13.	long-term, short-term	14.	company
15.	centralized	16.	share prices

1.8 Further Readings

Books

Dr Pradeep Kumar Sinha, *Financial Management*, New Delhi, Excel Books, 2009.

Van Horne, J.C. and Wachowicz, Jr, J.M., *Fundamentals of Financial Management*, New Delhi, Prentice Hall of India Pvt. Ltd., 1996, p. 2.

Chandra, P., *Financial Management – Theory and Practice,* New Delhi, Tata McGraw Hill Publishing Company Ltd., 2002, p. 3.

Notes

Unit 2: Time Value of Money

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Objectives

After studying this unit, you will be able to:

- Explain the time value of money of single amount
- Identify the conception of present and future value of annuity
- Describe the concept of perpetuity
- Discuss various significant aspects related growth rate calculations

Introduction

This unit is concerned with interest rates and their effects on the value of money. Interest rates have widespread influence over decisions made by businesses and by us in personal lives. Corporations pay lakhs of rupees in interest each year for the use of money they have borrowed. We earn money on sums we have invested in savings accounts, certificate of deposit, and money market funds. We also pay for the use of money that we have borrowed for school loans, mortgages, or credit card purchases. We will first examine the nature of interest and its computation. Then, we will discuss several investment solutions and computations related to each.

2.1 Future Value of Single Amount

Money available at present is more valuable than money value in future.

Did u know? What is interest?

The compensation for waiting is the time value of money is called interest. Interest is a fee that is paid for having the use of money.

Notes

Example: Interest on mortgages for having the use of bank's money.

Similarly, the bank pays us interest on money invested in savings accounts or certificates of deposit because it has temporary access to our money. The amount of money that is lent or invested is called principal. Interest is usually paid in proportion and the period of time over which the money is used. The interest rate is typically stated as a percentage of the principal per period of time,

Example: 18 per cent per year or 1.5 per cent per month.

Interest that is paid solely on the amount of the principal is called **simple interest**. Simple interest is usually associated with loans or investments that are short-term in nature. The computation of simple interest is based on the following formula:

Simple interest = principal × interest rate per time period × number of time period

*Example:*A person lends ₹ 10,000 to a corporation by purchasing a bond from the corporation. Simple interest is computed quarterly at the rate of 3 per cent per quarter, and a cheque for the interest is mailed each quarter to all bondholders. The bonds expire at the end of 5 years and the final cheque includes the original principal plus interest earned during the last quarter. Compute the interest earned each quarter and the total interest which will be earned over the 5-year life of the bonds.

Solution:

In this problem, principal = ₹ 10,000, interest = 3 per cent per quarter and the period of loan is 5 years. Since the time period for interest is a quarter of a year, we must consider 5 years as 20 quarters. And since we are interested in the amount of interest earned over one quarter, the period is 1 quarter. Therefore, quarterly interest equals ₹ 10,000 × 0.03 × 1 = ₹ 300

To compute total interest over the 5-year period, we multiply the per-quarter interest of ₹ 300 by the number of quarters 20, to obtain

Total interest = ₹ 300 × 20 =₹ 6,000

Compound Interest: Compound Interest occurs when interest earned during the previous period itself earns interest in the next and subsequent periods. If ₹ 1000 is placed into savings account paying 6% interest per year, interest accumulates as follows:

Principal invested in the first year	₹ 1000.00
Interest for first year (₹ 1000 × 0.06 × 1)	60.00
Amount available at end of first year	1060.00
Interest for second year (₹ 1060 × 0.06 × 1)	63.60
Amount available at end of second year	₹ 1123.60

The interest earned in the second year is greater than ₹ 60 because it is earned on the principal plus the first year's interest. If the savings account pays 6% interest compounded quarterly, 1.5% interest is added to the account each quarter, as follows:

Principal invested in the first year	₹ 1000.00
Interest for first quarter (₹ 1000 × 0.06 × 1 × 1/4)	15.00
Amount available at end of first quarter	1015.00

Notes

Interest for second quarter (₹ 1015 × 0.06 × 1 × 1/4)	15.23
Amount available at end of second quarter	₹ 1030.23
Interest for third quarter (₹ 1030.23 × 0.06 × 1 × 1/4)	15.45
Amount available at end of third quarter	1045.68
Interest for fourth quarter (₹ 1045.68 × 0.06 × 1 × 1/4)	15.69
Amount available at end of first year	1061.37

With quarterly compounding, the initial investment of ₹ 1000 earned ₹ 1.37 more interest in the first year than with annual compounding. Compound interest is defined with the following terms:

P = principal sum earns

i = interest rate per period

n = number of period during which compounding takes place – a period can be any length in time

Future Value of ₹ 1

A sum of money invested today at compound interest accumulates to a larger sum called the **amount** or **future value.** The future value of ₹ 1000 invested at 6% compounded annually for 2 years is ₹ 1123.60. The future value includes the original principal and the accumulated interest.

Notes The future value varies with the interest rate, the compounding frequency and the number of periods.

If the future value of ₹ 1 principal investment is known, we can use it to calculate the future value of any amount invested. For example, at 8% interest per period, ₹ 1 accumulates as follows:

Future value of ₹ 1 at 8% for 1 period = ₹ 1.00000 × 1.08 = ₹ 1.08000

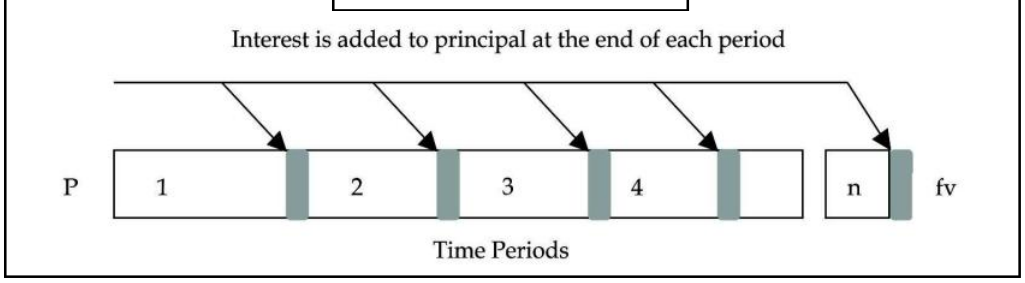
Future value of ₹ 1 at 8% for 2 periods = ₹ 1.08000 × 1.08 = ₹ 1.16640

Future value of ₹ 1 at 8% for 3 periods = ₹ 1.16640 × 1.08 = ₹ 1.25971

The above can be diagrammed as follows:

Interest is added to principal at the end of each period

Figure 2.1



The end of each period is designated by a grey cylinder like figure. The arrows pointing to the end of each period indicate that payments are made into the investment. The general formula for the future value of ₹ 1, with n representing the number of compounding period is

$$fv = (1 + i)n$$

Notes

Using this formula, future values can be calculated for any interest rate and any number of time periods. To obtain the future value of any principal other than ₹ 1, we multiply the principal by the factor for the future value of ₹ 1.

$$fv = (1 + i)n$$

or $$fv = Pf$$

where f is the factor in the future value of ₹ 1, with interest rate *i* and number of periods *n*.

Example: XYZ Company invests ₹ 40,00,000 in certificates of deposit that earn 16% interest per year, compounded semi-annually. What will be the future value of this investment at the end of 5 years when the company plans to use it to build a new plant?

Solution: Compounding is semi-annual and there are 5 years, so the number of half-year periods is 10. The semi-annual interest rate is half of the 16% annual rate or 8%. With $i = 8\%$ and $n = 10$, the factor in the table is 2.15892. Multiplying this factor by the principal investment, we get:

$$fv = P \times f(n = 10, i = 8\%)$$

$$= ₹\ 40,00,000 \times 2.15892$$

$$= 86,35,680$$

Self Assessment

Fill in the blanks:

1. The compensation for waiting is the time value of money, called…….
2. The future value includes the original principal and the……..
3. The future value varies with the interest rate, the …….frequency and the number of periods.

2.2 Present Value of Single Amount

If ₹ 1 can be invested at 8% today to become ₹ 1.08 in the future, then ₹ 1 is the **present value** of the future amount of ₹ 1.08. The present value of future receipts of money is important in business decision-making. It is necessary to decide how much future receipts are worth today in order to determine whether an investment should be made or how much should be invested. Finding the present value of future receipts involves discounting the future value to the present. **Discounting** is the opposite of compounding. It involves finding the present value of some future amount of money that is assumed to include interest accumulations.

Present Value of ₹ 1

Knowing the present value of ₹ 1 is useful because it enables us to find the present value of any future payment. Assuming 8% interest per period, a table of present values of ₹ 1 can be constructed as follows:

Present value of ₹1 discounted for 1 period at 8% =₹ 1.0/1.08 =₹ 0.92593

Present value of ₹1 discounted for 2 periods at 8% =₹ 0.92593/1.08 =₹ 0.85734

Present value of ₹1 discounted for 3 periods at 8% =₹ 0.85734/1.08 =₹ 0.79383

Notes

The general formula for the present value of ₹1 is

$$pv = 1/(1+i)n$$

The present value on the tables can be constructed from this formula.

Caution To find out the present value of any future amount, the appropriate factor from the table is multiplied by the amount.

Example: Alpha company can invest at 16 per cent compounded annually. Beta company can invest at 16 per cent compounded semi-annually. Each company will need ₹ 2,00,000 four years from now. How much must each invest today?

Solution: With annual compounding n=4 and I =16 per cent. With semi-annual compounding n=8 and i=8 per cent. Using the above formula we find the present value

$$= 1/(1.16)\ 4 = 0.55229 \times 2{,}00{,}000 = ₹\ 110{,}458$$

For Beta Company present value $= 2{,}00{,}000 \times 1/(1.08)4 = 200{,}000 \times 0.54027 = ₹\ 108{,}054$

Beta company needs to invest less than Alpha Company because its investment grows faster due to more frequent compounding.

Did u know? The more frequent the compounding the smaller the present value.

Self Assessment

Fill in the blanks:

4. Discounting is the opposite of ……
5. Finding the present value of future receipts involves ……the future value to the present.
6. The more frequent the compounding the ……..the present value.

2.3 Present and Future Value of Annuities

An **annuity** is a series of equal payments made at equal time intervals, with compounding or discounting taking place at the time of each payment. Each annuity payment is called a **rent**. There are several types of annuities, out of which in an ordinary annuity each rent is paid or received at the **end** of each period.

Notes

- There are as many rents as there are periods.
- Installment purchases, long-term bonds, pension plans, and capital budgeting all involve annuities.

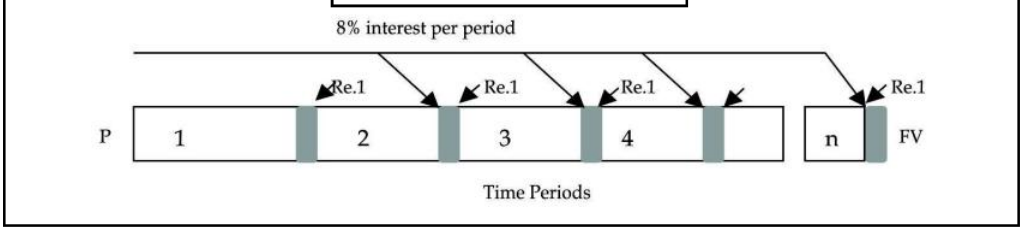
Notes

2.3.1 Future Value of Annuity of ₹ 1

If you open a savings account that compounds interest each month, and at the end of each month you deposit ₹ 100 in the savings account, your deposits are the rents of an annuity. After 1 year, you will have 12 deposits of ₹ 100 each, and a total of ₹ 1200, but the account will have more than ₹ 1200 in it because each deposit earns interest. If the interest rate is 6 per cent a year, compounded monthly, your balance is ₹ 1233.56. The future value of an annuity or amount of annuity is the sum accumulated in the future from all the rents paid and the interest earned by the rents. The abbreviation FV is used for the future value of an annuity to differentiate it from the lower case fv used for the future value of ₹1.

To obtain a table of future values of annuities, we assume payments of ₹1 each period made into a fund that earns 8 per cent interest compounded each period. The following diagram illustrates an annuity of four payments of ₹1, each paid at the end of each period, with interest of 8 per cent compounded each period.

Figure 2.2



Notice that there are four rents and four periods, each rent is paid at the end of each period. At the end of the first period, ₹1 is deposited and earns interest for three periods. The next rent earns interest for two periods, and so on. The amount at the end of the fourth period can be determined by calculating the future value of each individual ₹1 deposit as follows:

Future value of ₹ 1 at 8% for 3 periods	=	₹ 1.25971
Future value of ₹ 1 at 8% for 2 periods	=	₹ 1.16640
Future value of ₹ 1 at 8% for 1 period	=	₹ 1.08000
The fourth rent of ₹ 1 earns no interest	=	₹ 1.0000
Total for 4 rents	=	₹ 4.50611

The formula for the future value of an annuity of ₹1 can be used to produce tables for a variety of periods and interest rates

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

Example: In the beginning of 2006, the directors of Molloy Corporation decided that plant facilities will have to be expanded in a few years. The company plans to invest: ₹ 50,000 every year, starting on June 30, 2006, into a trust fund that earns 11 per cent interest compounded annually. How much money will be in the fund on June 30, 2010, after the last deposit has been made?

Solution: The first deposit is made at the end of the first 1-year period, and there is a total of 5 periods. The last deposit, made on June 30, 2010 earns no interest.The investment is an ordinary annuity with n =5 and i =11 per cent. From Table Future Value of Annuity ₹1 we find that the amount of an ordinary annuity of ₹1 is 6.22780.

$$FV = \text{Rent} \times f\,(n = 5, i = 11\%)$$

$$= ₹50{,}000 \times 6.22780 = ₹\,311{,}390$$

Notes

If the company needs a total of ₹ 3,00,000 on June 30, 2010, how much would it have to deposit every year? Here we have to solve for the rent, given the future value, as follows:

$$FV = \text{Rent} \times f\,(n = 5,\ i = 11\%)$$

$$₹\,3{,}00{,}000 = \text{Rent} \times 6.22780$$

$$\text{Rent} = ₹\,3{,}00{,}000/6.22780 = ₹\,48{,}171.10$$

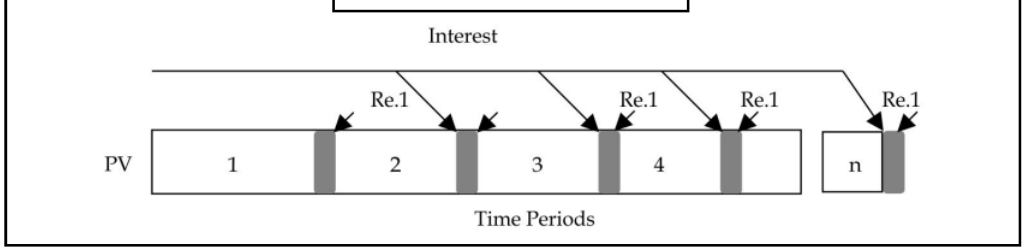
The company has to deposit ₹ 48,171 each time in order to accumulate the necessary ₹ 3,00,0000 by June 30, 2010.

2.3.2 Present Value of Annuity of ₹ 1

The present value of an annuity is the sum that must be invested today at compound interest in order to obtain periodic rents over some future time.

Notice that we use the abbreviation ***PV*** for the present value of an annuity, as differentiated from the lower case *pv* for the present value of ₹1. By using the present value of ₹1, we can obtain a table for the present value of an ordinary annuity of ₹1. The present value of an ordinary annuity of ₹1 can be illustrated as follows:

Figure 2.3



With each rent available at the end of each period, when compounding takes place, the number of rents is the same as the number of periods. By discounting each future event to the present, we find the present value of the entire annuity.

Present value of ₹1 discounted for 1 period at 8% = ₹ 0.92593

Present value of ₹1 discounted for 2 periods at 8% = 0.85734

Present value of ₹1 discounted for 3 periods at 8% = 0.79383

Present value of ₹1 discounted for 4 periods at 8% = 0.73503

Present value of annuity of 4 rents at 8% = ₹ 3.31213

The first rent is worth more than others because it is received earlier. Table on present value of annuities may be used to solve problems in this regard. The formula used to construct the table is:

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

Example: Mr. F, the owner of F Corporation is retiring and wants to use the money from the sale of his company to establish a retirement plan for himself. The plan is to provide an income of ₹ 5,00,000 per year for the rest of his life. An insurance company calculates that his life expectancy is 32 more years and offers an annuity that yields 9 per cent compounded annually. How much the insurance company wants now in exchange for the future annuity payments?

Notes

Solution: The investment today is the present value of an annuity of ₹ 5,00,000 per year, with n =32 and i =9 per cent compounded annually. From the cumulative present value table we find the factor 10.40624 which is the present value if the rents were ₹1.

$$PV = \text{Rent} \times f\ (n = 32,\ i = 9\%)$$

$$= ₹\ 5{,}00{,}000 \times 10.40624 = ₹\ 52{,}03{,}120$$

Self Assessment

Fill in the blanks:

7. ……..is a series of equal payments made at equal time intervals, with compounding or discounting taking place at the time of each payment.
8. The …….of an annuity is the sum that must be invested today at compound interest in order to obtain periodic rents over some future time.
9. The ……..of an annuity or amount of annuity is the sum accumulated in the future from all the rents paid and the interest earned by the rents.

2.4 Perpetuities

An annuity that goes on for ever is called a perpetuity. The present value of a perpetuity of ₹ C amount is given by the simple formula: C/i where i is the rate of interest.

This is because as the length of time for which the annuity is received increases, the annuity discount factor increases but as length gets very long, this increase in the annuity factor slows down.

Caution as annuity life becomes infinitely long the annuity discount factor approaches an upper limit. Such a limit is 1/i.

Example: Mr. X wishes to find out the present value of investments which yield ₹ 500 in perpetuity, discounted at 5%. The appropriate factor can be calculated by dividing 1 by 0.05. The resulting factor is 20. This is to be multiplied by the annual cash inflow of ₹ 500 to get the present value of the perpetuity i.e., ₹ 10,000.

Managerial Problems

Many business problems are solved by use of compound interest and present value tables. For example, B Corporation is investigating two possible investments. Project A is the purchase of a mine for ₹ 20,00,000 which will give an expected income from sale of ore of ₹ 480,000 per year for 10 years, after which the property will be sold at an estimated price of ₹ 600,000. Project B is the purchase of an office building that is leased for 15 years. The lease provides annual receipts of ₹ 4,00,000 at the end of the each of the next 4 years, and annual receipts of ₹ 4,50,000 for the remaining life of the lease. The purchase price is ₹ 20,00,000. B Corporation requires a 20 per cent return on its investments. Which investment is preferable?

Solution: To evaluate Project A we need to find the present value of the future income stream of ₹ 4,80,000 per year for 10 years plus the present value of the future sales price of ₹ 6,00,000, both discounted to the present at the company's required rate of return of 20 per cent.

Notes

PV of annuity of ₹ 4,80,000 (n =10, i =20%) = 480,000 × 4.19247	₹ 20,12,386
PV of ₹ 6,00,000 at the end of 10 years = 600,000 × 0.16151	96,906
Total present value of Project A cash inflows	21,09,292

The problem can be broken down into two separate annuities, one with receipts of ₹ 4,50,000 per year for 15 years and the other with payments of ₹ 50,000 for 4 years. The present value of the two annuities can be found by computing the present value of ₹ 4,50,000 for 15 years at 20 per cent minus an annuity of ₹ 50,000 for 4 years at 20 per cent.

PV of annuity of ₹ 4,50,000 (n=15, i=20 per cent) = 450,000 × 4.67547	21,03,961
PV of annuity of ₹ 50,000 (n=4, i=20 per cent) = 50,000 × 2.58873	(1,29,437)
Total present value of project B cash inflows	19,74,524

By discounting each project at the company's required rate of return, we find the Project A

cash inflows have a present value of ₹ 12,09,292 and Project B cash inflows have a present value of ₹ 19,74,524. Since the asking price of each project is ₹ 20,00,000, project B should not be accepted. The value of project A is greater than the asking price, therefore the company should acquire Project A.

Task Calculate the present value of cash flows of ₹ 700 per year for ever (in perpetuity)

1. Assuming an interest rate of 7%
2. Assuming an interest rate of 10%

Self Assessment

Fill in the blanks:

10. An annuity that goes on for ever is called a……...
11. The present value of a perpetuity of ₹ C amount is given by the simple formula: C/i where i is the……..
12. Many business problems are solved by use of compound interest and …….tables.

2.5 Calculation of the Compound Growth Rate

Compound growth rate can be calculated with the following formula:

$$gr = Vo(1 + r)^n = V^n$$

where,

gr = Growth rate in percentage.

Vo = Variable for which the growth rate is needed (i.e., sales, revenue, dividend at the end of year '0').

V^n = Variable value (amount) at the end of year 'n'.

$(1 + r)^n$ = Growth rate.

Illustration:

From the following dividend data of a company, calculate compound rate of growth for period (1998-2003).

Notes

Year	1998	1999	2000	2001	2002	2003
Dividend per share (₹)	21	22	25	26	28	31

Solution:

$$21\ (1 + r)^5 = 31$$

$$(1 + r)^5 = 31 / 21 = 1.476$$

Notes: See the compound value one rupee Table for 5 years (total years - one year) till you find the closest value to the compound factor, after finding the closest value, see first above it to get the growth rate.

Task Determine the rate of growth of the following stream of dividends a person has received from a company:

Year	Dividend (per share) (Rs)
1	2.50
2	2.60
3	2.74
4	2.88
5	3.04

Doubling Period

Doubling period is the time required, to double the amount invested at a given rate of interest. For example, if you deposit ₹ 10,000 at 6 per cent interest, and it takes 12 years to double the amount. (see compound value for one rupee table at 6 per cent till you find the closest value to 2).

Doubling period can be computed by adopting two rules, namely:

1. ***Rule of 72 :*** To get doubling period 72 is divided by interest rate.

$$\text{Doubling period (Dp)} = 72 \div I$$

Where,

$$I = \text{Interest rate}$$

$$Dp = \text{Doubling period in years}$$

Example: If you deposit ₹ 500 today at 10 per cent rate of interest, in how many years will this amount double?

Solution:

Dp = 72 ÷ I = 72 ÷ 10 = 7.2 years (approx.)

2. Rule of 69**:** Rule of 72 may not give the exact doubling period, but rule of 69 gives a more accurate doubling period. The formula to calculate the doubling period is:

$$Dp = 0.35 + 69 / I$$

Notes

Example: Take the above problem as it is and calculate doubling period.

Solution:

$$Dp = 0.35 + 69 / 10 = 7.25 \text{ years.}$$

Effective Rate of Interest in Case of Doubling Period

Sometimes investors may have doubts as to what is the effective interest rate applicable, if a financial institute pays double amount at the end of a given number of years.

Effective rate of interest can be defined by using the following formula.

(a) In case of rule of 72

$$ERI = 72 \text{ per cent Doubling period (Dp)}$$

where,

$$ERI = \text{Effective rate of interest.}$$

$$Dp = \text{Doubling period.}$$

Example: A financial institute has come with an offer to the public, where the institute pays double the amount invested in the institute by the end of 8 years. Mr. A, who is interested to make a deposit, wants to know the affective rate of interest that will be given by the institute. Calculate.

Solution:

$$ERI = 72 \div Dp = 72 \div 8 \text{ years} = 9 \text{ per cent}$$

(b) In case of rule of 69

$$ERI = \frac{69}{Dr} + 0.35$$

Example: Take the above example:

$$ERI = \frac{69}{8 \text{ years}} + 0.35$$

$$= 8.98 \text{ per cent or } 9 \text{ per cent}$$

Self Assessment

Fill in the blanks:

13. Compound growth rate can be calculated with the formula- ……

14. To get doubling period 72 is divided by ……rate

15. ……..period is the time required, to double the amount invested at a given rate of interest.

Case Study

Case: Comparing Mortgage Alternatives

The application of the time value of money principles can help you make decisions on loan alternatives. This exercise requires you to compare three mortgage alternatives

Contd...

Notes

using various combinations and points. Points on a mortgage refer to a payment that is made upfront to secure the loan. A single point is a payment of one per cent of the amount of the total mortgage loan. If you were borrowing ₹ 200,000 a single point would require an upfront payment of ₹ 2,000.

When you are evaluating alternative mortgages, you may be able to obtain a lower rate by making an upfront payment. This comparison will not include an after-tax comparison. When taxes are considered, the effective costs are affected by interest paid and the amortization of points on the loan. This analysis will require you to compare only before-tax costs.

Zeal.com allows you to compare the effective costs on alternative mortgages. You are considering three alternatives for a ₹ 250,000 mortgage. Assume that the mortgage will start in December, 2006. The mortgage company is offering you a 6% rate on a 30-year mortgage with no points. If you pay 1.25 points, they are willing to offer you the mortgage at 5.875%. If you pay 2 points, they are willing to offer you the mortgage at 5.75%.

Questions

1. What are the mortgage payments under the three alternatives?
2. Which alternative has the lowest effective cost?
3. Can you explain how the effective rate is being calculated?

2.6 Summary

- The compensation for waiting is the time value of money, called interest. Interest is a fee that is paid for having the use of money
- The future value varies with the interest rate, the compounding frequency and the number of periods.
- The general formula for the future value of ₹ 1, with n representing the number of compounding period is *fv = (1 + i)n*
- Finding the present value of future receipts involves discounting the future value to the present. Discounting is the opposite of compounding.
- The general formula for the present value of ₹1 is pv = 1/(1+i)n
- An annuity is a series of equal payments made at equal time intervals, with compounding or discounting taking place at the time of each payment. Each annuity payment is called a rent.
- The future value of an annuity or amount of annuity is the sum accumulated in the future from all the rents paid and the interest earned by the rents.
- The present value of an annuity is the sum that must be invested today at compound interest in order to obtain periodic rents over some future time.
- An annuity that goes on for ever is called a perpetuity. The present value of a perpetuity of ₹ C amount is given by the simple formula: C/i where i is the rate of interest.
- Compound growth rate can be calculated with the following formula:

$$gr = Vo(1 + r)n = Vn$$

Notes

2.7 Keywords

Annuity: It is a stream of equal annual cash flows.

Cash Flow: It is the movement of cash into or out of a business, a project, or a financial product. It is usually measured during a specified, finite period of time

Compound Interest: When interest is added to the principal, so that from that moment on, the interest that has been added also itself earns interest.

Compound Value: The interest earned on the initial principal becomes a part of the principal at the end of a compounding period.

Interest: It is a fee paid on borrowed assets. It is the price paid for the use of borrowed money.

Present Value: In case of present value concept, we estimate the present worth of a future payment/instalment or series of payment adjusted for the time value of money.

Time Value of Money: Time value of money is that the value of money changes over a period of time.

2.8 Review Questions

1. "Cash flows of two years in absolute terms are uncomparable" Give reasons in support of your answer.
2. Define the following terms and phrases:
   (a) Compound sum of an annuity
   (b) Present value of a future sum
   (c) Present value of an annuity
   (d) Annuity
   (e) Discount rate
3. What happens to the effective rate of interest as the frequency of compounding is increased?
4. As a financial consultant, will you advise your client to have term deposit in a commercial bank, which pays 8% interest compounded semi-annually or 8% interest compounded annually? Why?
5. What effects do (i) increasing rate of interest and (2) increasing time periods have on the (a) present value of a future sum and (b) future value of the present sum? Why?
6. Can annuity tables be used for all types of cash flows?
7. For a given interest rate and a given number of years, is the factor for the sum of an annuity larger or smaller than the interest factor for the present value of the annuity?
8. Explain the mechanics of calculating the present value of a mixed stream that includes an annuity.
9. A limited company borrows from a commercial bank ₹ 10,00,000 at 12% rate of interest to be paid in equal end-of-year installments. What would the size of the instalment be? Assume the repayment period is 5 years.
10. If ABC company expects cash inflows from its investment proposal it has undertaken in time zero period, ₹ 2,00,000 and ₹ 1,50,000 for the first two years respectively and then expects annuity payment of ₹ 1,00,000 for next eight years, what would be the present value of cash inflows, assuming 10% rate of interest?

Notes

11. The XYZ company is establishing a sinking fund to retire ₹ 5,00,000 8% debentures 10 years from today. The company plans to put a fixed amount into the fund each year for 10 years. The first payment will be made at the end of current year. The company anticipates that the fund will earn 6% a year. What equal annual contributions must be made to accumulate ₹ 5,00,000, 10 years from now.

12. Calculate the price of 10% debentures having face value of ₹ 100, to be redeemed after 10 years at par and paying interest after every six months, assuming the market rate of interest of debentures of similar risk and maturity period is (a) 10%, (b) 12%, (c) 8%

Answers: Self Assessment

1.	interest	2.	accumulated interest
3.	compounding	4.	compounding
5.	discounting	6.	smaller
7.	Annuity	8.	present value
9.	future value	10.	perpetuity
11.	rate of interest	12.	present value
13.	gr = Vo(1 + r)n = Vn	14.	interest
15.	Doubling		

2.9 Further Readings

Books

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Unit 3: Sources of Finance

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Objectives

After studying this unit, you will be able to:

- Identify the different long-term sources of finance
- Explain the different short-term sources of finance
- Describe leasing as a source of finance
- Discuss various significant aspects related to venture capital finance

Introduction

One of the most important element for an entrepreneur or company implementing a new project or undertake expansion, diversification, modernization and rehabilitation scheme is working out the cost of project and the means of finance. There are several sources of finance/ funds available to any company. Among the various sources of funds available to a company an effective mechanism is required to evaluate risk, tenure and cost of each and every source of fund. The selection of the fund source is dependent on the financial strategy pursued by the company, the leverage planned by the company, the financial conditions prevalent in the economy and the risk profile of both viz., the company as well as the industry in which the company operates. Each and every source of funds has some merits and demerits.

3.1 Financial Needs and Sources of Finance of a Business

Financial needs of a business: The financial needs of a business may be grouped into following three categories:

1. ***Long-term financial needs:*** Such needs generally refer to funds 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.

2. ***Medium-term financial needs:*** Such requirements refer to funds for a period exceeding one year but not exceeding 5 years. For example, if a company as part of strategy goes for 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 them are classified in the category of medium term financial needs. Sometimes, long-term requirements, for which long-term funds cannot be arranged immediately, may be met from medium-term sources and thus the demand of medium-term finance is generated. As and when the desired long-term funds are made available, medium-term loans taken earlier may be paid off.

3. ***Short-term financial needs:*** 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. Firms require working capital to employ fixed assets gainfully. The requirement of working capital depends upon a number of factors, which may differ from industry to industry and from company to company in the same industry. 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.

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 for 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. Basically, there are two sources of raising funds for any business enterprise viz., owner's capital and

Notes

borrowed capital. The owner's capital is used for meeting long-term financial needs and it primarily comes from share capital and retained earnings. Borrowed capital for all the other types of requirement can be raised from different sources such as debentures, public deposits, loans from financial institutions and commercial banks, etc.

The following section shows at a glance the different sources from where the three aforesaid types of finance can be raised in India.

Sources of Finance of a Business

1. ***Long-term***
   - (a) Share capital or equity share
   - (b) Preference shares
   - (c) Retained earnings
   - (d) Debentures/Bonds of different types
   - (e) Loans from financial institutions
   - (f) Loans from State Financial Corporation
   - (g) Loans from commercial banks
   - (h) Venture capital funding
   - (i) Asset securitisation
   - (j) International financing like Euro-issues, foreign currency loans
2. ***Medium-term***
   - (a) Preference shares
   - (b) Debentures/Bonds
   - (c) Public deposits/fixed deposits for a duration of three years
   - (d) Commercial banks
   - (e) Financial institutions
   - (f) State financial corporations
   - (g) Lease financing/hire purchase financing
   - (h) External commercial borrowings
   - (i) Euro issues
   - (j) Foreign currency bonds
3. ***Short-term***
   - (a) Trade credit
   - (b) Commercial banks
   - (c) Fixed deposits for a period of 1 year or less
   - (d) Advances received from customers
   - (e) Various short-term provisions

Notes

It is evident from the above section that funds can be raised from the same source for meeting different types of financial requirements.

Notes Financial sources of a business can also be classified as follows by using different basis:

1. According to period:
   (a) Long-term sources
   (b) Medium-term sources
   (c) Short-term sources
2. According to ownership:
   (a) Owner's capital or equity capital, retained earnings, etc.
   (b) Borrowed capital such as debentures, public deposits, loans, etc.
3. According to source of generation:
   (a) Internal sources e.g., retained earnings and depreciation funds, etc.
   (b) External sources e.g., debentures, loans, etc.

However for the sake of convenience, the different sources of funds can also be classified into following categories:

1. Security financing – financing through shares and debentures
2. Internal financing – financing through retained earning, depreciation
3. Loans financing – this includes both short-term and long-term loans
4. International financing
5. Other sources

Self Assessment

Fill in the blanks:

1. Long-term financial needs generally refer to funds for a period exceeding ……..years.
2. Investment in …….financial assets is known as meeting of working capital requirements of the concern.

3.2 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) and debt (including debentures, long-term borrowings or other debt instruments). In recent times in India, many companies have raised long-term finance by offering various instruments to public like deep discount bonds, fully convertible debentures, etc. These new instruments have characteristics of both equity and debt and it is difficult to categorize these either as debt or equity. The different sources of long-term finance can now be discussed.

Notes

3.2.1 Owners' Capital or Equity

A public limited company may raise funds from promoters or from the investing public by way of owners' capital or equity capital by issuing ordinary equity shares. Ordinary shareholders are owners of the company and they undertake the risks inherent in business. They elect the directors to run the company and have the optimum control over the management of the company. Since equity shares can be paid off only in the event of liquidation, this source has the least risk involved. This is more so due to the fact that equity shareholders can be paid dividends only when there are distributable profits. However, the cost of ordinary shares is usually the highest. This is due to the fact that such shareholders expect a higher rate of return on their investment as compared to other suppliers of long-term funds. Further, the dividend payable on shares is an appropriation of profits and not a charge against profits. This means that it has to be paid only out of profits after tax.

Ordinary share capital also provides a security to other suppliers of funds. Thus, a company having substantial ordinary share capital may find it easier to raise further funds, in view of the fact that share capital provides a security to other suppliers of funds.

Did u know? What are the governing acts for share capital?

The Companies Act, 1956 and SEBI Guidelines for disclosure and investors' protections and the clarifications there to lay down a number of provisions regarding the issue and management of equity shares capital.

Advantages of raising funds by issue of equity shares are:

1. It is a permanent source of finance.
2. The issue of new equity shares increases flexibility of the company.
3. The company can make further issue of share capital by making a right issue.
4. There are no mandatory payments to shareholders of equity shares.

3.2.2 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 repayment of capital on winding up of the company.

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 is an adequate profit 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 that partakes 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. Typically, when preference dividend is skipped it is payable in future because of the cumulative feature associated with most of preference shares.

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. For normal preference shares, the maximum permissible rate of dividend is 14%.

Notes

Preference share capital may be redeemed at a predefined 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. It may be mentioned that irredeemable preference shares cannot be issued by any company.

Notes Preference shares have gained importance after the Finance Bill 1997 as dividends became tax exempted in the hands of the individual investor and are taxable in the hands of the company as tax is imposed on distributed profits at a flat rate. The Budget for 2000–01 has doubled the dividend tax from 10% to 20% besides a surcharge of 10%. The Budget for 2001-2002 has reduced the dividend tax from 20% to 10%. Many companies raised funds during1997 through this route especially through private placement or preference shares, as the capital markets were not vibrant.

The advantages of taking the preference share capital route are:

1. No dilution in EPS on enlarged capital base – if equity is issued it reduces EPS, thus affecting the market perception about the company.
2. There is leveraging advantage as it bears a fixed charge.
3. There is no risk of takeover.
4. There is no dilution of managerial control.
5. Preference capital can be redeemed after a specified period.

3.2.3 Debentures or Bonds

Loans can be raised from public by issuing debentures or funds by public limited companies. Debentures are normally issued in different denominations ranging from ₹ 100 to ₹ 1,000 and carry different rates of interest. By issuing debentures, a company can raise long-term loans from public. Normally, debentures are issued on the basis of a debenture trust deed, which list the terms and conditions on which the debentures are floated. Debentures are normally secured against the assets of the company.

As compared with preference shares, debentures provide a more convenient mode of long-term funds. 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. Secured debentures are protected by a charge on the assets of the company. While the secured debentures of a well-established company may be attractive to investors, secured debentures of a new company do not normally evoke same interest in the investing public.

Advantages of raising finance by issue of debentures are:

1. 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.
2. Debenture financing does not result in dilution of control.
3. In a period of rising prices, debenture issue is advantageous. The fixed monetary outgo decreases in real terms as the price level increases.

Notes

The disadvantages of debenture financing are:

1. The protective covenants associated with a debenture issue may be restrictive
2. Debenture financing enhances the financial risk associated with the firm.

These days, many companies are issuing convertible debentures or bonds with a number of schemes/incentives like warrants/options etc. These bonds or debentures are exchangeable at the option of the holder for ordinary shares under specified terms and conditions. Thus, for the first few years these securities remain as debentures and later they can be converted into equity shares at a predetermined conversion price. The issue of convertible debentures has distinct advantages from the point of view of the issuing company. Firstly, such as issue enables the management to raise equity capital indirectly without diluting the equity holding, until the capital raised has started earning an added return to support the additional shares. Secondly, such securities can be issued even when the equity market is not very good. Thirdly, convertible bonds are normally unsecured and, therefore, their issuance may ordinarily not impair the borrowing capacity. These debentures/bonds are issued subject to the SEBI guidelines notified from time to 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 at India Ltd.). The credit rating is given after evaluating factors like track record of the company, profitability, debt servicing capacity, credit worthiness and perceived risk of lending.

Caution Debenture interest and capital repayment are obligatory payments.

3.2.4 Types of Debentures

Debentures can be classified based on security against which it is placed and whether convertible into shares or not.

Non-Convertible Debentures (NCDs)

These debentures cannot be convertible into equity shares and will be redeemed at the end of the maturity period.

Example:ICICI offered for public subscription for cash at par ₹ 20,00,000, 16% unsecured redeemable bonds (Debentures) of ₹ 1000 each. These bonds are fully non-convertible (i.e., the investor is not given the option of converting into equity shares); interest payable half yearly on June 30 and December 31, to be redeemed (paid back) on the expiry of 5 years from the date of allotment. But ICICI has also allowed the investors, the option of requesting the company to redeem all or part of the bonds held by them on the expiry of 3 years from the date of allotment, provided the bond holders give the prescribed notice to the company.

Fully Convertible Debentures (FCDs)

These debentures will be converted into equity shares either fully at one stroke or in instalments. The debentures may or may not carry interest till the date of conversion. The conversion will be at a premium either fixed before hand or as per some formula. FCDs are very attractive to the investors as their bonds are converted into equity shares at a price, which actually in the market may be much higher.

Notes

Example: Let us look at the Jindal issue:

The total issue was 301,72,080 secured zero interest fully convertible debentures. Of these 129,30,000 FCDs of ₹ 60 each were offered to the existing shareholders of the company as right basis in the ratio of one FCD for every one fully paid equal share held as on 30th March of the year. The balance of 172,42,080 secured zero interest, FCD's were offered to the public at par value of ₹ 100 each.

The terms of conversion were: Each fully paid FCD's will be compulsorily converted into one equity shares of ₹ 10 each at a premium of ₹ 90 per share, credited as fully paid up, at the end of 12 months from the date of investment.

Partly Convertible Debentures (PCDs)

These are debentures or bonds, a portion of which will be converted into equity share capital after a specified period, whereas the non-convertible part (NCD) of PCD will be redeemed as per terms of the issue after the maturity period. The non-convertible portion of the PCD will carry interest upto redemption whereas the interest on the convertible portion will be only upto the date immediately preceding the date of conversion.

Normally, PCDs carry a lower rate of interest (coupon) as compared to NCDs.

This is a kind of NCD with an attached warrant that gives the holder the right for allotment of equity shares through cash payment. This right has to be exercised between certain time frame after allotment, by which time the SPN will be fully paid up.

3.2.5 New Financial Instruments

- ***Non-voting shares:*** Useful for companies to increase net worth without losing management control. These stocks are similar in every respect to equity, the sole exception being the absence of voting rights.
- ***Detachable equity warrants:*** This gives the holder the right to purchase a certain number of shares (equity) at a specified price over a certain period of time (of course holders of warrants earn no income from them, till the option is exercised or warrants are sold). Warrants are often attached to debt issues as 'sweetener'. When a firm makes a large bond issue the attachment of stock purchase warrants may add to the marketability of the issue and lower the required interest rate. A sweetener's warrants are similar to conversion features often when a new firm is raising its initial capital suppliers of debt will require warrants to permit them to participate in whatever success the firm achieves. In addition, established companies, offer warrants to debts to compensate for risk and thereby lower the interest rate/and/or provide for fewer restrictive covenants.
- ***Participating debentures:*** These are unsecured corporate debt securities that participate in the profits of the company. Potential issuers are existing dividend paying companies could appeal to investors willing to take risk for higher returns.
- ***Participating preference shares:*** Quasi equity instrument to bolster net worth without loss of management control payouts linked to equity dividend and also eligible for bonus will appeal to investors who are willing to take low risk.
- ***Convertible debentures with options:*** A derivative of the convertible debentures, with an embedded option, providing flexibility to the issues as well as the investor to exit from the terms of the issue. The coupon rate is specified at the time of issue.
- ***Third party convertible debenture:*** Debt with a warrant allowing the investor to subscribe to the equity of a third firm at a preferential price vis-à-vis the market price. Interest rate here is lower than pure debt on account of the conversion option.

Notes

- ***Mortgage backed securities:*** An instrument, otherwise known as the Asset Backed Security ABS), for securitization of debt. An ABS is backed by pooled assets like mortgages, credit card receivables and the like.
- ***Convertible debentures redeemable at premium:*** Convertible debenture issued at face value with a 'put' option entitling investors to sell the bond later to the issuer at a premium. It serves a similar purpose as that of convertible debt, but risks to investors are lower.
- ***Debt equity swaps:*** An offer from the issue of debt to convert (swap) it for common share. The risk may dilute earnings per share in the case of the issues, the expect capital appreciation may not materialize in the case of investor.
- ***Zero coupon convertible note:*** A Zero Coupon Convertible Note (ZCCN) converts into common shares. If investors choose to convert, they forego all accrued and unpaid interest. The risk ZCCN prices are sensitive to interest rates.

Did u know? **What are floating rate bonds?**

The bonds in which the interest rate is not fixed and is allowed to float depending upon the market conditions. This has become very popular as a money market investment.

3.2.6 Loans from Financial Institutions

In India, specialized institutions provide long-term financial assistance to industry. Thus, the Industrial Finance Corporation of India, the State Financial Corporations, the Life Insurance Corporation of India, the National Small Industries Corporation Limited, the Industrial Credit and Investment Corporation, the Industrial Development Bank of India and the Industrial Reconstruction Corporation of India provide term loans to companies. Before a term loan is sanctioned, a company has to satisfy the concerned financial institution regarding the technical, commercial, economic, financial and managerial viability of the project for which the loan is required. Such loans are available at different rates of interest under different schemes of financial institutions and are to be repaid according to a stipulated repayment schedule.

Term loans represent secured borrowings and at present it is the most important source of finance for new projects. They generally carry a rate of interest inclusive of interest tax, depending on the credit rating of the borrower, the perceived risk of lending and the cost of funds. These loans are generally repayable over a period of 6 to 10 years in annual, semi-annual or quarterly installments.

Term loans are also provided by banks. State financial/development institutions and all-India term lending financial institutions. Banks and State Financial Corporations normally provide term loans to projects in the small scale sector, while for the medium and large industries, term loans are provided by state developmental institutions alone or in consortium with banks and State-Financial Corporations. For large scale projects all-India financial institutions provide the bulk of term finance either singly or in consortium with other all-India financial institutions, state level institutions and/or banks.

After Independence, the institutional setup in India for the provision of medium and long-term credit for industry has been broadened. The assistance sanctioned and disbursed by these specialized institutions has increased impressively over the years. A number of specialized institutions have been established all over the country.

Caution The loans in many cases stipulate a number of conditions regarding the management and certain other financial policies of the company.

Notes

3.2.7 Internal Accruals

This basically means what is being ploughed back in business i.e., retained earnings and the depreciation charge. While depreciation is used for replacing an old machinery, etc., retained earnings can be used, for finding other long-term requirements of the business. The major advantage of using this as a source of long-term finance are its easy availability, elimination of issue expenses and avoiding the problem of dilution of control (with equity source of fund). The disadvantage of this source is limited funds from this source, plus foregoing of dividends receipts may lead to higher opportunity costs for the firm.

Task Which of the following do you think is costliest of long-term sources of finance? Give reasons to support your answer.

1. Preference Share Capital
2. Retained Earnings
3. Equity Share Capital
4. Debentures
5. Capital raised through private placement.

Self Assessment

Fill in the blanks:

3. Ordinary shareholders are owners of the company and they undertake the …….inherent in business.
4. Long-term funds from preference shares can be raised through a ……..of shares.
5. A Zero Coupon Convertible Note (ZCCN) converts into……...

3.3 Issue of Securities

A firm can raise capital from the primary market (both domestic and foreign) by using securities in the following ways:

- Public issue
- Rights issue
- Private placement
- Bought out deals
- Euro issues

The apex body regulating the Indian securities market and the companies raising finance from it is the Securities and Exchange Board of India (SEBI). After the repeal of Capital Issues Control Act, 1947 in May 1992, SEBI was given the statutory powers to regulate the securities market.

3.3.1 Public Issue

Companies issue securities in the public in the primary market and get them listed in the stock exchange. The major activities in making a public issue of securities are as below:

- The firm should appoint a SEBI registered category I Merchant Banker to manage the issues. The lead manager will be responsible for all the pre and post issue activities,

Notes

liaison with the other intermediaries, and statutory bodies like SEBI, Stock Exchange and the Register of Companies (ROC) and finally ensure that securities are listed on the Stock Exchange.

- The other intermediaries involved in the public issue of securities are underwriters, registrars, and bankers to the issues, brokers and advertising agencies. It also involves promotion of the issue, printing and dispatch of prospectus and application form, obtaining statutory clearances, filing the initial listing application, final allotment and refund activities. The cost of issue ranges between 12 – 15% of the issue size and may go up to 20% in adverse market conditions.

3.3.2 Rights Issue

As per Section 81 of the Companies Act, 1956, when a firm issues additional equity capital it has to first offer such securities to the existing shareholders in a prorate basis. The company must give notice of maximum 14 days to each of the equity shareholders giving him the option to take the shares offered to him by the company against payment of specified money per share. The shareholder unless the articles otherwise provide, have the right to renounce the offer, in whole or in part, in favour of some others who need not be a member of the company. The cost of floating right issue is comparatively less than the public issue. Since marketing costs and other public issue expenses are avoided as the offer is made to the existing shareholders. The rights issue is also priced lower than the public issue.

3.3.3 Private Placement

The private placement method involves direct selling of securities to a limited number of institutional or high net worth investors. This avoids delay involved in going public and also reduces the expenses involved in public issue. The company appoints a merchant banker to network with the institutional investor and negotiate the price of the issue. The major advantages of private placement securities are:

- Easy access to any company
- Fewer procedural formalities
- Access to funds is faster
- Lower cost involved in issues
- Securities can be custom-tailored for firms with special problems or opportunities.

3.3.4 Bought out Deals

Bought out is a process whereby a investor or group of investors buy out a significant portion of the equity of an unlisted company with a view to sell the same to public within an agreed time frame. The company places the equity shares, to be offered to the public with a sponsor or the Merchant Banker. At the right time, the shares are off loaded to the public through the OTCE I route or by way of public issue and the funds reach the company without much delay. Further, it affords greater flexibility in terms of issue and matters relating to offloading. Major advantages of entering into a bought out deal are:

- Companies both existing and new, which do not satisfy conditions laid down by SEBI for premium issues, may issue at a premium through this route.
- The procedural complexities are reduced, and funds reach faster upfront. Added to this there is significant reduction in issue cost.
- An advantage accruing to the investor is that the issue price reflects the company's intrinsic value.

Notes

Task A company is in dire need for funds but lost the confidence of its shareholders due to the inadequate return on investments. Which of the following methods is/are suitable to that company to raise funds? Why.

1. Public issue
2. Rights issue
3. Private placement
4. Bought out deals

3.3.5 Euro Issues

The Government of India as a part of liberalization and de-regulation of industry and to augment the financial resources of Indian companies, has allowed the companies to directly tap foreign resources for their requirements. The liberalized measures have boosted the confidence of foreign investors and also provided an opportunity to Indian companies to explore the possibility of tapping the European Market for their financial requirements. Where the resources are raised through the mechanism of EURO ISSUES i.e., Global Depository Receipts (GDRs), Foreign Currency Convertible Bonds (FCCB) and pure debt bonds. These investments are issued abroad and listed and traded as a foreign stock exchange. Once they are converted into equity, the underlying shares are listed and traded on the domestic exchange.

GDRs are created when the rising company delivers ordinary shares issued in the name of overseas depository bank (depository) to the domestic custodian bank (who is an agent of the depository) against which the depository issues GDRs representing the underlying equity shares to the foreign investors. The physical possession of the shares remains with the depository and the respective foreign investors obtain GDRs from the depository evidencing their holding. The main advantage of the issue is that there is an inflow of foreign exchange through the proceeds of the issue whereas the dividend outflow is in Indian rupees. The Department of Economic Affairs, Ministry of Finance has given detailed Guidelines Regarding Issue of GD₹ GDRs can be treated freely among non-resident investors like any other dollar-dominated security either on a foreign exchange market or in the OTC market.

Foreign currency convertible bond is an equity-linked unsecured debt instrument carrying a fixed rate of interest and an option of conversion into fixed number of equity shares or GDRs of the issuer company. However, the option to retain FCCB as a bond also exists. As a bond, the issuer has the responsibility to repay the principal amount and make the specified interest payment for the given period. These bonds are listed and traded on one or more such exchanges abroad till conversion interest and well as redemption is paid in dollars or freely convertible currency.

Self Assessment

Fill in the blanks:

6. The private placement method involves ……selling of securities to a limited number of institutional or high net worth investors.
7. Foreign currency convertible bond is an equity-linked unsecured ……..instrument carrying a fixed rate of interest.

Notes

3.4 Sources of Short-term Finance

3.4.1 Trade Credit

Trade credit refers to the credit extended by the supplier of goods or services to his/her customer in the normal course of business. Trade credit occupies very important position in short-term financing due to the competition. Almost all the traders and manufacturers are required to extend credit facility (a portion), without which there is no possibility of staying back in the business. Trade credit is a spontaneous source of finance that arises in the normal business transactions of the firm without specific negotiations (automatic source of finance). In order to get this source of finance, the buyer should have acceptable and dependable credit worthiness and reputation in the market. Trade credit generally extended in the format open account or bills of exchange. Open account is the form of trade credit, where supplier sends goods to the buyer for the payment to be received in future as per terms of the sales invoice. As such trade credit constitutes a very important source of finance; it represents 25 per cent to 50 per cent of the total short-term sources for financing working capital requirements.

Getting trade credit may be easy to the well-established or well-reputed firm, but for a new or the firm with financial problems will generally face problem in getting trade credit. Generally suppliers look for earning record, liquidity position and payment record which is extending credit. Building confidence in suppliers is possible only when the buyer discussing his/her financial condition future plans and payment record. Trade credit involves some benefits and costs.

Advantages of Trade Credit

The main advantages are:

1. Easy availability when compared to other sources of finance (except financially weak companies).
2. Flexibility is another benefit, as the credit increases with the growth of the firm's sales.
3. Informality as we have already seen that it is an automatic finance.

The above discussion on trade credit reveals two things. One, cost of trade credit is very high beyond the cash discount period, company should not have cash discount for prompt payment and second, if the company is not able to avail cash discount it should pay only at the end of last day of credit period, even if it can delay by one or two days, it does not affect the credit standing.

3.4.2 Bridge Finance

Bridge finance refers to loans taken by a company normally from commercial banks for a short period, pending disbursement of loans sanctioned by financial institutions. 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. Bridge loans are also provided by financial institutions pending the signing of regular term loan agreement, which may be delayed due to non-compliance of conditions stipulated by the institutions while sanctioning the loan. 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.

Notes

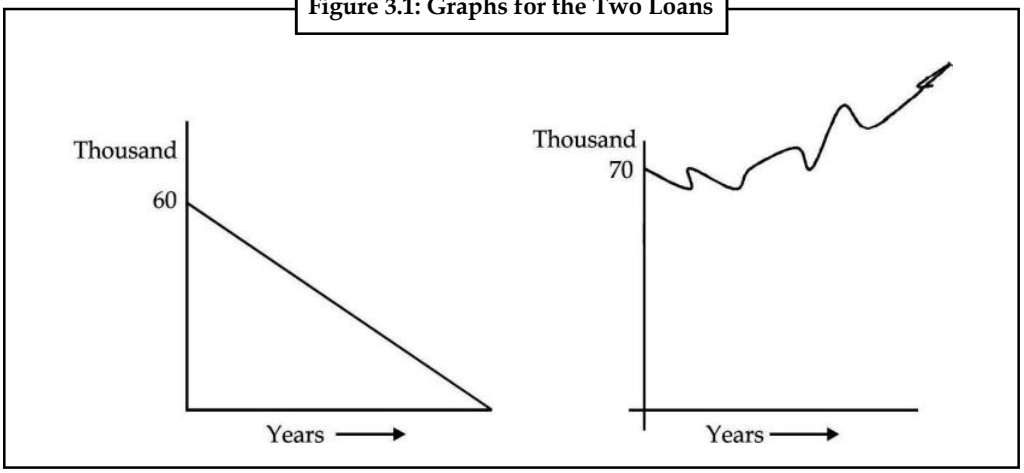
3.4.3 Loans from Commercial Banks

The primary role of the commercial bank is to short-term requirements of industry. Of late, however, banks have started taking an interest in term financing of industries in several ways, though the formal term lending is so far small and is confined to major banks only.

Term lending by banks has become a controversial issue these days. It has been argued that term loans do not satisfy the canon of liquidity, which is a major consideration in all bank operations. According to the traditional values, banks should provide loans only for short periods and for operations, which result in the automatic liquidation of such credits over short periods. On the other hand, it is contended that the traditional concept of liquidity requires to be modified. The proceeds of the term loan are generally used for what are broadly known as fixed assets or for expansion in plant capacity. 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.

As a matter of fact, a working capital loan is more permanent and long-term than a term loan. The reason for making this statement is that a term loan is always repayable on a fixed date and ultimately, a day will come when the account will be totally adjusted. However, in the case of working capital finance, though it is payable on demand, yet in actual practice it is noticed that the account is never adjusted as such, and, if at all the payment is asked back, it is with a clear purpose and intention of refinance being provided at the beginning of the next year or half year. To illustrate this point let us presume that two loans are granted on January 1, 1996 (a) to A; term loan of ₹60, 000 for 3 years to be paid back in equal half yearly installments, and (b) to B; cash-credit limit against hypothecation, etc. of ₹60, 000. If we make two separate graphs for the two loans, they may be something like the figure shown below.

Figure 3.1: Graphs for the Two Loans



Notes: It has been presumed that both the concerns are good. Payment of interest has been ignored. It has been presumed that cash credit limit is being enhanced gradually.

The above graphs clearly indicate that at the end of 1999 the term loan would be fully settled whereas the cash credit limit might have been enhanced to over a lakh of rupees. It really amounts to providing finances for the long-term.

This technique of providing long-term finance can be technically called "rolled over for periods exceeding more than one year". Therefore, instead of indulging in term financing by the rolled over method, banks can and should extend credit term after proper appraisal of applications for terms loans. In fact, as stated above, the degree of liquidity in the provision for regular amortization of term loans is more than some of these so-called demand loans that are renewed from year-to-year. Actually, term financing disciplines both the banker and borrower as long-

Notes

term planning is required to ensure that cash inflow would be adequate to meet the instruments of repayments and allow an active turnover of bank loans. The adoption of the formal term loan lending by commercial banks will not in any way hamper the criteria of liquidity and as a matter of fact, it will introduce flexibility in the operations of the banking system.

The real limitation to the scope of bank activities in this field is that all banks are not well equipped to make appraisal of such loan proposals. Term loan proposals involve an element of risk because of changes in the conditions affecting the borrower. The bank making such a loan, therefore, has to assess the situation to make a proper appraisal. The decision in such cases would depend on various factors affecting the conditions of the industry concerned and the earning potential the borrower.

3.4.4 Commercial Papers (CPs)

Commercial paper represents a short-term unsecured promissory note issued by firms that have a fairly high credit (standing) rating. It was first introduced in USA and it was an important money market instruments. In India, Reserve Bank of India introduced CP on the recommendations of the Vaghul Working Group on money market. CP is a source of short-term finance to only large firms with sound financial position.

Features of CP

1. The maturity period of CP ranges from 15 to 365 day (but in India it ranges between 91 to 180 days).
2. It is sold at a discount from its face value and redeemed at its face value.
3. Return on CP is the difference between par value and redeemable value.
4. It may be sold directly to investors or indirectly (through) dealers.
5. There is no developed secondary market for CP.

Eligibility Criteria for Issuing CP

CP is unsecured promissory note, the issue of CP is being regulated by the Reserve Bank of India. RBI has laid down the following conditions to determine the eligibility of a company that wishes to raise funds through the issue of CPs.

1. The Tangible Net worth (TNW) of the company, as per latest audited balance sheet should not be less than ₹ 4 crore.
2. The company should have been sanctioned as a fund based limit for bank(s) finance and/ or the All India Financial Institutions.
3. Company can issue CPs amounting to 75% of the permitted bank (working capital limit) credit.
4. Company's CPs receives a minimum rating of (P2 from CRISIL, A-2 form ICRA, etc.).
5. The minimum size of each CP is ₹ 5 lakhs or multiples thereof.
6. The size of any single issue should not be less than ₹ 1 crore.
7. The CP is in the form of usance promissory note negotiable by endorsement and delivery.

Advantages of CP

1. It is an alternative source of finance and proves to be helpful during the period of tight bank credit.
2. It is a cheaper source of short-term finance when compared to the bank credit.

Notes

Disadvantages of CP

It is available only for large and financially sound companies.

Caution Commercial Paper (CP) cannot be redeemed before the maturity date.

3.4.5 Inter-corporate Deposits (ICDs)

A deposit made by one firm with another firm is known as Inter-corporate Deposits (ICDs). Generally, these deposits are usually made for a period up to six months. Such deposits may be of three types:

1. ***Call Deposits:*** Deposits are expected to be payable on call. In other words, whenever its repayment is demanded on just one days notice. But, in actual practice, the lender has to wait for at least 2 or 3 days to get back the amount. Inter corporate deposits generally have 12 per cent interest per annum.
2. ***Three Months Deposits:*** These deposits are more popular among companies for investing the surplus funds. The borrower takes this type of deposits for tiding over a short-term cash inadequacy. The interest rate on these types of deposits is around 14 per cent per annum.
3. ***Six Months Deposits:*** Generally, the inter-corporate deposits are made for a maximum period of six months. These types of deposits are usually given to 'A' category borrowers only and they carry an interest rate of around 16% per annum.

Features of ICDs

1. There are no legal regulations, which make an ICD transaction very convenient.
2. Inter-corporate deposits are given and taken in secrecy.
3. Inter-corporate deposits are given based on borrower's financial sound, but in practice lender lends money based on personal contacts.

Self Assessment

Fill in the blanks:

8. ……refers to loans taken by a company normally from commercial banks for a short period, pending disbursement of loans sanctioned by financial institutions.
9. Commercial paper represents a short-term ……promissory note issued by firms that have a fairly high credit rating.

3.5 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 a broad sense, under venture capital financing, venture capitalists make investments to purchase equity or debt securities from inexperienced entrepreneurs, who undertake highly risky ventures with a potential of success.

Methods of Venture Capital Financing

The venture capital industry in India is just a decade old. The venture capitalist generally finance ventures, which are in national priority areas such as energy conservation, quality

Notes

upgradation, etc. In November 1988, the Government of India issued the first set of guidelines for venture capital companies' funds and made them eligible for capital gain concessions. In 1995, certain new clauses and amendments were made in the guidelines. These guidelines require the venture capitalists to meet the requirements of different statutory bodies and this makes it difficult for them to operate as they do not have much flexibility in structuring investments. In 1999, the existing guidelines were relaxed for increasing the attractiveness of the venture schemes and induce high net worth investors to commit their funds to 'sunrise' sectors particularly the information technology sector.

Initially, the contribution to the funds available for venture capital investment in the country was from the all-India development financial institutions, state development financial institutions, commercial banks and companies in private sector. In the last couple of years, many offshore funds have been started in country and the maximum contribution is from foreign institutional investors. A few venture capital companies operate as both investment and fund management companies, while other set up funds and function as asset management companies.

It is hoped that the changes in the guidelines for the implementation of venture capital schemes in the country would encourage more funds to be set up to provide the required momentum for venture capital investment in India.

Some common methods of venture capital financing are as follows:

1. ***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 remain with the entrepreneur.
2. ***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, riskiness 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 sounds.
3. ***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.
4. ***Participating debenture:*** Such security carries charges in three phases – in the start-up phase, no interest is charged, in 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.

Self Assessment

Fill in the blanks:

10. A …….loan is repayable in the form of a royalty after the venture is able to generate sales.
11. …….is a hybrid security, which combines the features of both conventional loan and conditional loan.

Notes

3.6 Leasing and Hire Purchase as a Source of Finance

A lease is a contractual arrangement under which the owner of an asset (called the lessor) agrees to allow the case of its asset by another party (lessee) in exchange of periodic payments (lease-rental) for a specified period. The lessee pays the lease rent as a fixed payment over a period of time at the beginning or at the end of a month, quarter, half year or year. Although generally fixed, lease rents can be tailored both in terms of amount and tuning to the profits and cash flow position of the lessee. At the end of the lease contract, the asset reverts back to the real owner i.e., the lessor. However, in long-term lease contract, the lessee is generally given the option to buy or renew the lease.

Lease agreements are divided into two major ones—operating lease and financial lease.

Operating lease is for periods shorter than the useful life of the asset and is cancelable at the option of the lessee. On the other hand, financial lease involves a relatively longer-term commitment on the part of the lessee and non-cancelable during the entire period specified in the contract. Operating lease is common among equipments/assets exposed to technological obsolescence such as computers, data processing equipments.

Financial leases are commonly used for leasing land, buildings and large pieces of fixed equipments.

Advantages of Leasing

1. Shifting the risk of technological obsolescence to the owner (lessor) the leasing company.
2. ***Easy source of finance:*** A lessee (user of the machine) avoids many of the restrictive covenants that are normally in the long-term loan agreements while borrowing from financial institution or commercial banks.
3. ***Enhance liquidity:*** A firm having shortage of working capital or forecasting liquidity problem may exercise the option of the selling the owned asset to a lesser (leasing company) and take it back on lease basis (the transaction is known as sale cum lease back).
4. Conserving borrowing capacity through off the balance-sheet financing.
5. Improved performance as reflected through improved turnover of assets.
6. Governance and flexibility-by adjusting the term based on losses) requirements.
7. ***Maintenance and specialized services:*** Under a full service lease, the lessee receives maintenance and other specialized services. Even in other types of lease, it is generally common to have maintenance provided by the lessor, thus absolving the lessee of the maintenance arrangement.
8. Lower administrative cuts as compared to other source of finance.

Disadvantages

1. Risk of being deprived of the use of equipment of the lessors (owners) financial condition worsens, or if the leasing company is worried up, the lessee may be deprived of the use of the equipment thus disrupting normal manufacturing operations.
2. ***Alteration/change in the asset:*** Under the lease, the lessee is generally prohibited from making alterations/improvements on the leased asset without the prior approval of the lessor (the owner).
3. ***Terminal value of the asset:*** In case of assets (such as land and buildings), which have high terminal value at the end of the lease term, it would be more appropriate to own the asset than to lease it.
4. To make lease payments even if the asset has become obsolete. If a lessee leases an asset that subsequently becomes obsolete, it still must make lease payments over the remaining term of the lease. This is true even if the asset is unsaleable.

Notes

Hire Purchase

Very similar to leasing is hire purchase except that in hire purchase, the ownership will be transferred to the buyer after all the hire purchase instalments are paid up. With many non-banking finance companies offering the leasing and Chire purchase of equipments, many companies are opting for this route to finance their fixed assets.

Self Assessment

Fill in the blanks:

12. Lease agreements are divided into two major ones – operating lease and ……lease.
13. …….. lease is for periods shorter than the useful life of the asset and is cancelable at the option of the lessee.

3.7 Deferred Credit

The deferred credit facility is offered by the suppliers of machinery, whereby the buyer can pay the purchase price in instalments spread over a period of time. The interest and repayment period are negotiated between the supplier and the buyer.

Notes Bill rediscounting scheme, supplier's line of credit, seed capital assistance and risk capital foundation schemes offered by financial institutions are examples of deferred credit scheme.

3.7.1 Capital Assistance Seed

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

The seed capital assistance is interest free but carries a service charge of 1% for the first five year and 10% p.a. thereafter. However, IDBI will have the option to change interest at such rate as may be determined by IDBI based on the financial position and profitability of the company. The repayment schedule is fixed depending upon the repaying capacity of the unit with an initial moratorium up to five years.

For projects with a project cost exceeding ₹ 200 lacs, seed capital may be detained from the Risk Capital and Technology Corporation Ltd. (RCTC). For small projects costing upto ₹ 5 lacs, assisted under the Natural Equity Fund of SIDBI may be availed.

3.7.2 Government Subsidies

The central and state governments provide subsidies to industrial units located in backward areas. The central government has classified backward areas into three categories of districts: A, B and C. The central subsidies applicable to industrial projects in these districts are:

1. ***Category A Districts***-25% of the fixed capital investment subject to a maximum of ₹ 25 lakh
2. ***Category B Districts***-15% of the fixed capital investment subject to a maximum of ₹ 15 lakh

Notes

3. ***Category C Districts***-10% of the fixed capital investment subject to a maximum of ₹10 lakh.

State governments also offer cash subsidies to promote widespread dispersal of industries within their states. Generally, the districts notified in the state subsidy schemes are different from those covered under the central subsidy scheme. The state subsidies vary between 5% to 25% of the fixed capital investment in the project, subject to a ceiling varying between ₹ 5 lakh and ₹ 25 lakh depending on the location.

Example: Satavahana Ispat Limited has been set up with the capacity to manufacture 1,20,000 tones of pig iron. The cost of project has been appraised by IDBI at ₹ 5,450 lakh and is to be mainly financed through equity capital and term loans. The unit is also eligible for a state government subsidy (Andhra Pradesh) of ₹20 lakh, which will also be a source of long-term finance. The unit is located at Anantapur district of Andhra Pradesh and falls into" the Category of a 'backward area.'

3.7.3 Sales Tax Deferments and Exemptions

To attract industries, the state provides incentives, in the form of sales tax deferments and sales tax exemptions. Under the sales tax deferment scheme, the payment of sales tax on the sale of finished goods may be deferred for a period ranging between five to twelve years. Essentially, it implies that the project gets an interest-free loan, represented by the quantum of Sales Tax deferment period.

Notes Under the sales tax exemption scheme, some states exempt the payment of sales tax applicable on purchase of raw materials, consumables, packing and processing materials from within the state while used for manufacturing purposes. The period of exemption ranges from three to nine years depending on the state and the specific location of the project within the state.

Example: Lupin Chemicals Ltd. has stated in their prospects that they are eligible for sales tax incentive for a period of five years or till they reach the ceiling of 60% of fixed capital investment whichever is earlier.

Self Assessment

Fill in the blanks:

14. The seed capital assistance scheme is designed by ……for professionally or technically qualified entrepreneurs.

15. The central and state governments provide subsidies to industrial units located in …… areas.

Case Study

Case: DLF Ltd. – Lease Option

DLF Ltd. is engaged in the business of leasing and hire purchase. The company also functions as a merchant banker equity researcher, corporate financier, portfolio

Contd...

Notes

manager, etc. The company provides fund based as well as non-fund based financial solutions to both wholesale and retail segments.

DLF Ltd. has been approached by A Ltd., Mumbai, for financial help. A Ltd. manufacturers process system for food processing, pharmaceuticals, engineering, dairy and chemical industries. A wide range of centrifugal separators, plate, spray drudgers, custom fabricated equipment for exotic metals, refrigeration compressors, are also manufactured by the company. One of the major strengths of the company is project management.

A Ltd. has a well-equipped R&D centre. It has pilot plant facilities and a modern laboratory for chemical, metallurgical and mechanical analyser. The company has also set up a technology centre with advanced testing facilities. Recently, the manager of the technology centre has requisitioned for the acquisition of computerised sophisticated equipment for conducting important tests.

The equipment is likely to have the useful life of three years. The cost of the equipment is ₹10 crore. The scrap value of the equipment at the end of its useful life will be zero for the company. The finance manager of A Ltd. has suggested that the company should take a loan for three years from a commercial bank. Repayment of the loan would be made at the end of each year in three equal instalments. The repayments would comprise of the (i) principal, and (ii) interest at 10% p.a. (on the outstanding amount in the beginning of the year). A Ltd. uses a cost of capital of 15% to evaluate the investments of this type. The equipment will be depreciated @ 33.3% p.a. (WDV).

P. Securities Ltd. has agreed to give the equipment to the company on a three-year lease. The annual rental for the lease, payable in the beginning of each year, would be ₹4 crore. P. Securities Ltd. discounts its cash flows @ 14%. The equipment is depreciable at 33.3% p.a. (straight line method). The lessee may exercise its option to purchase the equipment for ₹4 crore at the termination of the lease.

A Ltd. would bear all maintenance, insurance and other charges in both the alternatives. Both the companies pay tax @ 35%.

You are a practicing Company Secretary. You are approached by the Managing Director of A Ltd. to help the company in evaluating the proposal.

Prepare a report for the Managing Director of A Ltd. showing the effect of the lease alternative on the wealth of its shareholders. Support your answer with appropriate calculations.

Notes Present value of ₹1 is:

Year	6%	7%	10%	14%	15%
1	0.943	0.935	0.909	0.877	0.870
2	0.890	0.873	0.826	0.769	0.756
3	0.840	0.816	0.751	0.675	0.658
4	0.792	0.763	0.683	0.592	0.572

Contd...

Notes

Present value of an annuity of ₹1 is:

Year	6%	7%	10%	14%	15%
1	0.943	0.935	0.909	0.877	0.870
2	1.833	1.808	1.736	1.647	1.626
3	2.673	2.624	2.487	2.322	2.283
4	3.465	3.387	3.170	2.914	2.855

Solution:

Alternative: Purchase of equipment by financing it through bank loan

Cost of equipment = ₹10,00,000

Useful life = 3 years

Loan period = 3 years (payment in three equal instalments)

Interest rate = 10% p.a.

Scrap value after 3 years = NIL

$$\text{Annual repayment amount} = \frac{₹\ 10,00,00,000}{\text{Annunity factor of 10\% of 3 years}}$$

$$= \frac{₹\ 10,00,00,000}{2,487} = ₹4.021 \text{ crore}$$

Calculation of Principal and Interest Amount Payments

Year	Principle amount	Instalment at the end of the year	Interest @ 10%	Repayment of Principal	Balance Amount
1	10.00	4.021	1.000	3.021	6.979
2	6.979	4.021	0.698	3.323	3.656
3	3.656	4.021	0.365	3.656	

Calculation of Present Value of Net Cash Outflows

Year	Principle	Depreciation @ $33\frac{1}{3}$ % p.a	Balance
1	10.00	3.333	6.667
2	6.667	2.222	4.445
3	4.445	1.482	2.693

Calculation of Present Value of Net Cash Outflows

Year	Loan Instalment	Principal Repayment	Interest @ 10% (₹)	Depreciation @ $33\frac{1}{3}$ % p.a (WDV)	Tax shield @ 35%	Net cash Outflow	PV Factor @ 15%	PV of Nt Cash Outflows
1	4.021	3.021	1	3.333	1.517	2.504	0.87	2.178
2	4.021	3.323	0.698	2.222	1.022	2.999	0.756	2.267
3	4.021	3.656	0.365	1.482	0.646	3.375	0.658	2.221
Total P.V. of net cash outflows								6.666

Contd...

Notes

Alternative I: Lease the Equipment

Year	Lease Rent	Tax Savings @ 35%	Net Cash Outflow	PV Factor @ 15%	PV of Net Cash Outflows
0	4.00		4.0	1.000	4.000
1	4.00	1.40	2.60	0.870	2.262
2	4.00	1.40	2.60	0.756	1.966
3		1.40	(1.40)	0.658	(0.921)
				Total P.V of net cash outflows	= 7,307

Suggestion: The present value of net cash outflows is lowest, if the equipment is purchased by taking a loan from the bank. Hence it is suggested to consider Alternative I.

3.8 Summary

- Financial needs of a business: The financial needs of a business may be grouped into three categories which are Long-term, Medium-term and Short-term financial needs.
- Long-term Sources of finance of a business include Share capital, Debentures/Bonds of different types, Loans from financial institutions and Venture capital funding
- Short-term Sources of finance includes Trade credit, Commercial banks, Fixed deposits for a period of 1 year or less, Advances received from customers and Various short-term provisions.
- In recent times in India, many companies have raised long-term finance by offering various instruments to public like deep discount bonds, fully convertible debentures, etc.
- In India, specialized institutions provide long-term financial assistance to industry.
- Bridge finance refers to loans taken by a company normally from commercial banks for a short period, pending disbursement of loans sanctioned by financial institutions.
- CP is a source of short-term finance to large firms with sound financial position.
- 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.
- A lease is a contractual arrangement under which the owner of an asset agrees to allow the case of its asset by another party in exchange of periodic payments (lease-rental) for a specified period.
- The seed capital assistance is interest free but carries a service charge of 1% for the first five year and 10% p.a. thereafter.

3.9 Keywords

Commercial Paper: It represents a short-term unsecured promissory note issued by firms that have a fairly high credit (standing) rating.

Income Note: It is a hybrid security, which combines the features of both conventional loan and conditional loan.

Inter-corporate Deposits (ICDs): A deposit made by one firm with another firm is known as Inter-corporate Deposits.

Notes

Retained Earnings: These are the portion of earning available to equity shareholders, which are ploughed back in the company.

Trade Credit: It refers to the credit extended by the supplier of goods or services to his/her customer in the normal course of business.

3.10 Review Questions

1. Explain the advantages of equity financing.
2. What are the advantages of debt financing from the point of the company and investors?
3. What do you mean by venture capital financing and what are the methods of this type of financing?
4. Write short notes on:
   (a) Zero interest fully convertible
   (b) Deep discount bonds
   (c) Inflation bonds
   (d) Sales tax deferments and Exemptions.
5. What are the advantages of lease financing?
6. "Is Trade Credit is source of working capital finance". Discuss.
7. Taking the example of the Indian corporate, analyse the importance of issuing the CPs for the firm & to the investors.
8. Do you agree that lease is the efficient source of finance for corporates? How?
9. In your opinion, which is the best source of finance available to the firm for raising money from the public?
10. You are starting your new company & wanted to raise capital from public. Analyse the sources of finance available to you.

Answers: Self Assessment

1.	5 – 10	2.	short-term	3.	risk
4.	public issue	5.	common shares	6.	direct
7.	debt	8.	Bridge finance	9.	unsecured
10.	conditional	11.	Income note	12.	financial
13.	Operating	14.	IDBI	15.	backward

3.11 Further Readings

Books

Dr Pradeep Kumar Sinha, *Financial Management*, New Delhi, Excel Books, 2009.

Chandra, P., *Financial Management – Theory and Practice,* New Delhi, Tata McGraw Hill Publishing Company Ltd., 2002, p. 3.

I.M. Pandey, *Financial Management*, 8th Edn., Vikas Publishing House Pvt. Ltd.

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Notes

Unit 4: Concept of Economic Value Added

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4.2 Advantages of EVA
4.3 Evaluation of EVA
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Objectives

After studying this unit, you will be able to:

- Recognize the meaning and scope of financial management
- Describe the goals and objectives of financial management
- Explain the different Finance functions
- Discuss various significant aspects related to financial management

Introduction

Management Information System can be developed as an act of interrelated components that collect (or retrieve), process, store and distribute information to support decision-making, co-ordinate and control in an organisation. Information means data have been shaped into a form that is meaningful and useful to human being. Data are stream of raw facts reporting events occurring in organisation or physical environment before they have been organized and rearranged into a form that people can understand and use. Performance measures are a central component of management information and reporting system. It deals with performance measures for different levels of an organisation and for managers at these levels – both financial and non-financial performance measures.

Economic Value Added was developed to promote value-maximizing behaviour in corporate managers. It is a single, value-based measure that was intended to evaluate business strategies, capital projects and to maximize long-term shareholders wealth.

4.1 Economic Value Added (EVA)

An alternative measure of financial performance in an investment centre is segment Residual Income or Economic Value Added.

Economic Value Added (EVA) is the amount in rupees that remains after deducting an "implied" interest charge from operating income. The implied interest charge reflects an opportunity cost, and is charged on the amount of assets in each investment centre. The rate of interest charge is equal to the minimum rate on investment specified by top management as part of the corporate strategic plan.

Notes

Notes The importance of management information system has increased in recent times because of the following:

1. Emergence of global economy
2. Transformation of industrial economics – knowledge and information intense products have become available.
3. Transformation of multinational enterprises
4. Emergence of digital form.

*Example:*A division has a budgeted income of ₹ 10 lakhs and a budgeted investment of ₹ 60 lakhs. The average cost of capital for the firm is 12 per cent. The budgeted residual income is:

Divisional Income	₹ 10 lakhs
Interest charge	
12% on ₹ 60 lakhs	7.20
Residual income/ Economic value added	2.80

Caution Different interest rates may be applied to different components of investment like fixed assets, inventories, receivables and cash.

During the 1990s, residual income has been refined and remained as Economic Value Added (EVA) by Stern Steward Counseling Organization and they have registered EVA (TM) as their trademark.

The EVA concept extends the traditional residual income measures by incorporating adjustments to the divisional performance measures against distortions introduced by generally accepted accounting principles (GAAP).

EVA can be defined as = Conventional divisional profit ± Accumulated adjustment – Cost of capital charge on divisional assets.

Adjustments are made to the chosen, conventional divisional profit measures in order to replace historical accounting data with a measure of economic profit and asset values. Stern Stewart has developed approximately 160 accounting adjustments but most organisations will only need to use about 10 of the adjustments. These adjustments result in the capitalization of many discretionary adjustments such as research and development, marketing and advertising by spreading these costs over the periods in which the benefits are received. Therefore, adopting EVA reduces some of the harmful side effects arising from using financial measures. Also, because it is restatement of the residual income measure compared to ROI, EVA is more likely to encourage goal congruence in terms of asset acquisition and disposal decisions. Managers are also made aware that capital has a cost and they are thus encouraged to dispose of underutilized assets that do not generate sufficient income to cover their cost of capital. There are a number of issues that apply to ROI, residual income or its replacement (EVA). They concern determining which assets should be included in a divisions asset base

Notes

and adjustments that should be made to financial accounting practices to derive managerial information that is closer to economic reality.

EVA = [Profit after Tax + Interest (1 – marginal tax rate of the firm)] – Cost of capital × Economic book value of the capital employed in the firm

EVA = Profit after Tax – Cost of equity × Equity employed in the firm

EVA is essentially the surplus left after making an appropriate charge for the capital employed in the business. It may be calculated in any of the following apparently different but essentially equivalent ways:

EVA = Net operating profit other tax – Cost of capital × Economic book value of capital employed in the firm.

EVA = Economic book value of capital employed in the firm (Return in capital – Cost of capital)

Self Assessment

Fill in the blanks:

1. ……is the amount in rupees that remains after deducting an "implied" interest charge from operating income.
2. EVA is essentially the …….left after making an appropriate charge for the capital employed in the business.
3. The implied interest charge reflects a ……cost.
4. The rate of interest charge is equal to the minimum rate on ……..specified by top management as part of the corporate strategic plan.

4.2 Advantages of EVA

1. EVA combines profit centre and investment centre concepts. With EVA, management establishes a target profit or target rate of return for the business segment. Any income in excess of the target level is the residual income/EVA. To illustrate, the target rate of return for DD Ltd., is 20 per cent on total net assets. Total net assets are ₹ 800,000 and actual net income ₹ 200,000 so the target net income is 800,000 × 0.20 = ₹ 160,000. The EVA for the company is actual net income minus target net income = ₹ 200,000 – ₹ 160,000 = ₹ 40,000.
2. In case of EVA, different interest rates may be used for different types of assets e.g., low rates can be used for inventories while a higher rate can be used for investments in fixed assets. Furthermore, different rates may be used for different of fixed assets to take into account different degrees of risk.
3. With EVA all business units have the same profit objective for comparable investments. The ROI approach, on the other hand provides different incentives for investments across business units.
4. The EVA in contrast to ROI has a stronger positive correlation with changes in company's market share. Shareholders are important stakeholders in a company's market value.
5. EVA eliminates economic distortions of GAAP to focus decisions on real economic results.
6. Provision of correct incentives for capital allocations.

Notes

7. EVA provides for better assessment of decisions that affect balance sheet and income statement or trade-offs between each through the use of the capital charge against NOPAT.
8. Long-term performance that is not compromised in favor of short-term results.
9. EVA decouples bonus plans from budgetary targets.
10. EVA covers all aspects of the business cycle.
11. EVA aligns and speeds decision making, and enhances communication and teamwork.
12. Provision of significant information value beyond traditional accounting measures of EPS, ROA and ROE.
13. Goal congruence of managerial and shareholder goals achieved by tying compensation of managers and other employees to EVA measures.
14. Annual performance measured tied to executive compensation.

Did u know? Cola-Cola is one of the many companies that adopted EVA for measuring its performance. Its aim, which was to create shareholders wealth, was announced in its annual report. Coca-Cola CEO Roberto Goizueta accredited EVA for turning Coca-Cola into the number one Market Value Added Company. Coca-Cola's stock price increased from $3 to over $60 when it first adopted EVA in the early 1980s. In 1995, Coca-Cola's investor received $8.63 wealth for every dollar they invested.

Self Assessment

Fill in the blanks:

5. EVA eliminates economic distortions of ……to focus decisions on real economic results
6. In case of EVA, ……interest rates may be used for different types of assets
7. EVA combines profit centre and ……concepts.
8. EVA decouples bonus plans from ……..targets

4.3 Evaluation of EVA

Economic Value Added (EVA) vs. Earning Per Share (EPS)

EPS is calculated by dividing the net profits after interest, depreciation and taxation by the number of equity shares issued by the company to find out the profits earned per share. This measure is flawed because it does not consider the equity cost of capital employed (i.e. it assumes that equity capital comes to the company for free). Naturally, when more funds are pumped into the company, the size of the business increases without necessary increasing the profitability. Also, EVA takes into consideration the total capital employed by the company—total shareholders' fund (equity and accumulated profits) and total debt—and finds out the difference between the earning and the cost of the capital employed.

Did u know? EPS can be improved without corresponding improvement in performance simply by issuing further equity at a premium.

Notes

Differences between ROI and EVA

Table 4.1: ROI Method

Business Unit	Current Assets	Fixed Assets	Total Investment	Budgeted Profit	ROI Objective
A	60	60	120	24.0	20%
B	70	50	120	14.4	12
C	95	10	105	10.5	10
D	35	40	75	3.8	5
E	25	10	35	(1.8)	(5)

Table 4.2: EVA

Business Unit	Profit Potential	Current Assets	Rate	Regd. Ergs. on C/Assets	F/A	Rate	Regs. Ergs. for F/A	Budgeted EVA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(1)-(4)-(7)
A	24.0	60	4%	2.4	60	10%	6	15.6
B	14.4	70	4	2.8	50	10	5	6.6
C	10.5	95	4	3.8	10	10	1	5.7
D	3.8	35	4	1.4	40	10	4	(1.6)
E	(1.8)	25	4	1.0	10	10	1	(3.8)

From, first portion of the calculation (ROI method) one can observe that only one business unit

C is ROI objective consistent with the company wide cut off rate, and in no unit is the objective consistent with the company wide 4 per cent cost of carrying Current Assets. Business unit A would decrease its chances of meeting its profit objective, if it did not earn at least 20 per cent on added investments in either Current Assets or Fixed Assets, whereas units D and E would benefit from investments with a much lower return.

The EVA method (2nd portion of the calculation – EVA Method) correct these inconsistencies in the following manner – the investments, multiplied by appropriate rates are subtracted from the budgeted profit. The resulting amount is the budgeted EVA. Periodically, the actual EVA is calculated by subtracting from the actual profits, the actual investment multiplied by the appropriate rates.

Self Assessment

Fill in the blanks:

9. EPS measure is flawed because it does not consider the …….of capital employed.
10. EVA takes into consideration the total capital employed by the company—total shareholders' fund and ……
11. EVA finds out the difference between the …….and the cost of the capital employed.

4.4 Limitations of EVA Analysis

1. The EVA analysis does not necessarily eliminate the problem of comparing the performance of large and small divisions. For example, a company has three divisions,

Notes

each of which earns a 25 per cent return on its total net assets. However, the EVA of the divisions is significantly different. Below are the data for three divisions:

Table 4.3: Division

	X	Y	Z
Total net assets	₹ 100,000	₹ 500,000	₹ 1000,000
Net income	₹ 25,000	₹ 125,000	₹ 250,000
ROI on net assets	25%	25%	25%
Target net income (15% of net assets)	₹ 15,000	₹ 75,000	₹ 150,000
EVA (net income – target net income)	₹ 10,000	₹ 50,000	₹ 100,000

Each division earned the same rate of return on net assets, and each has the same percentage target net income requirement. Still the EVA measures are dramatically different among the divisions. This approach has a tendency to highlight the divisions that generate the largest rupee profits for the firm.

2. Most of the problem in measuring the divisional income and divisional investment base are also present in the measurement of EVA.

3. There is additional risk of selecting a fair and equitable measure of the required cut-off percentage (i.e., the cost of capital).

4. EVA can be readily transformed into ROI and many firms tend to convert EVA into ROI. The relationship between EVA and ROI is as follows:

$$ROI = \frac{EVA}{1} \times K$$

Where,

ROI = Return on investment

EVA = Economic Value Added

I = Investment

K = Cost of capital

The two methods however, may show different results. In face of such a conflict, a question may arise: which of two must be considered more reliable?

Task Taking the example of different companies, analyze how the corporates have used EVA model.

Illustration:

Income Statement

Net Sales	**2,600.00**
Cost of Goods Sold	1,400.00
SG&A Expenses	400.00
Depreciation	150.00

Notes

Other Operating Expenses	100.00
Operating income	550.00
Interest Expenses	–200.00
Income Before Tax	350.00
Income Tax (25%)	140.00
Net Profit After Taxes	210.00

Common Balance Sheet

Current Assets		**Current Liabilities**	
Cash	50.00	Accounts Payable (A\P)	100.00
Receivable (A/R)	370.00	Accrued Expenses (A\E)	250.00
Inventory	235.00	Short-Term Debt	300.00
Other Current Assets	145.00	*Total Current Liabilities*	*650.00*
Total Current Assets	*800.00*	***Long-Term Liabilities***	
Fixed Assets		Long-Term Debt	760.00
Property, Land	650.00	*Total Long-Term Liabilities*	*760.00*
Equipment	410.00	***Capital (Common Equity)***	
Other Long-Term Assets	490.00	Capital Stock	300.00
Total Fixed Assets	*1,550.00*	*Retained Earnings*	*430.00*
		Year to Date Profit/Loss	*210.00*
		Total Equity Capital	**940.00**
Total Assets	**2,350.00**	**Total Liabilities**	**2,350.00**

1. Calculate Net Operating Profit After Tax (NOPAT)
2. Identify company's Capital (C)
3. Determine a reasonable Capital Cost Rate(CCR)
4. Calculate company's Economic Value Added (EVA)

Solution:

Step 1: Calculate Net Operating Profit After Taxes (NOPAT)

Net Sales			2,600
(A)	Cost of Goods Sold	1,400.00	
	SG&A Expenses	400.00	
	Depreciation	150.00	
	Other Operating Expenses	100.00	2050
	Operating income		**550.00**
	Tax (25%)		140.00
	NOPAT		**410.00**

Notes

Note: This NOPAT calculation does not include the tax savings of debt. Companies paying high taxes and having high debts may have to consider tax savings effects, but this is perhaps easiest to do by adding the tax savings component later in the capital cost rate (CCR).

An alternative way to calculate NOPAT:

Net Profit After Tax	210.00
Interest Expenses	+200.00
NOPAT	**410.00**

Step 2: Identify Company's Capital (C)

Company's Capital (C) are

Total Liabilities less Non-Interest Bearing Liabilities:

Total Liabilities	2,350.00
less	
Accounts Payable (A/P)	100.00
Accrued Expenses (A/E)	250.00
Capital (C)	**2,000.00**

Step 3: Determine Capital Cost Rate (CCR)

In this example: CCR = 10%

Because, Owners expect 13% return for using their money because less are not attractive to them; this is about the return that investors can get by investing long-term with equal risk (stocks, mutual funds, or other companies). Company has 940/2350 = 40% (or 0.4) of equity with a cost of 13%. Company has also 60% debt and assume that it has to pay 8% interest for it. So the average capital costs would be:

$$\text{CCR} = \text{Average Equity Proportion} \times \text{Equity Cost} + \text{Average Debt Proportion}$$

$$\text{Debt cost} = 40\% \times 13\% + 60\% \times 8\% = 0.4 \times 13\% + 0.6 \times 8\% = 10\%$$

Note: CCR depends on current interest level (interest higher, CCR higher) and company's business (company's business more risky, CCR higher).

Note: If tax savings from interests are included (as they should if we do not want to simplify), then CCR would be:

CCR = 40% × 13% + 60% × 8% × (1– tax rate) = 0.4 × 13% + 0.6 × 8% × (1 – 0.4) = 8.08% (Using 40% tax rate)

Step 4: Calculate Company's EVA

$$\begin{aligned} \text{EVA} &= \text{NOPAT} - \text{C} \times \text{CCR} \\ &= 410.00 - 2{,}000.00 \times 0.10 \\ &= 210.00 \end{aligned}$$

This company created an EVA of 210.

Note: This is the EVA calculation for one year. If a company calculates EVA, e.g., for a quarterly report (3 months) then it should also calculate capital costs accordingly:

Capital costs for 3 months: 3/12 × 10% × 2,000 = 50

Capital costs for 4 months: 4/12 × 10% × 2,000 = 67

Capital costs for 6 months: 6/12 × 10% × 2,000 = 100

Capital costs for 9 months: 9/12 × 10% × 2,000 = 150

Notes

The Complete Procedure:

Calculate EVA in the Internal Reporting

Net Sales		**2,600.00**
Cost of Goods Sold	-1,400.00	
SG&A Expenses	-400.00	
Depreciation	-150.00	
Other Operating Expenses	-100.00	
Operating income		550.00
Tax (25%)	-140.00	
NOPAT		410.00
Capital costs (10% * 2000)	-200.00	
Economic Value Added (EVA)		**210.00**

Note: In this example (for one year) the capital costs are calculated on a yearly basis. E.g. capital costs for 3 months: 3/12 × 10% × 2,000 = 50

Self Assessment

Fill in the blanks:

12. Most of the problem in measuring the divisional income and divisional ……..base are also present in the measurement of EVA.
13. EVA can be readily transformed into……...
14. The relationship between EVA and ROI is ROI = …….
15. EVA analysis does not necessarily eliminate the problem of comparing the performance of ……and ……..divisions.

Case Study

Case: Economic Value Added

In economics, the value addition is calculated by the following formula:

Value Added = Value of sales less the cost of bought-in goods and services.

In this formula, only cost of bought-in goods and services has been accounted for. It completely ignores labour cost, depreciation, markup etc. In fact, they are factors of production (land, labour and capital). They provide "services" which raise value of "inputs" to a much higher realized value. The difference would be shared among them.

Calculate the value added & the value distributed in the below case.

Sales of the company	2862000
Out-side purchases	676800
Workers salary	104400
Bankers	836570

Contd...

Notes

Government	350810
Owners	500000
Firms deprecation	367800
Retained earnings	25620

Indus Machine Tools Ltd. is a Private Ltd Company at Multan, a city in Punjab, Pakistan. Its Balance Sheet is given below:

Indus Machines Tools Ltd. Balance Sheet as on 31st Dec08

Liabilities		Assets	
Accounts payable	208000	Cash	4940
Bank overdraft	484000	Raw material stock	86400
Long term debt	6000000	Finished goods stock	171360
Equity	4000000	Account receivables	429300
		Fixed assets	10000000
Total	10692000	Total	10692000

Additional Information

Taxes accounts for ₹685, 440/-, Total costs is ₹1148, 400/-, effective returns on debt- 7.5 %, equity- 20% & bank loan is 10.8%.

Questions

1. Calculate the NOPAT & total capital.
2. What is the return on capital?
3. From the given details, calculate the cost of capital.
4. Analyse the financial position of the company by calculating the EVA.
5. Do you think the company will be getting the desired equity investment if it plans to go for expansion? Why?

4.5 Summary

- Economic Value Added (EVA) is the amount in rupees that remains after deducting an "implied" interest charge from operating income.
- The EVA concept extends the traditional residual income measures by incorporating adjustments to the divisional performance measures against distortions introduced by generally accepted accounting principles (GAAP).
- EVA is more likely to encourage goal congruence in terms of asset acquisition and disposal decisions.
- In case of EVA, different interest rates may be used for different types of assets e.g., low rates can be used for inventories while a higher rate can be used for investments in fixed assets.
- The EVA in contrast to ROI has a stronger positive correlation with changes in company's market share.
- EVA decouples bonus plans from budgetary targets.
- The EVA analysis does not necessarily eliminate the problem of comparing the performance of large and small divisions.
- EVA can be readily transformed into ROI and many firms tend to convert EVA into ROI.

Notes

4.6 Keywords

Capital Employed: It is the capital investment necessary for a business to function.

Corporate Finance: It is an area of finance dealing with the financial decisions corporations make and the tools and analysis used to make these decisions.

Economic Value Added: It is an estimate of economic profit by after making adjustments to GAAP accounting, including deducting the opportunity cost of equity capital.

Net Asset Value: It is a term used to describe the value of an entity's assets less the value of its liabilities.

NOPAT: It is a company's after-tax operating profit for all investors, including shareholders and debt holders.

4.7 Review Questions

1. Why is performance measurement required in management control system?
2. Elucidate the advantages which a firm will obtain by using EVA approach.
3. EVA results in increasing the shareholders wealth. Do you agree? Justify.
4. Comment on the major applications of EVA.
5. Analyse the need for EVA in today's competitive scenario.
6. Elucidate how EVA is much better & efficient approach than other traditional approaches.
7. "Successful implementation of EVA requires a substantial commitment by managers and employees at all levels of an organisation." Comment.
8. Critically appraise the Economic value added approach.
9. Given sales of a company- ₹ 4,500,000/-, cost of goods- ₹ 2,857,600/- & tax paid by the firm is ₹ 50000/-. Calculate NOPAT from the given data.
10. If XYZ employs a total capital of ₹ 15,896,000 & return on capital is 15%. The cost of capital is ₹ 12%. Calculate EVA.

Answers: Self Assessment

1.	Economic Value Added (EVA)	2.	surplus	3.	opportunity
4.	investment	5.	GAAP	6.	different
7.	investment centre	8.	budgetary	9.	equity cost
10.	total debt	11.	earning	12.	investment
13.	ROI	14.	$\frac{EVA}{1} \times K$	15.	large, small

4.8 Further Readings

Books

Dr Pradeep Kumar Sinha, *Financial Management*, New Delhi, Excel Books, 2009.

Van Horne, J.C. and Wachowicz, Jr, J.M., *Fundamentals of Financial Management*, New Delhi, Prentice Hall of India Pvt. Ltd., 1996, p. 2.

Chandra, P., *Financial Management – Theory and Practice,* New Delhi, Tata McGraw Hill Publishing Company Ltd., 2002, p. 3.

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Unit 5: Risk and Return Analysis

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Objectives

After studying this unit, you will be able to:

- Recognize the concept of risk and return and determine their relationship
- Differentiate relevant and irrelevant risk
- Explain the measurement of risk
- Describe the use of Capital Asset Pricing Model (CAPM)

Notes

Introduction

In the most basic sense, risk is the chance of financial loss. Assets having greater chances of loss are considered as more risky than those with lesser chances of loss. More formally, the term, risk, is used synonymous with uncertainty in terms of variability of returns associated with a given asset. As for example, interest of ₹ 600 on Govt. Bond of ₹ 10,000 for 1 year since there is no variability associated with interest, it is considered as risk-free. Whereas ₹ 10,000 investment in equity shares over 1 year period may give return anywhere between ₹ 0 to ₹ 2000. It is considered risky because of high variability in its return.

5.1 Risk and Return characterization

Some risks directly affect both finance managers and the shareholders whereas some risks are from specific and some are shareholders specific. These are given below:

Box 5.1: Specific Risks

Firm Specific Risk	
Business Risk	The chance that the firm will be able to cover its operating costs. Level is drawn by the firms revenue stability and the structure of its operating cost (fixed vs. variable).
Financial Risk	The chance that the firm is available to cover its financial obligations. Level is drawn by the predictability of the firm's operating cash flows and its fixed cost financial obligations like interest on debt/bond.
Shareholder Specific Risk	
Interest Rate Risk	The chance that changes in interest rate will adversely affect the value of an investment. Most investments lose value when the interest rate rise and increase in value when it falls.
Liquidity Risk	The chance that an investment can be converted into money at a reasonable price Liquidity is significantly affected by the size and departments of the markets in which an investment is normally traded.
Market Risk	The chance that the value of an investment will decline because of market factors that are independent of investment (such as economic, political and social events). The more the value of the given investment responds to market uncertainties, the greater its risk and the less it refunds, the smaller the risk.

Box 5.2: Firm and Shareholders Risk

Event Risk	The chance that a totally unexpected event will have a significant effect on the value of the firm or a specific instrument. These events, such as government's withdrawal of a popular prescription along with affect only a small group of firms or investments.
Exchange Rate Risk	This is future cash flow getting affected by fluctuation in the currency exchange rate. The greater the chance of an unexpected exchange rate fluctuation the greater the risk of cash flows and therefore the lower the value of the firm or investment.
Purchasing Power Risk	The chance that changing price levels due to inflation or deflation in the economy, will adversely affect the firms or investments' cash flows and values. Typically, firms or investments with cash flows that moves with general price levels have a low purchasing power risk and those with cash flows that do not make with general price levels have high purchasing power risk.
Tax Risk	The chances that with adverse change in tax laws firm and investment values change adversely are considered more risky.

Notes

5.1.1 Return Defined

If we are going to assess risk on the basis of variability of return, we need to be certain what return is and how to measure it. The return is the total gain or loss experienced on an investment over a given period of time. It is measured as cash distributions (either dividend or interest) during the period plus the change in value expressed as a percentage of value of the investment at the beginning of the period. For Example, suppose one buys a security for ₹ 100 and receives ₹ 10 in cash and is worth ₹ 110 one year later. The return would be (₹ 10 + ₹ 10)/₹ 100 = 20 per cent. Thus, return accrues from two resources, income plus price appreciation (or loss in price). The expression for calculating the rate of return earned on any asset over period t, k_t can be defined as:

$$K_t = \frac{C_t + P_t - P_{t-1}}{P_{t-1}}$$

Where, K_t = actual, expected or required rate of return during period t

C_t = Cash flow received from the investment during time period t–1 to t

P_t = Price (value) of asset at time t

P_{t-1} = Pric e (value) of asset at time t – 1

Example: X, a high traffic video arcade wants to determine the return on its two video machines – C and D. C was purchased 1 year back for ₹ 200,000 and currently has a market value of ₹ 215,000. During the year, it generated ₹ 8000 cash receipts. D was purchased 4 years ago, its value in the year declined from ₹ 120,000 to ₹ 118,000. During the year, it generated ₹ 17,000 cash receipts. The annual rate of return of C and D will be as follows:

$$\text{For C} = \frac{8000 + 215000 - 200,000}{200,000} = \frac{23000}{200,000} = 11.5\%$$

$$\text{For D} = \frac{17000 + 118000 - 120,000}{120,000} = \frac{15000}{120,000} = 12.5\%$$

It may be noted that though market value of D declined during the year, its cash flow enabled it to earn higher rate of return than C during the same period.

5.1.2 Risk Preferences

Perception of risk varies among managers and firms. The three basic risk preference behaviour is identified – risk averse, risk indifferent and risk seeking.

1. For the risk indifferent manager, the expected return does not change as risk increases from one level to another. In essence, no change in return is expected for the increase in risk.
2. For the risk average manager, the expected return increases for an increase in risk. These managers shy away from risk and hence expectations of return go up to compensate for taking greater risk.
3. For the risk-seeking managers, the expected return decreases with increase in risk. Because they enjoy risk, these managers are willing to give up some return to assume more risk. However, such behaviour is not likely to benefit the firm.

Notes

Did u know? Most managers are risk averse for a given increase in risk, they expect increase in return. They generally tend to be conservative rather than aggressive when accepting risk for their firm.

Self Assessment

Fill in the blanks:

1. The chance that the firm is available to cover its financial obligations is known as ……. risk.
2. …….is measured as cash distributions during the period plus the change in value expressed as a percentage of value of the investment at the beginning of the period.
3. For the …….manager, the expected return does not change as risk increases from one level to another.

5.2 Risk Measurement

The concept of risk can be developed by considering a single asset in isolation. We can see the expected return behaviour to assess risk and statistics can be used to measure it.

Sensitivity analysis and probability distribution can be used to assess the general level of risk associated with a single asset.

5.2.1 Risk Assessment

Sensitivity Analysis or Scenario Analysis uses several possible return estimates to ascertain the extent of variability among outcomes. One common method is to have pessimistic (worst), most likely (expected) and optimistic (best) estimates of the return associated with a given asset. In this case, the assets' risk can be measured by the range of returns. The range is found by subtracting the pessimistic outcome from the optimistic outcome. The greater the range, the more variability or risk, the asset is said to have.

Example: N Co. wants to choose the better of two investments A and B. Each require an initial outlay of ₹ 100,000 and each has a most likely annual rate of return of 15%. Management has made pessimistic and optimistic estimates of returns associated with each as follows:

	Asset A	Asset B
Initial investment	₹ 100,000	₹ 100,000
Annual rate of return		
Pessimistic	13%	7%
Most likely	15%	15%
Optimistic	17%	23%

Asset A appears to be less risky than asset B, its range of (17% –13%) 4% is less than the range of 16% (23% –7%) for asset B. The risk averse decision maker would prefer Asset A over Asset B. Since A offers the same most likely return as B (15%) with lower risk (smaller range).

Although the use of sensitivity analysis and range is rather simple, it doesn't give the decision-maker a feel for variability of returns that can be used to estimate the risk involved.

Notes

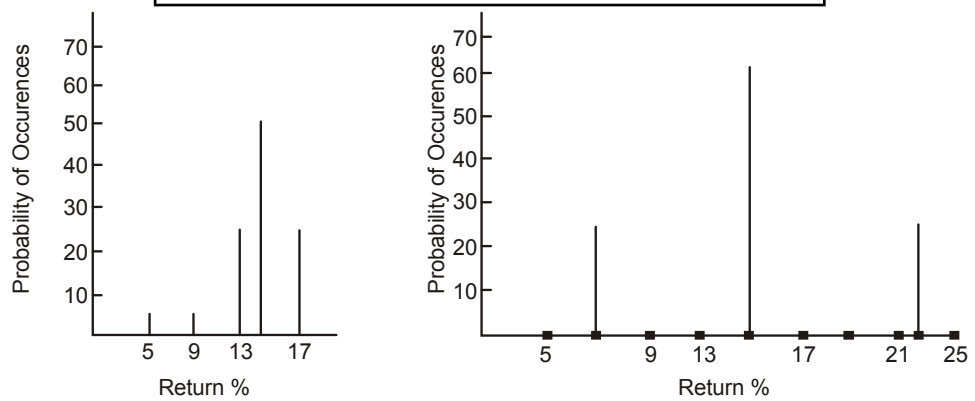
5.2.2 Probability Distribution

Probability distribution provides a more quantitative insight into an assets risk. The probability of a given charge is its chance of occurring.

> *Notes* An outcome with probability of 80% occurrence is expected 8 out of 10 times. An outcome with probability of 100% is certain to happen. Outcomes with probability of zero will never occur.

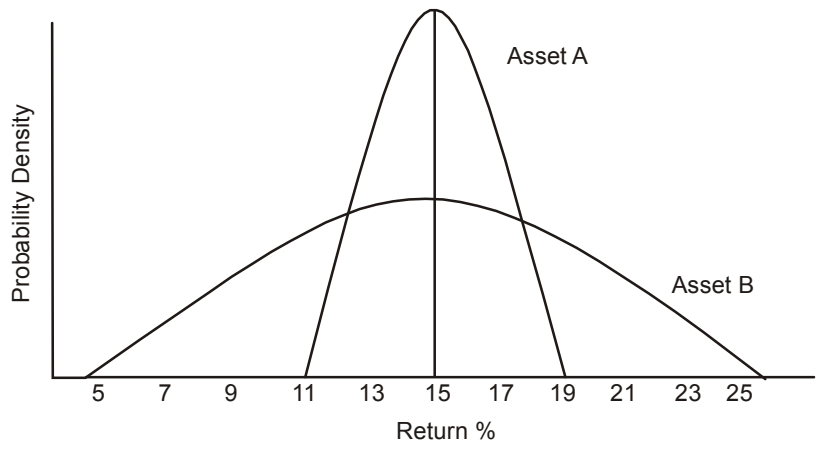
A probability distribution is a model that relates probabilities to the associated outcomes. The simplest type of probability distribution is the bar chart, which only shows a limited number of outcomes. The bar charts for N company Asset A and Asset B are shown in Figure 5.1. Although both assets have the same must likely returns, the range of return is much greater or more dispersed for Asset B than for Asset A – 16 per cent versus 4 per cent.

Figure 5.1: Possible Outcomes and Associated Probabilities



If we know all the possible outcomes and associated probabilities we can develop a continuous probability distribution. This type of distribution can be presented as a bar chart for a very large number of outcomes.

Figure 5.2: Continuous Probability Distribution for Asset A and Asset B



The figure presents continuous probability distribution for asset A and Asset B. Note that although assets A and B have the most likely return (15 per cent), the distribution of returns for assets B has much greater dispension than that for Asset A. Clearly asset B is more risky than Asset A.

Notes

5.2.3 Risk Measurement Quantitatively

The risk of asset in addition to range can be measured quantitatively by using statistical methods – the standard deviation and the co-efficient of variation.

Standard Deviation

The most common statistical indicator of an asset's risk is the standard deviation (6k) which measures the dispension around the expected value k. The expected value of a return (k) is the most likely return on a given asset and is calculated as:

$$\bar{K} = \sum_{i=1}^{n}(k_i \times P_i)$$

where k_i = return for the *i*th outcome

P_i = probability of occurrence of *i*th income

N = number of outcomes considered

The expression of Standard Deviation of returns (6k)

$$6K = \frac{0.8 \times 0.03}{0.022}\sqrt{\sum_{i=1}(k_i - \bar{k}) \times P_i}$$

where $\sqrt{\ }$ represents the square root.

The square of the standard deviation $(6k)^2$ is known as variance of the distribution.

Co-efficient of Variation

The coefficient of variation (CV) is a measure of relative dispension that is useful in comparing the risk of assets with differing expected returns. Thus coefficient of variation (CV) is

$$CV = \frac{6_k}{K} = \frac{\text{Standard Deviation of Returns}}{\text{Expected value of a return}}$$

Did u know? The higher the coefficient of variation, the greater the risk.

Example: The probability distribution of returns for assets A and B

Assets A		Assets B	
Returns	**Probability**	**Returns**	**Probability**
13%	0.2	0	0.1
15%	0.7	15%	0.7
17%	01	25%	0.2

Calculate the expected value, the standard deviation and the coefficient of variation of returns in respect of Asset A and Asset B. Which of these mutually exclusive assets do you prefer and why?

Notes

Asset A

Returns	Returns x Probability	Deviation = Returns – Expected Return	Square of deviation	Probability	Square of deviation x Probability
13%	2.6	-1.8	+ 3.24	0.2	+ 0.648
15%	10.5	0.2	0.04	0.7	0.028
17%	1.7	2.2	4.84	0.1	0.484
Expected Return	14.8				1.160

Standard Deviation $\sqrt{1.160}$ = 1.077

Asset B

Returns	Returns x Probability	Deviation = Returns – Expected Return	Square of deviation	Probability	Square of deviation x probability
0	-	-15.5	240.25	0.1	24.025
15%	10.5	0.5	0.25	0.7	0.175
25%	5.0	9.5	90.25	0.2	18.05
Expected Return	15.5				42.25

Standard Deviation $\sqrt{42.25}$ = 6.5

$$\text{Coefficient of Variation of Returns of Asset A} = \frac{\text{Standard Deviation}}{\text{Expected Returns}}$$

$$= \frac{1.077}{14.8} = 0.73$$

$$\text{Coefficient of variation of return of Asset B} = \frac{6.5}{15.5} = 0.42$$

The higher the coefficient of variation, the more risky the asset returns are. Returns of Asset B is therefore more risky than returns of Asset A.

Self Assessment

Fill in the blanks:

4. Sensitivity analysis and ……can be used to assess the general level of risk associated with a single asset.
5. A ……..is a model that relates probabilities to the associated outcomes.
6. The ……...is a measure of relative dispension that is useful in comparing the risk of assets with differing expected returns.

5.3 Portfolio Theory and Risk Diversification

The portfolio theory provides a normative approach to investor's decision to invest in assets or securities under risk. It is based on the assumption that investors are risk averse. This implies

Notes

that investors hold well diversified portfolio instead of investing in a single asset or security. A portfolio as the name signifies, is a bundle or a combination of individual assets or securities. Hence individuals concern should be on the expected return and risk of the portfolio rather than on individual assets or securities. The second assumption of the portfolio theory is that the returns of securities are normally distributed. This means that the expected value (mean) and variance (or standard deviation) analysis is the foundation of the portfolio decisions.

5.3.1 Portfolio Return and Standard Deviation

The return of a portfolio is equal to the weightage average of the returns of individual assets or securities in the portfolio with weights being equal to the proportion of investment in each asset.

Example: Suppose you have the opportunity of investing your wealth either in asset X or asset Y. The possible outcomes of the two assets indifferent states of economy are given below:

State of Economy	Probability	Returns	
		X	Y
A	0.1	−8	14
B	0.2	10	−4
C	0.4	8	6
D	0.2	5	15
E	0.1	−4	20

The expected rate of return of an individual asset:

$$\bar{K} = \sum_{i=1}^{n}(k_i \times P_i) \qquad \text{(already seen earlier)}$$

The expected rate of return of X is

$$\bar{k}_x = (-8 \times 0.1) + (10 \times .2) + (8 \times 0.4) + (5 \times 0.2) + (-4 \times 0.1) = 5\%$$

and of Y =

$$\bar{k}_y = (14 \times 0.1) + (-4 \times 0.2) + (6 \times 0.4) + (15 \times 0.2) + (20 \times 0.1) = 8\%$$

Suppose you decide to invest 50% on X and 50% in Y.

Since we know the expected rate of return of X (5 per cent) and Y (8%) and their weights (50% each) we can calculate the expected rate of return on the portfolio as the weighted average of the expected rates of return of X and Y.

i.e. $0.5 \times 5 + 0.5 \times 8 = 6.5\%$

Thus, we can conclude the return on a portfolio is a weightage average of the returns on the individual assets from which it is formed. The portfolio return

$$K_p = W_1 \times k_1 + W_2k_2 + \ldots\ldots W_nk_n = \sum_{i=1}^{n} W_1 \times k_i$$

Where W_i = proportion of the portfolio rupee value represented by asset;

k_i = return on asset

Notes

Of course $\sum_{i=1}^{n} = 1$ which represents that 100 per cent of portfolio assets must be included in this computation.

Portfolio Risk – Two Asset Case

Individual assets or securities are more risky than portfolio. How is the risk of portfolio measured? As discussed earlier risk is measured in terms of variance in standard deviation. The standard deviation of a portfolio's return is found by applying the formula for standard deviation of a single asset.

Example: There are two investment opportunities A and B

Economic condition	Probability	Return %	
Good	0.5	40	0
Bad	0.5	0	40

The expected rate of return, variance and standard deviation of A are:

$$\text{Return} = 0.5 \times 40 + 0.5 \times 0 = 20\%$$

$$\text{Standard Deviation}^2 = 0.5\,(40 - 20)^2 + 0.5\,(0 - 20)^2 = 400$$

$$\text{Standard Deviation} = \sqrt{400} = 20\%$$

And of B

$$\text{Return} = 0.5 \times 40 + 0.5 \times 0 = 20\%$$

$$\text{Standard Deviation}^2 = 0.5\,(0 - 20)^2 + 0.5\,(40 - 20)^2 = 400$$

$$\text{Standard Deviation} = \sqrt{400} = 20\%$$

Both A and B have the same expected rate of return (20 per cent) and same variance (400) and Standard Deviation (20 per cent). Thus, they are equally risky.

If the portfolio consisting of equal amount of A and B is constructed, the portfolio return would be 0.5 × 20 + 0.5 × 20 = 20%, same as the expected return from individual securities but without risk; why? If the economic conditions are good, then A would yield 40 per cent and zero and the portfolio return will be 0.5 × 40 + 0.5 × 0 = 20%.

When the economic conditions are bad, then A's return will be zero and B's 40 per cent and the portfolio return will be the same 0.5 × 0 + 0.5 × 40 = 20%.

Thus, by investing equal amount in both A and B, the investor is able to eliminate the risk altogether and assumed of a return of 20 per cent with a 0.5 x 20 + 0.5 x 20 = 20%, same as the expected return from individual securities but without risk; why? If the economic conditions are good, then A would yield 40 per cent and zero and the portfolio return will be 0.5 × 40 + 0.5 × 0 = 20%.

When the economic conditions are bad, then A's return will be zero and B's 40 per cent and the portfolio return will be the same 0.5 × 0 + 0.5 × 40 = 20%.

Thus, by investing equal amount in both A and B, the investor is able to eliminate the risk altogether and assumed of a return of 20 per cent with a zero standard deviation.

Notes

5.3.2 Measuring Portfolio Risk

Like in the case of individual assets or securities, the risk of a portfolio can be measured in terms of variance or standard deviation. The portfolio variance is affected by the association of movement of returns of two securities. Covariance of two securities measures their co-movements. Three steps are involved in the calculation of covariance between two securities:

1. Determine the expected returns for securities.
2. Determine the deviation of possible returns for each security.
3. Determine the sum of the product of each deviation of returns of two securities and probability.

Caution The variance or standard deviation of the portfolio is not simply the weighted average of variances or standard deviations of individual securities.

Let us consider the data of securities X Y given in Example 4.

We have seen that the expected return for security X is 5% and for security Y is 8%. Calculations of variations from the expected return and covariance – products of deviations of returns of securities X and Y and the associated probabilities are given below:

Co-variance of Returns of Securities X and Y

State of Economy	Probability	Returns %		Deviations from expected Return		Product of Deviation & Probability
		X	Y	X	Y	
A	0.1	–8	14	–13	6	–7.8
B	0.2	10	–4	5	–12	–12.0
C	0.4	8	6	3	–2	–2.4
D	0.2	5	15	0	7	0.0
E	0.1	–4	20	9	12	–10.8
Covariance						**–33.0**

The covariance of returns of securities X and Y is – 33. We can use the following formula for computing covariance:

$$\text{Covxy} = \sum_{i=1}^{n} P_1 (kx - k\bar{x})\,(ky - k\bar{y})$$

Where CoVxy is the variance of returns of securities X and Y, kx and ky returns of securities X and Y respectively, Kx and Ky.

It may be observed from the calculation of covariance of returns of securities X and Y that is a measure of both the standard deviations of the securities and their association. Thus, covariance can be calculated as follows:

Covariance XY = Standard Deviation X × Standard Deviation Y × Correlation XY

Covxy = 6x × 6y × Corxy

Where 61 and 62 are standard deviation returns for securities X and Y and Corxy is the correlation coefficient of securities X and Y. Correlation measures the linear relationship between two variables (in this case X and Y securities).

Notes

Thus, correlation coefficient of securities X an Y can be computed as:

$$\text{Correlation XY} = \frac{\text{Convariance XY}}{\text{Standard Deviation X} \times \text{Standard Deviation Y}}$$

Or, $$\text{Cor}_{xy} = \frac{\text{Cov}_{xy}}{6x6y}$$

The variances and standard deviation of X and Y are as follows:

$$6x_2 = 0.1\,(-8-5)^2 + 0.2\,(10-5)^2 + 0.4\,(8-5)^2 + 0.2\,(5-5)^2 + 0.1\,(-4-5)^2$$

$$= 16.9 + 5 + 3.6 + 0 + 8.1 = 33.6$$

$$6x = \sqrt{33.6} = 5.80\%$$

$$6y^2 = 0.1\,(14-8)^2 + 0.2\,(-4-8)^2 + 0.4\,(6-8)^2 + 0.2\,(15-8)^2 + 0.1\,(20-8)^2$$

$$= 3.6 + 28.8 + 1.6 + 9.8 + 14.4 = 58.2$$

$$6y = \sqrt{58.2} = 7.63\%$$

The correlation coefficient of securities X and Y is as follows:

$$\frac{-33}{5.80 \times 7.63} = -\frac{-33}{44.25} = -0.746$$

Securities X and Y are negatively correlated. If an investor invests in the combination of these securities, risk can be reduced.

5.3.3 Variance of a Portfolio

The variance of two security portfolio is given by the following equation:

$$6p^2 = 6^2xwx^2 + 6^2ywy^2 + 2wx\ wy\ 6x\ 6y\ \text{Cor xy}$$

where, $6p$ = Standard deviation of the portfolio

wx and wy are the weightage of securities in value.

If we assume wx and wy in our above example as 50 : 50, then we get

$$6p^2 = 33.6 \times (0.5)^2 + 58.2 \times (0.5)^2 + 2 \times 0.5 \times 0.5 \times 5.80 \times 7.63 \times -0.746$$

$$= 8.4 + 14.55 - 16.51 = 6.44$$

and standard deviation $= \sqrt{6.44} = 2.54\%$

5.3.4 Minimum Variance Portfolio

A portfolio that has the lowest level of risk is referred as the optimal portfolio. A risk averse investor will have a trade-off between risk and return.

We can use the following formula for estimating optimal weights of securities X and Y.

$$Wx^* = \frac{6y^2 - \text{Covxy}}{6x^2 + 6x^2 - 2\text{Covxy}}$$

Notes

Where Wx* is the proportion of investment in security X (since the variance in Security X is lower than Y). Investment in Y will be 1 – Wx*. In the above example, we find

$$Wx^* = \frac{58.2-(-33)}{58.2+33.6-2(-33)} = \frac{91.2}{157.6} = 0.578$$

Thus, the weight of Y will be 1 – 0.578 = 0.422

The portfolio variance (with 57.8 per cent of investment in X and 42.2 per cent in Y) is:

$$6p^2 = 33.6\ (0.578)^2 + 58.2\ (0.422)^2 + 2(0.578)\ (0.422)\ (5.80) \times (7.63)\ (-746)$$

$$6p^2 = 11.23 + 10.36 - 16.11 = 5.48$$

Any other combination of X and Y will yield a higher variance.

(In the earlier example of 50% and 50% weights, we have seen the variance as 6.44)

Self Assessment

Fill in the blanks:

7. The return of a portfolio is equal to the ……..of the returns of individual assets.
8. A portfolio that has the lowest level of risk is referred as the …….portfolio.
9. The portfolio ……is affected by the association of movement of returns of two securities.

5.4 Portfolio Risk and Correlation

The risk of portfolio of X and Y has considerably reduced due to the negative correlation between returns of securities X and Y. The above example shows that risk can be reduced by investing in more than one security. However, the extent of benefits of portfolio diversification depends on the correlation between returns of securities.

The correlation coefficient will always be between +1 and –1. Returns of securities vary perfectly when the correlation coefficient is + 1.0 and is perfectly opposite direction when it is – 1.0. A zero correlation coefficient implies that there is no relationship between the return of securities. In practice, the correlation coefficients of returns of securities may vary between +1 and –1. How the portfolio variance is affected by the Correlation Coefficient can be explained by an example.

Example: Securities M and N are equally risky but they have different expected returns:

Km = 0.16	6^2m = 0.04	Kn = 0.24	6n = 0.20
Wm = 0.50	ám = 0.20	Wn = 0.50	6^2n= 0.04

What is the portfolio variance if (a) Cormn = = +1.0, (b) Cormn = –1.0 (c) Cormn = +0.10 and (d) Cormn – 0.10

Perfect Positive Correlation

When the returns of two securities M and N are perfectly positively correlated the portfolio variance will be

$$6p^2 = 0.04\ (0.5)^2 + 0.04\ (0.5)^2 + 2\ (0.5)(0.5)\ (1.0)(0.2)(0.2)$$

$$= 0.01 + 0.01 + 0.02 = 0.04$$

The portfolio variance is just equal to the variance of individual securities. Thus, the combination of securities M and N is as risky as the individual securities.

Notes

Perfect Negative Correlation

If the returns of securities M and N are perfectly negative correlative the portfolio variance will be:

$$6p^2 = 0.04\ (0.5)^2 + 0.04\ (0.5) + 2\ (0.5)(0.5)\ (-1.0)(0.2)(0.2)$$
$$= 0.01 + 0.01 - 0.02 = 0$$

The portfolio variance is zero. The combination of securities M and N completely reduces the risk.

Weak Positive Correlation: The portfolio variance under weak positive correlation (+0.10) is given below:

$$6p^2 = 0.04\ (0.5)^2 + 0.04\ (0.5)^2 + 2\ (0.5)(0.5)\ (0.1)(0.2)(0.2)$$
$$= 0.01 + 0.01 + 0.002 = 0.022$$

The portfolio variance is less than the variance of individual securities.

Weak Negative Correlation

The portfolio variance under weak negative correlation (–0.10) is given below:

$$6p^2 = 0.04\ (0.5)^2 + 0.04\ (0.5)^2 + 2\ (0.5)(0.5)\ (-1.0)(0.2)(0.2)$$
$$= 0.01 + 0.01 - 0.002 = 0.018$$

The portfolio variance has reduced more than when the returns were weak positive correlated.

5.4.1 Portfolio Risk N-Security Case

We have so far discussed the computation of risk when a two security portfolio is formed. The calculations of risk becomes quite involved when a large number of securities are combined to form a portfolio.

Based on the logic of the portfolio risk in a two security case, the portfolio risk (measured as variance) in N security can be calculated as follows:

$$6p^2 = n(1/n)^2 \times \text{average variance } (+n^2 - n)\ (1/n)^2 \times \text{average covariance}$$
$$= (1/n) \times \text{average variance} + (1 - 1/n) \times \text{average covariance}$$

It may be noted that the first term on the right hand side (1/n) will become insignificant when n is very large and thus the positive variance will become approximately equal to average covariance.

5.4.2 Systematic and Unsystematic Risk

Risk has two parts. A part of the risk arises from the uncertainties which are unique to individual securities and which is diversifiable if large number of securities are combined to form well diversified portfolios. The unique risk of individual securities in a portfolio cancel out each other. This part of the risk can be totally reduced through diversification and is called unsystematic or unique risk. The examples of unsystematic risk are:

1. The company loses a big contract in a bid.
2. The company makes a breakthrough in process innovation.
3. The R&D expert of the company leaves.
4. Workers declare strike in a company.
5. A formidable competitor enters the market.

Notes

6. The government increases customs duty on the material used by the company.

7. The company is not able to obtain adequate quantity of raw materials from the suppliers.

The other part of the risk arises on account of economywide uncertainties and the tendency of individual securities to move together with changes in the market. This part of the risk cannot be reduced through diversification and it is called systematic or markets risk. The examples of systematic risk are:

1. The government changes the interest rate policy.
2. The corporate tax rate is increased.
3. The government resorts to massive deficit financing.
4. The inflation rate increases.
5. The Reserve Bank of India announces a restrictive credit policy.

Notes Investors are exposed to market risk even when they hold well diversified portfolios of securities.

Total risk, which in the case of an individual security, is the variance (or standard deviation) of its return can be divided into two parts.

Total risk = Systematic risk + Unsystematic risk

Self Assessment

Fill in the blanks:

10. The extent of benefits of portfolio diversification depends on the ……..between returns of securities.
11. Part of the risk that cannot be reduced through diversification is called ……or markets risk.
12. The ……..will always be between +1 and –1.

5.5 Capital Asset Pricing Model (CAPM)

CAPM provides a framework for measuring the systematic risk of an individual security and relates it to the systematic risk of a well diversified portfolio. In the context of CAPM, the risk of an individual security is defined as the volatility of the security's return vis-à-vis the return of a market portfolio. The risk (volatility) of individual securities is measured by β (beta). Beta is a measure of a security's risk relative to the market portfolio. Since diversifiable risk does not matter, beta is thus a measure of systematic risk of a security.

Risk free security has no volatility and it has a zero beta:

The Capital Asset Pricing Model is given in equataion:

$$K_1 = R_f + \beta_1 \times (km - Rf)$$

Where K_1 = required rate of an asset I

Rf = risk-free rate of return, commonly measured by return on treasury bills or government securities

β_1 = beta coefficient or index of non diversifiable risk for the asset I

Km = market rate of return on the market portfolio of assets

Notes

The CAPM can be divided into two parts (1) risk-free interest Rf which is required return on a risk free asset typically treasury bill or short-term government security and (2) the risk premium. These are respectively the two elements on the either side of the plus sign in the above equation. The (km – Rf) portion of the risk premium is called the market risk premium, because it represents the premium – the investor must receive for taking the average amount of risk associated with holding the market portfolio of assets.

The risk premium is the highest for small company stocks, followed by large company stocks, long-term corporate bonds, and long-term government bonds. Small company stocks are riskier than large company stocks, which are riskier than long-term corporate bonds (equity is riskier than debt instrument).

Long-term corporate bonds are riskier than long-term government bonds (because the government is less likely to ravage on debt). And of course, treasury bills and short-term government securities because of no default risk, very short maturity virtually risk-free as indicated by zero risk premium.

Other things being equal, the higher the beta, the higher the required return and lower the beta, the lower the required return.

Example: B Co. Ltd., wishes to determine the required rate of return on an asset Z, which has a beta of 1.5. The risk free rate of return is 7%, the return on market portfolio of assets is 11%. Thus we get:

$$Kz = 7\% + 1.5\,(11\% - 7\%) = 7\% + 6\% = 13\%$$

The market risk premium 4% (11% –7%) when adjusted for the assets index of risk (beta) of 1.5, results in a risk premium of 6% (1.5 × 4%). That risk premium when added to 7% risk-free return, results in 13% required return.

5.5.1 Assumptions of CAPM

1. ***Market efficiency:*** The capital markets are efficient. The capital market efficiency implies that share prices reflect all available information.
2. ***Risk aversion:*** Investors are risk-averse. They evaluate a security's return and risk in terms of the expected return and variance or standard deviation respectively. They prefer the highest expected return for a given level of risk.
3. ***Homogenous expectations:*** All the investors have the same explanation about the expected return and risk of securities.
4. ***Single time period:*** All investors can lend or borrow at risk-free rate of interest.
5. ***Risk-free rate:*** All investors can lend or borrow at a risk-free rate of interest.

5.5.2 Interpreting Beta

The beta of a portfolio can be easily estimated by using the betas of the individual assets it includes. Suppose w_1, represent the proportion of the portfolio's total rupee value represented by asset j, and let β, denotes beta of the asset, the portfolio beta

$$\beta p = (w_1 \times \beta_1) + (w_2 \times \beta_2) + \ldots\ldots\ldots\ldots \left(\underset{i=1}{wn} \times \beta_n\right) = \sum^{n} w_1 \times \beta_1$$

of course $\sum_{i=1}^{n} = I$ which means that 100 per cent of the portfolio's assets must be included in the computation.

Notes

Portfolio betas are interpreted in the same way as the betas of individual assets. They indicate the degree of responsiveness of the portfolio's return to changes in the market return. For example, when the market return increases by 10 per cent, a portfolio with a beta of 0.75 will experience a 7.5 per cent increase in its return (0.75 × 10%).

Again since beta measures the relative volatility of a security's return, in relation to the market return, it should be measured in terms of security's and markets' covariance and markets variance. Thus β_1 can be measured by:

$$\beta_1 = \frac{Cov(K_i, K_m)}{\sigma^2} = \frac{\sigma_1\ \sigma_m\ Cor\ j_m}{\sigma^2 m} = \frac{\sigma_1\ Cor\ j_m}{\sigma m}$$

Where, k_i = The expected return on indiversifiable security

K_m = The expected return on market portfolio

σ_1 = Standard deviation of the security

σ_m = Standard deviation of the market portfolio

$Cov_{(kikm)}$ = Covariance of security with regard to market portfolio

Cor_{jm} = Correlation coefficient of the security with the market

Example: An investor is seeking the price to pay for a security whose standard deviation is 3.00 per cent. The correlation coefficient for the security with the market is 0.8 and the market standard deviation is 2.2 per cent. The return for government securities is 7.2 per cent and from the market portfolio 12.8 per cent. The investors know that, by calculating the required return he can determine the price to pay for the security. What is the required return on the security?

Solution:

$$\text{Beta Coefficient} = \frac{0.8 \times 0.03}{0.022} = 1.0909$$

$$\text{Required rate of return} = 0.072 + 1.0909 \times (0.128 - 0.072)$$

$$= 0.072 + 0.061 = 0.133$$

Task An investor holds two equity shares X and Y in equal proportion with the following risks and return characteristics:

Return of Security X = 24 %; Return of Security Y = 19 %

Standard Deviation of X = 28% Standard Deviation of Y = 23 %

The return of these securities has a positive correlation of 0.6. You are required to calculate the portfolio return and risk. Further suppose that the investor wants to reduce the portfolio risk to 15 per cent. How much should the correlative coefficient be to bring the particular risk to the desired level?

5.5.3 Limitations of CAPM

1. It is based on unrealistic assumptions that are far from reality. For example, it is very difficult to find a risk-free security, since inflation causes uncertainty about the real rate of return. The assumption of the equality of lending and borrowing rate is also not correct. Further, investors may not hold highly diversified portfolio or the market indices may not be well-diversified.

Notes

2. It is difficult to test the validity of CAPM from a practical point of view.

3. Betas do not remain stable over time. Beta is a measure of a security's future risk. But investors do not have future data to estimate beta. What they have are past data about the share prices and market portfolio. Thus, they can only estimate beta based on historical data. This implies that historical betas are poor indicators of the future risk of securities.

Caution Investors can use historical data as the measure of future risk only if it is a stable over time.

Despite the limitations of CAPM, it provides a useful conceptual framework for evaluating and linking risk and return. An awareness of the trade-off and an attempt to consider risk as well as return in financial decision-making should help financial managers achieve their goals.

Self Assessment

Fill in the blanks:

13. ……is a measure of a security's risk relative to the market portfolio.

14. The CAPM can be divided into two parts which are risk-free interest and the……..

15. ……provides a framework for measuring the systematic risk of an individual security and relates it to the systematic risk of a well diversified portfolio.

Case Study

Case: To Invest or Not?

Wipro Company has asked the investors to invest in their securities & while making an offer, they have provided you with the following information. For a period of 10 years, company has provided you with the rate of return on security & return on the market portfolio of its securities as:

Period	Return on security WIPRO (%)	Return on market portfolio (%)
1	20	22
2	22	20
3	25	18
4	21	16
5	18	20
6	-5	8
7	17	-6
8	19	5
9	-7	6
10	20	11

You as an investor have decided to invest in the securities of the company. The anticipated return with the associated probabilities is as:

Contd...

Notes

Return %	-10	-15	5	12	10	20	13
Probability	0.03	0.02	0.15	0.25	0.3	0.1	0.05

Question

Now after getting all the details, what would you suggest, whether to invest in the securities or not and what would be your expected rate of return & risk in terms of standard deviation. Also give your comments based on the average rate of return, variance and beta value for the company's securities.

5.6 Summary

- Risk is the chance of financial loss.
- Some risks directly affect both finance managers and the shareholders whereas some risks are from specific and some are shareholders specific.
- Sensitivity analysis and probability distribution can be used to assess the general level of risk associated with a single asset.
- Probability distribution provides a more quantitative insight into an assets risk.
- The risk of asset in addition to range can be measured quantitatively by using statistical methods – the standard deviation and the co-efficient of variation.
- The coefficient of variation (CV) is a measure of relative dispension that is useful in comparing the risk of assets with differing expected returns
- The risk of a portfolio can be measured in terms of variance or standard deviation.
- The correlation coefficient will always be between +1 and –1.
- The part of the risk that can be totally reduced through diversification is called unsystematic risk and the part of the risk that cannot be reduced through diversification is called systematic risk.
- Capital Asset Pricing Model (CAPM) provides a framework for measuring the systematic risk of an individual security and relates it to the systematic risk of a well diversified portfolio.

5.7 Keywords

Beta: It is a measure of the systematic risk of a security that cannot be avoided through diversification.

Correlation: It is a statistical measure that indicates the relationship between series of number representing anything from cash flows to test data.

Covariance: It is the measure of their co-movement, expressing the degree to which the securities vary together.

Non-systematic Risk: The variability in a security is total returns not related to overall market variability.

Portfolio: It is a collection of securities

Risk: Probability that the expected return from the security will not materialize.

Systematic Risk: Variability in a security is total returns that are directly associated with overall movements in the general market or economy is called systematic risk.

Notes

5.8 Review Questions

1. Explain how the range is used in sensitivity analysis?
2. What relationship exists between the size of the standard deviation and the degree of asset risk?
3. When is coefficient of variation preferred over the standard deviation for comparing asset risk?
4. What is an efficient portfolio? How can the return and standard deviation of a portfolio be determined?
5. Why is the correlation between asset returns important? How does diversification allow risky assets to be combined so that the risk of the portfolio is less than the risk of the individual assets in it?
6. What risk does beta measure? How can you find the beta of a portfolio?
7. Explain the meaning of each variable in the capital asset pricing model (CAPM) equation.
8. Why do financial managers have some difficulty applying CAPM in financial decision-making? Generally, what benefits does CAPM provide them?
9. J Co. has the following dividend per share and the market price per share for the period 1997 to 2002.

Year	Dividend	Market Price (₹)
1997	1.53	₹ 31.25
1998	1.53	₹ 20.75
1999	1.53	₹ 30.88
2000	2.00	₹ 67.00
2001	2.00	₹ 100.00
2002	3.00	₹ 154.00

Calculate the annual rates of return for last 5 years. How risky is the share?

10. The shares of H.Co.Ltd. has the following anticipated return with associated probabilities.

Return %	Probability
–20	0.05
–10	0.10
10	0.20
15	0.25
20	0.20
25	0.15
30	0.05

Calculate the expected rate of return and the risk factor.

Notes

Answers: Self Assessment

1.	financial	2.	Return	3.	risk indifferent
4.	probability distribution	5.	probability distribution	6.	coefficient of variation
7.	weightage average	8.	optimal	9.	variance
10.	correlation	11.	systematic	12.	correlation coefficient
13.	Beta	14.	risk premium	15.	CAPM

5.9 Further Readings

Books

Dr Pradeep Kumar Sinha, *Financial Management*, New Delhi, Excel Books, 2009.

Van Horne, J.C. and Wachowicz, Jr, J.M., *Fundamentals of Financial Management*, New Delhi, Prentice Hall of India Pvt. Ltd., 1996, p. 2.

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Unit 6: Cost of Capital

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Objectives

After studying this unit, you will be able to:

- Recognize the significance of cost of capital
- Discuss the basic aspects of the concept of cost of capital
- Categorize the costs
- Identify the factors that affect cost of capital

Introduction

The cost of capital is an important concept in formulating a firm's capital structure. Cost of capital is a central concept in financial management. It is also viewed as one of the corner stones in the theory of financial management. It has received considerable attention from both theorists and practitioners. Two major schools of thought, have emerged having basic difference on the relevance of cost of capital. In one camp, Modigliani Miller argued, that a firm's cost of capital is constant and it is independent of the method and level of financing. In another camp (traditionalists) cost of capital is varying and dependent on capital structure. In both the camps, optimal policy is taken as the policy that maximizes the value of a company.

Notes

Cost of capital is still largely an academic term and the problem of measuring it in operational terms is a recent phenomena. Prior to this development, the problem was either ignored or by passed. In modern times, it is widely used as basis of investment projects and evaluating the alternative sources of finance.

6.1 Cost of Capital – Concept

The term cost of capital is a concept having many different meanings. The three viewpoints, regarding the cost of capital is given below:

1. ***From Investors' View Point:*** Investor may define it as "the measurement of the sacrifice made by him in capital formation."

   Example: Mr. A an investor invested in a company's equity shares, amount ₹ 1,00,000, instead of investing in a bank at the rate of 7 per cent interest. Here he had sacrificed 7 per cent interest for not having invested in the bank.

2. ***Firms Point:*** It is the minimum required rate of return needed to justify the use of capital.

   Example: A firm raised ₹ 50 lakhs through the issues of 10 per cent debentures, for justifying this issue, a minimum rate of return it has to earn is 10 per cent.

3. ***Capital Expenditure Point:*** The cost of capital is the minimum required rate of return, the hurdle or target rate or the cut off rate or any discounting rate used to value cash flows.

   Example: Firm 'A' is planning to invest in a project, that requires ₹ 20 lakh as initial investment and provides cash flows for a period of 5 years. So for the conversion of future 5 years cash flows into present value, cost of capital is needed.

Cost of capital represents the rate of return that the firm must pay to the fund suppliers, who have provided the capital. In other words, cost of capital is the weighted average cost of various sources of finance used by the firm. The sources are, equity, preference, long-term debt and short-term debt.

"*The rate that must be earned on the net proceeds to provide the cost elements of the burden at the time they are due.*"

—Hunt, William and Donaldson

"*Cost of capital is the minimum required rate of earnings or the cut-off rate of capital expenditures.*"

—Solomon Ezra

"*A cut-off rate for the allocation of capital to investments of projects. It is the rate of return on a project that will leave unchanged the market price of the stock.*"

—James C. Van Horne

"*The rate of return the firm requires, from investment in order to increase the value of the firm in the market place.*"

—Hampton, John J

Thus, as defined above, we can say, that cost of capital is that minimum rate of return, which a firm must and is expected to earn on its investments so as to maintain the market value of its shares. It is also known as Weighted Average Cost of Capital (WACC), composite cost of capital or combined cost of capital. It is expressed in terms of percentage.

Notes

Basic Aspects on the Concept of Cost of Capital

The above definitions indicates, that the following are the three basic aspects of the concept of cost of capital:

1. ***Rate of Return:*** Cost of capital is not a cost as such, infact it is the rate of return that a firm requires to earn from its investment projects.
2. ***Minimum Rate of Return:*** Cost of capital of any firm is that minimum rate of return that will at least maintain the market value of the shares.
3. Cost of capital comprises three components:
   (a) The risk less cost of the particular type of financing (r_j)
   (b) The business risk premium, (b) and
   (c) The financial risk premium (f)

Symbolically cost of capital may be represented as: $K_o = r_j + b + f$

Self Assessment

Fill in the blanks:

1. Cost of capital represents the ……that the firm must pay to the fund suppliers, who have provided the capital.
2. Cost of capital is expressed in terms of …….
3. Investor defines Cost of capital as "the measurement of the sacrifice made by him in……..."

6.2 Importance/Significance of Cost of Capital

The concept of cost of capital is very important and the central concept in financial management decisions. The decisions in which it is useful are as follows:

1. ***Designing Optimal Corporate Capital Structure:*** This concept is helpful in formulating a sound and economical capital structure for a firm. The debt policy of a firm is significantly influenced by the cost consideration. Capital structure involves determination of proportion of debt and equity in capital structure that provides less cost of capital.

   Caution While designing a firm's capital structure, the financial executives always keep in mind minimisation of the over all cost of capital and to maximise value of the firm.

   The measurement of specific costs of each source of funds and calculation of weighted average cost of capital help to form a balanced capital structure. By comparing various (sources of finance) specific costs, he/she can choose the best and most economical source of finance and can succeed in designing a sound and viable capital structure.

2. ***Investment Evaluation/Capital Budgeting:*** Wilson R.M.S., states that the Cost of Capital is a concept, which should be expressed in quantitative terms, if it is to be useful as a cut-off rate for capital expenses. Capital expenditure means investment in long-term projects like investment on new machinery. It is also known as Capital budgeting expenditure. Capital budgeting decisions require a financial standard (cost of capita) for evaluation. The financial standard is Cost of Capital. In the Net Present Value (NPV) method, an investment project is accepted, if the present value of cash inflows are greater than the

Notes

present value of cash outflow. The present values of cash inflows are calculated by discounting the rate known as Cost of Capital. If a firm adopts Internal Rate of Return (IRR) as the technique for capital budgeting evaluation, investment should be accepted only when cost of capital is less than the calculated IRR. Hence, the concept of cost of capital is very much useful in capital budgeting decisions, particularly if a firm is adopting discounted cash flow methods of project evaluation.

3. ***Financial Performance Appraisal:*** Cost of capital framework can be used to evaluate the financial performance of top management. Financial performance evaluation involves a comparison of actual profitability of the investment project with the project overall cost of capital of funds raised to finance the project. If the actual profitability is more than the projected cost of capital, then the financial performance may said to be satisfactory and vice versa.

The above discussion clearly shows the role of cost of capital in financial management decisions. Apart from the above areas (decisions), cost of capital is also useful in (distribution of profits), capitalization of profits, making to rights issue and investment in owner assets.

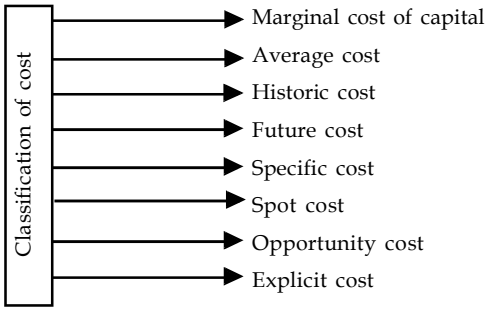
Self Assessment

Fill in the blanks:

4. The …….policy of a firm is significantly influenced by the cost consideration.
5. In the Net Present Value (NPV) method, the present values of cash inflows are calculated by discounting the rate known as…….
6. If the ……is more than the projected cost of capital, then the financial performance may said to be satisfactory.

6.3 Classification of Cost

Figure 6.1: Classification of Cost



Before going to discuss the computation of specific cost of each source of funds and cost of capital, it is wise to know various relevant costs associated with the problem of measurement of cost of capital. The relevance costs are:

1. ***Marginal Cost of Capital:*** A marginal cost is the additional cost incurred to obtain additional funds required by a firm. It refers to the change in the total cost of capital resulting from the use of additional funds. The marginal cost of capital is a very important concept in investment decisions (capital budgeting decisions).
2. ***Average Cost/Composite/Overall Cost:*** It is the average of various specific costs of the different components of equity, preference shares, debentures, retained earnings of capital

Notes

structure at a given time and this is used as the acceptance criteria for (capital budgeting) investment proposals.

3. ***Historic Cost/Book Cost:*** The book cost has its origin in the accounting system in which book values, as maintained by the books of accounts, are readily available. They are related to the past. It is in common use for computation of cost of capital. For example, cost of capital may be computed based on the book value of the components of capital structure.

Did u know? Historical costs act as guide for future cost estimation.

4. ***Future Cost:*** It is the cost of capital that is expected to raise funds to finance a capital budget or investment proposal.

5. ***Specific Cost:*** It is the cost associated with particular component/source of capital. It is also known as component cost of capital. For example, cost of equity (Ke) or cost of preference share (Kp), or cost of debt (Kd), etc.

6. ***Spot Cost:*** The costs that are prevailing in the market at a certain time. For example, few years back cost of bank loans (house loans) was around 12 per cent, now it is 6 per cent is the spot cost.

7. ***Opportunity Cost:*** The opportunity cost is the benefit that the shareholder foregoes by not putting his/her funds elsewhere because they have been retained by the management. For example, an investor, had invested in a company's equity shares (100 shares, each share at ₹ 10). The company decided to declare dividend of 10 per cent on book value of share, but due to capital requirements it retains its investment on one project that is having return on investment (RoI) of 4 per cent. Elsewhere, the project rate of interest (banks) is at 6 per cent. Here, the opportunity cost to the investor is (6-4) 2 per cent.

8. ***Explicit Cost:*** Cost of capital can be either explicit or implicit. Distinction between explicit and implicit is important from the point of view of computation cost of capital. An explicit cost of any source of capital is the discount rate that equates the present value of the cash inflows, that are incremental to the taking of the financing opportunity with present value of its increments cash outflows. In other words, the discount rate that equates the present value of cash inflows with present value of cash outflows. It is also called as the internal rate of return. For example, a firm raises ₹ 1,00,000 through the sale of 12 per cent perpetual debentures. There will be a cash inflow of ₹ 1,00,000 and a cash outflow of ₹ 12,000 every year for a indefinite period. The rate that equates the PV of cash inflows (₹ 1,00,000) and PV of cash outflows (₹ 12,000 per year) would be the explicit cost. Computation of explicit cost is almost similar to the computation of IRR, with one difference.

9. ***Implicit Cost:*** It is the cost of opportunity, which is given up in order to pursue a particular action. It is also known as implicit cost of capital. The implicit cost of capital of funds raised and invested by the firm may, therefore be defined as "the rate of return associated with the best investment opportunity for the firm and its shareholders that would be foregone, if the projects presently under consideration by the firm were accepted". The cost of retained earnings is an opportunity cost of implicit cost for a shareholder, who is deprived of the opportunity to invest retained earnings elsewhere. Funds raised by any form of financing have implicit capital costs once they are invested. Thus, in a sense, implicit costs may also be viewed as opportunity costs. This implies that a project reflects negative PV, when its cash flows are discounted by the implicit cost of capital.

Notes

Self Assessment

Fill in the blanks:

7. A ……cost is the additional cost incurred to obtain additional funds required by a firm.
8. …….is the cost of capital that is expected to raise funds to finance a capital budget or investment proposal.
9. ……..Cost is the cost that is prevailing in the market at a certain time.

6.4 Computation of Specific Cost of Capital

The financial manager has to compute the specific cost of each type of funds needed in the capitalisation of a company. The company may resort to different financial sources (equity share, preference share, debentures, retained earning public deposits; or it may prefer internal source (retained earnings) or external source (equity, preference and public deposits). Generally, the component cost of a specific source of capital is equal to the investors' required rate of returns. Investors required rate of returns are interest, discount on debt, dividend, capital appreciation, earnings per share on equity shareholders, dividend and share of profit on preference shareholders funds. But investors' required rate of returns should be adjusted for taxes in practice for calculating the cost of a specific source of capital, to the firm.

Compensation of specific source of finance, viz., equity, preference shares, debentures, retained earnings, public deposits is discussed below:

6.4.1 Cost of Equity

Firms may obtain equity capital in two ways (a) retention of earnings and (b) issue of additional equity shares to the public. The cost of equity or the returns required by the equity shareholders is the same in both the cases, since in both cases, the shareholders are providing funds to the firm to finance their investment proposals. Retention of earnings involves an opportunity cost. The shareholders could receive the earnings as dividends and invest the same in alternative investments of comparable risk to earn returns. So, irrespective of whether a firm raises equity finance by retaining earnings or issue of additional equity shares, the cost of equity is same. But issue of additional equity shares to the public involves a floatation cost whereas, there is no floatation cost for retained earnings. Hence, issue of additional equity shares to the public for raising equity finance involves a bigger cost when compared to the retained earnings.

In the following cost of equity is computed in both sources point of view (i.e., retained earnings and issue of equity shares to the public).

Cost of Retained Earnings (K_{re})

Retained earnings is one of the internal sources to raise equity finance. Retained earnings are those part of (amount) earnings that are retained by the form of investing in capital budgeting proposals instead of paying them as dividends to shareholders. Corporate executives and some analysts too normally consider retained earnings as cost free, because there is nothing legally binding the firm to pay dividends to equity shareholders and the company has its own entity different from its stockholders. But it is not so. They involve opportunity cost. The opportunity cost of retained earning is the rate of return the shareholder forgoes by not putting his/her funds elsewhere, because the management has retained the funds. The opportunity cost can be well computed with the following formula.

$$K_{re} = K_e \left(\frac{(1 - T_i)}{(1 - T_b)} \right) \times 100$$

Notes

Where,

K_e = Cost of equity capital [D ÷ P or E/P + g].

T_i = Marginal tax rate applicable to the individuals concerned.

T_b = Cost of purchase of new securities/broker.

D = Expected dividend per share.

NP = Net proceeds of equity share/market price.

g = Growth rate in (%).

Illustration 1:

A company paid a dividend of ₹ 2 per share, market price per share is ₹ 20, income tax rate is 60 per cent and brokerage is expected to be 2 per cent. Compute the cost of retained earnings.

Solution:

$$K_{re} = \left(\frac{D}{NP} \times \frac{(1-T_i)}{(1-T_b)}\right) \times 100$$

$$= \left(\frac{2}{20} \times \frac{(1-0.60)}{(1-0.02)}\right) \times 100$$

$$= 0.10 \times 0.409 \times 100 = 4.1 \text{ per cent}$$

Illustration 2:

ABC company's cost of equity (Ke) capital is 14 per cent, the average tax rate of individual shareholders is 40 per cent and it is expected that 2 per cent is brokerage cost that shareholders will have to pay while investing their dividends in alternative securities. What is the cost of retained earnings?

Solution:

$$K_{re} = \left(K_e \times \frac{(1-T_i)}{(1-T_b)}\right) \times 100$$

$$= 0.14 \times \frac{(1-0.4)}{(1-0.02)} \times 100$$

$$= (0.14 \times 0.613) \times 100 = 8.6 \text{ per cent}$$

Illustration 3:

Life Style Garment Manufacturing Company has net earnings of ₹ 20 lakhs and all of its stockholders are in the bracket of 50 per cent. The management estimates that under the present conditions, the stockholder's required rate of returns is 12 per cent. 3 per cent is the expected brokerage to be paid if stockholders want to invest in alternative securities. Compute the cost of retained earnings.

Solution:

$$K_{re} = K_e\left(\frac{(1-T_i)}{(1-T_b)}\right) \times 100$$

Notes

$$= \left(0.10 \times \frac{(1-0.50)}{(1-0.03)}\right) \times 100$$

$$= (0.10 \times 0.516) \times 100 = 5.2 \text{ per cent}$$

Illustration 4:

BPL company's equity share is currently being sold at ₹ 350.75 and it is currently paying a dividend of ₹ 5.25 per share. The dividend is expected to grow at 15 per cent per annum for one year. Income tax rate is 40 per cent and brokerage is 2 per cent. Calculate cost of retained earnings.

Solution:

$$K_{re} = \left(\frac{D}{NP} + g \times \frac{(1-T_i)}{(1-T_b)}\right) \times 100$$

$$= \left(\frac{5.25}{350.75} + 0.15 \times \frac{1-0.40}{1-0.02}\right) \times 100$$

$$= (0.165 \times 0.613) \times 100 = 10.2 \text{ per cent}$$

Cost of Issue of Equity Shares (K_e)

Calculation of cost of equity (K_e) capital cost brings forth, a host of problems. It is the most difficult and controversial cost to measure because there is no one common basis for computation. For calculation of cost of debt (K_d) interest charge is the base and preference dividend is the base for calculation of cost of preference shares (K_p). Interest on debentures/debt and dividend on preference shares is fixed in terms of the stipulations following the issue of such debentures and shares. In contrast, the return on equity shareholders solely depends upon the discretion of the company management. Apart from this, there is no stipulation for payment of dividend to equity shareholders. They are ranked at the bottom as claimants on the assets of the company at the time of liquidation. Though it is quite evident from the above discussion that, equity capital does not carry any cost. However, this is not true, equity capital has some cost.

The cost of equity capital (K_e), may be defined as the minimum rate of returns that a firm must earn on the equity financed portions of an investment project in order to leave unchanged the market price of the shares. The cost of equity is not the out-of-pocket cost of using equity capital as the equity shareholders are not paid dividend at a fixed rate every year.

Approaches to Calculate the Cost of Equity (K_e)

There are six approaches available to calculate the cost of equity capital, they are:

Dividends Capitalisation Approach (D/MN Approach)

According to this approach, the cost of equity capital is calculated on the basis of a required rate of return in terms of the future dividends to be paid on the shares. Accordingly, K_e is defined as the discount rate that equates the present value of all expected future dividends per share, along with the net proceeds of the sale (or the current market price) of a share. It means investor arrives at a market price for a share by capitalizing dividends at a normal rate of return. The cost of equity capital can be measured by the given formula:

$$K_e = D/CMP \text{ or } NP$$

Notes

Where,

K_e = Cost of equity

D = Dividends per share

CMP = Current market price per share

NP = Net proceed per share

This method assumes that investor give prime importance to dividends and risk in the firm remains unchanged and it does not consider the growth in dividend.

Illustration 5:

XYZ Ltd., is currently earning ₹ 1,00,000, its current share market price of ₹ 100 outstanding equity shares is 10,000. The company decides to raise an additional capital of ₹ 2,50,000 through issue of equity shares to the public. It is expected to pay 10 per cent per share as floatation cost. Equity capital is issued at a discount rate of 10 per cent, per share. The company is interested to pay a dividend of ₹ 8 per share. Calculate the cost of equity.

Solution:

$$K_e = \frac{D}{NP} \times 100$$

$$K_e = \frac{₹\ 8}{(100 - 10 - 10)} \times 100$$

$$K_e = \frac{₹\ 8}{80} \times 100$$

$$= 10 \text{ per cent}$$

Notes Dividend capitalization approach, suffers from the following limitations:

1. It does not consider future earnings.
2. It ignores the earnings on retained earnings.
3. It ignores the fact that market price raise may be due to retained earnings and not on account of high dividends.
4. It does not take into account the capital gains.

Earnings Capitalisation Approach (E/MP Approach)

According to this approach, the cost of equity (K_e) is the discount rate that equates the present value of expected future earnings per share with the net proceeds (or current market price) of a share. The advocates of this approach establish a relationship between earnings and market price of the share. They say that, it is more useful than the dividend capitalisation approach, due to two reasons, one, the earnings capitalization approach acknowledges that all earnings of the company, after payment of fixed dividend to preference shareholders, legally belong to equity shareholders whether they are paid as dividends or retained for investment, secondly, and most importantly, determining the market price of equity shares is based on earnings and not dividends. Computation

Notes

of retained earnings cost, taken separately leads to double the company's cost of capital. Assumption of earnings capitalization approach is employed under the following conditions:

1. Constant earnings per share over the future period;
2. There should be either 100 per cent rotation ratio or 100 per cent dividend payout ratio; and
3. The company satisfies the requirements through equity shares and does not employ debt.

Cost of equity can be calculated with the following formula:

$$K_e = \frac{E}{CMP \text{ or } NP}$$

Where,

K_e = Cost of equity

E = Earnings per share

CMP = Current market price per share

NP = Net proceeds per share.

Illustration 6:

Well do Company Ltd. is currently earning 15 per cent operating profit on its share capital of ₹ 20 lakh (FV of ₹ 200 per share). It is interested to go for expansion for which the company requires an additional share capital of ₹ 10 lakh. Company is raising this amount by the issue of equity shares at 10 per cent premium and the expected floatation cost is 5 per cent. Calculate the cost of equity.

Solution:

$$K_e = \frac{E}{NP} \times 100$$

$$= \frac{₹\ 30}{(₹\ 200 + 20 - 10)} \times 100$$

$$= \frac{₹\ 30}{₹\ 210} \times 100$$

= 14.3 per cent

1. ***Calculation of EPS***

   Operating Profit = ₹20,00,000 × 0.15 = ₹3,00,000

   No.of Equity Shares = 20,00,000/200 = 10,000 Shares

   EPS = 3,00,000/10,000 = ₹30

2. Net Proceeds (NP) = Face value + Premium – Floatation cost

   = 200 + 20 – 10 = ₹210

Illustration 7:

A firm is currently earning ₹ 1,00,000 and its share is selling at a market price of ₹ 90. The firm has 10,000 shares outstanding and has no debt. Compute the cost of equity.

Solution:

$$K_e = \frac{E}{MP} \times 100$$

Notes

$$= \frac{₹\ 10}{90} \times 100 = 11.11$$

Limitations: Earnings capitalization approach has the following limitations:

1. All earnings are not distributed to the equity shareholders as dividends.
2. Earning per share may not be constant.
3. Share price also does not remain constant.

Dividend Capitalization plus Growth Rate Approach [(D/MP) + g]

Computation of cost of equity capital based on a fixed dividend rate may not be appropriate, because the future dividend may grow. The growth in dividends may be constant perpetually or may vary over a period of time. It is the best method over dividend capitalisation approach, since it considers the growth in dividends. Generally, investors invest in equity shares on the basis of the expected future dividends rather than on current dividends. They expect increase in future dividends. Growth in dividends will have positive impact on share prices.

Cost of Capital under Constant Growth Rate Perpetually: The formula for computation of cost of equity under constant growth rate is:

$$K_e = \frac{D}{NP \text{ or } CMP} + g$$

Where,

K_e = Cost of equity capital

D = Dividends per share.

NP = Net proceeds per share.

CMP = Current market price per share.

g = Growth rate (%).

Illustration 8:

Equity shares of a paper manufacturing company is currently selling for ₹ 100. It wants to finance its capital expenditure of ₹ 1 lakh either by retaining earnings or selling new shares. If company seeks to sell shares, the issue price will be ₹ 95. The expected dividend next year is ₹ 4.75 and it is expected to grow at 6 per cent perpetually. Calculate cost of equity capital (internal and external).

Solution:

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

$$K_e = \frac{4.75}{100} + 0.06$$

$$= 0.048 + 0.06 = 10.8 \text{ per cent}$$

Calculate cost of external equity (Issue of shares)

$$K_e = \frac{4.75}{95} + 0.06$$

$$= 0.050 + 0.06 = 11 \text{ per cent}$$

Notes

Cost of Capital under Variable Growth Rate: The computation cost of equity after a specific period, is based on the estimation of growth rate in dividends of a company. Expected growth rate will be calculated based upon the past trend in dividend. It may not be unreasonable to project the trend into the future, based on the past trend. The financial manager must estimate the internal growth rate in dividends on the basis of long range plans of the company. Expected growth rate in the internal context requires to be adjusted. Compound growth rate in dividends can be computed with the following formula.

$$gr = D_o (1 + r)_n = D_n$$

Where,

gr = Growth rate in dividends

D_o = First year dividend payment

$(1 + r)^n$ = Present value factor for 'nth' year

D_n = Last year dividend payment.

Illustration 9:

From the following dividends record of a company, compute the expected growth rate in dividends.

Year	1996	1997	1998	1999	2000	2001	2002	2003
Dividends per share (₹)	21	22	23	24	25	26	27	28

Solution:

$$gr = D_o (1 + r)_n = D_n = 21 (1 + r)^7 = 28$$

$$(1 + r)^7 = 28 \div 21 (1 + r)^7 = 1.334$$

During seven years the dividends has increased by ₹ 7 giving a compound factor of 1.334. The growth rate is 4 per cent since the sum of ₹ 1 would accumulate to ₹ 1.334 in seven years at 4 per cent interest.

Illustration 10:

Mr. A an investor, purchases an equity share of a growing company for ₹ 210. He expects the company to pay dividends of ₹ 10.5, ₹ 11.025 and ₹ 11.575 in years 1, 2 and 3 respectively and he expects to sell the shares at a price of ₹ 243.10 at the end of three years.

1. Determine the growth rate in dividends.
2. Calculate the current dividend yield.
3. What is the required rate of return of Mr. A on his equity investment?

Solution:

1. ***Computation of growth rate (gr)***

$$gr = D_o (1 + r)^n = D_n = ₹\ 10.5 (1 + r)^2 = ₹\ 11.575$$

$$(1 + r)^2 = \frac{11.575}{10.5}$$

$$(1 + r)^2 = 1.103$$

$$gr = 5 \text{ per cent}$$

Notes

2. ***Calculation of the current dividend yield***

3rd year dividend ₹ 11.575

$$\text{Current dividend yield} = \frac{11.575}{100} \times 105 = ₹\ 12.154$$

$$\text{Growth in dividend is [12.154 – 11.575]} = 0.579$$

$$\text{Current dividend yield } \frac{0.579}{11.575} \times 100 = 5 \text{ per cent}$$

In simple words, current dividend yield is equal to growth rate in dividends.

3. ***Mr. A's required rate of return***

$$K_e = \frac{D}{\text{Expected sales price (MP)}} + g$$

$$= \frac{₹\ 12.154}{243.10} + 0.05$$

$$= 0.050 + 0.05 = 0.10 \times 100 = 10 \text{ per cent}$$

Illustration 11: (Variable growth rates)

A textile company's dividends have been expected to grow in the following manner.

1 – 2 years	15 per cent
3 – 5 years	10 per cent
6 year and beyond	5 per cent

The company currently pays a dividend of ₹ 2 per share, which is currently selling at ₹ 75 per share. What would be the cost of equity capital assuming a fixed dividend pay out ratio?

Solution:

$$NP = \sum_{t=1}^{n} \frac{D_0(1+gr)^t}{(1+K_e)^t} + \frac{D_{n+1}}{K_e - g^n} \times \frac{1}{(1+K_e)^n}$$

$$75 = \frac{2.3}{(1+K_e)^1} + \frac{2.645}{(1+K_e)^2} + \frac{2.9095}{(1+K_e)^3} + \frac{3.200}{(1+K_e)^4} + \frac{3.52}{(1+K_e)^5} + \frac{3.52(1+0.05)}{(1+K_e)^5} \times \frac{1}{(1+K_e)^5}$$

$$= 2.3(PVIF_{1.K_e}) + 2.645(PVIF_{2.K_e}) + 2.9095(PVIF_{3.K_e}) + 3.2(PVIF_{4.K_e}) + 3.52(PVIF_{5.K_e}) + \frac{3.696(PVIF_{6.K_e})}{K_e - 0.05}$$

By trial and error method using PV tables, we find Ke = 14%

First trial at 14%

$$75 = 2.3(0.877) + 2.645(0.769) + 2.909(0.675) + 3.2(0.592) + 3.52(0.519) + \frac{3.696}{0.14 - 0.05} \times (0.456)$$

$$75 = 2.02 + 2.03 + 1.96 + 1.89 + 1.83 + 18.73$$

$$75 = 28.5$$

Notes

Here, 75 is not equal to 28.5, for increasing the 28.5 to 75 we have to try at a lower rate, say 6%

$$= 2.3(0.943) + 2.645(0.890) + 2.907(0.840) + 3.2(0.823) + 3.52(0.747) + \frac{3.696}{0.06 - 0.05} \times (0.705)$$

$$= 2.17 + 2.35 + 2.44 + 2.63 + 2.63 + 260.568 = 272.79$$

New PV of cash out flows exceeding cash inflow. So, we will use interpolation formula

$$K_e = 6\% + \left((14\% - 6\%)\frac{272.79 - 75}{272.79 - 28.5}\right)$$

$$= 6\% + 8\%\left(\frac{197.79}{244.29}\right)$$

$$K_e = 6\% + 6.48 = 12.48 \text{ per cent.}$$

Bond Yield Plus Risk Premium Approach

According to this approach, the rate of return required by the equity shareholder of a company is equal to

$$K_e = \text{Yield on long-term bonds} + \text{Risk premium}$$

The logic of this approach is very simple, equity investors bear a higher risk than bond investors and hence their required rate of return should include a premium for their higher risk. In other words, bond holders and equity shareholders, both are providing funds to the company, but the company assures a fixed rate of interest to the bond holders and not to the equity shareholders, hence, there is a risk involved due to uncertainty of expected dividends. It makes a sense to base the cost of equity on a readily observable cost of debt. The problem involved in this approach, is the addition of premium, should it be one per cent, two per cent, three per cent or 'n' per cent. There is no theoretical basis for estimating the risk premium. Most analysts look at the operating and financial risks of the business and arrive at a subjectively determined risk premium that normally ranges between 3 per cent to 5 per cent. Cost of equity capital calculated, based on this approach is not a precise one, but it is a ballpark estimation.

Computation of the cost of equity based on dividends capitalisation and earnings capitalisation, have serious limitations. It is not possible to estimate future dividends and earnings correctly, both these variables are uncertain. In order to remove the difficulty in the estimation of the rate of return that investors expect on equities, where future dividends, earnings and market price of share are uncertain, Realised Yield Approach is suggested.

Did u know? **What is Realised Yield Approach?**

Realised Yield Approach takes into consideration that, the actual average rate of returns realised in the past few years, may be applied to compute the cost of equity share capital i.e, the average rate of returns realised by considering dividends received in the past few years along with the gain realised at the time of sale of share.

This is more logical because the investor expects to receive in future at least what he has received in the past. The realised yield approach is based on the following assumptions:

1. Firms risk does not change over the period.
2. Past realised yield is the base for shareholders expectations.

Notes

3. There is no opportunity cost to investors.

4. Market price of equity share does not change significantly.

Calculation of the cost of equity based on realised yield approach is not realistic, due to unrealistic assumptions.

Illustration 12:

XYZ Company is planning to sell equity shares. Mr. A is planning to invest in XYZ Company by purchasing equity shares. Bond yield of XYZ Company is 12 per cent. Mr. A, an investor requests you to calculate his required rate of return on equity with 3 per cent risk premium.

Solution:

$$K_e = \text{Bond yield} + \text{Risk premium} = 10\% + 3\% = 13 \text{ per cent}$$

Illustration 13:

An investor purchased equity share of HPH company at ₹ 240 on 01.01.1998 and after holding it for 5 years sold the share in early 2003 at ₹ 300. During this period of 5 years, he received a dividend of ₹ 14 in 1998 and 1999 and ₹ 14.5 from 2000 to 2002. Calculate the cost of equity capital based on realised yield approach with 10 per cent discounting factor.

Solution:

Years	Cash inflows (₹)	DF 10%	PV of Cash inflows (₹)
1998	14.0	0.909	12.7
1999	14.0	0.826	11.6
2000	14.5	0.751	10.9
2001	14.5	0.683	9.9
2002	14.5	0.621	9.0
2003	300.0	0.621	186.3
			240.4
		(-) Purchase price in 1998	240.0
			0.4

At 10 per cent discount rate, the total PV of cash inflows equals to the PV of cash outflows. Hence, cost of equity capital is 10 per cent.

6.4.2 Cost of Preference Shares

The preference share is issued by companies to raise funds from investors. Preference share has two preferential rights over equity shares, (i) preference in payment of dividend, from distributable profits, (ii) preference in the payment of capital at the time of liquidation of the company.

Computation of cost of preference share capital have some conceptual difficulty. Payment of dividend is not legally binding on the company and even if dividends are paid, they are not a charge on earnings, they are distributed from distributable profits. This may create an idea that preference share capital is cost free, which is not true.

The cost of preference share capital is a function of the dividend expected by the investors. Generally, preference share capital is issued with an intention (a fixed rate) to pay dividends. In case dividends are not paid, it will affect the firm's fund raising capacity. For this reason, dividends on preference share capital should be paid regularly except when the firm does not make profits.

Notes

There are different types of preference shares, cumulative and non-cumulative, redeemable and irredeemable, participating and non-participating, and convertible and non-convertible. But computation of cost of preference share will be only for redeemable and irredeemable.

Cost of Irredeemable Preference Share/Perpetual Preference Share

The share that cannot be paid till the liquidation of the company is known as irredeemable preference share. The cost is measured by the following formula:

$$K_p \text{ (without tax)} = \frac{D}{\text{CMP or NP}}$$

Where,

K_p = Cost of preference share

D = Dividend per share

CMP = Market price per share

NP = Net proceeds

Cost of irredeemable preference stock (with dividend tax)

$$K_p \text{ (with tax)} = \frac{D(1+D_t)}{\text{CMP or NP}}$$

Where,

D_t = tax on preference dividend

Illustration 14:

HHC Ltd., issues 12 per cent perpetual preference shares of face value of ₹ 200 each. Compute cost of preference share (without tax).

Solution:

$$K_p = \frac{D}{NP} \times 100$$

$$= 12 \text{ per cent}$$

Illustration 15: (with dividend tax)

A company is planning to issue 14 per cent irredeemable preference share at the face value of ₹ 250 per share, with an estimated flotation cost of 5%. What is the cost of preference share with 10% dividend tax.

Solution:

$$K_p = \frac{D(1+D_t)}{NP} \times 100$$

$$= \frac{35(1+0.10)}{237.5} \times 100 = 16.21 \text{ per cent}$$

Illustration 16:

Sai Ram & Co. is planning to issue 14 per cent perpetual preference shares, with face value of ₹ 100 each. Floatation costs are estimated at 4 per cent on sales price. Compute (a) cost of

Notes

preference shares if they are issued at (i) face/par value, (ii) 10 per cent premium, and (iii) 5 per cent discount, (b) compute cost of preference share in these situation assuming 5 per cent dividend.

Solution:

Without dividend tax	With dividend tax
(i) Issued at face value $K_p = \frac{14}{(100 - 4)} = 14.6$ per cent	(i) Issued at face value $K_p = \frac{14(1 + 0.05)}{96} = 15.4$ per cent
(ii) Issued at 10% premium $K_p = \frac{14}{(110 - 4)} = 13.2$ per cent	(ii) Issued at 10% premium $K_p = \frac{14(1 + 0.05)}{106} = 13.9$ per cent
(iii) Issued at 5% discount $K_p = \frac{14}{(100 - 5 - 3.8)} = 15.4$ per cent	(iii) Issued at 5% discount $K_p = \frac{14(1 + 0.05)}{91.2} = 16.2$ per cent

Cost of Redeemable Preference Shares

Shares that are issued for a specific maturity period or redeemable after a specific period are known as redeemable preference shares. The explicit cost of redeemable preference shares is the discount rate that equates the net proceeds of the sale of preference shares with the present value of the future dividend and principal repayments. In other words, cost of preference share is the discount rate that equates the present value of cash inflows (sale proceeds) with the present value of cash outflows (dividend + principal repayment). Dividends will be paid at the end of each year, but the principal amount will be repaid either in lump sum at the end of maturity period or in installments (equal or unequal). If the principal amount is paid in instalments, then the cash outflow for each year equals to dividend plus part of principal amount. Cost of preference shares, when the principal amount is repaid in one lump sum amount:

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

$$NP = \frac{D_1}{(1+K_p)^1} + \frac{D_2}{(1+K_p)^2} + \frac{D_3}{(1+K_p)^3} + \dots\dots\dots + \frac{P_n}{(1+K_p)^n}$$

Where,

K_p = Cost of preference share.

NP = Net sales proceeds (after discount, flotation cost).

D = Dividend on preference share.

P_n = Repayment of principal amount at the end of 'n' years.

Illustration 17: (Lump sum repayment)

A company issues ₹ 1,00,000, 10 per cent preference shares of ₹ 100 each redeemable after 10 years at face value. Cost of issue is 10 per cent. Calculate the cost of preference share.

Solution:

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

Notes

$$90 = \sum_{t=1}^{10} \frac{10}{(1+K_p)^t} + \frac{₹\,100}{(1+K_p)^{10}}$$

The trial and error method is used here, for the computation of the cost of preference share.

Year	Cash outflow (₹)	PV factor		Present Values	
		10%	12%	10%	12%
1 - 10	10	6.145	5.650	61.45	56.5
10	100	0.386	0.322	38.60	32.2
Total PV of Cash outflow				**100.05**	**88.70**
(-) PV of Cash inflow				90.00	90.00
				10.05	(-) 1.3

In trials, PV of cash outflow did not equal to the PV of cash inflow (₹ 100). Hence, cost of preference share is calculated by using interpolation formula.

$$K = LDF(\%) + \left((HDF - LDF)\frac{LDFPV - PV\ of\ CIF}{LDFPV - HDFPV}\right)$$

Where,

LDF = Lower discounting factor in %.

LDFPV = Lower discounting factor present value (₹).

HDFPV = Higher discounting factor present value (₹).

PV of CIF = Present value of cash inflows.

$$Kp = 10\% + \left((12\% - 10\%)\frac{100.05 - 90}{100.05 - 88.7}\right)$$

$$= 10\% + \left(2 \times \frac{10.05}{11.35}\right)$$

$$= 10\% + 2 \times 0.886 = 10\% + 1.772$$

= 11.77 per cent

Short cut formula:

$$K_p = \frac{D + (f + d + p_r - p_i)/N_m}{(RV + NP)/2}$$

Where,

D = Dividend per share.

f = Flotation cost (₹).

d = Discount on issue of preference share (₹).

p_r = Premium on redemption of preference shares (₹).

p_i = Premium on issue of preference share (₹).

N_m = Term of preference shares.

RV = Redeemable value of preference share.

Notes

NP = Net proceeds realized.

$$K_p = \frac{10+(10+0+0-0)/10}{(100+90)/2}$$

$$= \frac{10+(1)}{95} = 11.579 \text{ per cent}$$

6.4.3 Cost of Debentures/Debt/Public Deposits

Companies may raise debt capital through issue of debentures or loan from financial institutions or deposits from public. All these resources involve a specific rate of interest. The interest paid on these sources of funds is a charge on the profit & loss account of the company. In other words, interest payments made by the firm on debt issue qualify tax deduction in determining net taxable income. Computation of cost of debenture or debt is relatively easy, because the interest rate that is payable on debt is fixed by the agreement between the firm and the creditors. Computation of cost of debenture or debt capital depends on their nature. The debt/debentures can be perpetual or irredeemable and redeemable cost of debt capital is equal to the interest paid on that debt, but from company's point of view it will be less than the interest payable, when the debt is issued at par, since the interest is tax deductible. Hence, computation of debt is always after tax cost.

Cost of Irredeemable Debt/Perpetual Debt

Perpetual debt provides permanent funds to the firm, because the funds will remain in the firm till liquidation. Computation of cost of perpetual debt is conceptually relatively easy. Cost of perpetual debt is the rate of return that lender expect (i.e., fixed interest rate). The coupon rate or the market yield on debt can be said to represent an approximation of cost of debt. Bonds/ debentures can be issued at (i) par/face value, (ii) discount and (iii) premium. The following formulae are used to compute cost of debentures or debt of bond:

(i) Pre-tax cost

$$K_{di} = \frac{I}{P \text{ or } NP}$$

(ii) Post-tax cost

$$K_{di} = \frac{I(1-t)}{P \text{ or } NP}$$

Where,

K_{di} = Pre-tax cost of debentures.

I = Interest

P = Principal amount or face value.

P = Net sales proceeds.

t = Tax rate.

Illustration 18:

XYZ Company Ltd., decides to float perpetual 12 per cent, debentures of ₹ 100 each. The tax rate is 50 per cent. Calculate cost of debenture (pre- and post-tax cost).

Notes

Solution:

(i) ***Pre-tax cost***

$$K_{di} = \frac{₹\ 12}{100} = 12 \text{ per cent}$$

(ii) ***Post-tax cost***

$$K_d = \frac{12(1-0.5)}{100} = 6 \text{ per cent}$$

Generally, cost of debenture is equal to the interest rate, when debenture is issued at par and without considering tax. Cost will be less than the interest when we calculate cost after considering tax since it is tax deductible. From the cost of capital point of view, debenture cost is always in post tax cost.

Sometimes debentures may be issued at premium or discount. A company, which is having a good track record, will be issued at premium and a company that is new or unknown to the public or has a nominal or poor track record will be issued at discount. Whenever debentures are issued at premium or discount the cost of debenture will be affected, it will decrease or increase respectively.

Illustration 19:

Rama & Co. has 15 per cent irredeemable debentures of ₹ 100 each for ₹ 10,00,000. The tax rate is 35 per cent. Determine debenture assuming it is issued at (i) face value/par value (ii) 10 per cent premium and (iii) 10 per cent discount.

Solution:

Issued at	Pre-tax	Post-tax
(i) Face value	$\frac{₹\ 15}{100} = 15$ per cent	$\frac{15(1-0.35)}{100} = 9.8$ per cent
(ii) 10% premium	$\frac{₹\ 15}{110} = 13.7$ per cent $(100+10)$	$\frac{15(1-0.35)}{110} = 8.9$ per cent
(iii) 10% discount	$\frac{₹\ 15}{90} = 16.67$ per cent $(100-10)$	$\frac{15(1-0.35)}{90} = 10.9$ per cent

Cost of Redeemable Debentures/Debt

Redeemable debentures that, are having a maturity period or are repayable after a certain given period of time. In other words, these type of debentures that are under legal obligation to repay the principal amount to its holders either at certain agreed intervals during the duration of loan or as a lump sum amount at the end of its maturity period. These type of debentures are issued by many companies, when they require capital for fulfilling their temporary needs.

Notes

Cost of Redeemable Debentures

$$K_d = \sum_{t=1}^{n} \frac{NI_t}{(1+K_d)^t} + \frac{P_n}{(1+K_d)^n}$$

Where,

K_d = Cost of debentures.

n = Maturity period.

NI = Net interest (after tax adjustment).

P_n = Principal repayment in the year 'n'.

Illustration 20:

BE Company issues ₹ 100 par value of debentures carrying 15 per cent interest. The debentures are repayable after 7 years at face value. The cost of issue is 3 per cent and tax rate is 45 per cent. Calculate the cost of debenture.

Solution:

$$(100-3) = \sum_{t=1}^{7} \frac{15(1-0.45)}{(1+K_d)^t} + \frac{100}{(1+K_d)^n}$$

Year	Cash outflow (₹)	DF		PV of Cash Outflows (₹)	
		7%	10%	7%	10%
1 - 7	8.25	5.389	4.868	44.96	40.16
7	100	0.623	0.513	62.30	51.30
	PV of cash out flows			**106.76**	**91.46**
(-) PV of Cash inflows				97.00	97.00
				9.76	**5.54**

Cost of debenture capital lies between 10 per cent and 12 per cent, because net present value ₹ 97 lies between the PV of 10 per cent and 12 per cent. Exact cost can be computed only with interpolation formula:

$$K_d = LDF + \left((HDF - LDF) \frac{LDFPV - NP}{LDFPV - HDFPV} \right)$$

Where,

LDF = Lower discounting factor.

HDF = Higher discounting factor.

LDFPV = Lower discounting factor present value.

HDFPV = Higher discounting factor PV.

PVCIF = Present value of cash inflows

NP = Net proceeds.

$$K_d = 7\% + \left[3 \times \frac{106.76 - 97}{106.76 - 91.46} \right]$$

$$= 7\% + 1.91 = 8.91\%$$

Notes

Short cut method

$$K_p = \frac{I(1-t)+(f+d+p_r-p_i)/N_m}{(RV+NP)/2}$$

Where,

I = Interest

t = Tax rate

f = Flotation cost

d = Discount

p_r = Premium on redemption

p_i = Premium on issue

RV = Redeemable value

NP = Net proceed

N_m = Maturity period of debt

$$K_p = \frac{15(1-0.45)+(3-0+0-0)/7}{(100-97)/2}$$

$$K_p = \frac{8.68}{98.5} = 8.81\%$$

Illustration 21: (Instalment repayment)

Hari Ram & Co. issued 14 per cent debentures aggregate at ₹ 2,00,000. The face value of debenture is ₹ 100. Issue cost is 5 per cent. The company has agreed to repay the debenture in 5 equal instalment at par value. Instalment starts at the end of the year. The company's tax rate is 35 per cent. Compute cost of debenture.

Solution:

Sales proceeds = Face value – Flotation cost = ₹ 100 – 5 = ₹ 95

Instalment amount = Face value ÷ No. of instalments = 100 ÷ 5 = ₹ 20.

Years	Cash Outflow (₹)	DF Factor		PV of Cash Outflows (₹)	
	(NI + Instalment)	8%	13%	8%	13%
1	9.1 + 20 = 29.1	0.926	0.885	26.947	25.754
2	7.28 + 20 = 27.28	0.857	0.783	23.379	21.361
3	5.46 + 20 = 25.46	0.794	0.693	20.216	17.644
4	3.64 + 20 = 23.64	0.735	0.613	17.376	14.492
5	1.82 + 20 = 21.82	0.681	0.543	14.860	11.849
	PV of cash out flows			**102.778**	**91.230**
	PV of cash inflows			95.000	95.000
				(+) 7.778	(-)3.770

$$K_d = 8\% + \left((13-8)\times\frac{102.778-95}{102.778-91.1}\right)$$

$$= 8\% + \left(5\times\frac{7.778}{11.678}\right)$$

= 8% + 3.33 = 11.33 per cent

Notes

Self Assessment

Fill in the blanks:

10. Cost of debenture is equal to the……., when debenture is issued at par and without considering tax.
11. Cost of preference share is the ……that equates the present value of cash inflows with the present value of cash outflows.
12. Retention of earnings involves an …….cost.

6.5 Weighted Average Cost of Capital (WACC)

A company has to employ a combination of creditors and fund owners. The composite cost of capital lies between the least and most expensive funds. This approach enables the maximisation of profits and the wealth of the equity shareholders by investing the funds in projects earning in excess of the overall cost o capital.

The composite cost of capital implies an average of the costs of each of the source of funds employed by the firm property, weighted by the proportion they hold in the firm's capital structure.

6.5.1 Steps Involved in Computation of WACC

1. Determination of the type of funds to be raised and their individual share in the total capitalisation of the firm.
2. Computation of cost of specific source of funds.
3. Assignment of weight to specific costs.
4. Multiply the cost of each source by the appropriate assigned weights.
5. Dividing the total weighted cost by the total weights to get overall cost of capital.

Once the company decides the funds that will be raised from different sources, then the computation of specific cost of each component or source is completed after which, the third step in computation of cost of capital is, assignment of weights to specific costs, or specific sources of funds. How to assign weights? Is there any base to assign weights? How many types of weights are there?

Assignment of Weights: The weights to specific funds may be assigned, based on the following:

1. ***Book Values:*** Book value weights are based on the values found on the balance sheet. The weight applicable to a given source of fund is simply the book value of the source of fund divided by the book value of the total funds.

   The merits of book values weights are:

   (a) Calculation of weights is simple.

   (b) Book values provide a usable base, when firm is not listed or security is not actively traded.

   (c) Book values are really available from the published records of the firm.

   (d) Analysis of capital structure in terms of debt – equity ratio is based on book value.

   Disadvantage of book value weights

   Book value proportions are not consistent with the concept of cost of capital because the latter is defined as the minimum rate of return to maintain the market value of the firm.

Notes

Caution There is no relation between book values and present economic values of the various sources of capital

2. ***Capital Structure Weights:*** Under this method, weights are assigned to the components of capital structure based on the targeted capital structure. Depending up on the target, capital structures have some difficulties. They are:

   (a) A company may not have a well defined target capital structure.

   (b) It may be difficult to precisely estimate the components of capital costs, if the target capital is different from present capital structure.

3. ***Market Value Weights:*** Under this method, assigned weights to a particular component of capital structure is equal to the market value of the component of capital divided by the market value of all components of capital and capital employed by the firm.

   Advantages of Market Value Weights

   (a) Market values of securities are approximately close to the actual amount to be received from their sale.

   (b) Costs of the specific resources of funds that constitute the capital structure of the firm, are calculated by keeping in mind the prevailing market prices.

   Disadvantages of Market Value Weights

   (a) Market values may not be available when a firm is not listed or when the securities of the firm are very thinly traded.

   (b) Market value may be distorted when securities prices are influenced by manipulation loading.

   (c) Equity capital gets greater importance.

Did u know? Most of the financial analysts prefer to use market value weights because it is theoretically consistent and sound.

Illustration 22:

A firm has the following capital structure as the latest statement shows:

Source of Funds	₹	After Tax Cost (%)
Debt	30,00,000	4
Preference shares	10,00,000	8.5
Equity share	20,00,000	11.5
Retained earnings	40,00,000	10
Total	**100,00,000**	

Based on the book values compute the cost of capital.

Solution:

Source of Finance	Weights	Specific Cost (%)	Weighted Cost
Debt	0.30	0.04	0.012

Contd...

Notes

Preference shares	0.10	0.08	0.008
Equity share	0.20	0.11	0.022
Retained earnings	0.40	0.10	0.040
	1.00		**0.082**

Overall cost of capital (Ko) = Total Weighted Cost × 100

= 0.082 × 100 = 8.2 per cent

Cost of Weight

$$\text{Debt weight} = \frac{\text{Debt capital}}{\text{Total capital}} = \frac{30,00,000}{1,00,00,000} = 0.30$$

Illustration 23:

XYZ company supplied the following information and requested you to compute the cost of capital based on book values and market values.

Source of Finance	Book Value (₹)	Market Value (₹)	After Tax Cost (%)
Equity capital	10,00,000	15,00,000	12
Long-term debt	8,00,000	7,50,000	7
Short-term debt	2,00,000	2,00,000	4
Total	**20,00,000**	**24,50,000**	

Solution:

Computation of Cost of Capital based on Book Value

Source of Finance	Book Value (₹)	Weights	Specific cost	Weighted cost
(1)	(2)	(3)	(4)	(5) = (3) × (4)
Equity capital	10,00,000	0.50	0.12	0.060
Long-term debt	8,00,000	0.40	0.07	0.028
Short-term debt	2,00,000	0.10	0.04	0.004
Total	**20,00,000**	**1.00**		**0.092**

Cost of capital = 0.092 × 100 = 9.2 per cent

Cost of Capital based on Market Value Weight

Source of Finance	Book Value (₹)	Weights	Specific cost	Weighted cost
(1)	(2)	(3)	(4)	(5) = (3) × (4)
Equity capital	15,00,000	0.613	0.12	0.074
Long-term debt	7,50,000	0.307	0.07	0.022
Short-term debt	2,00,000	0.080	0.04	0.003
	24,50,000	**1.000**		**0.099**

Cost of capital = 100 × 0.099 = 9.9 per cent

Notes

Weighted Average Cost of Capital (Alternative Method)

Source of Finance	Market Value (₹)	Cost (%)	Total Cost
(1)	(2)	(3)	(4) = (2) × (3)
Equity capital	15,00,000	0.12	1,80,000
Long-term debt	7,50,000	0.07	52,500
Short-term debt	2,00,000	0.04	8,000
	24,50,000		**2,40,500**

$$\text{WACC} = \frac{\text{Total Cost}}{\text{Total Capital}}$$

$$= \frac{2,40,500}{24,50,000} \times 100 = 9.9\% \quad \text{approx.} = 10 \text{ per cent}$$

6.5.2 Marginal Cost of Capital

Companies may rise additional funds for expansion. Here, a financial manager may be required to calculate the cost of additional funds to be raised. The cost of additional funds is called marginal cost of capital. For example, a firm at present has ₹ 1,00,00,000 capital with WACC of 12 per cent, but it plans to raise ₹ 5,00,000 for expansion, such as additional funds, the cost that is related to this ₹ 5 lakhs is marginal cost of capital.

The weighted average cost of new or incremental, capital is known as the marginal cost of capital. The marginal cost of capital is the weighted average cost of new capital using the marginal weights. The marginal weights represent the proportion of various sources of funds to be employed in raising additional funds.

Notes The marginal cost of capital shall be equal to WACC, when a firm employs the existing proportion of capital structure and some cost of component of capital structure. But in practice WACC may not be equal to marginal cost of capital due to change in proportion and cost of various sources of funds used in raising new capital. The marginal cost of capital ignores the long-term implications of the new financing plans. Hence, WACC should be preferred, to maximise the shareholders wealth in the long-term.

Illustration 24:

HLL has provided the following information and requested you to calculate (a) WACC using book-value weights and (b) weighted marginal cost of capital (assuming that specified cost do not change).

Source of Finance	Amount (₹)	Weights (%)	After tax cost (%)
Equity capital	14,00,000	0.452	9
Preference capital	8,00,000	0.258	12
Debentures	9,00,000	0.290	16

HLL wishes to raise an additional capital of ₹ 12,00,000 for the expansion of the project. The details are as follows:

Equity capital	₹ 3,00,000
Preference capital	₹ 3,00,000
Debentures	₹ 6,00,000

Notes

Solution:

Computation of WACC

Source of Finance	Weights	After tax Cost (%)	Weighted Cost
Equity capital	0.452	0.09	0.041
Preference capital	0.258	0.12	0.031
Debentures	0.290	0.16	0.046
			0.118

WACC = 0.118 × 100 = 11.8 per cent

Computation of Weighted Marginal Cost of Capital (WACC)

Source of Finance	Marginal Weights	After tax Cost (%)	Weighted marginal cost
Equity capital	0.50	0.09	0.045
Preference capital	0.25	0.12	0.030
Debentures	0.25	0.16	0.040
			0.115

WACC = 0.115 × 100 = 11.5 per cent

6.5.3 Factors Affecting WACC

Weighted average cost of capital is affected by a number of factors. They are divided into two categories such as:

1. ***Controllable Factors:*** Controllable factors are those factors that affect WACC, but the firm can control them. They are:

   (a) *Capital Structure Policy:* As we have assured, a firm has a given target capital structure where it assigns weights based on that target capital structure to calculate WACC. However, a firm can change its capital structure or proportions of components of capital that affect its WACC. For example, when a firm decides to use more debt and less equity, which will lead to reduction of WACC. At the same time increasing proportion of debt in capital structure increases the risk of both debt and equity holder, because it increases fixed financial commitment.

   (b) *Dividend Policy:* The required capital may be raised by equity or debt or both. Equity capital can be raised by issue of new equity shares or through retained earnings. Sometimes companies may prefer to raise equity capital by retention of earnings, due to issue of new equity shares, which are expensive (they involve flotation costs). Firms may feel that retained earnings is less costly when compared to issue of new equity. But if it is different it is more costly, since the retained earnings is income that is not paid as dividends hence, investors expect more return and so it affects the cost of capital.

   (c) *Investment Policy:* While estimating the initial cost of capital, generally we use the starting point as the required rate of return on the firm's existing stock and bonds. Therefore, we implicitly assume that new capital will be invested in assets of the same type and with the same degree of risk. But it is not correct as no firm invest in assets similar to the ones that currently operate, when a firm changes its investment policy. For example, investment in diversified business.

Notes

2. ***Uncontrollable Factors:*** The factors that are not possible to be controlled by the firm and mostly affects the cost of capital. These factors are known as External factors.

   (a) *Tax Rates:* Tax rates are beyond the control of a firm. They have an important effect on the overall cost of the capital. Computation of debt involves consideration of tax. In addition, lowering capital gains tax rate relative to the rate on ordinary income makes stocks more attractive and reduces cost of equity and lower the overall cost of capital.

   (b) *Level of Interest Rates:* Cost of debt is interest rate. If interest rates increases, automatically cost of debt also increases. On the other hand, if interest rates are low then the cost of debt is less. The reduced cost of debt decreases WACC and this will encourage an additional investment.

   (c) *Market Risk Premium:* Market risk premium is determined by the risk in investing proposed stock and the investor's aversion to risk. Market risk is out of control risk, i.e., firms have no control on this factor.

The above are the important factors that affect the cost of capital.

Task Weighted average of cost of capital may be determined using book value and market value weights. Compare the pros and cons of using market value weights rather than book value weights in calculating WACC.

Self Assessment

Fill in the blanks:

13. The weighted average cost of new or incremental, capital is known as the ……....

14. Book value weights are based on the values found on the……

15. The ……..cost of capital lies between the least and most expensive funds.

Case Study

Case: Nike, Inc. – Cost of Capital

On July, Kimi-ford, a portfolio manager at North Point Group, a mutual-fund-management firm, pored over analysts' write-ups of Nike, Inc., the athletic-shoe manufacturer. Nike's share price had declined significantly from the start of the year. Ford was considering buying some shares for the fund she managed, the North Point Large-Cap Fund, which invested mostly in fortune 500 companies, with an emphasis on value investing. Its top holdings included Exxon Mobile. General Motors, McDonald's, 3M, and other large-cap. It had performed extremely well. In 2000, the fund earned a return of 20.7 per cent even as the S&P 500 fell 10.1 per cent. The fund's year-to-date returns at the end of June 2001 stood at 6.4 versus the S&P – 7.3 per cent.

Only a week ago, on June 28,2001, Nike held an analyst' meeting to disclose its fiscal-year 2001 results. The meeting, however had another purpose : Nike management wanted to communicate a strategy for revitalizing the company. Since 1997 Nike's revenues had plateaued at around $9 billion, while net income had fallen from almost $ 800 million to $580 million (see Exhibit 1). Nike's markets in the U.S. had fallen from 48 per cent in 1997

Contd...

Notes

to 42 per cent in 2000. In addition, recent supply-chain issues and the adverse effect of a strong dollar had negatively affected revenue.

At the meeting, the management revealed plans to address both-line growth and operating performance. To boost revenue, the company would develop more athletic-shoe products in the mid-priced segment – a segment that had been overlooked in the recent years. Nike also planned to push its apparel line, which, under the recent leadership of industry veteran Mindy Grossman had performed extremely well. On the cost side, Nike would exert more effort on expense control, finally, the company's executives reiterated their long-term revenue growth targets of 8-10 per cent and earnings-growth targets of above 1 percent.

The Analysts reactions were mixed. Some thought, the financial targets too aggressive ; other saw significant growth opportunities in apparel and in Nike's international businesses.

Ford read all the analysts reports that she could find about the June 28 meeting, but the reports gave her no clear guidance: a Lehman Brothers report recommended a "Strong Buy", while UBS analysts expressed misgiving about the company and recommended a "Hold". Ford decided instead to develop her own discounted-cash-flow forecast to come to a clearer conclusion.

Her forecast showed that, at discount rate of 12 per cent, Nike was overvalued at its current share price of $42.09 (see Exhibit 2). She had, however, done a quick sensitivity analysis that revealed Nike was valued at discount rates below 11.2 per cent. As she was about to go into a meeting, she asked her new assistant, Joanna Cohen, to estimate Nike' s cost of capital.

Cohen immediately gathered all the data she though she might need (Exhibits 1,2,3 and 4) began to work on her analysis. At the end of the day, she submitted her cost-of-capital estimate and a memo (Exhibit 5) explaining her assumption to Ford.

Exhibit 1: Consolidated Income Statements Year ended May 31

(in millions excepts per share data)	2000	2001	2002	2003	2004	2005	2006
Revenues	4,760.8	6,470.6	9,816.5	9,553.1	8,776.9	8,995.1	9,488.8
Cost of goods sold	2,865.3	3,906.7	5,503.0	6,065.5	5,493.5	5,403.8	7,784.9
Gross profit	1,895.6	2,563.9	3,683.5	3,487.6	3,283.4	3,591.3	3,703.9
Selling and administrative	1,209.8	1,588.6	2,303.7	2,623.8	2,426.6	2,606.4	2,689.7
Operating Income	685.8	975.3	1,379.8	863.8	856.8	984.9	1,014.2
Interst expense	24.2	39.5	52.3	60.0	44.1	45.0	58.7
Other expense net	11.7	36.7	32.3	20.9	21.5	23.2	34.1
Restructuring charge,net	---	---	---	129.9	45.1	2.5	---
Income before Income taxes	649.9	899.1	1,295.20	653.0	746.1	919.2	921.4
Income taxes	250.2	345.9	499.4	253.4	294.7	340.1	331.7
Net Income	399.7	553.2	795.8	399.6	451.4	579.4	589.7
Diluted earning per Annum Shares	1.4	1.9	2.7	1.4	1.6	2.1	2.2
Average shares outstanding (diluted)	294.0	293.6	297.0	296.0	287.5	279.8	273.3

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Notes

Growth(%)							
Revenue		35.9	42.0	4.0	8.1	2.5	5.5
Operating income		42.2	41.5	37.4	0.8	15.0	3.0
Net income		38.4	43.9	49.8	13.0	28.3	1.8
Margins (%)							
Gross margin		39.6	40.1	36.5	37.4	39.9	39.0
Operating margin		15.1	15.0	9.0	9.8	10.9	10.7
Net margin		8.5	8.7	4.2	3.1	6.4	6.2
Effective tax rate (%)		38.5	38.6	38.8	39.5	37.0	36.0

Exhibit 2: Discounted - Cash - flow Analysis

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Assumption										
Revenue growth (%)	7.0	6.5	6.5	6.5	6.0	6.0	6.0	6.0	6.0	6.0
COGS/Sales (%)	60.0	60.0	59.5	59.5	59.0	59.0	58.5	58.5	58.0	58.0
S & A / Sales (%)	28.0	27.5	27.0	26.5	26.0	25.5	25.0	25.0	25.0	25.0
Tax rate (%)	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0
Current Assets / sales (%)	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0
Current liabilities/ sales (%)	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5
Yearly depreciations Equals capex.										
Cost of Capital (%)	12.0									
Terminal growth rate (%)	3.0									
Discounted cash flow										
Opeating income	1,218.4	1,351.6	1554.6	1717.0	1950.0	2135.9	2410.2	2554.8	2790.1	2957.5
Taxes	463.0	513.6	590.8	652.5	741.0	811.7	915.9	970.8	1060.2	1123.9
NOPAT	755.4	838.0	963.9	1064.5	1209.0	1324.3	1494.3	1584.0	1729.9	1833.7
Capex.net of dereciation	---	---	---	---	---	---	---	---	---	---
Change in NWC	8.8	-174.9	186.3	198.4	195.0	206.7	219.1	232.3	246.2	261.0
Free cash flow	764.1	663.1	776.6	866.2	1014.0	1176.6	1275.2	1351.7	1483.7	1572.7
Terminal value										17998.7
Total flows	764.1	663.1	776.6	866.2	1014.0	1176.6	1275.2	1351.7	1483.7	19571.5
Present value of flows	682.3	528.6	553.5	550.5	575.4	566.2	576.8	545.9	535.0	6301.5
Enterprise value	11415.7									
Less : current outstanding dept.	1296.6									
Equity value	10119.1									
Current shares outstanding	271.5									
Equity value per share	$37.27		Current share price		$42.09					

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Notes

Exhibit 3: Sensitivity of Equity Value of Discount Rate

Discount rate	Equity value
8.00%	$75.80
8.50	67.85
9.00	61.25
9.50	55.68
10.00	50.92
10.50	46.81
11.00	43.22
11.17	42.09
11.50	40.07
12.00	37.27

Exhibit 4: Consolidated Balance Sheets (in millions) May 31

	2005	2006
Assets		
Current assets		
Cash and equivalents	$254.3	$304.0
Accounts receivable	1,569.4	1,621.4
Inventories	1,446.0	1,424.0
Deferred income taxes	111.5	113.3
Prepaid expenses	215.2	162.5
Total Current assets	3,596.4	3,625.3
Property, plant and equipment, net	1,583.4	1,618.8
Identifiable, intangible assets and goodwill, net	410.9	397.3
Deferred income taxes and other assets	266.2	178.2
Total assets	**$5,856.9**	**$5,819.6**
Liabilities and shareholder's equity		
Current Liabilities		
Current portion of long-term debt	$50.1	$5.4
Notes payable	924.2	855.3
Accounts payable	543.8	432
Accrued liabilities	621.9	472.1
Income taxes payable	-----	21.9
Total current liabilities	2,140.0	1,786.7
Long-term debt	470.3	435.9
Deferred income taxes and other liabilities	110.3	102.2
Redeemable preferred stock	0.3	0.3
Share holder equity		
Common stock, par	2.8	2.8
Capital in excess of stated value	369.0	459.4
Unearned stock comper	11.7	9.9
Accumulated other comprehensive income	111.1	152.1
Retained earnings	2887.0	3194.3
Total share holder equity	3136.0	3494.5
Total liabilities and shareholder's equity	**$5,856.9**	**$5,819.6**

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Notes

Exhibit 5: Dr. Bhatt's Analysis

Subject: Nike's Cost of Capital

Based on the following assumptions, my estimate of Nike's cost of capital is 8.4 percent:

Single or Multiple Costs of Capital

The first question I considered was whether to use single or multiple costs of capital given that Nike has multiple business segments. Aside from footwear, which makes up 62 per cent of revenue. Nike also sells apparel (30 per cent of revenue) that complement its footwear products. In addition, Nike sells sport balls, time-pieces, eyewear, skates, bats and other equipment designed for sports activities. Equipment products account for 3.6 per cent of revenue. Finally, Nike also sells some non-Nike branded products such as Cole-Haan dress and casual footwear, and ice stakes, skate blades, hockey sticks, hockey jerseys and other products under the Bauer trademark, non-Nike brands account for 4.5 per cent of the revenue.

I asked myself, whether Nike's different business segments shad enough risks from each other to warrant different costs of capital. Were their profiles really different? I concluded that it was only the Cole-Haan line that was somewhat different: the rest were all sports-related businesses. However, since Cole-Haan makes up only a tiny fraction of the revenues, I did not think it necessary to compute a separate cost of capital. As for the apparel and footwear lines, they are sold through the same marketing and distribution channels and are often marketed in "collections" of similar design. I believe, they face the same risk factors, as such, I decided to compute only one cost of capital of the whole company.

Methodology for Calculating the Cost of Capital; WACC

Since Nike is funded with both debt and equity, I used the Weighted Average Cost of Capital (WACC) method. Based on the latest available balance sheet, debt as a proportion of total capital makes up 27.0 per cent and equity accounts for 73.0 per cent:

Capital sources	Book Values	
Debt		
Current portion of long-term debt	$ 5.4	
Notes payable	855.3	
Long-term debt	435.9	
	$ 1.291.2	→ 27.0% of total capital
	$ 3.494.5	→ 72.0% of total capital

Cost of Debt

My estimate of Nike's cost of debt is 4.3 per cent. I arrived at this estimate by taking total interest expense for the year 2001 and dividing it by the company's average debt balance. The rare is lower than Treasury yields but that is because Nike raised a portion of its funding needs through Japanese yen notes, which carry rates between 2.0 per cent to 4.3 per cent.

After adjusting for tax, the cost of debt comes to 2.7 per cent. I used a tax rate of 38 per cent, which I obtained by adding state taxes of 3 per cent to the U.S. statutory tax rate. Historically, Nike's state taxes have ranged from 2.5 per cent to 3.5 per cent.

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Notes

Cost of Equity

I estimated the cost of equity, using the Capital Asset Pricing Model (CAPM). Other methods such as the Dividend Discount Model (DDM) and the Earnings Capitalization Ratio can be used to estimate the cost of equity. However, in my opinion, the CAPM is the superior method.

My estimate of Nike's cost of equity is 10.5 per cent I used the current yield on 20-year Treasury bonds as my risk-free rate, and the compound average premium of the market over Treasury bonds (5.9 per cent) as my risk premium. For beta, I took the average of Nike's beta from 1996 to the present.

Putting it all Together

After inputting all my assumptions into the WACC formula, my estimate of Nike's cost of capital is 8.4 per cent.

$$\begin{aligned} WACC &= Kd\,(1 - t) \times D/(D + E) + Kc \times E/(D + E) \\ &= 2.7\% \times 27.0\% + 20.5\% \times 73.0\% \\ &= 8.4\% \end{aligned}$$

Question

What is the importance of cost of capital for any firm?

6.6 Summary

- The cost of capital is viewed as one of the corner stones in the theory of financial management.
- Cost of capital may be viewed in different ways.
- Cost of capital is the weight average cost of various sources of finance used by the firm. It comprises the risk less cost of the particular type of financing (r_j), the business risk premium, (b) and the financial risk premium (f).
- The cost of capital is useful in designing optimal capital structure, investment evaluation, and financial performance appraisal.
- The financial manager has to compute the specific cost of each type of funds needed in the capitalisation of a company.
- Retained earnings are one of the internal sources to raise equity finance.
- The opportunity cost of retained earning is the rate of return the shareholder forgoes by not putting his funds elsewhere.
- Cost of equity capital, is the minimum rate of return that a firm must earn on the equity financed portions of an investment project in order to leave unchanged the market price of the shares.
- The marginal cost of capital is the weighted average cost of new capital using the marginal weights.
- Marginal cost of capital shall be equal to WACC, when a firm employs the existing proportion of capital structure and some cost of component of capital structure.

Notes

6.7 Keywords

Cost of Capital: It is that minimum rate of return, which a firm must earn on its investments so as to maintain the market value of its shares.

Explicit Cost: It is the discount rate that equates the present value of the cash inflows with the present value of its increments cash outflows.

Future Cost: It is the cost of capital that is expected to raise the funds to finance a capital budget or investment proposal.

Implicit Cost: It is the cost of opportunity which is given up in order to pursue a particular action.

Marginal Cost of Capital: The additional cost incurred to obtain additional funds required by a firm.

Opportunity Cost: The benefit that the shareholder foregoes by not putting his/her funds elsewhere because they have been retained by the management.

Specific Cost: It is the cost associated with particular component or source of capital.

Spot Cost: The cost that are prevailing in the market at a certain time.

6.8 Review Questions

1. Examine the relevance of cost of capital in capital budgeting decisions.
2. Elucidate the importance of CAPM approach for calculation of cost of equity.
3. "Marginal cost of capital nothing but the average cost of capital". Explain.
4. Analyse the concept of flotation costs in the determination of cost of capital.
5. AMC Engineering Company issues 12 per cent, ₹ 100 face value of preference stock, which is repayable with 10 per cent premium at the end of 5 years. It involves a flotation cost of 5 per cent per share. What is the cost of preference share capital, with 5 per cent dividend tax?
6. "Evaluating the capital budgeting proposals without cost of capital is not possible." Comment.
7. VS International is thinking of rising funds by the issuance of equity capital. The current market price of the firm's share is ₹ 150. The firm is expected to pay a dividend of ₹ 3.9 next year. At present, the firm can sell its share for ₹ 140 each and it involves a flotation cost of ₹ 10. Calculate cost of new issue.
8. WACC may be determined using the book values & the market value weights. Compare the pros & cons of using market value weights rather than book value weights in calculating the WACC.
9. Critically evaluate the different approaches to the calculation of cost of equity capital.
10. A company issues 12,000, 12 per cent perpetual preference shares of ₹ 100 each. Company is expected to pay 2 per cent as flotation cost. Calculate the cost of preference shares assuming to be issued at (a) face value of par value, (b) at a discount of 5% and (c) at a premium of 10%.
11. An investor supplied you the following information and requested you to calculate. Expected rate of returns on market portfolio – Risk free returns = 10 per cent

Notes

Investment in Company			Initial Price	Dividends	Year-end Market Price	Beta risk Factor
A		Paper	20	2	55	0.7
		Steel	30	2	65	0.8
		Chemical	40	2	140	0.6
B		GOI Bonds	1000	140	1005	0.99

12. A company currently is maintaining 6 per cent rate of growth in dividends. The last year dividend was ₹ 4.5 per share. Equity share holders required rate of return is 15 per cent. What is the equilibrium price per share?

13. Karvy is planning to sell equity shares. Mr. Ram wishes to invest in Karvy Company by purchasing equity shares. The company's bond has been yielding at 13 per cent. You are requested by Mr. Ram to calculate his expected rate of return on equity based on bond yield plus risk premium approach (assuming 3 per cent as risk premium).

14. Sai Enterprises issued 9 per cent preference share (irredeemable) four years ago. The preference share that has a face value of ₹ 100 is currently selling for ₹ 93. What is the cost of preference share with 8 per cent tax on dividend?

15. Company has 50,000 preference shares of ₹ 100 at par outstanding at 11 per cent dividend. The current market price of the share is ₹ 90. What is its cost?

Answers: Self Assessment

1.	rate of return	2.	percentage.	3.	capital formation
4.	debt	5.	Cost of Capital	6.	actual profitability
7.	marginal	8.	Future Cost	9.	Spot
10.	interest rate	11.	discount rate	12.	opportunity
13.	marginal cost of capital	14.	balance sheet	15.	composite

6.9 Further Readings

Books

Dr Pradeep Kumar Sinha, *Financial Management*, New Delhi, Excel Books, 2009.

Sudhindra Bhat, *Financial Management*, New Delhi, Excel Books, 2008.

Van Horne, J.C. and Wachowicz, Jr, J.M., *Fundamentals of Financial Management*, New Delhi, Prentice Hall of India Pvt. Ltd., 1996, p. 2.

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Unit 7: Capital Structure Decision

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Objectives

After studying this unit, you will be able to:

- Define the capital structure
- Recognize the conception of optimum capital structure
- Explain the different considerations in capital structure planning
- Describe the theories of capital structure.

Introduction

Organizations have need of funds to run and maintain its business. The requisite funds may be raised from short-term sources or long-term sources or a combination both the sources of funds, so as to equip itself with an appropriate combination of fixed assets and current assets. Current assets to a considerable extent, are financed with the help of short-term sources. Normally, firms are expected to follow a prudent financial policy, as revealed in the maintenance of net current assets. This net positive current asset must be financed by long-term sources. Hence, long-term sources of funds are required to finance for both (a) long-term assets (fixed assets) and (b) networking capital (positive current assets). The long-term financial strength as well as profitability of a firm is influenced by its financial structure. The term 'Financial Structure' refers to the left hand side of the balance sheet as represented by "total liabilities" consisting of current liabilities, long-term debt, preference share and equity share capital. The financial structure, therefore, includes both short-term and long-term sources of funds.

Notes

7.1 Meaning of Capital Structure

The basic objective of financial management is to maximize the shareholders wealth. Therefore, all financial decisions in any firm should be taken in the light of this objective.

Whenever a company is required to raise long-term funds the finance manager is required to select such a mix of sources of finance that overall cost of capital is minimum (i.e., value of the firm/wealth of shareholders is maximum). Mix of long-term sources of finance is referred as "capital structure".

Optimum Capital Structure

The capital structure is said to be optimum when the firm has selected such a combination of equity and debt so that the wealth of firm (shareholder) is maximum. At this capital structure, the cost of capital is minimum and market price per share is maximum.

It is very difficult to find out optimum debt and equity mix where capital structure would be optimum because it is difficult to measure a fall in the market value of an equity shares on account of Increase in risk due to high debt content in capital structure. Hence, in practice, the expression "appropriate capital structure" is more realistic expression than 'optimum capital structure'.

Features of an Appropriate Capital Structure

1. ***Profitability:*** The most profitable capital structure is one that tends to minimize cost of financing and maximize earning per equity share.
2. ***Flexibility:*** The capital structure should be such that company can raise funds whenever needed.
3. ***Conservation:*** The debt content in the capital structure should not exceed the limit, which the company can bear.
4. ***Solvency:*** The capital structure should be such that firm does not run the risk of becoming insolvent.
5. ***Control:*** The capital structure should be so devised that it involves minimum risk of loss of control of the company.

Self Assessment

Fill in the blanks:

1. Capital structure is referred as mix of ……..sources of finance.
2. At …….capital structure, the cost of capital is minimum and market price per share is maximum.
3. The most profitable capital structure is one that tends to minimize …….and maximize earning per equity share.

7.2 Major Considerations in Capital Structure Planning

ln planning the capital structure, one should keep in mind that there is no one definite model that can be suggested/used as an ideal for all business undertakings. This is because of varying circumstances of business undertakings. It is, therefore important to understand that different types of capital structure would be required for different types of business undertakings.

Notes

Notes The capital structure depends primarily on number of factors like:

- The nature of industry,
- Gestation period,
- Certainty with which the profit will accrue after the undertaking goes into commercial production, and
- The likely quantum of return on investment.

However, finance manager should take into consideration following factors while planning the capital structure:

1. ***Risk:*** Risk is of two kinds, i.e. financial risk and business risk. In the context of capital structure planning, financial risk is relevant. Financial risk also is of two types:

   (a) *Risk of cash insolvency:* As a firm raises more debt, its risk of cash insolvency increases. This is due to two reasons. Firstly, higher proportion of debt in the capital structure increases the commitments of the company with regard to fixed charges. This means that a company stands committed to pay a higher amount of interest irrespective of the fact whether it has cash or not. Secondly, the possibility that the supplier of funds may withdraw the funds at any given point of time. Thus, the long-term creditors may have to be paid back in installments, even if sufficient cash to do so does not exist. This risk is not there in the case of equity shares.

   (b) *Risk of variation in the expected earnings available to equity shareholders:* In case a firm has higher debt content in capital structure, the risk of variations in expected earnings available to equity shareholders will be higher. This is because of trading on equity, Financial leverage works both ways, i.e.; it enhances the shareholders return by a high magnitude, or brings it down sharply depending upon whether the return on investment is higher or lower than the rate of interest.

2. ***Cost of capital:*** Cost is an important consideration in capital structure decisions, it is obvious that a business should be at least capable of earning enough revenue to meet its cost of capital and finance its growth.

3. ***Control:*** Along with cost and risk factors, the control aspect is also important consideration in planning the capital structure. When a company issues further equity shares, it automatically dilutes the controlling interest of the present owners. Similarly, preference shareholders can have voting rights and thereby affect the composition of the Board of Directors in case dividends on such shares are not paid for two consecutive years. Financial institutions normally stipulate that they shall have one or more directors on the Board. Hence, when the management agrees to raise loans from financial institutions, by implication it agrees to forego a part of its control over the company. It is obvious therefore, that decisions concerning capital structure are taken after keeping the control factor mind.

4. ***Trading on Equity:*** A company may raise funds either by the issue of shares or by borrowings. Borrowings carry a fixed rate of interest and this interest is payable irrespective of fact whether there is profit or not. Of course, preference shareholders are also entitled to a fixed rate of dividend but payment of dividend is subject to the profitability of the company. In case the Rate Of Return (ROI) on the total capital employed i.e. shareholders funds plus log term borrowings, is more than the rate of interest on borrowed funds or rate of dividend on preference shares, it is said that the company is trading on equity. One of the prime objectives of a finance manager is to maximize both the return on ordinary

Notes

shares and the tota1 wealth of company. This objective has to be kept in view while making a decision on a new source of finance its impact on the earnings per share has to be carefully analyzed. This helps in deciding whether funds should be raised by internal equity or by borrowings.

5. ***Corporate Taxation:*** Under the Income Tax laws, dividend on shares is not deductible, while interest paid on borrowed capital is allowed as deduction for computing taxable income. The cost of raising finance through borrowing is deductible in the year in which it is incurred. If it is incurred during the pre-commencement period, it is to be capitalized. Cost of issue of shares is allowed as deduction. Owing to these provisions corporate taxation plays an important role in determining the choice between different sources of financing.

6. ***Government Policies:*** Government policies are a major factor in determining capital structure.

   Example: a change in the lending policies of financial institutions may mean a complete change in the financial pattern to be followed in the companies.

   Similarly, the Rules and Regulations framed by SEBI considerably affect the capital issue policy of various companies. Monetary and fiscal policies of the government also affect the capital structure decisions.

7. ***Legal Requirements:*** The finance manager has to keep in view the legal requirements while deciding about the capital structure of the company.

8. ***Marketability:*** To obtain a balanced capital structure it is necessary to consider the ability of the company to market corporate securities.

9. ***Maneuverability:*** Maneuverability is required to have as many alternatives as possible at the time of expanding or contracting the requirement of funds. It enables use of proper type of funds available at a given time and also enhances the bargaining power when dealing with the prospective suppliers of funds.

10. ***Flexibility:*** Flexibility refers to the capacity of the business and its management to adjust to expect and unexpected changes in circumstances. In other words, management would like to have a capital structure, which provides maximum freedom to changes at all times.

11. ***Timing:*** Closely related to flexibility is the timing for issue of securities. Proper timing of a security issue often brings substantial savings because of the dynamic nature of the capital market. An Intelligent management tries to anticipate the climate in capital market with a view to minimize the cost of raising funds and also to minimize the dilution resulting from an issue of new ordinary shares.

12. ***Size of the Company:*** Small companies rely heavily on owners' funds while large companies are generally considered to be less risky by the investors and therefore, they can issue different types of securities.

13. ***Purpose of Financing:*** The purpose of financing also to some extent affects the capital structure of the company. In case funds are required for productive purposes like manufacturing etc.; the company may raise funds through long-term sources. On other hand, if funds are required for non-productive purposes, like welfare facilities to employees such as schools, hospitals etc., the company may rely only on internal resources.

14. ***Period of Finance:*** The period for which finance is required also effects the determination of capital structure. In case such funds are required for long-term requirements, say 8-10

years, then it will be appropriate to raise borrowed funds. However, if the funds are required more or less permanently, it will be appropriate to raise them by the issue of equity share.

15. ***Nature of Enterprise:*** The nature of enterprise too, to a great extent, affects the capital structure or the company. Business enterprises that have stability in their earnings or those who monopoly regarding their products may go for borrowings or preference shares, since they have adequate profits to pay interest/fixed charges. On the contrary, companies, which do not have assured income, should preferably rely on internal resources to a large extent.

16. ***Requirement of Investors:*** Different types of securities are issued to different classes of investors according to their requirement.

17. ***Provision for Future:*** While planning capital structure the provision for future requirement of capital is also to be considered.

Caution Along with the risk as a factor, the finance manager has to consider the cost aspect carefully while determining the capital structure.

Self Assessment

Fill in the blanks:

4. In the context of capital structure planning, ……..risk is relevant.
5. Along with cost and risk factors, the ……..aspect is also important consideration in planning the capital structure.
6. In case a firm has higher debt content in capital structure, the risk of variations in …….available to equity shareholders will be higher.

7.3 Value of the Firm and Capital Structure

Value of the firm depends on the earnings of the firm and earnings of the firm depend upon the investment decisions of the firm.

Investment decision influences the size of the EBIT. The EBIT is shared among three main claimants:

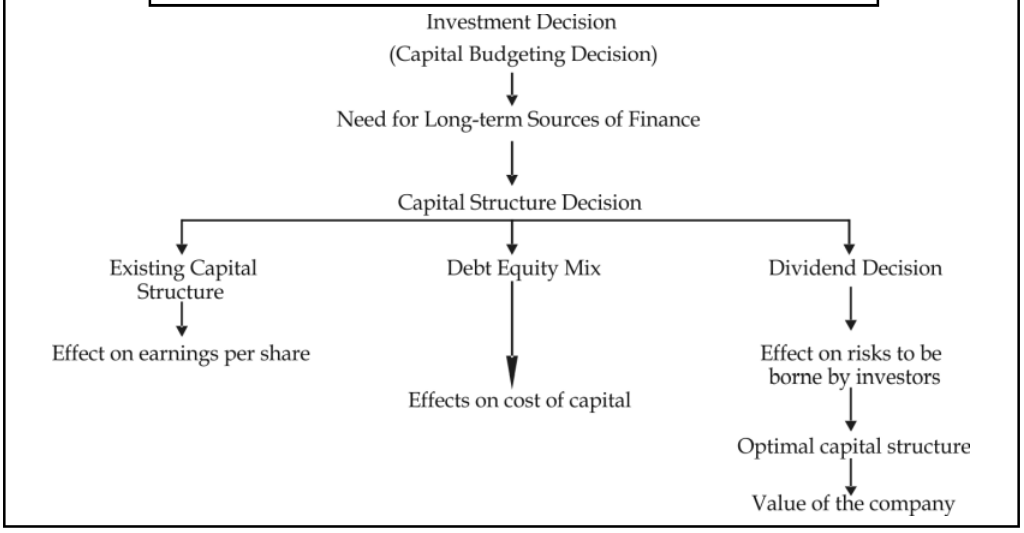
1. The debt holders who receive their share in the form of interest.
2. The government which receives its share in the form of taxes.
3. The shareholders who receive the balance.

Thus, the investment decisions of the firm determine the size of the EBIT pool while the capital structure mix determines the way it is to be sliced. The total value of the firm is the sum of the value to the debt holders and its shareholders. Therefore, investment decision can increase the value of the firm by increasing the size of the EBIT whereas capital structure mix can affect the value only by reducing the share of the EBIT going to the government in the form of taxes.

Thus, the value of the firm, investment decisions and capital structure decisions are closely related and is depicted by the following figure.

Notes

Figure 7.1: Relation between Value of Firm, Investment Decision and Capital Structure Decisions



Did u know? **What are the Patterns/Forms of Capital Structure?**

The following are the forms of capital structure.

1. Complete equity share capital;
2. Different proportions of equity and preference share capital;
3. Different proportions of equity and debenture (debt) capital; and
4. Different proportions of equity, preference and debenture (debt) capital.

Self Assessment

Fill in the blanks:

7. Investment decisions of the firm determine the size of the ……pool
8. The EBIT is shared among three main claimants which are debt holders, government and ……who receive the balance.
9. The total value of the firm is the sum of the value to the ……and its shareholders.

7.4 Capital Structure Theories

These approaches analyze the relationship between the leverage, the cost of capital and the value of the firm in different ways. However, the following assumptions are made to understand these relationships.

1. There are only two sources of funds viz., debt and equity.
2. The total assets of firm are given. The degree of leverage can be changed by selling debt to repurchase shares or selling shares to retire debt.
3. There are no retained earnings. It implies that entire profits are distributed among shareholders.
4. The operating profit of firm is given and expected to grow.

Notes

5. The business risk is assumed to be constant and is not affected by the financing mix decision.
6. There are no corporate or personal taxes.
7. The investors have the same subjective probability distribution of expected earnings.

7.4.1 Net Income (NI) Approach

The Net Income (NI) approach is the relationship between leverage and cost of capital and value of the firm. This theory states that there is a relationship between capital structure and the value of the firm and therefore, the firm can affect its value by increasing or decreasing the debt proportion in the overall financing mix. The NI approach makes the following additional assumptions:

1. That the total capital requirement of the firm is given and remains constant.
2. That cost of debt is less than cost of equity capitalization rate.
3. There are no corporate taxes.
4. The use of debt content does not change the risk reception of the investors as a result; both the debt capitalization rate and the equity capitalization rate remain constant.

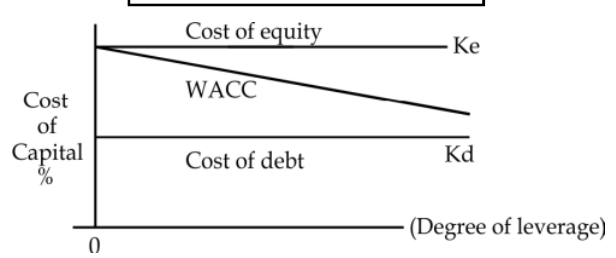
Did u know? **Who suggested NI Approach?**

NI (Net Income) Approach is suggested by Durand.

The NI approach starts from the argument that change in financing mix of a firm will lead to change in Weighted Average Cost of Capital (WACC) of the firm, resulting in the change in value of the firm. As debt capitalization is less than equity, the increasing use of cheaper debt (and simultaneous decrease in equity proportion) in the overall capital structure will result in magnified returns to the shareholders.

The increased returns to the shareholders will increase the total value of the equity and this increases the total value of the firm. The WACC will decrease and the value of the firm will increase. On the other hand, if the financial leverage is reduced by the decrease in the debt financing, the WACC of the firm will increase and the total value of the firm will decrease. The NI approach to the relationship between leverage costs of capital has been presented graphically.

Figure 7.2: NI Approach



The value of the firm on the basis of Net income approach can be ascertained as follows: V= S+D. Where

V = Value of the firm

S = Market value of equity.

D = Market value of debt.

Notes

$$\text{Market value of equity (S)} = \frac{NI}{Ke}$$

Where,

NI = Earnings available for equity shareholders,

Ke = Equity capitalization rate.

Under NI approach, the value of the firm will be maximum at a point where average cost of capital is minimum. Thus the theory suggests total or maximum possible debt financing for minimizing the cost of capital.

$$\text{The overall cost of capital} = \frac{\text{E.B.I.T.}}{\text{Value of the firm}} \times 100$$

The NI approach can be illustrated with the help of the following example.

Example: Expected EBIT of the firm is ₹ 2,00,000. The cost of equity (i.e., capitalization rate) is 10%. Find out the value of Firm and overall cost of capital if degree of leverage is:

₹ 200000

₹ 500000

₹ 700000

Debenture interest rate is 6%.

Statement Showing the Value of Firm and Overall Cost of Capital WACC

	Degree of Leverage.		
	₹	₹	₹
Debenture capital	200000	500000	700000
EBIT	200000	200000	200000
Less Int.@ 6%	12000	30000	42000
Net profit (i.e. earning available to equityshare holders)	188000	170000	158000
Equity capitalization rate i.e. K_e	10%	10%	10%
Therefore value of equity (e.g. 188000/10%	1880000	1700000	1580000
+ Value of debt (D)	200000	500000	700000
Therefore value of firm (V)	2080000	2200000	2280000
WACC, $\frac{\text{EBIT}}{\text{value of firm.}} \times 100$	$\frac{200000}{2080000}$ =9.6%	$\frac{200000}{2200000}$ =9%	$\frac{200000}{2280000}$ =8.7%

Conclusion: Firm is able to increase its value and to decrease it's (WACC) increasing the debt proportion in the capital structure.

The NI approach, though easy to understand, ignores perhaps the most important aspects of leverage that the market price depends upon the risk, which varies in direct relation to the changing proportion of debt in capital structure.

7.4.2 Net Operating Income (NOI) Approach

The Net Operating Income (NOI) approach is the opposite of the NI approach. According to the NOI approach, the market value of the firm depends upon the net operating profit or EBIT and

Notes

the overall cost of capital, WACC. The financing mix or the capital structure is irrelevant and does not affect the value of the firm. The NOI approach makes the following assumptions:

1. Investors see the firm as a whole and thus capitalize the total earnings of the firm to find the value of the firm as a whole.
2. The overall cost of capital of the firm is constant and depends upon the business risk, which also is assumed to be unchanged.
3. The cost of debt is also taken as constant.
4. The use of more and more debt in the capital structure increases the risk of shareholders and thus results in the increase in the cost of equity capital i.e., the increase in cost of equity is such, as to completely offset the benefits of employing cheaper debt, and
5. There is no tax.

The NOI approach is based on the argument that the market values the firm as a whole for a given risk complexion. Thus, for a given value of EBIT, the value of the firm remains the same, irrespective of the capital composition and instead depends on the overall cost of capital. The value of the equity may be found by deducting the value of debt from the total value of the firm i.e.,

$$V = \frac{EBIT}{Ko}$$

$$E = \text{Value of equity}$$

$$V = \text{Value of firm.}$$

$$D = \text{Market value of debt}$$

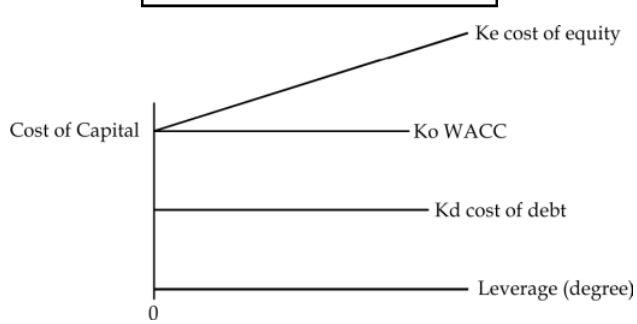
$$\text{And } E = V - D$$

And the cost of equity capital, Ke, is

$$Ke = \frac{EBIT - Interest}{V - D}$$

Thus, the financing mix is irrelevant and does not affect the value of the firm. The value remains same for all types of debt-equity mix. Since there will be change in risk of the shareholders as a result of change in debt-equity mix, therefore, the Ke will be changing linearly with change in debt proportions. The NOI approach to the relationship between the leverage and cost of capital has been presented in the following figure.

Figure 7.3: NOI Approach



The above diagram shows that the cost of debt, Kd, and the overall cost of capital Ko are constant for all levels of leverage. As the debt proportion or the financial leverage increases, the risk of

Notes

the shareholders remains constant because increase in Ke is just sufficient to off set the benefits of cheaper debt financing.

The NOI approach considers Ko to be constant and therefore, there is no optimal capital structure as good as any other and so every capital structure is an optimal one. The NOI approach can be illustrated with an example.

Example: A firm has an EBIT of ₹ 200,000 and belongs to a risk class of 10%. What is the value of cost of equity capital, if it employs 6% debt to the extent of 30%, 40% or 50% of the total capital fund of ₹ 10,00,000?

Solution:

The effect of changing debt proportion on the cost of equity capital can be analyzed as follows:

	30% debt	40% debt	50% debt
EBIT	Rs. 200,000	200,000	200,000
Overall cost of capital	10%	10%	10%
Value of the firm, V	2000,000	2000,000	2000,000
Value of 6% debt, D	300,000	400,000	500,000
Value of equity, (E=V-D)	17,00,000	1600,000	1500,000
Net profit (EBIT Interest)	182,000	176,000	170,000
Cost of equity = Net profit / Value of equity x 100	10.7%	11%	11.33%

The NI and the NOI approach hold extreme views on the relationship between the leverage, cost of capital and the value of the firm. In practical situations, both these approaches seem to be unrealistic. The traditional approach takes a compromising view between the two and incorporates the basic philosophy of both. It takes a midway between the NI approach (that the value of the firm can be increased by increasing the leverage) and the NOI approach (that the value of the firm is constant irrespective of the degree of financial leverage).

The traditional viewpoint states that the value of the firm increases with increase in financial leverage but only up to a certain limit. Beyond this limit, the increase in financial leverage will increase its WACC and hence the value of the firm will decline.

Under the traditional approach, the cost of debt is assumed to be less than the cost of equity. In case of 100% equity firm, overall cost of the firm is equal to the cost of equity, but, when (cheaper) debt is introduced in the capital structure and the financial leverage increases, the cost of equity remains the same as the equity investors expect a minimum leverage in every firm.

The cost of equity does not increase even with increase in leverage. The argument for Ke remaining unchanged may be that up to a particular degree of leverage, the interest charge may not be large enough to pose a real threat to the dividend payable to the shareholders. This constant Ke and Kd makes the Ko to fall initially. Thus, it shows that the benefits of cheaper debts are available to the firm. But this position does not continue when leverage is further increased.

The increase in leverage beyond a limit increases the risk of the equity investors too and as a result the Ke also starts increasing. However, the benefits of use of debt may be so large that even after offsetting the effects of increase in Ke, the Ko may still go down or may become constant for some degree of leverages.

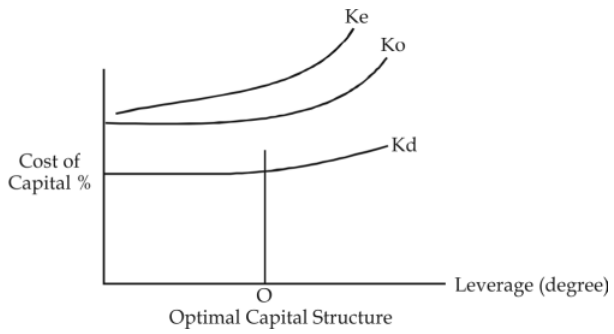
However, if the firm increases leverage further, then the risk of the debt investor may also increase and consequently the Kd of debt also starts increasing. The already increasing Ke and

Notes

the now increasing makes the Ko increase. Therefore, the use of leverage beyond a point will have the effect of increase the overall cost of capital of the firm and thus results in the decrease in the value of the firm.

Thus, there is a level of financial leverage in any firm, up to which it favorably affect the value of the firm may decrease. There may be a particular leverage or a range of leverage, which separates the favorable leverage. The traditional viewpoint has been shown in the following figure.

Figure 7.4



Notes As per traditional approach, a firm can be benefited from a moderate level of leverage when the advantage of using debt (having lower cost) outweigh the disadvantages of increasing Ke (as a result of higher financial risk). The overall cost of capital Ko, therefore, is a function of a financial leverage. The value of the firm can be affected therefore, by the judicious use of debt and equity to capital structure.

Example: ABC Ltd., having an EBIT of ₹ 1,50,000 is contemplating to redeem a part of the capital by introducing debt financing.

Presently, it is a 100% equity firm with equity capitalization rate, Ke, of 16%. The firm is to redeem the capital by introducing debt financing up to ₹ 3,00,000 i.e., 30% of total funds or up to ₹ 5,00,000 i.e., 50% of the total funds. It is expected that for the debt financing up to 30%, the rate of interest will be 10% and the equity capitalization will increase up to 17%. However, if the firm opts for 50% debt financing, then interest will be payable at the rate of 12% and the equity capitalization rate will be 20%. Find out the value of the firm and its overall cost of capital under different levels of debt financing.

Solution:

On the basis of the information given, the total funds of the firm is ₹ 10,00,000 (whole of which is provided by the equity capital) out of which 30% or 50% i.e., ₹ 3,00,000 or ₹ 5,00,000 may be replaced by the issue of debt bearing interest at 10% or 12% respectively. The value of the firm and its WACC maybe ascertained as follows:

	0% Debt	30% Debt	50% Debt.
Total debt		Rs. 300,000	Rs. 500,000
Rate of interest		10%	12%
EBIT	Rs. 150,000	150,000	150,000
Interest		30,000	60,000

Contd...

Notes

Profit before tax	150,000	120,000	90,000
Equity capitalization rate	0.16	0.17	0.20
Value of equity, E	937,500	70,5882	450,000
Value of debt,		300,000	500,000
Total value	937,500	1005,882	950,000
Overall cost of capital (EBIT) Total value of the firm.	0.16	0.149	0.158

The example shows that with the increase in leverage from 0% to 30%, the firm is able to reduce its WACC from 16% to 14.9% and the value of the firm increases from ₹ 9,37,500 to ₹ 10,05,882. This happens as the benefits of employing cheaper debt are available and the cost of equity does not rise too much.

However, thereafter, when the leverage is increased further to 50%, the cost of debt as well as the cost of equity, both, rises to 12% and 20% respectively. The equity investors have increased the equity capitalization rate to 20% as they are now finding the firm to be more risky (as a result of 50% leverage). The increase in cost of debt and the equity capitalization rate has increased the cost of equity, hence as a result, the value of the firm has reduced from ₹ 10,05,882 to ₹ 9,50,000 and Ko has increased from 14.9% to 15.8%.

7.4.3 Modigliani–Miller's Approach (Extension of NOI Approach)

The Modigliani–Millers (MM) model is considered to be one of the most influential papers ever written in corporate finance.

The Modigliani–Miller approach is similar to the Net Operating Income (NOI) approach. In other words, according to this approach, the value of a firm is independent of its capital structure. However, there is a basic difference between the two. The NOI approach is purely conceptual. It does not provide operational justification for irrelevance of the capital structure in the valuation of the firm. While MM approach supports the NOI approach providing behavioural justification for the independence of the total valuation and the cost of capital of the firm from its capital structure. In other words, MM approach maintains that the weighed average cost of capital does not change in the debt equity mix or capital structure of the firm.

Did u know? When was Modigilani–Miller (MM) represented?

Modigilani–Miller (MM) was represented in 1958

Basic Proportions

The following are the three basic proportions of the MM approach.

1. The overall cost of capital (K) and the value of the firm (V) are independent of the capital structure. In other words, K and V are constant for all levels of debt-equity mix. The total market value of the firm is given by capitalizing the expected Net Operating Income (NOI) by the rate appropriate for that risk class.
2. The cost of equity (Ke) is equal to capitalization rate of a pure equity stream plus a premium for the financial risk. The financial risk increases with more debt content in the capital structure. As a result, Ke increases in a manner to off set exactly the use of a less expensive source of funds represented by debt.
3. The cut-off rate for investment purposes is completely independent of the way in which an investment is financed.

Notes

Assumptions

The MM approach is subject to the following assumptions:

1. ***Capital markets are perfect:*** This means that investors are free to buy and sell securities.
2. The form can be classified into homogenous risk classes. All the forms within the same class will have the same degree of business risks.
3. All investors have the same expectations of a firm's net operating income (EBIT) with which to evaluate the value of any firm.
4. The dividend payout ratio is 100%. In other words, there are no retained earnings.
5. There are no corporate taxes. However, this assumption has been removed later.

In brief, the MM hypothesis can be put in the following words:

"MM hypothesis is based on the idea that no matter how you bifurcate the capital structure of a firm among debt, equity and other claims, there is a conservation of investment value. That is because 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 capitalization. Thus, the total pie does not change as it is divided into debt, equity and other securities. The sum of the parts must equal the whole; so regardless of financing mix; the total value of the firm stays the same.

Arbitrage Process

The "arbitrage process" is the operational justification of MM hypothesis. The term 'arbitrage' refers to an act of buying a security in one market having lower price and selling it in another market at higher price. As a result of such action, the market prices of the securities can not remain different markets. Thus, arbitrage process restores equilibrium in the value of securities. This is because investors of the overvalued firm would sell their shares, borrow additional funds on personal account and invest in the undervalued firm in order to obtain the same return on smaller investment outlay. The use of debt by the investor for arbitrage is termed as 'home made leverage' or 'personal leverage'. Arbitrage process can be explained with the help of the following example.

Example: Two firms X Ltd. & Y Ltd. are alike and identical in all respects except that X Ltd. is a levered firm and has 10% debt of ₹ 30,00,000 in its capital structure. On the other hand Y Ltd. is an unlevered firm and has raised funds only by way of equity capital. Both these firms have same EBIT of ₹ 10,00,000 and equity capitalization rate (Ke) of 20%. Under these parameters, the total value and the WACC of both the firms may be ascertained as follows:

	X Ltd	Y Ltd
EBIT (Rs)	10,00,000	10,00,000
– Interest (Rs)	– 300,000	
Net profit	700,000	10,00,000
Equity capitalization rate	20%	20%
Value of equity (Rs)	35,00,000	50,00,000
+ Value of debt	30,00,000	NIL
Value of firm	65,00,000	50,00,000
WACC $\frac{[EBIT \times 100]}{V}$	15.38%	20%

Notes

Comments

Though, EBIT is same, value of both the firm and WACC are different. MM argue that this position can not persist for a long; and soon there will be equilibrium in the values of the two firms through arbitrage process, which is explained, in the following paragraphs.

Mr. A is holding 10% equity shares in X Ltd. The value of his loading is ₹ 3,50,000 i.e., 10% of ₹ 35,00,000. Further, he is entitled for ₹ 70,000 income (i.e., 10% of total profits of ₹ 7,00,000). In order to earn more income, he disposes off his holding in X Ltd. for ₹ 3,50,000 and buys 10% holding in Y Ltd. For this purpose, he adopts following steps.

Step 1: In order to buy 10% holding in Y Ltd, he requires total funds of ₹ 5,00,000, whereas his proceeds are only ₹ 3,50,000. Therefore, he borrows ₹ 3,00,000 loan @ 10% i.e. (10% of Debt of X Ltd). Thus, he substitutes personal loan for corporate loan.

Step 2:

Mr. A now has total funds of	₹ 6,50,000
Sale proceeds	₹ 3,50,000
10% personal loan	₹ 3,00,000
Total	₹ 6,50,000
Less: Invest in shares of Y Ltd shares	– 5,00,000
Surplus funds (which he invests in some other securities say at 10%)	₹ 1,50,000

Step 3:

Mr. A will earn more through arbitrage process.	
Profits available to A from Y Ltd. (10% of ₹ 10,00,000)	1,00,000
Less: interest on borrowing (10% 300,00,000)	– 30,000
+ Interest income on some other investment (150000 × 10%)	+ 15,000
Total income after Arbitrage Process	85,000

Conclusion

MM model argues that this opportunity to earn extra income through arbitrage process will attract so many investors. The gradual increase in sales of shares of the levered firm X Ltd. will push down its prices and the tendency to purchase the shares to unlevered firm Y Ltd. will drive its prices up. These selling and purchasing processes will continue until the market value of the two firms is equal. At this stage, the value of the leverage and unleveled firm and also their cost of capital are same. Thus overall cost of capital is independent of the financial leverage.

Criticism

Theoretically speaking, the MM model seems to be good. However, most of its assumptions are unrealistic and untenable. Following are criticisms against MM Model:

1. The arbitrage process, which provides the behavioural justification for the model is itself questionable in real life because of following reasons:

   (a) Investors do not have complete information about levered and unlevered firms.

Notes

(b) It is extremely doubtful that investors would substitute personal leverage for corporate leverage, as they do not have the same risk characteristics. Rates of interests are not the same for individuals and the firms.

2. The assumption that there is no corporate tax is unrealistic.

Caution Existence of corporate tax results in higher value of the levered firm, since the interest is tax deductible.

3. The assumption of no tries transaction cost is also imaginary. In reality, whenever a firm tries to obtain debt capital associates creditors, they seek certain restrictions on the firm. On the part of the firm, some protective comments incorporated in the loan contract.

4. In subsequently analyses, MM agreed that the leverage might increase the value of the firm.

Task "As the debt-equity ratio increases, there is a trade-off between the interest tax shield and bankruptcy, causing an optimum capital structure." Do you agree with the statement? Give reasons.

Self Assessment

Fill in the blanks:

10. The Net Income (NI) approach is the relationship between leverage and ……and value of the firm.

11. The …….. is the operational justification of MM hypothesis.

12. The Net Operating Income (NOI) approach is the opposite of the …….approach.

7.5 Effects of a Financing Decision on Earnings Per Share

One of the present objectives of a finance function is to maximize both the return on ordinary shares and the total wealth of the company. This objective is also important at the time of deciding in the new source of finance. Earnings Per Share (EPS) denote what has been earned by the company during a particular period in each of the ordinary shares. It can be worked out by dividing net profit after interest, taxes and preference dividend, by the number of equity shares.

If the company has a number of options of new financing, it can compute the impact of each method of new financing on earnings per share. It should also calculate the EPS without the new financing and compares it with cash of the various alternatives of financing available, is accepted. It is obvious that earnings per share would be the highest in case of financing, which has the least cost to the company.

Example: X Ltd. requires ₹ 50 lacs for a new plant, which is expected to yield earnings before interest and taxes of ₹ 10 lacs. The company has three alternatives for financing.

Option I: Raising debt of ₹ 5 lacs and the balance by equity.

Option II: Raising debt of ₹ 20 lacs and the balance by equity.

Option III: Raising debt of ₹ 30 lacs and the balance by equity.

Notes

The company's share is currently selling at ₹ 150, but it expected to decline to ₹ 125 in case the funds are borrowed in excess of ₹ 20 lacs. The funds can be borrowed at the rate of 10% up to ₹ 50 lacs at 15% over ₹ 5 lacs and up to ₹ 20 lacs and at 20% over ₹ 20 lacs. The tax rate applicable to the company is 50%. Which option of financing the company should choose?

Solution:

	Alternative I	Alternative 2	Alternative 3
	Debt Rs. 5 lacs + equity Rs. 45 lacs.	**Debt Rs. 20 lacs + equity Rs. 30 lacs.**	**Debt Rs. 30 lacs + equity Rs. 20 lacs.**
Earnings before interest and tax	Rs. 10,00,000	Rs. 10,00,000	Rs. 10,00,000
Less interest on debt	50,000	275,000	475,000
Earnings before tax	9,50,000	725,000	525,000
Tax @ 50%	475,500	362,500	262,500
Earnings after tax	475,500	362,500	262,500
No. of equity shares	30,000	20,000	16,000
Earnings per share	Rs. 15,833	18,125	16,406

The earnings per share is higher in Alternative 2 i.e., if the company finances the project by raising debt of ₹ 70,00,000 and issue equity shares of ₹ 30,00,000.

Task The existing capital structure of XYZ Ltd. is as under:

Equity shares of Rs. 100 each	Rs. 40,00,000
Retained earnings	10,00,000
9% preference shares	25,00,000
7% debentures	25,00,000

The existing rate of return on the company's capital is 12% and I/T rate 50%. The company requires a sum of ₹ 25,00,000 to finance its expansion programme for which it is considering the following alternatives:

(a) Issue of 20,000 equity shares at a premium of ₹ 25 per share.

(b) Issue of 10% preference shares.

(c) Issue of 8% debentures.

It is estimated that the P/E ratio in case of equity, preference and debentures financing would be 20, 17 and 16 respectively.

Which of these alternatives would you advocate? Why?

EPS Volatility

EPS Volatility refers to the magnitude or the extent of fluctuations of earnings per share of a company in various years as compared to the mean or average earnings per share. In other words, EPS volatility shows whether a company enjoys a stable income or not.

Did u know? Higher the EPS volatility, greater would be the risk attached to the company.

A major cause of EPS volatility would be the fluctuations in the sales volume and the operating leverage. It is obvious that the net profits of a company would greatly fluctuate with small

fluctuations in the sales figures specially if the fixed cost instant were very high. Hence, EPS will fluctuate in such a situation. This effect may be heightened by the financial leverage.

Self Assessment

Fill in the blanks:

13. ……..denote what has been earned by the company during a particular period in each of the ordinary shares.
14. A major cause of EPS volatility would be the fluctuations in the sales volume and the ……..leverage.
15. EPS volatility shows whether a company enjoys a ……..or not.

Case Study

Case: Wishart and Associates — Financial Alternatives

This case provides the opportunity to match financing alternatives with the needs of different companies. It allows the reader to demonstrate a familiarity with different types of securities.

George Thomas was finishing some weekend reports on a Friday afternoon in the downtown office of Wishart and Associates, an investment-banking firm. Meenda, a partner in the firm, had not been in the New York office since Monday. He was on a trip through Pennsylvania, visiting five potential clients, who were considering the flotation of securities with the assistance of Wishart and Associates. Meenda had called the office on Wednesday and told George's secretary that he would cable his recommendations on Friday afternoon. George was waiting for the cable.

George knew that Meenda would be recommending different types of securities for each of the five clients to meet their individual needs. He also knew Meenda wanted him to call each of the clients to consider the recommendations over the weekend. George was prepared to make these calls as soon as the cable arrived. At 4:00 p.m. a secretary handed George the following telegram.

George Thomas, Wishart and Associates STOP Taking advantage of offer to go skiing in Poconos STOP Recommendations as follows : (1) common stock, (2) preferred stock, (3) debt with warrants, (4) convertible bonds, (5) callable debentures STOP. See you Wednesday STOP Meenda.

As George picked up the phone to make the first call, he suddenly realized that the potential clients were not matched with the investment alternatives. In Meenda's office, George found folders on each of the five firms seeking financing. In the front of each folder were some handwritten notes that Meenda had made on Monday before he left. George read each of the notes in turn.

API, Inc

APT, Inc, needs $8 million now and $4 million in four years. Packaging firm with high growth rate in tri-state area. Common stock trades over the counter. Stock is depressed but should rise in year to 18 months. Willing to accept any type of security. Good management. Expects moderate growth. New machinery should increase profits substantially. Recently retired $7 million in debt. Has virtually no debt remaining except short-term obligations.

Contd...

Notes

Sandford Enterprises

Needs $16 million. Crusty management. Stock price depressed but expected to improve. Excellent growth and profits forecast in the next two year. Low debt-equity ratio, as the firm has record of retiring debt prior to maturity. Retains bulk of earnings and pays low dividends. Management not interested in surrendering voting control to outsiders. Money to be used to finance machinery for plumbing supplies.

Sharma Brothers., Inc.

Needs $20 million to expand cabinet and woodworking business. Started as family business but now has 1200 employees, $50 million in sales, and is traded over the counter. Seeks additional shareholder but not willing to stock at discount. Cannot raise more than $12 million with straight debt. Fair management. Good growth prospects. Very good earnings. Should spark investor's interest. Banks could be willing to lend money for long-term needs.

Sacheetee Energy Systems

The firm is well respected by liberal investing community near Boston area. Sound growth company. Stock selling for $16 per share. Management would like to sell common stock at $21 or more willing to use debt to raise $ 28 million, but this is second choice. Financing gimmicks and chance to turn quick profit on investment would appeal to those likely to invest in this company.

Ranbaxy Industry

Needs $25 million. Manufactures boat canvas covers and needs funds to expand operations. Needs long-term money. Closely held ownership reluctant surrender control. Cannot issue debt without permission of bondholders and First National Bank of Philadelphia. Relatively low debt-equity ratio. Relatively high profits. Good prospects for growth. Strong management with minor weaknesses in sales and promotion areas.

As George was looking over the folders, Meenda's secretary entered the office. George said, "Did Meenda leave any other material here on Monday except for these notes?".

She responded, "No, that's it, but I think those notes should be useful. Meenda called early this morning and said that he verified the facts in the folders. He also said that he learned nothing new on the trip and he sort of indicated that, he had wasted his week, except of course, that he was invited to go skiing at the company lodge up there".

George pondered over the situation. He could always wait until next week, when he could be sure that he had the right recommendations and some of the considerations that outlined each client's needs and situation. If he could determine which firm matched each recommendation, he could still call the firms by 6:00 P.M. and meet the original deadline. George decided to return to his office and match each firm with the appropriate financing.

Questions

1. Which type of financing is appropriate to each firm?
2. What types of securities must be issued by a firm which is on the growing stage in order to meet the financial requirements?

7.6 Summary

- Mix of long-term sources of finance is referred as "capital structure".
- At optimum capital structure, the cost of capital is minimum and market price per share is maximum.

Notes

- ln planning the capital structure, one should keep in mind that there is no one definite model that can be suggested/used as an ideal for all business undertakings.
- To obtain a balanced capital structure it is necessary to consider the ability of the company to market corporate securities.
- Small companies rely heavily on owners' funds while large companies are generally considered to be less risky by the investors and therefore, they can issue different types of securities.
- The Net Income (NI) approach is the relationship between leverage and cost of capital and value of the firm.
- According to the NOI approach, the market value of the firm depends upon the net operating profit or EBIT and the overall cost of capital, WACC.
- According to Modigilani-Miller approach, the value of a firm is independent of its capital structure.
- Earnings per share would be the highest in case of financing, which has the least cost to the company.
- EPS volatility shows whether a company enjoys a stable income or not.

7.7 Keywords

Arbitrage: It refers to an act of buying a security in one market having lower price and selling it in another market at higher price.

Capital Structure: It is that part of financial structure, which represents long-term sources.

MM Theory: According to this theory the value of the firm is independent of its capital structure.

Net Income Approach: According to this approach, the cost of debt and the cost of equity do not change with a change in the leverage ratio.

NOI Approach: According to this approach, the market value of the firm is not affected by the capital structure changes.

Optimum Capital Structure: It is that capital structure where market value per share is maximum and the cost of capital is minimum.

7.8 Review Questions

1. Explain briefly the major considerations in capital structure planning.
2. Explain briefly, the Modigliani-Miller approach on cost of capital.
3. Explain the conditional theory of capital structure.
4. What important factors in addition to quantitative factor should a firm consider when it is making a capital structure decisions?
5. The total value of a firm remains unchanged, regardless of the variations in the financing mix. Discuss the statement and point out the role of arbitrating and who made leverage?
6. How will the firm go for optimizing capital structure?
7. List down the approach which advocates that the cost of Equity Capital and Debt Capital remains unaltered when the degree of leverage varies?

Notes

8. Explain the approach which pronounced that the overall capitalization rate and the cost of debt remain constant for all degrees of leverage.
9. Critically analyze the different theories of capital structure.
10. Comment on the flexibility in the capital structure.

Answers: Self Assessment

1.	long-term	2.	Optimum	3.	cost of financing
4.	financial	5.	control	6.	expected earnings
7.	debt holders	8.	shareholders	9.	EBIT
10.	cost of capital	11.	arbitrage process	12.	NI
13.	Earnings Per Share (EPS)	14.	operating	15.	stable income

7.9 Further Readings

Books

Dr Pradeep Kumar Sinha, *Financial Management*, New Delhi, Excel Books, 2009.

Van Horne, J.C. and Wachowicz, Jr, J.M., *Fundamentals of Financial Management*, New Delhi, Prentice Hall of India Pvt. Ltd., 1996, p. 2.

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Notes

Unit 8: Concept of Leverages

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Objectives

After studying this unit, you will be able to:

- Describe the notion of leverage
- Define the operating leverage
- Explain the significance of financial leverage
- Discuss the aspect of combined leverage

Introduction

Leverage results from the use of fixed costs assets or funds to magnify returns to the firm's owners. Generally, increases in leverage results in increased returns and risk; and decreases in leverage results in decrease in returns and risk. The amount of leverage in the firm's capital structure (the mix of long-term debt and equity) can significantly affect its value by affecting returns and risks.

The term 'leverage' in general refers to a relationship between two inter-related variable. In financial analysis, it represents the influence of one financial variable over some other related financial variable.

The three basic types of leverage can be defined with reference to firm's income statement as follows:

1. Operating leverage is concerned with the relationship between the firm's sales revenue and its earnings before interest and taxes, or EBIT (EBIT is descriptive label for operating profits).
2. Financial leverage is concerned with the relationship between the firms EBIT and its common share earnings per share (EPS earnings per share). It is defined as the firm's ability to use fixed financial charges to magnify the effects of charge in EBIT/operating profit on firm's earnings per share.

Notes

3. Total leverage is concerned with the relationship between the firm's sales revenue and EPS.

8.1 Operating Leverage

Operating leverage results from the existence of the fixed operating expenses in the firm's income stream. The operating costs of a firm fall into three categories:

1. Fixed costs, which may be defined as those do not vary with sales volume, are a function of time and are typically contractual; they must be paid regardless of the amount of revenue available with sales volume.
2. Variable costs, which vary directly.
3. Semi-variable or semi-fixed costs are those, which are partly fixed and partly variable. They are fixed over a certain higher sales volumes. Since the last category of cost can be broken down into fixed and variable components, the cost of a firm in operational terms can be divided into fixed and variables. The operating leverage occurs anytime a firm has fixed costs that must be met regardless of the volume. With fixed costs, the percentage change in profit accompanying a change in volume is greater than the percentage change in volume.

Notes Operating leverage is defined as the firm's ability to use fixed operating costs to magnify effects of changes in sales or its earnings before interest on tax.

Example: A firm sells its product at ₹ 100%, as variable operating cost of 50% and fixed operating cost of ₹ 50,000 per year. Show the various levels of EBIT that would result from sale.

1. 1000 units
2. 2000 units
3. 3000 units.

Solution:

	Case 2 –50%	Base data	Case 1 +50%
Sales in units	1000	2000	3000
Sales revenue	100,000	200,000	300,000
Less variable operating costs	50,000	100,000	150,000
Contribution	50,000	100,000	150,000
Less fixed operating costs	50,000	50,000	50,00
EBIT	ZERO	50,000	100,000
	–100%		+100%

From the above results, certain generalization can be made.

Case I: A 50% increase in sales (from 2000 to 3000 units) results in a 100% increase in EBIT (from 50,000 to 100,000).

Case II: A 50% decrease in sales (from 2000 to 1000 units) results in a 100% decrease in EBIT (from 50,000 to zero).

Notes

$$\text{Hence, Operating leverage} = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}}$$

$$= \frac{+100\%}{+50\%} = 2 \text{ (case I)}, \frac{-100\%}{-50\%} = 2 \text{ (case II)}.$$

Self Assessment

Fill in the blanks:

1. Operating leverage results from the existence of the fixed operating expenses in the firm's ……stream.
2. ……costs are those which do not vary with sales volume.
3. ……costs are those, which are partly fixed and partly variable.
4. ……..costs are the costs which vary directly.

8.2 Relation with Break-even Analysis

Break-even analysis is used by the firm.

1. To determine the level of operations necessary to cost all operating costs and,
2. To evaluate the profitability associated with various levels of sales. The firms operating break-even point are the level of sale necessary to give all operating costs. At that point, earnings before interest and taxes equal ₹ zero.

In the example, we see that the firm has reached breakeven ('0' profit) at the sales level of 1000 units, at which all the fixed and variable operating costs are coursed.

Did u know? Break-even analysis as is sometimes called cost volume profit analysis.

8.2.1 Changing Costs and the Operating Break-even Point

The firm's operating breakeven point is sensitive to a number of variables. Fixed operating cost, the sales price per unit and the variable cost per unit. The effects of increase or decrease in these variables can be analyzed as under:

Increase in variable	Effect on operating break-even
Fixed operating costs	Increase
Sales price per unit	Decrease
Variable operating cost per unit	Increase

8.2.2 Fixed Cost and Operating Leverage

Changes in fixed operating costs affect operating leverage. Significantly, the higher the fixed operating costs, higher are the firms, operating leverage and its operating risks. High operating leverage is good when revenues are rising and bad when they are falling.

Did u know? **What is operating risk?**

Operating risk is the risk of the firm not being able to cover is fixed operating costs.

Notes

The larger is their magnitude, the larger is the volume of sales required to cost all fixed costs. The effects of changes in fixed operating expanses on operating leverage can be best explained by continuing our example.

Example: Assume that A Company exchanges a portion of its variable operating costs for fixed operating costs by eliminating sales commission and increasing sales salaries. This change results in reduction of variable operating costs by 5% of sales and increase in fixed operating costs from ₹ 50,000 to ₹ 60,000. At base level of 2000 units, there will be no change in EBIT of ₹ 50,000 but operating leverage will change as shown below.

	Case 2 – 50%	Base data	Case 1 + 5-%
Sales in units	1000	2000	3000
Sales revenue	100,000	200,000	300,000
Less variable operating costs	45,000	90,000	135,000
Contributions	55,000	110,000	165,000
Less fixed operating costs.	60,000	60,000	60,000
EBIT	–5000	50,000	105,000
	–110%		+110%

Hence degree of operating leverage has become $\frac{+110\%}{+50\%} = 2.2$

Task The following data is available for X Ltd.:

Selling price ₹ 120 pu; Variable cost ₹ 70 pu; Total fixed cost ₹ 200,000

1. What is the operating leverage when, X Ltd produces and sells 6000 units,
2. What is the percentage change that will occur in the operating profit (EBIT) of X Ltd., if output increases by 5 per cent?

Self Assessment

Fill in the blanks:

5. ……..is used by the firm to determine the level of operations necessary to cost all operating costs.
6. Changes in ……..costs affect operating leverage.
7. High operating leverage is good when ……are rising and bad when they are falling.
8. The firms operating break-even point are the level of sale necessary to give all …… costs

8.3 Financial Leverage

Financial leverage is defined as the ability of a firm to use fixed financial charges to magnify the effects in EBIT/operating profits, on the firm's earning per share, the two fixed financial cost that may be found in the firms income statement are:

1. Interest on debt and
2. Dividends on preferred shares.

These charges must be paid regardless of the amount of EBIT available to pay them.

Notes

Notes The financial leverage is favourable when the firm earns more on the investments/ assets financed by the sources having fixed charges. It is obvious that shareholders gain in a situation where a company earns a higher rate of return and pays a low rate to the supplier of long term funds. Financial leverage in such cases is also called "trading in equity."

The degree of financial leverage is the nursical measure of the firms' financial leverage and is calculated as:

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

Example: C Company Ltd. a small food company expects EBIT of ₹ 10,000 in the current year. It has ₹ 20,000 bond with 10% (annual) coupon rate of interest and 600 shares of ₹4 (annual dividend on share) preferred stock outstanding. It has also 1000 equity shares outstanding. The firm is in the 40% tax bracket. Two situations are shown:

Case 1: A 40% increase in EBIT from ₹ 10,000 – ₹ 14,000

Case 2: A 40% decrease in EBIT from ₹ 10,000 – 6,000

The corresponding change in EPS is shown below:

	Case 2 – 40%	**Base data**	**Case 1 + 40%**
EBIT	₹ 6000	10,000	14,000
Less interest	2000	2,000	2,000
Net profit before tax	4000	8,000	12,000
Less tax @ 40%	1600	3,200	4,800
Net profit after tax	2400	4,800	7,200
Less preferred stock dividend	2400	2,400	2,400
Earnings available to equity shares	0	2,400	4,800
No. of shares	1000	1,000	1,000
Earnings per share (EPS)	0	₹ 2.40	₹ 4.8
	- 100%		+100%

It is seen that in:

Case No. I – A 40% increase in EBIT has resulted in a 100% increase in earnings per share (from ₹ 2.40 to ₹ 4.80).

Case No. II – A 40% decrease in EBIT has results in a 100% decrease in earning per share (from ₹ 2.40 to ₹ 0).

$$\text{i.e., financial leverage is: } \frac{100\%}{40\%} = 2.5$$

The effect of financial leverage is such that an increase in the firm's EBIT results in a more than proportional increase in the firms earnings per share, whereas a decrease in the firms EBIT results in a more than proportional decrease in EPS.

Notes

Task Given-Financial leverage is 2

Fixed interest charge ₹ 1,00,000.

Find out the operating profit.

Significance of Financial Leverage

Financial leverage is a double-edged sword. On the one hand, it increases earnings per share, and on the other hand it increases financial risk. A high financial leverage means high fixed financial cost and high financial risks, i.e., as the debt component in capital structure increases, the financial leverage increased and at the time of the financial risk also increases. i.e., risk of insolvency increases.

Caution The finance manager is required to trade–off i.e., there has to be a balance between risk and return for determining the appropriate amount of debt in the capital structure of a firm.

Self Assessment

Fill in the blanks:

9. The financial leverage is favourable when the firm earns more on the investments/assets financed by the sources having ……..charges.
10. As the …….component in capital structure increases, the financial leverage increased.
11. A high financial leverage means high fixed financial cost and high financial……..

8.4 Combined Leverage

Combined leverage or total leverage can be defined as potential use of fixed costs, both operating and financial, to magnify the effect of changes in sales on the firms, earnings per share. Total leverage or combined leverage can therefore be viewed as the total impact of the fixed cost in the firms operating and financial structure.

$$\text{Combined leverage} = \text{operating leverage} \times \text{financial leverage}$$

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

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

Significance of Combined Leverage

A high operating leverage and a high financial leverage combination is very risky. If the company is producing and selling at a high level it will make extremely high profit for its shareholders. But, even a small fall in the level of operations would result in tremendous fall in earnings per share. A company must, therefore, maintain a proper balance between these two leverages.

A combination of high operating level and a low financial leverage indicates that the management is careful since the higher amount of risk involved in high operating leverage has been sought to be balanced by low financial leverage. However, a more preferable option would be to have a low

Notes

operating leverage and a high financial leverage. A low operating leverage implies that the company reaches its breakeven point at a low level of sales. Therefore, risk is diminished. A highly cautious and conservative manager will keep both its operating and financial leverage at a very low level, but the approach may, however, mean that the company is losing profitable opportunities.

Example: Cable Company, a computer cable manufacturer expects sales of 20,000 units @ ₹ 50 per unit in the coming year and must meet the following obligations: Variable operating costs of ₹ 20 per unit, fixed operating costs of ₹ 100,000, interest of ₹ 200,000 as preferred stock dividends of ₹ 120,000. The firm is in the 40% tax bracket and has 50,000 of equity shares outstanding. If we present the levels of earnings per share associated with the expected sales of 20,000 units as with sales of 30,000 units, it will look as below:

	= 50%		
Sales in units	20,000	30,000	Operating leverage $= \frac{+60\%}{+50\%} = 1.2$
Sales revenue	₹ 10,00,000	₹ 15,00,000	
Less variable operating costs	400,000	600,000	
Less fixed operating costs	100,000	100,000	
Earnings before interest & taxes EBIT	500,000	800,000	
	+ 60%		
Less interest	200,000	200,000	
Net profit before taxes	300,000	600,000	
Less taxes 40%	120,000	240,000	
Net profit after tax	180,000	360,000	
Less pref. stock dividends	120,000	120,000	Financial leverage $= \frac{+300\%}{+60\%} = 5.0$
Earnings available for equity shares	60,000	240,000	
No. of shares	50,000	50,000	
Earnings per share	₹ 1.20	₹ 4.80	
	+ 300%		Combined leverage $= \frac{+300\%}{50\%} = 6.0$

The table illustrates that as a result of 50% increase in sales (from 20,000 to 30,000 units), the firm would have a 300% increase in earnings per share (from ₹ 1.20 to ₹ 4.80). Similarly, a 50% decrease in sales would conversely, result in a 300% decrease in earnings per share (not shown in the table). The linear nature of the leverage relationship accounts for the fact that sales charges of equal magnitude in opposite directions results in EPS charges of equal magnitude in the corresponding direction. At this point, it should be clear that whenever a firm has fixed units, operating or financial, in its structure, combined leverage would exist.

Impact of Turnover and Capital Turnover Ratio and Working Capital Ratio

An increase in sales improves the net profit ratio, raising the Ratio On Investment (ROI) to a higher level. One may wonder that it will be very attractive for the management to try to raise their capital turnover ratio without restrain. This is not preferable in all situations; since a rise in capital turnover must be supported by an adequate capital base i.e., working capital.

The main reason for a fall in ratio showing the working capital position due to increase in turnover rates is that as the activity increases without a corresponding rise in working capital, the working capital position becomes tight. As the sales increase, both the current assets and current liabilities also increase, but not in direct proportion to the current ratio.

Notes

If the current ratio is to be maintained at 2, each increase in sales must result in a two-fold rise in the current assets as compared to current liabilities. But, this does not happen with the same amount of funds, hence a fall in the current ration.

Caution It needs to be ensured that when capital turnover ratio is sought to be increased, its effect on the working capital situation is to be carefully considered.

If the current ratio and the acid test ratio are high, it is apparent that the capital turnover ratio can be increased without any problem. However, it may be very risky to increase capital turnover ratio when the working capital position is not satisfactory.

Self Assessment

Fill in the blanks:

12. Combined leverage is equals to ……..leverage multiplied by financial leverage.
13. Combined leverage is viewed as the total impact of the ……..cost in the firms operating and financial structure.
14. A high operating leverage and a high financial leverage combination is……...
15. The ……..nature of the leverage relationship accounts for the fact that sales charges of equal magnitude in opposite directions results in EPS charges of equal magnitude in the corresponding direction

Case Study

Case: RKV – Leverage

This case provides the reader with the opportunity to apply different concepts of leverage to the planning process of the firm.

RKV is an important manufacturer of swimming pools. The firm is located in a semi-urban area. The firm's primary markets are hardware and discount stores located in five Northeastern states. Lucid products reach its market mostly by truck.

Most of RKV's financial planning is done by George Lee, GM of finance. Lee has recently prepared financial statements estimating next year's operating results. He believes that, the firm will earn just over $800,000 in the current year on sales of $8 million and is forecasting sales of $13 million next year. It is likely, that variable costs will remain at approximately the same percentage of sales next year as this year. Fixed costs will probably rise to 12 per cent next year.

Company A has an EBIT of $2.6 million, no debt, $8 in equity (300,000 shares), $18 million. Company B has the same level of sales, an EBIT of $2.85 million, $3.3 and sales of debt at 11 per cent, and $8 in equity (300,000 shares). The tax rate is 35 per cent.

RKV has been investigating the addition of a number of new product lines to be sold through its existing distribution channels. Two items have been of particular interest. The first would involve the production and sale of chaise lounges for use around swimming pools. The product would be aimed at commercial users, such as hotels, but could be sold through hardware and discount stores as a residential product. The second new item would be a patio umbrella. The umbrella would be a large, 12-rib, multicolored canvas with fringe and would be aimed at the residential market. Both products would fit in with RKV's existing product line and neither would require any increase in networking capital.

Contd...

Notes

In his analysis regarding the new product proposals, George Lee recognized that, the firm would have to build new facilities to produce each product. The lounges would require an investment of $3.8 million which would include the purchase and installation of manufacturing and packaging machinery. The umbrellas, although a relatively simple concept, would require an investment of $6 million for efficient production. For both products, it would take 80 days to install the equipment. This means that production could begin by January 1st.

Len haton, the firm's vice-president of sales, has prepared sales estimates for the two products. He forecasts $4 million in sales for the lounges and $ 4.3 million in sales for the umbrellas on annual basis. The report from the cost accounting department estimates variable costs of two-third of the sales value for the lounge unit and 61 per cent for the umbrellas. Fixed costs would be $400,000 and $ 650,000, respectively.

To finance the new projects, Lee has been working with Lucid's investment bankers. At a recent meeting, Lee was told that the firm could raise money from two sources under the current market conditions. First, it could borrow on an 11 year note at 12 per cent for either or both the projects in an amount not exceeding $ 8.5 million. Second, the investment bankers felt confident that they could underwrite a preferred stock issue with a 12 per cent dividend upto a dollar amount of $6 million. The issue would have to be cumulative with respect to dividends. Common stock financing would not be a possibility at present.

RKV Balance Sheet (Projected through December 31 this Year)

Cash	$ 425,000
Accounts receivables	750,000
Inventory	500,000
Fixed Assets	7,650,000
	$ 9,325,000
Current liabilities	$ 600,000
Long-term debt (10%)	3,800,000
Common stock ($3 par)	1,500,000
Retained earnings	3,425,000
	$ 9,325,000

Question

What would be the effect of acceptance of each project on leverages? Would it give a favourable financial leverage to RKV?

RKV Income Statement (Projected through December 31 this Year)

EBIT	1,926,520
EBT	1,536,520
Fixed Costs	1,043,480
Interest	390,000
Marginal contribution	2,970,000
Net Income	1,027,303
Sales	$ 8,000,000
Taxes	509,217
Variable Costs	5,030,000

Notes

8.5 Summary

- In financial analysis, leverage represents the influence of one financial variable over some other related financial variable.
- The amount of leverage in the firm's capital structure can significantly affect its value by affecting returns and risks.
- Operating leverage is concerned with the relationship between the firm's sales revenue and its earnings before interest and taxes, or EBIT
- Operating leverage = $\frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}}$
- Break-even analysis, sometimes called cost volume profit analysis, is used by the firm to determine the level of operations necessary to cost all operating costs
- High operating leverage is good when revenues are rising and bad when they are falling.
- Financial leverage = $\frac{\text{Percentage change in EBIT}}{\text{Percentage change in EBIT}}$
- The financial leverage is favourable when the firm earns more on the investments/assets financed by the sources having fixed charges.
- Combined leverage or total leverage can be defined as potential use of fixed costs, both operating and financial, to magnify the effect of changes in sales on the firms, earnings per share.
- Combined leverage = operating leverage × financial leverage.

8.6 Keywords

Debt: It is that which is owed; usually referencing assets owed.

Degree of Operating Leverage: It is the change in the percentage of operating income (EBIT) for the change in percentage of sales revenue.

Financial Leverage: It is the payment of fixed rate of interest for the use for the fixed interest bearing securities, to magnify the rate of return as equity shares.

Leverage: It allows accomplishing certain things that are otherwise not possible.

Operating Leverage: It results from the present fixed operating expenses within firm's income stream.

Operating Risk: It is the risk of the firm not being able to cover its fixed operating costs.

Return on Assets: This percentage shows how profitable a company's assets are in generating revenue.

Operating Income: It is a measure of a firm's profitability that excludes interest and income tax expenses.

Notes

8.7 Review Questions

1. What is meant by the term leverage? How are operating leverage, financial leverage and total leverage related to the income statement?
2. What is operating break-even point? How do charges in fixed operating costs, the sale price per unit and the variable operating cost per unit affect it?
3. What is operating leverage? What causes it? How is the degree of operating leverage measured?
4. What is financial leverage? What causes it? How is the degree of financial leverage measured?
5. What is the general relationship among operating leverage, financial leverage and the total leverage of the firm? Do these types of leverage complement each other? Why or why not?
6. A firm has sales of ₹ 7500,000, variable cost of ₹ 42,00,000 and fixed cost of ₹ 6,00,000. It has a debt of ₹ 45,00,000 @ 9% and equity of ₹ 55,00,000.
   (a) What is the firm's ROI?
   (b) Does it have favorable financial leverage?
   (c) What are the operating financial and combined leverages of the firm?
   (d) If the sales drop to ₹ 500,00,000, what will be the new EBIT?
7. The capital structure of P Company consists of ordinary share capital of ₹ 10,00,000 (shares of ₹ 100 per value) and ₹ 10,00,000 of 10% debentures. Sales increased by 20% from 100,000 to 120,000 units; the selling price is ₹ 10 per unit, variable costs amount to ₹ 6 per unit and fixed expenses amount to ₹ 200,000. The income tax rate is 50%. You are required to calculate the following :
   (a) The percentage increase in earnings per share
   (b) The degree of financial leverage at 100,000 units and 120,000 units.
   (c) The degree of operating leverage of 100,000 and 120,000 units.
8. The selected financial data A, B & C Companies for the year ending 31st December, 2004 are as follows:

	A	B	C
Variable expenses on % of sales	66 2/3	75	50
Interest expenses	₹ 200	₹ 300	₹ 1000
Degree of operating leverage	5-1	6-1	2-1
Degree of financial leverage	3-1	4-1	2-1
Income tax rate.	50%	50%	50%

   Prepare income statement for A, B and C
9. X Corporation has estimated that for a new product its break-even point is 2,000 units of P. This item is sold for 14%(identified variable cost ₹ 7 per unit). Calculate the degree of operating leverage for sales volume of 2,500 units and 3,000 units. What do you infer from the degree of operating leverage at the sales volume of 2,500 units and 3,000 units and their differences, if any?

Notes

10. ABC companies capital structure is of ₹ 5 lakh, [₹ 100 each share] and 10 per cent debt capital equity of ₹ 2,00,000. The sales are increased by 20 per cent from 50,000 to 60,000 units. ₹ 10 is the selling price per unit, and ₹ 6 is variable cost per unit and fixed expenses amount to ₹ 1,00,000. Tax rate is 10 per cent. Calculate:

    (a) Percentage increase in EPS

    (b) The degree of operating leverage at 5,0000 units and 60,000 units

    (c) The degree of financial leverage at 50,000 units and 60,000 units

11. Calculate operating and financial leverages under situations A, B and C and Financial plan 1,2, and 3 respectively from the following functions of XYZ Co. Also find out the combination of operating and financial leverage that gives the highest value and least value:

    Installed capacity = 12,000 units;

    Actual production & sales = 800 units

    Selling price = ₹ 15 p.u;

    Variable cost = ₹ 10 p.u

    Fixed Cost = Situation A, ₹ 1000; Situation B, ₹ 2000; Situation C, ₹ 3000

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

Particulars	P	Q	R
Output (Units)	3,00,000	75,000	5,00,000
Fixed Cost (₹)	3,50,000	7,00,000	75,000
Variable Cost per unit (₹)	1.00	7.5	0.1
Interest Expenses (₹)	25,000	40,000	– –
Selling Price per unit (₹)	3.00	25.00	0.50

13. From the following data, calculate operating leverage.

Year	EBIT (₹)	Sales in units
1998	60,000	3,00,000
1999	70000	3,60,000

14. Calculate operating leverage. Interest ₹ 5,0000; sales ₹ 50,000; Variable cost ₹ 25,000; Fixed cost ₹ 15,000.

15. AMC Company Ltd. provided the following information and requested you to Calculate (a) Operating leverage with 4000 and 6000 quantity of sales, (b) operating BEP (Q). Given, Selling price ₹ 300, variable cost ₹ 200, Fixed cost ₹ 2, 40,000.

Answers: Self Assessment

1.	income	2.	Fixed	3.	Semi-variable or semi-fixed
4.	Variable	5.	Break-even analysis	6.	fixed operating
7.	revenues	8.	operating	9.	fixed
10.	debt	11.	risks	12.	operating
13.	fixed	14.	very risky	15.	linear

8.8 Further Readings

Notes

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Dr Pradeep Kumar Sinha, *Financial Management*, New Delhi, Excel Books, 2009.

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Unit 9: Capital Budgeting

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Objectives

After studying this unit, you will be able to:

- Explain the meaning and process of Capital budgeting
- Describe the methods of analyzing capital budgeting decisions
- Define the conception of capital rationing
- Discuss capital decision under risk and uncertainty

Introduction

As part of long range planning process decision is taken on the programme, the organization will undertake and the appropriate resources that will be allocated to each programme over the next few years. Hence, management's decision to expand or diversify emerges from the exercise of strategic planning. The techniques of capital budgeting are used to take such decisions.

9.1 Capital Budgeting Characterization

Definition

Capital budgeting may be defined as the decision-making process by which firms evaluate the purchase of major fixed assets such as machinery, equipment, buildings, acquisition of other firms either through the purchase of equity shares or group of assets to conduct an on-going business. Capital budgeting describes the firm's formal planning process for the acquisition and investment of capital and results in a capital budget i.e., the firm's formal plan outlay for purchase of fixed assets.

Importance

Preparation of the firm's formal capital budget is necessary for a number of reasons:

1. ***It affects profitability:*** Capital budgeting decisions affect the profitability of the firm. They also have a bearing on the competitive position of the firm. They determine the future destiny of the company. An opportune investment decision can yield spectacular returns. On the other hand, an ill-advised and incorrect investment decision can endanger the very survival even of the large sized firms.
2. ***Effects are felt over long time periods:*** The effects of capital spending decisions will be felt by the firm over extended periods of time, e.g., construction of a factory affects the company's future cost structure.
3. ***It involves substantial expenditures:*** Capital expenditure may range from a single piece equipment costing thousands of rupees to complete. Profit and other physical facilities costing crores of rupees.
4. ***Not easily reversible:*** Capital investment decisions once made, are not easily reversible without much financial loss to the firm, since there may be no market for second hand plant and equipment, or conversion to other uses may not be financially feasible.
5. ***Based on long-term policy decisions:*** Capital budgeting decisions should be based on long-term policy decisions and should rest firmly on organisation policies on growth, marketing, industry share, social responsibility and other matters and not taken on ad hoc basis.
6. ***Scarce capital resources:*** Capital investment involves cost and the majority of the firm's resources are limited. This underlines the need for thoughtful and correct investment decisions.
7. ***Difficulties in evaluation:*** Evaluation of capital investment proposals is difficult since the benefits from investment are received in some future period. Hence there is a substantial

Notes

risk involved in estimation of the future benefits. Added to this, the possibility of shifts in consumer preferences, the actions of competitors, technological developments and changes in the economic and political environment. Even to quantify the future benefits in rupees is not an easy task.

Notes **Kinds of Proposals**

One can identify five types of proposals:

1. ***Replacement:*** As fixed assets are used they wear out or become outdated by new technology. Money may be budgeted to replace worn out or obsolete equipment.
2. ***Expansion:*** A firm has to grow, and therefore production facilities are to be added by way of single machinery or group of machines either for the same products or new products in the same area.
3. ***Diversification:*** A business can reduce the risk by operating in several markets rather than a single market. Firms seeking the facilities to enter new markets will consider proposals for the purchase of new machinery and facilities to handle the new products.
4. ***Research and development:*** Firms in industries where technology is rapidly changing will expend large sums of money for research and development of new products. If large sums of money are needed for equipment these proposals will normally be included in the capital budget.
5. ***Miscellaneous:*** A firm will frequently have proposals that do not directly help achieve profit-oriented goals, e.g., installation of pollution control equipment. Safety items, such as automatic sprinkling systems to protect against fire, may involve considerable expenditures.

Self Assessment

Fill in the blanks:

1. ……..describes the firm's formal planning process for the acquisition and investment of capital.
2. Capital investment decisions once made, are not easily …….without much financial loss to the firm

9.2 Capital Budgeting Process

A capital budgeting decision is a two-sided process:

1. Calculation of likely or expected return from the proposal. Here the focus is cash outflow at the beginning of the project and a stream of cash flow flowing into the firm over the life of the project. The calculation of expected return from cash outflow and cash inflows may be done by different methods discussed later.
2. To select a required return that a project must achieve before it is acceptable. The focus is the relationship between risk and return. Two methods may be used weighted average cost of capital (if project risk is identical to firms current risk) or capital asset pricing model (if project risk differs from firm's current risk).

Notes

The concept of cash outflow vs. cash inflows: The following general rules to be followed:

1. ***Only cash flow is relevant:*** Cash flow should be differentiated with accounting profits.
2. Estimate cash flows on an incremented basis that follow from project acceptance.
3. Estimate cash flows before interest basis. This is essential since capital budgeting is an evaluation technique based on discounting future cash flows by cost of capital. Estimate cash flows on an after tax basis. Some firms do not deduct tax payments.

   Caution While working out cash flows debit or charge in account of interest and cut of capital should not be considered.

4. They try to offset this mistake by discounting the cash flows before taxes at a rate higher than the opportunity cost of capital. Unfortunately, there is no reliable formula for making such adjustments to the discount rate.
5. ***Do not confuse average with incremental profits*:** Most managers hesitate to throw good money after bad e.g., they are reluctant to invest more money in a loosing division. But occasionally, you will find "turnaround" opportunities in a looser are strongly positive.
6. Cash flows should be recorded only when they occur and not when the work is undertaken or the liability incurred.
7. ***Include all incidental effects*:** It is important to include all incidental effects on the remainder of the business.

   Example: a branch line for a railroad may have negative net inflows when considered in isolation, but shall be a worthwhile investment when one allows for additional traffic that it brings to the main line.

8. ***Include working capital requirements*:** Most projects require additional investment in working capital on a continuous basis with increase in sales. This increase in working capital should be considered as a cash outflow in the relevant period. Similarly, when the project comes to an end, you can usually recover some of the investment, which will no longer be required, which will be treated as a cash inflow.
9. ***Forget sunk costs*:** They are past and irreversible outflows. Because sunk costs are by gones, they cannot be affected by the decision to accept or reject the proposal and so they should be ignored.
10. ***Include opportunity costs*:** The cost of a resource may be relevant to the investment decision even no cash changes hands. For example, suppose a new manufacturing operation uses land which otherwise could be sold for ₹ 10,00,000. This resource has an opportunity cost, which is the cash it could generate for the company, if the project is not taken up, and the resource sold or put to some other productive use.
11. ***Beware of allocated overhead costs*:** If the amount of overhead changes as a result of the investment decision, then they are relevant and should be included.
12. ***Effect of depreciation*:** Depreciation is a non-cash expense; it is important because it reduces taxable income. According to the income tax rules in India, depreciation is charged on the basis of the written down value method at the rates prescribed by Income Tax Rules. Hence, book profit has to be adjusted by the difference in depreciation (depreciation charged in books as per Companies Act and depreciation charged as per Income Tax Rules) to arrive at taxable income. Hence depreciation provides an annual tax shield equal to the product of depreciation and the marginal tax rate.

Notes

13. ***Treat inflation inconsistently*:** If the discount rate is stated in nominal terms, then consistency requires that cash flows be estimated in nominal terms, taking account of trends in selling price, labour and material costs, etc. This calls for more than simply applying a single assumed inflation rate to all components of cash flow. Tax shields on depreciation do not increase with inflation. They are constant in nominal terms because tax law in India allows only the original cost of assets to be depreciated.

14. ***Effect on other projects*:** Cash flow effects of the project under consideration. If it is not economically independent on other existing projects of the firm it must be taken into consideration.

    Example: If the company is considering the production of a new product that competes with the existing products in the firms product line, it is likely that as a result of the new proposal, the cash flows related to the old product will be effected.

15. ***Tax effect from investment tax credit*:** An investment tax credit is a tax benefit allowed to business purchasing capital assets. The firm may claim a specified percentage of new capital investments as credit against income tax in the current year. This is in line with investment allowance provided in the Income Tax Act, 1961 earlier.

    Conversion of Incremental Accounting Profit to Cash Inflow for Project Evaluation:

    Year wise Incremental

    Cash Inflow = Year Wise Incremental Accounting Profit of any project (whether it be for new product or replacement of old Machinery with new machinery etc.) after tax, but, before interest + Depreciation + all other non-cash expenses.

    – Non-cash revenue i.e., profit on sale of asset after the end of the project.

Self Assessment

Fill in the blanks:

3. A capital budgeting decision is a ……process.
4. It is important to include all ……..effects on the remainder of the business.

9.3 Methods of Analyze Capital Budgeting Decisions

9.3.1 Traditional Techniques of Evaluation

Payback Period

Sometimes called the payout method i.e., a computationally simple project evaluation approach that has been used for many years. The procedure is to determine how long it takes a project to return the cost of the original investment.

Example: A project costing ₹ 20 lakhs yields annually a profit of ₹ 3 lakhs after depreciation @12.5% (straight line method) but before tax 50%. In this case cash inflow = Profit after tax + Depreciation = ₹ 3,00,000 – Tax ₹ 1,50,000 + Depre. ₹ 2,00,000 = ₹ 4,00,000 p.a.

$$\text{Payback period} = \frac{1,60,000 - 10,000}{15} \quad \frac{\text{Cost of the project}}{\text{Annual cash inflow}} = \frac{20,00,000}{4,00,000} = 5 \text{ years.}$$

Notes

The project with a lower payback period will be preferred. Sometimes, the management lays down policy guidelines regarding payback period.

Merits

1. This method is quite simple and easy to understand; it has the advantage of making it clear that there is no profit of any project unless the payback is over. When funds are limited it is always better to select projects having shorter payback periods. This method is suitable to industries where the risks of obsolescence are very high.
2. The payback period can be compared to a break-even point, the point at which costs are fully recovered, but profits are yet to commence.
3. The risk associated with a project arises due to uncertainty associated with the cash inflows. A shorter payback period means less uncertainty towards risk.

Limitations

1. The method does not give any considerations to time value of money. Cash flows occurring at all points of time are simply added.
2. This method becomes a very inadequate measure of evaluating two projects where cash inflows are uneven.
3. It stresses capital recovery rather than profitability. It does not take into account the returns from a project after its payback period. Therefore, this method may not be a good measure to evaluate where the comparison is between two projects one involving a long gestation period and other yielding quick results only for a short period.

The Payback Reciprocal

A simple method of calculating the internal rate of return is the payback reciprocal which is 1 divided by the payback period.

Example: A project has an initial cash outlay of ₹ 2,00,000 followed by 10 years of annual cash savings of ₹ 50,000. The payback period is ₹ 2,00,000/₹ 50,000 = 4 years and the payback reciprocal is

$$\frac{1}{\text{Playback period}} = \frac{1}{4} = 25\%$$

A major drawback of the payback reciprocal that it does not indicate any cutoff 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 if the life of the project is at least twice the payback period and the project generates equal amount of the annual, cash inflows.

Accounting Rate of Return (ARR)

The accounting rate of return (ARR) method of evaluating capital budgeting projects is so named because it parallels traditional accounting concepts of income and investment. A project is evaluated by computing a rate of return on the investment, using accounting measures of net income. The formula for the accounting rate of return is:

$$\text{ARR} = \frac{\text{Annual revenue from project} - \text{Annual exp. of project}}{\text{Project investment}} \times 100$$

Notes

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 of rate) they may have in mind.

Merits: This method is quite simple and popular because it is easy to understand and includes income from the project throughout its life.

Limitations:

1. This method ignores the timing of cash flows, the duration of cash flows and the time value of money.
2. It is based upon a crude average of profits of the future years. It ignores the effect of fluctuations in profits from year to year.

Conclusion: The traditional techniques of appraising capital investment decision have two major drawbacks:

1. They do not consider total benefits throughout the life of the project and
2. timing of cash inflows is not considered.

Hence, two essential ingredients of a theoretically sound appraisal method are that:

1. it should be based on total cash stream through the project life and
2. it should consider the time value of money of cash flows in each period of a projects life.

Did u know? The discounted cash flows techniques also known as time adjusted techniques satisfy these requirements and provide a more objective basis for selecting and evaluating investment projects.

9.3.2 Discounted Cash Flow Methods

Discounted cash flow refers to the fact that all projected cash inflows and outflows for a capital budgeting project are discounted to their present value using an approximate interest rate. Three discounted cash flow methods are generally used in capital budgeting. One is called Net Present Value Method (NPV); the other is called Profitability Index or Desirability factor and the third Internal Rate of Return (lRR). All the three methods focus on the timing of cash flows over the entire life of the project. The spotlight is on the cash flows as opposed to accounting measures of revenue and expense.

All discounted cash flow methods are based on the time value of money, which means that an amount of money received now is worth more than an equal amount of money received in future. Money in hand can be invested to earn a return.

To simplify the process of evaluating proposals using discounted cash flows, the assumption is often made that cash flow or cash savings from a project occur at the end of accounting period since the results are not materially different from mere precise calculations.

Net Present Value (NPV)

nder this method, all cash inflows and outflow are discounted at a minimum acceptable rate of return, usually the firm's cost of capital. If the present value of the cash inflows is greater than the present value of the cash outflows, the project is acceptable i.e., NPV > 0, accept and NPV < 0, reject. In other words, a positive NPV means the project earns a rate of return higher than the firm's cost of capital.

Notes

Example: JP Company wants to buy a machine with a cost of ₹ 33,522 and annual cash savings of ₹ 10,000 for each of 5 years. JP Company's cost of capital is 12%. With uniform cash flows, the present value (PV) is computed using the present value of and annuity of 5 payments of ₹ 10,000 each at 12%, the NPV is calculated as follows:

PV of Cash inflows = 10,000 × 3,605 (PV 1 – 5 years @ 12%)	₹ 36,050
Less: Present Value of Cash outflows	33,522
Net present value of the project	2,528

Since NPV is positive, the project is acceptable since the net value of earnings exceeds by ₹ 2,528 the amount paid for the use of the funds to finance the investment.

The net present value relies on the time value of money and the timings of cash flows in evaluating projects. All cash flows are discounted at the cost of capital and NPV assumes that all cash inflows from projects are re-invested at the cost of capital.

As a decision criterion, this method can be used to make a choice between mutually exclusive projects. The project with the highest NPV would be assigned the first rank, followed by others in the descending order.

Merits:

1. It recognises the time value of money.
2. The whole stream of cash flows throughout the project life is considered.
3. A changing discount rate can be built into the NPV calculations by altering the denominator.
4. NPV can be seen as the addition to the wealth of shareholders. The criterion of NPV is, thus, in conformity with basic financial objectives.
5. This method is useful for selection of mutually exclusive projects.
6. An NPV uses the discounted cash flows i.e., expresses cash flows in terms of current rupees. The NPV's of different projects therefore, can be added/compared. This is called the value additive principle, implying that NPV's of separate projects can be added. It implies that each project can be evaluated independent of others on its own merit.

Limitations:

1. It is difficult to calculate as well as understand and use in comparison with the payback method or even the ARR method.
2. The calculation of discount rate presents serious problems. In fact, there is difference of opinion even regarding the exact method of calculating it.
3. PV method is an absolute measure. *Prima facie* between the two projects, this method will favour the project, which has Higher Present Value (or NPV). But it is likely that this project may also involve a larger initial outlay. Thus, in case of projects involving different outlays, the present value method may not give dependable results.
4. This method may not give satisfactory results in case of projects having different effective lives.

Desirability Factor/Profitability Index (PI)

NPV of a project is a function of the discount rate, the timings of the cash flow and the size of the cash flows. Other things being equal, large investment proposals yield larger net present values.

Notes

Logic tells, cash flows of the larger machine are merely a multiple of cash flows of the smaller machines. To adjust, the size of the cash flows, we can calculate a profitability index, which is the ratio of the present value of cash inflows to the present value of the cash outflows. Thus, profitability index

$$(PI) = \frac{\text{P.V. of cash inflow}}{\text{P.V. of cash outflow}}$$

The higher the PI, the more desirable the project in terms of return per rupees of investment. A PI of I.O. is the cut-off point for accepting projects and is equivalent to being NPV positive. A PI of less than 1.0 indicates negative net present value for the project.

Internal Rate of Return (IRR)

Internal rate of return is the interest rate that discounts an investment's future cash flows to the present so that the present value of cash inflows exactly equals the present value of the cash outflows i.e., at that interest rate the net present value equals zero.

The discount rate i.e., cost of capital is considered in determination of the net present value while in the internal rate of return calculation, the net present value is set equal to zero and the discount rate which satisfies this condition is determined and is called Internal Rate of Return.

Any investment that yields a rate of return greater than the cost of capital should be accepted because the project will increase the value of the firm.

Did u know? Unlike, the NPV method, calculating the value of IRR is more difficult. The procedure depends on whether the cash flows are annuity (equal year wise) or non-uniform.

The following steps are taken in determining IRR for an annuity (equal cash flows):

1. Determine the payback period of the proposed investment.
2. From the table of Present value of Annuity, look for year that is equal to or closer to the life of the project.
3. From the year column, find two Present Value or discount factors closest to payback period, one larger and other smaller than it.
4. From the top row of the table note, the two interest rates corresponding to these Present values as in (3) above.
5. Determine IRR by interpolation

When cash flows are not uniform, an interest rate cannot be found using annuity tables.

Instead trial and error methods or a computer can be used to find the IRR. If the IRR is computed manually, the first step is to select an interest rate that seems reasonable (this can be done by calculating average annual cash flows by the annuity method as mentioned earlier) and then compute the present value of the individual cash flows using that rate.

If the net present value is positive, then the interest rate used is low, i.e., IRR is higher than the interest rate selected. A higher interest rate is then chosen and the present value of the cash flows is computed again. If the new interest rates yield a negative net present value, then a lower interest rate is to be selected. The process is repeated until the present value of cash inflow is equal to the present value of the cash outflows. Finding the rate of return using trial and error methods can be tedious, but a computer can accomplish the task quite easily.

Notes

Advantages

1. It possesses the advantages, which are offered by the NPV criterion such as it considers time value of money and takes into account the total cash inflows and outflows.
2. IRR is easier to understand. Business executives and non-technical people understand the concept of IRR much more readily that they understand the concepts of NPV.
3. It does not use the concept of the required cost of return (or the cost of capital). It itself provides a rate of return which is indicative of the profitability of the proposal. The cost of capital enters the calculation, later on.
4. It is consistent with the overall objective of maximizing shareholders wealth since the acceptance or otherwise of a project is based on comparison of the IRR with the required rate of return.

Limitations

1. It involves tedious calculations.
2. It produces multiple rates, which can be confusing.
3. In evaluating mutually exclusive proposals, the project with the highest IRR would be picked up to the exclusion of all others. However, in practice, it may not turn out to be one that is the most profitable and consistent with the objectives of the firm i.e., maximization of the wealth of the shareholders.
4. Under IRR method, it is assumed that, all intermediate cash flows are reinvested at the IRR rate. It is not logical to think that the same firm has the ability to re-invest, the cash flows at different rates. In order to have correct and reliable results it is obvious, therefore, that they should be based on realistic estimates of the interest rate at which the income will be re-invested.
5. The IRR rule requires comparing the projects IRR with the opportunity cost of capital. But, sometimes, there is an opportunity cost of capital for 1 year cash flows, a different cost of capital for 2-year cash flows and so on. In these cases, there is no simple yardstick for evaluating the IRR of a project.

Self Assessment

Fill in the blanks:

5. Under Net Present Value (NPV) method, all cash inflows and outflow are discounted at a ……..acceptable rate of return, usually the firm's cost of capital.
6. ……is the ratio of the present value of cash inflows to the present value of the cash outflows.
7. ……..is the interest rate that discounts an investment's future cash flows to the present so that the present value of cash inflows exactly equals the present value of the cash outflows.

9.4 Comparison – NPV and IRR Methods

Similarities

In respect of conventional and independent projects, the two methods give a concurrent acceptance-reject decision. In case of conventional investment cash outflows are confined to the initial

Notes

period (i.e. in the beginning) followed by cash inflows. The independent proposals refer to investment, the acceptance of which does not preclude the acceptance of others, so that all profitable proposals can be accepted and there are no constraints. The decision rule is that a proposal will be accepted if

1. NPV exceeds zero,
2. IRR exceeds the required rate of return.

Similarly, when NPV = Zero or the IRR = required rate of return, the project may be accepted or rejected.

Differences

In case of mutually exclusive capital project i.e., the acceptance of an investment precludes the acceptance of others (i.e. if there are alternative courses of action, only one can be accepted). Mutual exclusiveness of the investment projects may be technical or financial. Technical means projects with different profitabilities and selection of the more profitable. Financial means resource constraints, which is also called capital rationing.

The different ranking by NPV and IRR methods can be due to the following:

1. Size disparity
2. Time disparity
3. Unequal expected lives.

As stated earlier, the IRR criterion implicitly assumes that the cash flow generated by the project will be reinvested at the internal rate of return, as opposed to company's cost of capital in case of NPV. The assumption of the NPV method is considered to be superior since the rate can be consistently applied to all investment proposals.

9.4.1 Net Present Value vs. Profitability Index

The investment proposal will be acceptable if:

1. PI is greater than one.
2. Positive Net Present Value.

Likewise, PI will be less than I when the investment proposal has a negative net present value under the NPV method.

Caution While evaluating mutually exclusive investment proposals, these methods will give different rankings. The best project is the one, which adds the most, among available alternatives, to the shareholders wealth. The NPV method by its very definition, will always select such projects.

9.4.2 Interrelation between Payback, Net Present Value, IRR and Profitability Index

We have seen $$\text{Payback period} = \frac{\text{Cost of the Project}}{\text{Annual cost saving/Inflows}}$$

We have also seen that investment proposal will be acceptable if PI is greater than one and Net Present Value is positive.

Notes

Again, NPV = 0, when the discount rate is equal to cost of capital and PI = I and by definition IRR is the interest rate that discounts an investments', future cash flows to the present so that present value of inflows equals to the present value of cash outflows i.e., NPV is equal to zero. Hence, under IRR, if interest rate is equal to cost of capital, NPV is zero and also PI = I.

The steps for determining IRR for an annuity (equal annual cash flows).

1. Payback period, which will give the cumulative present value factor.
2. From cumulative PV (discount) factor tables see the corresponding interest rate nearest to that figure corresponding to the life of the project (No. of years).

From the above discussion we can conclude the following:

1. Payback period = Cumulative Present value of Discount, based.
   (equal annual cash flows) on cost of capital.
2. At IRR rate of interest NPV = 0 i.e., Cost of the project = Cash outflows
   = Present value of cash inflows
   = Annual cash inflows × Cumulative discount factor
   (In case of equal annual cash inflows)

Example: Following are the data on a capital project being evaluated by the management of X Ltd.

	Project M
Annual cost saving	₹ 40,000
Useful life	4 years
IRR	15%
Profitability Index (PI)	1.064
NPV	?
Cost of capital	?
Cost of project	?
Payback	?
Salvage value	0
Find the missing values.	(Given cumulative PV 1-4 years @ 15% = 2.855)

Solution:

At 15% IRR, the sum total of cash inflows = Initial cash outlay i.e. cost of the project

Cumulative present value @ 15% for 4 years = 2.855 and Annual Cost saving ₹ 40,000

Hence, Total of Cash inflows = 40,000 × 2.855 = ₹ 1,14,200

Therefore, Initial Cost Outlay

i.e., Cost of the project = ₹ 1,14,200

$$\text{Payback period} = \frac{\text{Cost of the project}}{\text{Annual cost saving}} = \frac{1,14,200}{40,000} = 2.855 \text{ years}$$

Notes

= 2 years 11 months

P I. = 1.064

$$= \frac{\text{P.V. of cash inflow}}{\text{P.V. of cash outflow i.e. Cost of the project}}$$

Hence, PV of Cash inflows = 1.064 × 1,14,200 = ₹ 1,21,508.8

NPV = 1,21,508.8 – 1,14,200 = ₹ 7,309

Current Present Value factor at Company's Cost of Capital

$$= \frac{\text{PV of Cash inflows}}{\text{Annual Cost Saving}}$$

$$= \frac{1,21,509}{40,000} = 3.0377$$

From the present value table corresponding to 4 years the discount/interest is 12%

i.e., Cost of capital = 12%.

Example: Following are the data on a capital project with equal annual cash savings evaluated by the management of S company –

	Project
Cost	₹ 1,01,400
Payback	5.07 years
Annual Cost Saving	?
Useful life	?
Cost of Capital	?
NPV -	?
IRR	19 per cent
PI	1.14
Salvage Value	0

Required: Find the missing values.

Solution:

1. Annual Cost Saving = Cost of Project/Payback period

= ₹ 1,01,400/5.07 = ₹ 20,000

2. At IRR rate of discount (i.e. 19%)

Cost of the project = PV of cash inflows

= ₹ 1,01,400

Hence, Cumulative Present Value at 19%

$$= \frac{1,01,400}{20,000} = 5.07$$

Notes

If we refer to Cumulative Present Value @19% Cumulative Present Value of 5.07 is computed at 19 years. Therefore, useful life =19 years.

3. PI = 1.14 at cost of capital rate of interest; at IRR rate of discount

   PI index = 1. Hence Cumulative Present Value at cost of capital rate of interest = 5.07 × 1.14 = 5.778. By referring to Cumulative Present Value table up to 19 years. We find at 17% Cumulative Present Value 5,585 and at 16% = 5.877. Since 5,778 Cumulative Present value is lying between 5.877 and 5,585 by interpolation we get,

   16 + = 16 + = 34 + 16 = 16.34%

4. NPV at IRR rate of discount = 0 when PI = I

   Since PI = 1.14

   Therefore, NPV = 0.14 × Cost of the project = 0.14 × 1,01,400 = ₹1,41,196

9.4.3 The Concept of Project IRR

In spite of the theoretical superiority of NPV, financial managers prefer to use IRR. The preference for IRR is due to the general preference of business people towards rates of return rather than actual rupee returns. Because interest rates, profitability and so on are most often expressed as annual rates of return, the use of IRR makes sense to financial decision makers. They tend to find NPV less intuitive because it does not measure benefits relative to amount invested. The concept of project IRR finds favour material financial undertakings and other providers of capital. It gives an idea of how much discounting towards amount of capital, the project can sustain during its life span. This can be explained through an example.

Example: XYZ Ltd. an infrastructural company is evaluating a proposal to build, operate and transfer a section of 35 km of road at a project cost of ₹ 200 crores to be financed as:

Equity share capital	₹ 50 crores
Loans at the rate of interest of 15% from financial institutions	₹ 150 crores

The project after completion must be opened to the traffic and must be affected for a period of 15 years and after 15 years, it must be handed over to the highway authorities at zero value. It is estimated that the total revenue must be ₹ 50 crore per annum and annual collection expenses including maintenance of roads will amount to 5% of the project cost. The company considers to write off the total cost of the project in 15 years in a straight line basis for corporate income tax, the company is allowed to take depreciation @ 10% on NDV basis. The financial institutions are agreeable to the repayment of the loan in 15 equal annual installments – consisting of principal and interest.

Calculate Project IRR and Equity IRR. Ignore corporate taxation. Explain the difference in project IRR and equity IRR.

Solution:

The project cash inflows and cash outflows can be summarized as follows:

Cash outflow / Cost of the project	0	1	2	3 – 15
	200			
Cash inflow / Revenue for Tax	50			

Less maintenance 5% of 200

Notes

Net. $\frac{10}{40 \quad 40 \quad 40 - 15 \text{ years}}$

At IRR – Cost of the project equal to discounted cash inflows of ₹ 40 crores for total project life i.e., 15 years.

Now, cost of the project = ₹ 200 crores.

Hence, 200 crores = cum discount factor 1 – 15 years × ₹ 40 crores or cum discount factor 1-15 years = $\frac{200}{40}$ = from the rate of present value of annuity, it will be observed that at 20% cum present value 1-15 years 5.09158 at 19% cum present value 1-15 years 4.87586. Hence Project IRR will be between 19% and 20%, it will be approximately 19% + $\frac{5 - 4.87586}{5.09158 - 4.87568}$ i.e. $\frac{0.12414}{0.21572}$ = 19 + 0.58%

Since, there is no corporate taxation, depreciation will not affect cash flow, hence depreciation; has not been considered. Now the project is financed by ₹ 50 crores debt @ 15% p.a. i.e., yearly interest of ₹ 7.50 crore and equity capital ₹ 150 crores. Hence profit available to equity shareholders each year

= Net cash inflow – Interest outflow

= ₹ 40 – ₹ 7.5 = ₹ 32.5 crores.

Hence, cum discount factor for equity shares

$$= \frac{150}{325} = 4.61538$$

If we see the present value of annuity table 1-15 years cumulative, we find

20% = 4.67547)

21% = 4.48901) Hence it will be between 20 & 21%

It will be

$$20\% + \frac{4.61538 - 4.48901}{4.67547 - 4.48901} \text{ i.e. } \frac{0.12607}{0.18646} = 20.68\%$$

Equity IRR is more than project IRR, since the project is earning 19.58% on discounted basis, interest is being paid @ 15% so capital is contributed by debt is interest paid is less than the interest earned, the balance goes to equity share holders to increase their return.

9.4.4 Capital Rationing

The process of selecting the more desirable projects among many profitable investments is called capital rationing. Like any rationing it is designed to maximize the benefit available from using scarce resources. In this case the scarce resources are funds available for capital investments and the benefits are returns on the investments. The objective is to select the combination of projects, which would give maximization of the total NPV. The project selection under capital rationing involves two stages:

1. The identification of the acceptable projects,
2. To select the combination, of projects. The acceptability of projects can be based either on profitability/present value index or IRR.

Notes

Notes Many firms' capital constraints are 'Soft'. They reflect no imperfections in capital markets. Instead they are provisional limits adapted by management as an aid to financial control. Soft rationing should never cost the firm anything. If capital constraints become tight enough to hurt in the sense that projects with significant positive NPV's are passed up then the firm raises more money and loosens the constraint. But when it can't raise more money, then it faces hard rationing. 'Hard' capital rationing always reflects on market imperfection a barrier between the firm and capital markets, which can be attributed to non-availability of market information, investor attitude etc.

There are various ways of resorting to capital rationing. For instance, a firm may effect capital rationing through budgets. Capital rationing may also be exercised by following the concept of "responsibility accounting", whereby management may introduce capital rationing by authorizing a particular department to make investment only up to a specified limit, beyond which the investment decisions are to be taken up by higher-ups.

In capital rationing, it may also be more desirable to accept small investment proposals than a few large investment proposals so that there may be full utilization of budgeted amount. This may result in accepting relatively less profitable investment proposals if full utilization of budget is a primary consideration.

Similarly, capital rationing may also mean that the firm foregoes the next most profitable investment following after the budget ceiling, even though it is estimated to yield a rate of return much higher than the required rate of return. Thus, capital rationing does not always lead to optimum results.

Example: S. Ltd. has ₹ 10,00,000 allocated for capital budgeting purposes. The following proposals and associated profitability indexes have been determined:

Project	Amount (₹)	Profitability Index
1	3,00,0.00	1.22
2	1,50,000	0.95
3	3,50,000	1.20
4	4,50,000	1.18
5	2,00,000	1.20
6	4,00,000	1.05

Which of the above investments should be undertaken? Assume that projects are indivisible and there is no alternative use of the money allocated for capital budgeting:

Solution:

We should go in for projects priority-wise based on PI Index:

Project	PI	Investment (₹)	Priority	Sum Total of Cash Inflows (₹)	NPV (₹)
1	1.22	3,00,000	I	3,66,000	66,000
3	1.20	3,50,000	2	4,20,000	70,000
5	1.20	2,00,000	2	2,40,000	40,000
4	1.18	4,50,000	3	5,31,000	81,000
6	1.05	4,00,000	4	4,20,000	20,000

Notes

Since there is no alternative use of money we should maximize capital spending provided project is profitable, that is, PI is more than I and NPV is positive. Combination of project 1, 3, 5 gives NPV of ₹ 1,76,000 but ₹ 1,50,000 remains unspent, whereas combination of 3, 4, 5 gives NPV of ₹ 1,91,000 and every amount is spent. Hence project 3, 4, 5 are to be taken.

9.4.5 Break-Even Time and Capital Budgeting for New Products

Time is being considered as a competitive weapon specifically for firms that bring a new product to market at a very fast rate in order to gain sizeable shares of total market sales for that product. Hence, the increased emphasis to the use of break-even time as a capital budgeting method and as a performance measures.

Break-Even Time (BET) is the time taken from the start of the project (the initial idea date) till the period the Cumulative Present Value of cash inflows of a project equal to present values of the total cash outflows. Hence, product proposals with shorter BET's are preferred to longer BETs if all other things are equal.

BET also promotes aggressive efforts by personnel on different functional areas such as product design and manufacturing to speed up the time taken to bring the product to the market and reap the benefits fast.

Did u know? Hewlett-Packard is a strong advocate of BET.

Example: Two products A and B are being evaluated by a Computer Manufacturing Company. The estimated cash outflows covering research and development, product design, manufacturing, marketing, distribution and customer services and cash inflows from sales are given below:

(₹ lakhs)

	Product A		Product B	
Year	**Cash Outflows**	**Cash Inflows**	**Cash Outflows**	**Cash Inflows**
1	8	0	10	4
2	6	14	7	32
3	22	34	17	26
4	13	37	6	8
5	10	22	0	2

The company uses a 14% required rate of return for discounting cash flows on a before tax basis.

Solution:

For Product A

(₹ lakhs)

Year	PV Factor	Cash Outflows	PV of cash Outflows	Cum PV of Cash Outflows	Cash Inflows	PV of cash Inflows	Cum. PV of cash Inflows.
1	0.877	8	7.016	7.016	0	-	0
2	0.769	6	4.614	11.63	14	10.766	10.766
3	0.675	22	14.85	26.48	34	22.95	33.716
4	0.592	13	7.696	34.176	37	21.904	55.62
5	0.519	10	5.19	39.366	22	11.418	67.038

Notes

For Product A, the present value of total cash outflows is ₹ 39.366 lakhs. At the end of 3 year, the cumulative present value of cash inflows is ₹ 33.716 lakhs and for 4th year the present value of cash inflows is ₹ 21.904 lakhs.

$$\text{BET of Product A} = 3 + \frac{39.366 - 33.716}{21.904} = 3.26 \text{ years}$$

For Product B

(₹ Lakh)

Year	PV Factor	Cash Outflows	PV of cash outflows	Cum PV of cash outflows	Cash inflows	PV of cash inflows	Cum. PV of cash inflows.
1	0.877	10	8.77	8.77	4	3.508	3.508
2	0.769	7	5.383	14.153	32	24.608	28.116
3	0.675	17	11.475	25.628	26	17.55	45.666
4	0.592	6	3.552	29.18	8	4.736	50.402
5	0.519	0	0	29.18	2	1.038	51.44

For Product B, the present values of the total cash outflows are ₹ 29.18 1akh. At the end of 2 year, the cumulative present value of cash inflows is ₹ 28,116 lakhs and for 3rd year the present value of cash inflows is 17.550.

$$\text{BET for Product B} = \frac{29.18 - 28.116}{17.550} = 2.06 \text{ years}$$

9.4.6 BET vs. the Payback Method

Differences

1. BET starts counting time at the start of the project, irrespective of when the cash outflows occur whereas payback method starts counting time from the initial cash outflow.
2. BET takes account of time value of money when cumulating cash inflows and cash outflows, whereas payback method ignores the time value of money.

Similarity

1. Both methods ignore cash inflows after the break-even time or the payback period.

Self Assessment

Fill in the blanks:

8. Profitability Index will be less than I when the investment proposal has a ……net present value under the NPV method.
9. 'The process of selecting the more desirable projects among many profitable investments is called ……..

9.5 Financial Data for Sample Problem

From the following, calculate differential cash flow streams considering that a firm has an existing machine and is considering the purchase of a new machine:

1. The new machine is more efficient than the existing machine. This will increase the firm's revenue from products made by the machine from ₹ 4,00,000 to ₹ 4,50,000 and will lower operating cost from ₹ 2,10,000 to ₹ 1,70,000.

Notes

2. The new machine will cost ₹ 2,20,000. It will cost ₹ 20,000 for transportation and installation of machine. The firm will receive ₹ 15,000 investment tax credit as a result of the purchases and installation of the machine.

3. The new machine will have a service life of 4 years. The existing machine will also be able to produce goods for four more years.

4. The new machine processes raw materials more quickly and works more efficiently on long production runs. Thus, the firm must tie up an additional ₹ 20,000 of goods in inventories to support the new machine.

5. At the present time, the book value of the existing machine is ₹ 80,000 and it is being depreciated at ₹ 20,000 per year, to a zero book value. If the existing machine is sold today, its cash value would be ₹ 40,000. If it continues to operate for 4 more years, its cash value would be ₹ 10,000.

6. The new machine will be depreciated using straight-line depreciation. In four years, it will have ₹ 40,000 book value and ₹ 30,000 cash salvage value. Take Income Tax @ 50%.

Step 1 – Calculate the Net Cash Outlay: The net cash outlay is the different amount of money that will be spent when the investment is made in year zero. It may be calculated by = Total cost of new investment including purchase price, transportation, installation and any related charges. Tax savings from investment tax credit +/– changes in the working capital requirements net cash received from replacing existing machines (i.e., selling price or money received less any costs of removing the asset) +/– either the taxes saved or additional taxes to be paid as a result of purchasing the new asset. In our example, ₹ 2,20,000 is the purchase price plus ₹ 20,000 for transportation and installation.

The investment tax credit produces a tax saving of ₹ 15,000. The working capital tied up is ₹ 20,000 that is treated as an outlay in year zero. It will be an inflow in year 4. The cash for the existing machine is ₹ 40,000. The tax effect is a saving that occurs because the firm sells a ₹ 6,80,000 book value machine for ₹ 40,000, procuring non-cash or book loss. At a 50 per cent tax rate, the loss of ₹40, 000 in the sale produces a ₹ 20,000 tax savings. Thus, net cash outlay (outflow) is

2,20,000 + 20,000 – 15,000 + 20,000 – 40,000 – 20,000 = ₹ 1,85,000.

Step 2 – Calculate the Depreciation Schedules: In practice, we use the method employed by the firm for tax purposes since only this method affects the tax shield and cash flow using straight line depreciation. In our example, the depreciation can be calculated with two formulas as follows:

Depreciable Cost = Total Cost of machine – Book salvage value

2,40,000 – 40,000 = ₹ 2,00,000

Annual Depreciation = Depreciable Cost/Years of life

= 2,00,000/4 = ₹ 50,000

With the straight-line method, ₹ 50,000 depreciation is the same for each of the four years of the new machines estimated service life. With other methods, the amount of depreciation differs each year.

The depreciation on the existing machine is given at ₹ 20,000 per year down to zero book value. Since the current book value is ₹ 80,000, the annual depreciation of ₹ 20,000 will be realised for the remaining four years of service life.

Notes

Step 3 – Calculate Annual after Tax Cash flows: In our example, the annual cash flows will be same each year since the revenues, costs, depreciation and taxes do not change. To compute after tax cash flows from operations or employment of the asset there are 2 methods:

1. We begin with revenues, deduct cash expenses and taxes, and we have the cash flow, or
2. We can begin with revenues; deduct cash expenses, and non-cash expenses. Calculate taxes and deduct them and then add back depreciation. The two methods are shown below:

	New Machine		Existing Machine	
	Accounting	**Cash flow**	**Accounting**	**Cash flow**
Annual-revenues	450,000	400,900	400,000	400,000
Less: Annual cost of operation	170,000	210,000	210,000	210,000
Before tax cash flow	280,000	190,000	190,000	190,000
Less: Annual depreciation	50,000	20,000	20,000	20,000
	230,000	170,000	170,000	170,000
Less: income taxes 50%	115,000		85,000	85,000
Net income after taxes	115,000	85,000	85,000	85,000
Add: Back Depreciation	50,000	20,000	20,000	20,000
After tax cash flow	165,000	105,000	105,000	105,000

Notes Any tax shield from interest payments on debt is omitted, since the effects off financing by different methods are considered in cost of capital calculation and are not covered in capital budgeting so as to avoid double counting of financing effects.

Step 4 – Calculate effects in final year:

In the final year two events occur:

1. The return of the working capital tied up in year zero. In our example, ₹ 20,000 is treated as an inflow in the final year since the money is freed for other uses.
2. In the final year, each machine is sold in its respective cash flow stream. To get the after tax effect, we must estimate the book and cash value and compute the net cash value from the sale of each asset, as given below:

	New Machine	**Existing Machine**
Book value in 4 years	40,000	0
Cash value in 4 years	30,000	10,000
Gain (Loss) on sale in 4 years	(10,000)	10,000
Tax saving (additional taxes)	5,000	(5,000)
Plus Cash Received	30,000	10,000
Net Cash Value	35,000	5,000

Thus, we have cash flow in the final year as follows:

	New Machine	**Existing Machine**
Annual inflows from step 3	1,65,000	1,05,000
Return of working capital	20,000	-
Sale of machine	35,000	5,000
Final year cash flow	2,20.000	1,10.000

Notes

Step 5 – Calculate the Differential after Tax stream: We subtract the existing machine stream from the new machine stream as follows:

Year	New Machine	Existing Machine	Difference
0	(1,85,000)	0	(1,85,000)
1	1,65,000	1,05,000	60,000
2	1,65,000	1,05,000	60,000
3	1,65,000	1,05,000	60,000
4	2,20,000	1,10,000	1,10,000

This stream shows both the timing and amount of net cash outlay and net cash inflow over the life of the new machine. All effects are differential – the difference between having the investment and not having it, and can be evaluated with time-value of money techniques as have been discussed earlier.

Cost of Capital

As mentioned above, the cost of capital is an important element as basic input information in capital investment decisions. It provides a yard stick to measure the work of investment proposals and thus, perform the role of accept reject criterion. It is also referred to a cut-off-rate, target rate, minimum required rate of return, standard return and so on. In the present value method of discounted cash flow techniques, the cost of capital is used as the discount rate to calculate the NPV.

Notes The PI Index or benefit cost ratio method similarly employs to determine the present value of future cash inflows. In case of internal rate of return method, the computed IRR is compared with the cost of capital, and accept only the cases where they are more than cost of capital.

In operational terms, cost of capital refers to the discount rate that would be used in determining the present values of estimated future cash proceeds and eventually deciding whether the project is worth accepting or not.

The cost of capital is considered as consisting of different sources of funds. The cost of each source is called as specific cost of capital and these specific costs when combined refer to overall cost of capital or weighted cost of capital.

Assumptions – Cost of Capital

1. That the firm's business and financial risk are unaffected by the acceptance and financing of projects.
2. The firm's financial structure is assumed to remain fixed. It implies that the additional funds required to finance the new project are to be raised in the same proportion as the firm's existing financing.

Solved Illustrations

Illustraton 1: A project costing ₹ 5,60,000 is expected to produce annual net cash benefits of ₹ 80,000 over a period of 15 years. Estimate the IRR. Also, find the payback period and obtain the IRR from it. How do you compare this IRR with the one directly estimated?

Solution:

$$\text{Payback period} = ₹\ \frac{5,60,000}{80,000}. = 7$$

Notes

Hence from the present value of annuity 1—15 years closest factors to 7 are 7.191, (at 11% rate of discount) and 6.811 (at 12% rate of discount). Hence IRR would be somewhere between 11% and 12%.

Using interpolation IRR would be:

$$11\% + \frac{7.191 - 7}{7.191 - 6.811} = 11\% + \frac{0.191}{0.380} = 11.5\%$$

We know that reciprocal of payback period is a good approximation of the IRR provided the life of the project is large or at least twice the payback period and the project generates equal annual cash inflows. Since both the conditions are satisfied. IRR would be reciprocal of the payback period i.e., 1/7 = 14.28%.

The two IRR's are different. The second method is an approximation present value whereas the first gives the correct IRR, since at that discount rate cash inflows equals the cost of the project or the net present value is zero.

Illustration 2:

Valuable Products are considering purchase of a machine for its production line. Two types of options are available deluxe model with ₹ 30,000 initial cost and economy model with ₹ 20,000 initial cost. Each model has 5 years life and no salvage value. The net cash flows after taxes associated with each investment proposal are:

	Deluxe Model	**Economy Model**
Net cash flows after taxes 1—5 years	₹ 9,000	₹ 6,000

Solution:

1. ***Net Present Value Method:***

		Cash inflow after taxes		**Total Present Value**	
Year's	**Deluxe Model (₹)**	**Economy Model (₹)**	**PV Factor 10%**	**Deluxe Model (₹)**	**Economic Model (₹)**
1 – 5	9,000	6,000	3.7907	34,116	22,744
		Deduct initial cost		30,000	20,000
		Net Present Value		4,116	2,744

Hence, the model that gives higher NPV should be chosen i.e. Deluxe Model.

Remark: Since capital outlay was higher for Deluxe Model it has given higher NPV.

2. ***Present Value Index:***

Deluxe Model		**Economy Model**	
=	$\frac{34,116}{30,000}$	=	$\frac{22,744}{20,000}$
=	1.1372	=	1.1372

Since both give same PI Index, we are indifferent as to both the models.

3. ***IRR:***

Deluxe Model		**Economy Model**	
=	$\frac{30,000}{9,000}$	=	$\frac{20,000}{6,000}$
=	3.33 years	=	3.33 years

Notes

Decision: If the capital is adequate there are no constraints, the proposal that gives higher NPV should be selected. In this case, the Deluxe Model.

Illustration 3:

The High Peaks Sporting Goods Stores have been plagued by numerous burglaries over the last 3 years. To keep insurance premiums at reasonable level and protect ₹10,00,000 inventory, the store fixed a night watchman. The watchman has solved the burglary problem, but he costs the firm ₹12,000 a year.

He is occasionally absent from work due to sickness or bad weather. A security system company has offered to sell the store system that would eliminate the need for the night watchman. The system has an expected useful life of 15 years. The security system's salesperson is computing the cost of the system and will present a bid this week. The management estimates cost of capital at 16%.

Required:

1. What is the maximum bid the store should accept?
2. If the bid is ₹ 64,000 should the store accept?
3. If the actual life of the security system is 12 years instead of 15, does it have any effect on your answer in part (b)?

Solution:

In this case there are two alternatives:

1. To employ watchman at a salary of ₹ 12,000 a year.
2. To buy the system that has an expected life of 15 years.

If one buys the system it will save ₹ 12,000 per year for 15 years i.e., at zero date it is equivalent to 12,000 × Cum Discount factor at 16% for 1 – 15 years = 12,000 × 5.575 = ₹ 66,900. Hence the maximum bid the store should accept is ₹ 66,900. Any offer less than 66,900 is acceptable hence if the bid is ₹ 64,000 the store should accept.

If the actual life of the security system is 12 years, the saving is equivalent to 12,000 × Discount factors at 16% 1 – 12 years = 12,000 × 5,197 = ₹ 62,364. Hence the maximum should be restricted to ₹ 62.364 in this case. Therefore, the offer of ₹ 64,000 cannot be accepted in a situation where the life of security is 12 years.

Illustration 4:

A company owns a machine, which is in current use. It was purchased at ₹ 1,60,000 and had a projected life of 15 years with ₹ 10,000 salvage value. It has a depreciated straight line for 5 years to date and could be sold for ₹ 1,30,000.

A new machine can be purchased at a total cost of ₹ 2,60,000 have a 10–year life salvage value of ₹ 10,000 and will be depreciated straight line. It is estimated that the new machine will reduce labour expenses of ₹ 15,000 per year and net working capital requirement of ₹ 20,000. The income tax rate applicable to the company is 40% and its required rate is 12% on investment. Determine whether the new machine should be purchased. The income statement of the firm using the current machine for the current year is as follows:

Sales		₹ 20,00,000
Labour	7,00,000	
Material	5,00,000	
Depreciation	2,00,000	14,00,000
Earnings before Tax		6,00,000
Taxation @ 40%		2,40,000
Profit after tax		3,60,000

Notes

Assume that if the sale proceeds of machine exceed the depreciated value, so much of the excess as does not exceed the difference between the costs and written down value, shall be subject to income tax. Given cumulative present value factor 1–10 years at 12% 5.650 and present value factor year 10 at 12% 0.322.

Solution:

	(₹)	(₹)	(₹)
Saving of labour expenses due to new machine			15,000
Less: Increase in depreciation on account of new machine			
	$\frac{2,60,000-10,000}{10}$	25,000	
Depre. on account of existing machine	$\frac{1,60,000-10,000}{15}$	10,000	15,000
Net increase in profits			0
Add depreciation added back			15,000
Incremental cash inflow per year			15,000
Capital investment:			
Cost of the new machine	2,60,000		
Sale proceeds of old machine	(–) 1,30,000		
Tax on account of sale of old machine:			
Sale proceeds	1,30,000		
Depreciated value 160,000 – 5 × 10,000	1,10,000		
40% tax	20,000		8,000
Reduction in Working Capital	(–) 20,000		118,000
Inflow:			
Saving from operations 1 - 10 years @ ₹ 15,000 × 5,650	84,750		
Sale proceeds at 10th year 10,000 × 0.322	3,220		
Reduction in working capital			
restored at the end of the project 20,000 × 0.322	(–) 6,440		81,530
Net Present Value			(–) 36,470

Since the net present value is negative, the new machine should not be purchased.

Illustration 5:

A company is setting up a project at a cost of ₹ 300 lakhs. It has to decide whether to locate the plant in a Forward Area (FA) or Backward Area (BA). Locating in Backward area means a cash subsidy of ₹ 15 lakhs from the Central Govt. Besides, the taxable profits to the extent of 20% is exempt for 10 years. The project envisages a borrowing of ₹ 200 lakhs in either case.

The cost of borrowing will be 12% in Forward Area and 10% in Backward Area; costs are bound to be higher in Backward Area. However, the revenue costs are bound to be higher in Backward

Notes

Area. The borrowings (principal) have to be repaid in 4 equal annual installments beginning from the end of the 4th year.

With the help of following information and by using DCF technique you are required to suggest the proper location of the project. Assume straight-line depreciation with no residual value.

Profit (Loss) before Depreciation and Interest

(₹ Lakh)

Year	FA	BA	Present value factor @ 15%
1	-6	-50	0.87
2	34	-20	0.76
3	54	10	0.66
4	74	20	0.57
5	108	45	0.5
6	142	100	0.43
7	156	155	0.38
8	230	190	0.33
9	330	230	0.28
10	430	330	0.25

Solution: Forward Area:

Year	Profit before Int.& Depre.	Depre.	Interest	Profit after Depre. & Int.	Tax	PAT	Cash inflow = PAT+ Depre	Cash outflow	Net cash	PV	Discount Value of cash flow
0								100	–100	1	–100
1	–6	30	24	–60		–60	–30		–30	.87	–26.1
2	34	30	24	–20		–20	10		10	.76	7.6
3	54	30	24				30		30	.66	19.8
4	74	30	24	20		20	50	50		.57	
5	108	30	18	60		60	90	50	40	.50	20
6	142	30	12	100	50	50	80	50	30	.43	12.9
7	156	30	6	120	60	60	90	50	40	.38	15.2
8	230	30		200	100	100	130		130	.33	42.6
9	330	30		300	150	150	180		180	.28	50.4
10	430	30		400	200	200	230		230	.25	57.5
											100

Notes: Year 1 and Year 2 loss of 60 and 20 respectively and Year 4 and 5 loss adjusted against the years profit to the extent of 20– and 60 respectively.

Notes

Backward Area:

Year	Profit before Int.& Depre.	Depre.	Interest	Profit after Depre. & Int	Tax	PAT	Cash inflow = PAT+ Depre	Cash outflow	Net cash flow	PV Factor	Discount PV
0								85	–85*	1.0	–85
1	–50	30	20	–100		–100	–70		–70	.87	– 60.9
2	–20	30	20	–70		–70	–40		–40	.76	–30.4
3	10	30	20	–40		–40	–10		–10	.66	–6.6
4	20	30	20	–30		–30		50	–50	.57	–28.5
5	45	30	15				30	50	–20	.50	–10.0
6	100	30	10	60		60	90	50	40	.43	17.2
7	155	30	5	120		120	150	50	100	.38	38
8	190	30		160	40	120	150		150	.33	49.5
9	230	30		200	80	120	150		150	.28	42.0
10	330	30		300	120	180	210		210	.25	52.5

* After adjusting cash subsidy of ₹ 15 lakhs received from the Central Government.

In the year 6 and 7, since the profits earned during the years were less than loss carried forward there was no tax liability.

In the year 8, profits of ₹ 160 lakhs were adjusted against loss c/f i.e. 100 + 70 + 40 + 30 – 60 – 120 i.e. 60 balance profit of ₹ 100 lakhs out of which 20% was tax free and the remaining 80% ₹ 80 lakhs was subject to tax @ 50% of ₹ 40 lakhs.

In the years 9 and 10, profits to the extent of 20% were tax free, balance 80% subject to tax of 50%, hence tax during the years were 200 × 0.8 × 0.5 i.e., ₹ 80 lakhs and 300 × 0.8 × 5 i.e., ₹ 120 lakhs respectively.

Decision: The net present value of the project in the Forward Area is ₹ 100.2 lakhs whereas it is negative to the extent of ₹ 22.2 lakhs in the Backward Area. Therefore, proper location of the project is the Forward Area.

Illustration 6:

TSL Ltd. a highly profitable and tax paying company is planning to expand its present capacity by 100%. The estimated cost of the project is ₹ 1,000 lakhs out of which ₹ 500 lakhs is to be met out of loan funds. The company has received two offers from their bankers:

	Option 1	Option 2
Values of loan	₹500 lakhs	US $ 14 lakhs equal to ₹500 lakhs
Interest	15% payable yearly	6% payable (fixed) yearly in US $
Period	5 years	5 years
Repayment	In 5 installments, First installment is payable 1 year after draw down?	same as Option 1
Other expenses (Average) Future exchange rate	1 % of the value of the loan -	1 % of USA = ₹ 36 (Average) End of 1 year USA = ₹ 8 thereafter to increase by ₹ 2 per annum.

The company is liable to pay Income tax at 35% and eligible for 25% depreciation of W.D. value. You may assume that at the end of the 5th year, the company will be able to claim balance in

Notes

WDV for tax purposes. The company follows Accounting Standard AS - 11 for accounting changes in Foreign Exchange Rate.

Required:

1. Compare the total outflow of cash under the above options.
2. Using discounted cash flow technique, evaluate the above offers.
3. Is there any risk, which the company should take care of?
4. In case TSL has large volume of exports would your advice be different.

The following discounting table may be adopted:

Years	**0**	**1**	**2**	**3**	**4**	**5**
Discounting factor	1	.921	.848	.781	.720	.663

Solution:

Option I: Loan in Rupees:

Year	Repayment of Principal	Interest @ 15%	Other expenses	Tax savings	Net outflow	Discount factor	Present value
0			5	1.75	3.25	1	3.25
1	100	75		26.25	148.75	0.921	137
2	100	60		21	139	0.848	117.872
3	100	45		15.75	129.25	0.781	100.944
4	100	30		10.5	119.5	0.720	86.040
5	100	15		5.25	109.75	0.663	72.764
	500	225	5	80.5	649.5		517.87

Option II: As per AS 11, the foreign exchange difference arising out of loan repayment in foreign currency is to be capitalized. Similarly, the outstanding loan balances at each year-end have to be converted at foreign exchange rate prevailing at the end of the year and the difference has to be capitalized.

Option III: Foreign Currency Loan

Exch. Rate	Year	Repay. of Principal	Interest @ 6%	Other charges	Total amount	Repay. of Principal	Int.	Other charges	Total payments
		(US $ in Lakhs.)				*(₹ Lakhs)*			
36	0			0.140	0.140			5.04	5.04
38	1	2.8	0.840		3.640	106.4	31.92		138.32
40	2	2.8	0.672		3.472	112	26.88		138.88
42	3	2.8	0.504		3.304	117.6	21.168		138.768
44	4	2.8	0.336		3.136	123.2	14.784		137.984
46	5	2.8	0.168		2.968	128.8	7.728		136.528
		14	**2.520**	**0.140**	**16.660**	**588**	**102.48**	**5.04**	**695.52**

Tax saving on additional depreciation on fixed assets on account of increase in loan amount at the year-end due to foreign exchange fluctuation and repayment of loan.

Notes

Year	Loan amount o/s in US $ Lakhs	Increase in loan due to foreign exchange fluctuations.	Opening WDV on addition	TOTAL	Depreciation 25% on additions (5)	Tax savings on additions @ 35%	Closing WDV on additions.
(1)	(2)	(3)	(4)	(5 =3 + 4)	25% on (6)	(7)	(8 = 5-6)
1	14	32		32	8	2.8	24
2	11.2	22.4	24	46.4	11.6	4.06	34.8
3	8.4	16.8	34.8	51.6	12.9	4.515	38.7
4	5.6	11.2	38.7	49.9	12.475	4.366	37.425
5	2.8	5.6	37.425	43.025	43.025*	15.059	

* Assumed that full benefit will be claimed for tax purposes.

Year	Amt of interest and other charges	Tax saving of Int. and other charges	Tax savings on Addl. Depreciation	Total payments	Net cash outflow	Discount factor	Present value
0	5.040	1.764		5.04	3.276	1	3.276
1	31.92	11.172	2.8	138.32	124.348	.921	114.525
2	26.88	9.408	4.06	138.88	125.412	.848	106.349
3	21.168	7.408	4.515	138.768	126.845	.781	99.066
4	14.784	5.174	4.366	137.984	128.444	.720	92.480
5	7.728	2.704	15.059	136.528	118.765	.663	78.741
		37.630	30.800	695.52	727.090		494.437

1. The absolute and discounted value of Option II seems to be better than Option I. However, the company has to be careful about future exchange rate, since the indicated rates are more by rule of a thumb rather than based on any specific approach. The company should cover possible foreign exchange fluctuations in future and then work out the value.

2. In case the company has good volume of exports, then it may help the company to help in future payments. In that case, the company may take a lenient view of covering foreign exchange risk.

Illustration 7:

S Engineering Company is considering replacing or repairing a particular machine, which has just broken down. Last year, this machine costed ₹ 20,000 to run and maintain. These costs have been increasing in real terms in recent years with the age of the machine. A further useful life of 5 years is expected, if immediate repairs of ₹ 19,000 are carried out. If the machine is not repaired it can be sold immediately to realize actual ₹ 5,000 (ignore loss/gain on such disposal).

Alternatively, the company can buy a new machine for ₹ 49,000 with an expected life of 10 years with no salvage value after providing depreciation on straight-line basis. In this case, running and maintenance costs will reduce to ₹ 14,000 each year and are not expected to increase much in real terms for a few years at least.

S Engineering Company regards an annual return of 10% p.a. after tax as a minimum requirement on any new investment. Considering the Capital Budgeting technique, which alternative will you choose? Take corporate tax rate of 50% and assume that depreciation on straight-line basis will be accepted for tax purposes also.

Notes

Given cumulative present value of Re. 1 p.a. @ 10% for 5 years ₹ 3,791 and for 10 years ₹ 6,145

Solution:

Repairing existing machine	₹ 9,500	
Cost of repairs is 19,000 net of tax		
Equivalent annual cost for 5 years	₹ 9,500 ÷ 3.791	= ₹ 2506
Annual Running & Maint. cost for 10 years		10000
₹ 20,000 net of tax		
Total annual cost		12506
Buying new machinery		
Purchase cost	₹ 49000	
Less: realization from old machine	5000	
Annual equivalent cost for 10 years	44000/6145	7160
Running & Maint. cost per machine	₹ 14000/net of tax	7000
Tax benefit of depreciation p.a.	49000/10/× 50	(2450)
Total annual cost		11710
Difference in annual cost in buying		796

Since annual cost of buying is less than that of repairing, one should go for buying option.

Second solution:

1. To repair existing machine.

Cost of repair immediately net of tax. (₹ 19,000 × 50%)		9,500
Running & Maint. Cost of 5 years (₹ 20,000 × 3.791)		37,910
Total net present value of after tax cash outflows for 5 years.		47,410
Hence net equivalent cash outflows p.a. 47,410/3.791		12,506

2. To buy new machine

Purchase cost of new machine	49,000	
Less: Sale proceeds of old machine	5,000	44,000
Tax benefit on depreciation p.a. (₹49000/10×50%)	(2,450)	
Running & Maint. Cost p.a. (50% of 14000)	7,000	
Net cash outflow for 10 years (₹ 4550×6.145)	4,550	27,960
Net cash outflows for 10 years.		71,960
Hence net equivalent cash outflows p.a.	71,960/6.145	11,710

Since, net equivalent cash outflow p.a. for buying a new machine ₹ 11,710 is less than net equivalent outflows of ₹ 12,506 for repairing of an existing machine. Therefore, it is advisable that the company should go for buying a new machine.

Notes

Caution ***Project with Unequal Lives:*** Where one is considering more than one project (mutually exclusive projects) with different project lives, one should consider the equivalent annual value method. Under this method, work out the following:

1. The total net present value of after tax cash flows of each project during the project life.
2. Divide the NAV of cash flows by the annual factor corresponding to the life of the project at the given cost of capital, the result and figure in the equivalent annual net present value. (EANPV).

The decision criteria, in the case of revenue expanding proposal, is the maximization of EANPV and minimization of equivalent annual cost of in the case of cost reduction proposal. This is illustrated in example above.

Task A machine purchased 6 years ago for ₹ 1,50,000 has been depreciated to a book value of ₹ 90,000. It originally had a projected life of 15 years and zero salvage value. A new machine will cost ₹ 2,50,000 and result in a reduced operating cost of ₹ 30,000 per year for the next 9 years. The older machine could be sold for ₹ 50,000. The cost of capital is 10%. The new machine will be depreciated on a straight-line basis over 9 years life with ₹ 25,000 salvage value. The company's tax rate is 50%; determine whether the old machine should be replaced.

Self Assessment

Fill in the blanks:

10. The net cash outlay is the different amount of money that will be spent when the investment is made in year……....
11. The cost of capital is an important element as basic input information in ……. decisions

9.6 Capital Decision under Risk and Uncertainty

In discussing the capital budgeting techniques, we have so far assumed that the proposed investment projects do not involve any risk. The assumption was made simply to facilitate the understanding of the capital budgeting techniques. In real life situations, the firm in general and its investment projects in particular are exposed to different degrees of risk. What is risk and how can risk be incorporated and measured in investment decisions in real world situation.

Nature of Risk

In the context of capital budgeting, the term, risk, refers to the chance that a project will prove unacceptable – that is NPV < ₹ 0 or IRR < cost of capital. More formally, risk in capital budgeting is the degree of variability of cash flows. Projects with a small chance of acceptability and a broad range of expected cash flows are more risky than projects that have a high chance of acceptability and a narrow range of expected cash flows.

In the capital budgeting projects, risk stems almost entirely from cash inflows, because the initial investment i.e., cash outflow is generally known with relative certainty. These inflows derive from a number of variables related to revenues expenditures and taxes.

Notes

Example: The level of sales, the cost of raw materials, labour rates, utility costs and tax rates.

Risk is associated with the variability of future returns of a project. The greater the variability of the expected returns, the riskier the project. Risk can however be measured more precisely. The most common measures of risk – standard deviation and co-efficient of variations – are discussed later, in this unit.

Notes **Risk Analysis in Practice in India**

- Most companies in India account for risk while evaluating their capital expenditure decisions. The following factors are considered to influence the riskiness of investment projects:
  - Price of raw material and other inputs
  - Price of product
  - Product demand
  - Government policies
  - Technological changes
  - Project life
  - Inflation
- Out of these factors, four factors thought to be contributing most to the project riskiness one selling price – product demand, technical changes and govt. policies.
- The most commonly used methods of risk analysis in practice are: sensitivity analysis, conservative forecasts include using short payback or higher discount rate for discounting cash flows.
- Except a very few companies, most companies do not use the statistical and other sophisticated techniques for analyzing risk in investment decisions.

Self Assessment

Fill in the blanks

12. In the context of capital budgeting, the term……., refers to the chance that a project will prove unacceptable.
13. Risk is associated with the …….of future returns of a project.

9.7 Conventional Techniques to Handle Risk

The following are conventional techniques to handle risk in capital budgeting:

- Payback
- Risk adjusted discount rate
- Certainty equivalent

These methods are simple, familiar and partially defensible on theoretical grounds.

Notes

9.7.1 Payback

Payback is one of the oldest and commonly used methods for explicitly recognizing risk associated with an investment project. Business firms using this method usually prefer short payback to longer one and often establish policies that a firm should accept guidelines with some maximum payback period say three to five years. Apart from simplicity, payback makes an allowance for risk by:

1. Focusing attention on the near term future and thereby emphasizing liquidity through early recovery of capital and
2. By favouring short-term projects over long-term riskier projects.

9.7.2 Risk Adjusted Discount Rate Approach (RAD)

Under this method, the amount of risk inherent in a project is incorporated in the discount rate employed in the present value calculations. The relatively risky projects (e.g. project involving introduction of new product into the untried market) would have relatively high discount rates and relatively safe projects would have relatively low discount rates. The rationale for using different risk adjusted rates for different projects is as follows. The rate of discount or the cost of capital is the minimum acceptable rate of return which the investors demand in providing capital to the firm for that type of investment since such rate is applicable elsewhere in the economy on assets of similar risk. If the project earns less than the rates earned in the economy for that risk, the shareholders will earn less and the value of the company's shares will fall. A well accepted economic premise is that the required rate of return should increase with increase in risks. Hence, the greater the risk, the greater should be the discount rate and vice versa.

The risk-adjusted rate can be used with both the NPV and IRR methods of evaluation of capital expenditure. If NPV were positive, the proposal would qualify for acceptance. In case of the IRR, as a decision criterion, the internal rate of return would be compared with the risk adjusted required rate of return and if the former exceeds the latter, the proposal would be accepted, otherwise not.

The risk in connection with future projections has two dimensions. First as already mentioned, riskiness of the projects at a particular point of time became of the nature of proposals, e.g., expansion of new products. Second, the risk may be different in the case of the same project over time e.g., risk at the end of Second year may be more than that at the end of first year.

Advantage

1. This method is simple to calculate and easy to understand, since companies in actual practice apply different standards of discount for different projects.

Disadvantages and Difficulties

1. Difficulty encountered is how to express a higher risk in terms of higher discount rates. It is doubtful if the exercise would give objective results.
2. It does not make direct use of the information available from the probability distribution of expected future cash. Conceptually, this approach adjusts the wrong element. It is the future cash flow of a project, which is subject to risk and hence should be adjusted and not the required rate of return.
3. The process of adding the risk premium to the discount rate leads to compounding of risk over time. In other words, this method implies increase of risk with time and therefore proposal in which risk does not necessarily increase with the time may not be properly evaluated by this method.

Notes

In brief, this method can at best be considered as a crude method of incorporating risk into the capital budgeting analysis.

Example: Let us determine the risk adjusted net present value of the following:

	A	B	C
Net cash outlays (₹)	1,00,000	1,20,000	2,10,000
Project life	5 years	5 years	5 years
Annual cash inflow (₹)	30,000	42,000	70,000
Co-efficient of variation	0.4	0.8	1.2

The company selects the risk-adjusted rate of discount on the basis of coefficient of variation:

Coefficient of variation	Risk adjusted rate of discount	PV factor 1 to 5 years at risk adjusted rate of discount
0.00	10%	3.791
0.40	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

Solution:

Project	Net cash outflow ₹	Coefficient of variation	Market discount rate	Annual cash inflow ₹	PV Factor (1-5 years) at market discount Rate	Discounted cash inflow ₹	NPV
A	1,00,000	0.4	12%	30,000	3,605	1,08,150	8,150
B	1,20,000	0.8	14%	42,000	3,433	1,44,186	24,186
C	2,10,000	1.2	16%	70,000	3,274	2,29,180	19,180

9.7.3 Certainty Equivalent Approach

Under this method, risk element is compensated by adjusting cash inflows rather than adjusting the discount rate. The risk adjustment factor is expressed in terms of certainty – equivalent coefficient i.e. the relationship between certain (riskless) cash flows and risky (uncertain) cash flows. The certainty equivalent coefficient can assume a value between 0 and 1 and is inversely related with risk. If risk is more, certainty is less and certainty coefficient small and vice-versa. The coefficients can be determined by subjective or objective assessments of cash flows that will rise certainly and cash flows that are likely to occur.

The second step under this approach after conversion of expected cash flows into certainty equivalents, is to calculate their present values based on the risk-free rate of discount (which appropriately reflects the time value of money). Finally, it has to be decided whether the project would be accepted or not, based on either NPV or the IRR method.

Advantages

1. It is simple to calculate.
2. It incorporates risk by modifying the cash flows, which are subject to risk.

Conceptually, it is superior to the time adjusted discount rate approach.

Weakness and Difficulties

Notes

1. Being a subjective estimate it cannot be objective, precise and consistent, hence conclusions based on such estimates are open to question.
2. It does not directly use the probability distribution of possible cash flows.
3. It cannot be consistently applied to various projects and over time.

Example:

		₹
Cash outflows		1,50,000
Cash inflows	Year 1	70,000
	Year 2	90,000
	Year 3	60,000

Riskless rate of return 9%

Risk adjusted rate of return for the current project 20%

Certainty equivalent coefficients for future cash inflows:

Year 1	0.90
Year 2	0.80
Year 3	0.65

Solution:

NPV based on risk-adjusted rate of discount

$$= -150{,}000 + \frac{70{,}000}{1.20} + \frac{90000}{(1.20)^2} + \frac{60000}{(1.20)^3}$$

$$= -150{,}000 + 58{,}333 + 62500 + 41667 = -150000 + 162500$$

$$= 12500, \text{ positive; hence project should be accepted}$$

NPV based on certainty equivalent coefficient:

$$= -150{,}000 + \frac{70{,}000 \times 0.90}{1.09} + \frac{90000 \times 0.80}{(1.09)^2} + \frac{60000 \times 0.65}{(1.09)^3}$$

$$= -150000 + 57798 + 60601 + 30115$$

$$= -150000 + 148514 = -1486$$

$$= \text{Negative; hence project should not be accepted.}$$

Hence from the above illustration, it is clear that both the above methods may not yield identical results.

9.7.4 Probability Distribution Approach

The probability distribution of cash flows over different periods provides valuable information about expected value of return and the dispersion of probability distribution of possible returns. On this basis, an accept-reject decision can be taken.

The application of probability distribution approach in analysing risk in capital budgeting depends upon the behaviour of the cash flows whether the cash flows are (a) independent or

Notes

(b) dependent. Independent means cash flows in future years are not affected by cash flows in the preceding or following years. On the other hand, when cash flows in one period are dependent on cash flows in previous year, they are referred to as dependent cash flows. Let us first discuss the application of probability theory to analyze risk in capital budgeting assumption of independent cash flows:

1. $$\text{NPV} = \sum_{t=1}^{n} \frac{\text{Expected cash inflow during each period}}{(1 + \text{riskless rate of interest})} - \text{Cash outflow}$$

$$t = 1\ (1 + \text{riskless rate of interest})t$$

$$t = \text{years/period}$$

Now expected cash inflow in each period = Diff. levels of cash inflow × Probability at each level

2. $$\sum_{t=1}^{n} \frac{\text{Probability at each level} \times \left(\text{different levels cash inflow in each period} - \text{expected cash inflow each period}\right)^2}{(1 + \text{riskless rate of interest})^{2t}}$$

3. By making use of normal probability distribution, one can analyze further. The element of risk in capital budgeting i.e. probability of different expected values of NPV i.e. the probability, of NPV having the value, zero or less, greater than within the range of two values and so on. Thus, the normal probability distribution an important statistical technique in the hands of decision makers for evaluating the extent of risk of the project.

Notes The normal probability has a number of useful properties as follows:

1. The area under normal curve, representing the normal probability distribution equal to 1 (0.5 on either side of the mean).
2. The curve has its maximum height at its expected value i.e., mean.
3. The probability of occurrence beyond 3 x Standard Deviation is very near zero (0.26%).
4. Probability of an outcome falling within plus or minus 1 × standard deviation from the mean is 0.6826 or 68.26%, Range ± 2 standard deviation 95.46%. Range ± 3 standard deviation 99.74%.

Example: A company is considering an investment in a project requiring initial outlay of ₹ 50,000 with expected cash inflow generated over 3 years as follows:

Year 1		Year 2		Year 3	
Cash flow (₹)	**Probability**	**Cash Flow (₹)**	**Probability**	**Cash Flow (₹)**	**Probability**
15000	0.2	20000	0.5	25000	0.1
20000	0.4	23000	0.1	30000	0.3
25000	0.3	25000	0.2	35000	0.3
30000	0.1	28000	0.2	50000	0.3

Notes

1. Assuming the probability distributions of cash outflows for future periods are independent, the firm's cost of capital is 10% and the firm can invest in 5% treasury bills, determine the expected NPV.
2. Determine the standard deviation about the expected value.
3. If the total distribution is approximately normal and assumed continuous.
   (a) What is the probability of the NPV being zero or less.
   (b) Greater than zero.
   (c) Profitability index being 1.00 or less.
   (d) At least equal to mean.
   (e) 10% below mean and 10% above mean.
   (f) The probability of NPV being (a) between the range of ₹15000 and ₹ 25,000 (b) between the range of ₹10000 and ₹20, 000 (c) at least ₹35, 000 (d) at least ₹ 7000.

Solution:

Period I			Period II			Period III		
Cash inflow (₹)	**Probability**	**Cash inflow × probability (₹)**	**Cash inflow (₹)**	**Probab-ility**	**Cash inflow × probability (₹)**	**Cash inflow (₹)**	**Probab-Ility**	**Cash inflow × probability (₹)**
15000	0.2	3000	20000	0.5	10000	25000	0.1	2500
20,000	0.4	8000	23000	0.1	2300	30,000	0.3	9,000
25,000	0.3	7500	25000	0..2	5000	35,000	0.3	10,500
30,000	0.1	3000	28000	0.2	5600	50,000	0.3	15,000
	Mean	21,500			22,900			37,000

Determination of NPV

Mean of Cash Inflow		PV factor @ 5% (riskless)	Total PV (₹)
Period 1	21500	0.952	20468
Period 2	22900	0.907	20770
Period 3	37000	0.864	31968
			73206
Less Cash Outflow			50000
NPV			23206

Determination of standard deviation of each period:

Period 1		Square of Deviation of Mean	Probability	Square of Deviation of Mean × Probability
Cash inflow (₹)	**Deviation from Mean**			
15000	-6500	42250000	0.2	8450000
20000	-1500	2250000	0.4	900000
25000	3500	12250000	0.3	3675,000
30,000	8500	72250,000	0.1	7225,000
				20250000

Notes

Standard Deviation = $\sqrt{10290000}$ = 4500

Period 2		Square of Deviation of Mean	Probability	Square of Deviation of Mean × Probability
Cash inflow ₹	Deviation from mean			
20000	–2900	8410000	0.5	4205000
23000	100	10000	0.1	1000
25000	2100	4410000	0.2	882000
28000	5100	26010000	0.2	5202000
				10290000

Standard Deviation = $\sqrt{20250000}$ = 3208

Period 3		Square of Deviation of Mean	Probability	Square of Deviation of Mean × Probability
Cash inflow ₹	Deviation from Mean			
25000	–12000	144000000	0.1	14400000
30000	–7000	49000000	0.3	14700000
35000	–2000	4000000	0.3	1200000
50000	+13000	169000000	0.3	50700000
				81000000

Standard Deviation = $\sqrt{810,00,000}$ = 9000

Standard Deviation about expected values:

$$\frac{189,850}{4.355} = ₹\ 43594\sqrt{\frac{(4500)^2}{(1.05)^2}+\frac{(3208)^2}{(1.05)^4}+\frac{(9000)^2}{(1.05)^6}}$$

Probability of NPV being zero or less: Calculate the difference between the specified point and NPV and then divide by standard deviation (NPV). This is referred to as Z. In this case $Z = \frac{0-23206}{9342} = -2484$. According to Table Z, the Probability of NPV being zero is 0.4934. but the area. For the area of the left hand side of the normal curve is equal to 0.5, the probability of he NPV being zero or less would be 0.5 – 0.4934 i.e. 0.0066. It means there is 0.66% probability that the NPV of the project will be zero or less.

Greater than zero = 100 – 0.66% (as per above) = 99.34%

Probability index being 1.00 or less: For PI Index to be 1.00 or less, the NPV would have to be zero or negative. Thus, the probability would be equal to 0.66% as calculated in the earlier part.

Atleast equal to mean: i.e. $Z = \frac{23206-23206}{9342} = 0$

Reading from the normal distribution table, we get the probability corresponding to 0 as 0. Therefore, the probability of having NPV at least equal to mean would be equivalent to the area to the right of the curve i.e., 0.5 = 50%.

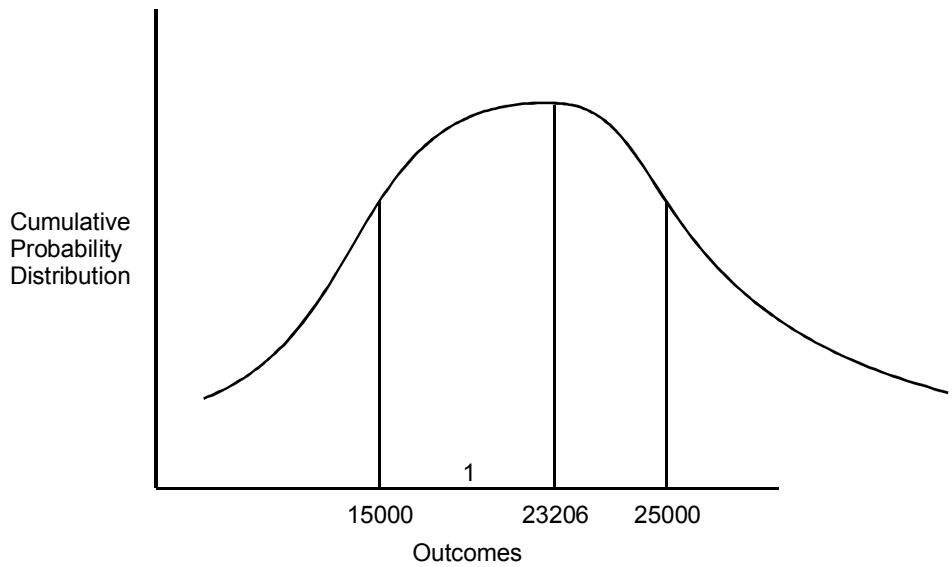
Notes

10% below mean, and 10% above mean:

$$Z = \frac{20,885 - 23206}{9342} = -0.248$$

According to Table Z, the probability comes to 0.0979 i.e., 9.79% similarly for 10% above mean it comes to 9.79%.

Between the Range of ₹ 15000 and ₹ 25000

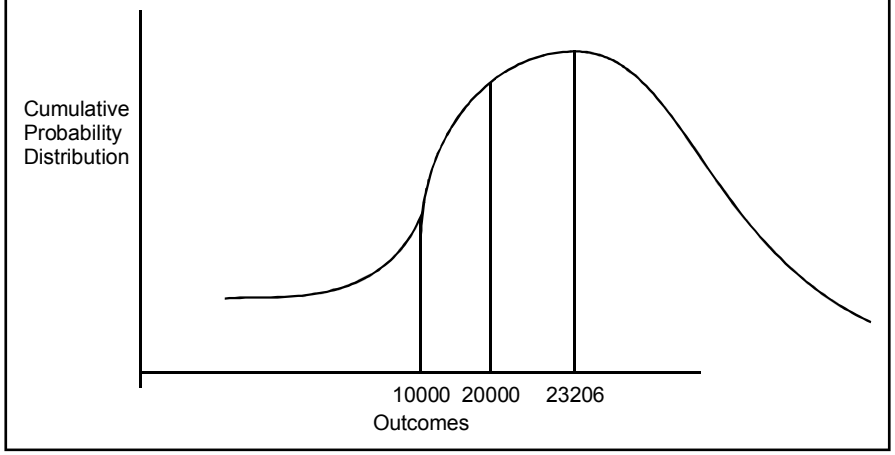


$$Z_1 = \frac{15000 - 23206}{9342} = -\ 0.878$$

$$Z_2 = \frac{25000 - 23206}{9342} = -\ 0.192$$

According to Table Z, the probability corresponding to the respective values of Z1 and Z2 are 0.3100 and 0.0761. Summing up the values we have 0.3861 i.e., 38.61%.

Between the Range of ₹ 10000 and ₹ 20000



Notes

$$Z_1 = \frac{10000 - 23206}{9342} = -1.414$$

$$Z_2 = \frac{20000 - 23206}{9342} = -0.343$$

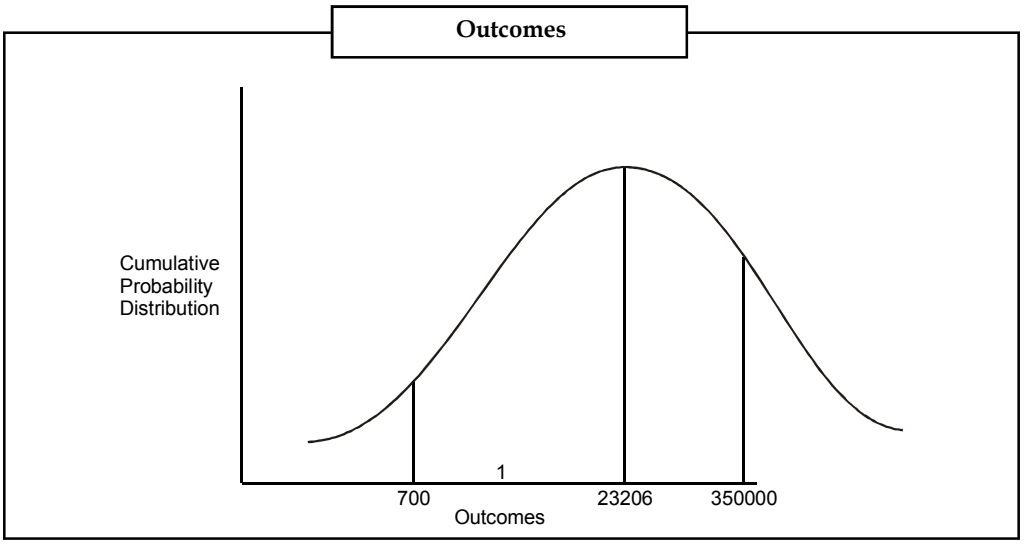
According to Table Z, the probability corresponding to these values of Z is 0.4213 and 0.1341. Since both are on the left side of the normal curve, the probability of having its value between ₹ 10,000 and ₹ 20,000 would be the difference i.e. 0.4213 – 0.1341 = 0.2872 i.e., 28.72%.

At least ₹ 35,000 $$Z = \frac{35000 - 23206}{9342} = 1.262$$

According to table Z, the probability of having the NPV values ₹ 35,000 is 0.3965. The probability of having NPV ₹ 35,000 or more would be 0.5 – 0.3965 = 0.1035 or 10.35%.

At least ₹ 7000 in this case $$Z = \frac{7000 - 23206}{9342} = -1.735$$

According to Table Z, the probability of having the NPV value of ₹ 7000 is 0.4586. The probability of NPV at least equal to ₹ 7000 would be more by 0.50 (area to the right side of the mean) i.e. 0.9586 or 95.86%.



9.7.5 Decision–Trees Approach (DT)

DT is another useful alternatives for evaluating risky investment proposals. Under this method, every possible outcome is weighed in probabilistic terms and then evaluated. This approach is especially useful for situations in which decisions at one point in time also affect the decisions of the firm at some later date. Another useful application of this approach is for such projects, which require decisions to be made in sequential parts.

A decision tree approach as the name suggests, is a pictorial representation in tree form along with branches of the magnitude, probability and inter relationship of all possible outcomes. As a matter of convention the decision point is denoted by the symbol and the evens are denoted by 0. The key steps in decision tree analysis are:

1. Identification of the problem and alternatives
2. Delineation of the decision tree

Notes

3. Specification of probabilities and monetary outcome
4. Evaluation of various decision alternatives

Example: A firm has an investment proposal, requiring an outlay of ₹ 40,000. The investment proposed is expected to have 2 years' economic life with no salvage value. In year I, there is a 0.4 probability that cash inflow after tax will be ₹ 25000 and 0.6 probability that cash inflow after tax will be ₹ 30,000. The probabilities assigned to cash inflows after tax for the year II are as follows:

The cash inflow year I	₹ 25,000		₹ 30,000	
The cash inflow year II	₹ 12000	Probability 0.2	₹ 20,000	Probability 0.4
	₹ 16,000	Probability 0.3	₹ 25,000	Probability 0.5
	₹ 22,000	Probability 0.5	₹ 30,000	Probability 0.1

The firm uses a 10% discount rate for this type of investment.

Required:

1. Construct a decision-tree for the proposed investment project.
2. What net present value will the project yield if worst outcome is realized? What is the probability of occurrence of this NPV?
3. What will be the best and probability of that occurrence?
4. Will the project be accepted? 10%, Discount factor 1 year 0.909

   2 year 0.826

Solution:

Investment proposal, capital Outlay ₹ 40000

Year 1 prob	Cash (nflow (-₹)	Year 2 prob.	Cash Inflow (₹)	Path no	Expected NPV at 10% rate of discount	Joint prob (prob year1x prob. Year 2)	Expected NPV x Joint Prob.
0.4	25,000	0.2	12,000	1	-7363	0.08	-589
		0.3	16,000	2	-4059	0.12	-487
		0.5	22,000	3	897	0.20	179
0.6	30,000	0.4	20,000	4	3,790	0.24	910
		0.5	25,000	5	7,920	0.30	2,375
		0.1	30,000	6	12,050	0.06	723
							3112

Expected NPV:

	Cash Inflow Year 1	×	Discount Factor	+	Cash inflow Year 2	×	Discount Factor	–	Cash Outlay	
Path 1 =	25000	×	0.909	+	12000	×	0.826	–	₹ 40000	= 32637 – 40000 = – 7363
2 =	25000	×	0.909	+	16000	×	0.826	–	₹ 40000	= 35941 – 40000 = – 4059
3 =	25000	×	0.909	+	22000	×	0.826	–	₹ 40000	= 40897 – 40000 = 897

Notes

4 =	30000	×	0.909	+	20000	×	0.826	– ₹ 40000	= 43790 – 40000 = + 3790
5 =	30000	×	0.909	+	25000	×	0.826	– ₹ 40000	= 47920 – 40000 = 7920
6 =	30000	×	0.909	+	30000	×	0.826	– ₹ 40000	= 52050 – 40000 = 12050

The last column shows the expected NPV, which is obtained by summing up the product of NPV and corresponding joint probability. The term of these weighted NPV is positive and therefore, the project would be accepted.

This DT approach has the advantage of exhibiting in a bird's eye view of all the possibilities associated with the proposed project. Management also becomes aware well in advance of the adverse possibilities when NPV is negative. The conditional nature of cash inflow associated with the project is clearly shown. The main limitation of the method is that decision format may become itself complex and difficult to understand and construct if the number of years of the expected life of the project and the number of possible outcomes for each year are of large. For instance, if we have 3-year project, there will be 27 paths (i.e. 33) and 59,049 (31") paths if the project life is 10 years, assuming only three possible outcomes.

9.7.6 Applied Utility Theory

If the risk factor of the top management (i.e. the group that makes decisions regarding investment) can be translated into a utility curve, the risk factor can be incorporated in the final decision in a fairly simple and consistent manner.

Did u know? A utility function describes a person's risk attitude.

The utility function shows the utilities (an arbitrary measure of satisfaction) associated with different monetary outcomes. Normally, utilities are shown as the vertical axis and monetary returns are shown on the horizontal axis. A person's utility function can be obtained as follows:

1. Find the monetary incomes that a person considers as relevant. The end may be designated as A and B.
2. Assign utility of 0 to A (the lowest outcome) and utility of 1 to B (the highest outcome).
3. Determine the utility associated with any intermediate value by the following process:
   (a) Present the individual with two alternatives. The first alternative of the intermediate value X, the utility of which is to be determined, second alternative consists of a lottery which has two possible outcome A and B with probabilitiesP1 and P2 attached to them (P1 + P2 = 1). Ask the individual to choose one of the alternatives.
   (b) If the individual chooses the first alternative, revise the second alternative makes it more attractive i.e., the value of P2 should be increased. If the individual chooses the second alternative, raise the same to less attractive i.e., value of P2 should be decreased and the value of P2 should be increased.
   (c) Continue the revision process laid down in (b), till the individual indifferent to both alternatives.
   (d) When the individual becomes indifferent to both alternatives, the utility of A is simply the value of P2.
4. Obtain the utility values of several intermediate outcomes and plot the utility function.

Notes

Once the utility curve of the decision-making unit is obtained, the expected utility project is measured as follows:

1. Define the probability distribution of NPV.
2. Calculate the expected utility by using utility function.

Σu (NPVi) Pi

where $u(NPV_i)$ = utility of the ith positive NPV

P_i = Probability of ith possible outcome

Example: Let the probability distribution of NPV for a project be as follows:

NPV	–10,000	0	20,000	30,000
Probability	0.1	0.3	0.4	0.2

Let the utility for money for the decision maker be as follows:

Money (₹)	Utility
– 20,000	0
– 10,000	0.10
0	0.35
+ 10,000	0.50
+ 20,000	0.68
+ 30,000	0.85
+ 40,000	0.90
+ 50,000	1.00

Hence the expected utility of the project is:

$$= 0.10 \times 0.1 + 0.35 \times 0.3 + 0.68 \times 0.4 + 0.85 \times 0.2$$

$$= .01 + 0.105 + 0.272 + 0.17 = 0.557$$

Evaluation: This method is superior to other methods of risk adjustments since it offers an approach for incorporating the risk factor consistently. However, the following are the problems:

1. It is difficult to obtain the utility functions of an individual i.e., translating the risk attitude of an executive requires patience and ingenuity on the part of the analyst.
2. Utility function of the decision-maker may not remain stable over time, since it is dependent on the organization financial position.
3. There is no acceptable way of determining the utility function of a group. (Since investment decisions are group decisions)

Hence, utility theory is not very useful for investment decisions where the cost and benefits are spread over long period. It is, however, a potential tool for short-term investment.

Self Assessment

Fill in the blanks:

14. Business firms using Payback method usually prefer ……..payback.
15. Under Certainty equivalent approach method, risk element is compensated by adjusting cash inflows rather than adjusting the……...
16. A ……..approach is a pictorial representation in tree form along with branches of the magnitude, probability and inter relationship of all possible outcomes.

Notes

9.8 Statistical Techniques to Handle Risk

The estimates of cash inflows and outflows may be termed as probability estimates i.e., they represent only likely happenings.

The uncertainty about future leads to variations in returns. Risk is perceived to be variability of actual returns from the estimated returns. For example, if two projects are considered, one with a NPV of ₹ 100 with probability I and other project with two possible outcomes.

NPV	Probability
200	0.5
0	0.5

Both the projects have the same NPV of ₹ 100. However, the risk profile of second project is different from the first. The returns on the first project do not vary or are certain while in the second project the returns can vary anywhere between 0 to 200 around its expected mean of 100. Thus, the certainty of getting returns of ₹ 100 is much lesser in the second project as compared to the first project making it more risky.

Actually, if risk and uncertainty factors are not taken into account there is always a danger that capital expenditure evaluation may produce misleading results.

Method of Accounting for Risk

Having established the need for taking into account the risk involved in a capital expenditure proposal, the different measures to quantity the risk in more precise terms are given below:

1. ***Sensitivity Analysis:*** Sensitivity Analysis provides information as to how sensitive the estimated project parameters, namely the expected cash flow, the discount rate and the project life are to estimation errors by considering a number of possible outcomes. It provides different cash flow estimates under three assumptions:

   The worst (i.e. the, most pessimistic), the expected (i.e., the most likely) and the best (i.e., the most optimistic) outcomes associated with the project.

   Example:

	Project X	Project Y
Initial cash outlays	– ₹ 80,000	– ₹ 80,000
Cash flow estimates (1 – 15 years) worst	12,000	0
Most likely	16,000	16,000
Best	20,000	32,000
Required rate of return	10%	10%
Economic life	15 years	15 years

Solution:

	Project X		Project Y	
	PV (₹)	NPV (₹)	PV (₹)	NPV (₹)
Worst	91,272	11,272	NIL	– 80,000
Most likely	1,21,696	41,696	1,21,696	41,696
Best	1,52,120	72,120	2,43,392	1,63,392

Notes

The above gives very useful information about projects that appear equally desirable on the basis of most likely estimates of their cash flows. Project X is less risky than Project Y, since the quantum of variation is relatively less in Project Y. The actual selection of the project (assuming projects are mutually exclusive) will depend on decision makers' attitude towards risk. If he is conservative, he will choose Project X since there is no possibility of suffering losses. On the other hand, if he is a risk-taker, he will choose Project Y, as there is a possibility of higher returns as compared to Project X.

Advantages: Since sensitivity analysis provides more than one estimate of future return of a project, it is superior to the single – figure forecast.

Limitation: The method does not disclose the chances of the occurrence of these variations.

To remedy this shortcoming of sensitivity analysis, so as to provide a more accurate forecast, probability of the variation should be provided.

2. ***Probability assignment to expected cash flow:*** This method provides a more precise measure of the variability of cash flows since it indicates the percentage chance of occurrence of each possible cash flow. For example, if some expected cash flow has (0.6) probability of occurrence, it means that the given cash flow is likely to be obtained in 6 out of 10 times.

The quantification of variability of returns involves two steps. First, depending on the chances of occurrence of a particular cash flow estimate, probabilities are assigned. The second step is to estimate the expected return on the project. The returns are estimated in terms of expected monetary values based on a weightage average return, weights are the probabilities assigned.

Example: From the following information regarding expected cash flows and then probability for Project X, what is the expected return of the project assuming 10% as discount rate – [Discount factor 10% year 1 – 0.909; year 2 – 0.826; year 3 – 0.751]

Year1		Year 2		Year 3	
Cash flow (₹)	Probability	Cash flow (₹)	Probability	Cash flow	Probability
4,000	0.25	4,000	0.50	4,000	0.25
7,000	0.50	7,000	0.25	7,000	0.25
9,000	0.25	9,000	0.25	9,000	0.50

Solution: **Cash flow**

Year 1 = 4,000 × 0.25 + 7,000 × 0.50 + 9,000 × 0.25 = ₹ 6750

Year 2 = 4,000 × 0.50 + 7,000 × 0.25 + 9,000 × 0.25 = ₹ 6000

Year 3 = 4,000 × 0.25 + 7,000 × 0.25 + 9,000 × 0.50 = ₹ 7250

Calculation of Present Values:

Year 1 = ₹ 6750 × 0.909 = ₹ 6136, Year 2 = 6,000 × 0.826 = ₹ 4956

Year 3 = ₹ 7250 × 0.751 = ₹ 5445

Total ₹ 16,537

Advantages of the method: The assignment of probabilities and the calculation of expected values, without doubt, taken into account the risk in terms of variability in explicit terms of investment decisions.

Notes

Limitation: The method does not provide the decision-maker with a concrete value indicative of variability and therefore risk. The standard deviation and the coefficient variation are two such measures, which tell us about the variability associated with the expected cash flow in terms of degree of risk. Standard deviation can be applied when the project involves the same outlay. If the prospects to be compared involve different outlay, the coefficient of variation is the correct choice, being a relative measure.

3. ***Standard Deviation and Co-efficient of variation:*** In statistical terms, standard deviation is defined as the square root of the mean of the standard deviations, where deviation is the difference between an outcome and the expected mean value of all outcomes. Further, calculate the value of standard deviation after providing weights to the square of each deviation (its probability of occurrence).

The greater the standard deviation of a probability distribution, the greater is the dispersion of outcomes around the expected values.

If the two prospects have the same expected value (mean) then one that has the greater standard deviation will said to have the higher degree of uncertainty or risk.

However, if the size of the project's outlay differs, the decision-maker should make use of the coefficient of variation to judge the riskiness of the project.

Example: The probability distribution of two projects NPVs is given below:

Project X		Project Y	
NPV (₹)	**Probability**	**NPV ₹**	**Probability**
5,000	0.2	0	0.1
7,500	0.7	7500	0.7
10,000	0.1	15,000	0.2

Calculate the expected value, the standard deviation and the coefficient of variation for 'each project. Which of these mutually exclusive projects do you prefer and why?

Solution: Project X

NPV ₹	NPV × Probability	NPV-Arithmetic mean	Square of deviation	Probability	Square of deviation × Probability
5,000	1,000	–2,250	50,62,500	0.2	10,12,500
7,500	5,250	250	62,500	0.7	43,750
10,000	1.000	2,750	75,62,500	0.1	7,56,250
Mean	7,250				18,12,500

Standard deviation = $\sqrt{18,12,500} = 1,346$

Project Y

NPV (₹)	NPV x Probability (₹)	NPV Arithmetic mean	Square of deviation	Probability	Square of deviation x Probability
0	0	– 8,250	680,62,500	0.1	68,06,250
7,500	5,250	–750	5,62,500	0.7	3,93,750
15,000	3.000	6,750	455,62,500	0.2	91.12.500
	8,250				
Mean					163,12,500

Notes

$$\text{Standard deviation} = \sqrt{163,12,500} = 4,039$$

The standard deviation of the project X is smaller than that of project Y. Therefore, it can be concluded that Project X is less risky than project Y.

The conclusion regarding the superiority of Project X over Project Y would hold if the projects have an equal size of outlay. However, if the size of the projects outlay differs, the decision-maker should make use of the coefficient of variation to judge the riskiness of the project. In this case –

$$\text{Coefficient of variation of Project X} = \frac{\text{Standard Deviation}}{\text{Arithmetic Mean}} = \frac{1,346}{7,250} = 0.18$$

$$\text{Coefficient of variation of Project Y} = \frac{\text{Standard Deviation}}{\text{Arithmetic Mean}} = \frac{4039}{8250} = 0.49$$

The higher the coefficient of variation, the more risky is the project. Project Y is, therefore, more risky than Project X.

Task A company is considering Projects X and Y with the following information:

	Project	
	X	**Y**
Expected Net Present Value	₹ 60,000	₹ 227,000
Standard Deviation	40,000	135,000

Which project will you recommend? Will your answer change if we use coefficient of variation as a measure of risk instead of standard deviation? Which measure is more appropriate in this situation? Give reason.

Self Assessment

Fill in the blanks:

17. …….analysis provides more than one estimate of future return of a project.
18. If the two prospects have the same expected value (mean) then one that has the greater ……..will said to have the higher degree of uncertainty or risk.

Case Study

Case: Mavis Machine Shop

The case is set in an metalworking shop in West Virginia, one of whose products is drill bits for oil exploration. The time is 1980, in the midst of an oil drilling boom resulting from the oil crises of 1974 and 1979.

Early in 1980, Tom Mavis, President of Mavis Machine shop was considering a project to modernize his plant facilities. The company operated out of a large converted warehouse in Salem, West Virginia. It produced machinery or assorted machined metal parts for the oil and gas drilling and production industry in the surrounding area. One of Mavis major

Contd...

Notes

customer was Buckeye Drilling, Inc., which purchased specialized drill bits and replacement parts for its operations. Mavis had negotiated an annual contract with Buckeye to supply its drill bit requirements and related spare parts in each of the past 8 years. In 1978 and 1979 the requirements had been about 8,400 bits per year. All Buckeye's rigs were busy. Mavis knew, there were 30 rigs operating in the state and that it had resin up from 17 in 1972. Wells drilled was up even more, from 679 in 1972 to 1,474 last year.

The arrangement of the machine shop included four large manual lathes currently devoted to the Buckeye business. Each lathe was operated by a skilled worker, and each bit required mechanical keep. Mavis was considering replacing these manual lathes with an automatic machine, capable of performing all four machinery operations necessary for a drill bit. This machine would produce drill bits at the same rate as the four existing lathes, and would only require one operator. Instead of skill in metalworking, the job would now involve more skill in computerized automation.

The four existing manual lathes were 3 years old and had cost a total of $590,000. Together they produced 8,400 drill bits on a two-shift, 5-day/week basis. The useful life of these lathes, calculated on a two-shift/day, 5 day/week basis, was estimated to be 15 years. The salvage value at the end of their useful life was estimated to be $5,000 each. Depreciation of $114,000 had been accumulated on the four lathes. Cash for the purchase of these lathes had been partially supplied by a 10-year, unsecured, 10% bank loan, of which $180,000 was still outstanding. The best estimate of the current selling price of the four lathes in their present condition was $240,000, after dismantling and removal costs. The loss from the sale would be deductible for tax purposes, resulting in a tax savings of 46% of the loss.

The automatic machine being considered needed only one skilled operator to feed in raw castings, observe functioning, and make necessary adjustments. It would have an output of 8,400 drill its annually on a two-shift, 5–day basis. As it would be specially built by a machine tool manufacturer, there was no catalogue price. The cost was estimated to be $680,000, delivered and installed, the useful life would be 15 years. Using a 12-year life (the remaining life of the current lathes). The estimated salvage value would be 10% of the cost.

The automatic lathe was first introduced in1975 at a cost of $ 750,000. It was expected that as the manufacturing techniques became more generally familiar, the price would continue to drop over the next few years. This price decline was in stark contrast to the inflation in oil services products and supplies which was 18% in both, 1978 and 1979.

A study prepared by the cost accountant to help decide, what action to take, showed the following information. The direct labour rate for lathe operations was $10 per hour including fringe benefits. Pay rates for operators would not change as a result of machining changes. The new machine would use less floor space, which would save $15,000 annually on the allocated charges for square footage of space used, although the layout of the plant was such that the left space unoccupied would be difficult to utilize and no other use was planned. Miscellaneous cash expenses for supplies, maintenance, and power would be $20,000 less per year, if the automatic machine were used. The purchase price was subject to 10% investment tax credit that did not reduce the depreciable cost.

Exhibit 1: Mavis Machine Shop Selected Financial Information
Condensed Income Statement, 1979

Neat Sales	85,364,213
Cost of Goods Sold	3,494,941
Selling, General & Administrative	643,706

Contd...

Notes

Profit before Taxes	81,225,566
Income Taxes	602,851
Net Income	8622,715

Questions

1. Summarize the net cash flows for the proposed project.
2. For the project, calculate the internal rate of return, the accounting rate of return, the payback period, the net present value and the profitability index.
3. What qualitative factors should be considered in evaluating this project?
4. What decision would you recommend?

9.9 Summary

- Capital budgeting describes the firm's formal planning process for the acquisition and investment of capital and results in a capital budget.
- Traditional Techniques to Analyze Capital budgeting decisionsTraditional Techniques of Evaluation are *Payback period, The Payback Reciprocal and* Accounting Rate of Return (ARR).
- Three discounted cash flow methods used in capital budgeting are Net Present Value Method (NPV); the Profitability Index or Desirability factor and Internal Rate of Return (lRR).
- The net present value relies on the time value of money and the timings of cash flows in evaluating projects.
- Internal rate of return is the interest rate that discounts an investment's future cash flows to the present so that the present value of cash inflows exactly equals the present value of the cash outflows
- The process of selecting the more desirable projects among many profitable investments is called capital rationing.
- Risk in capital budgeting is the degree of variability of cash flows.
- The conventional techniques to handle risk in capital budgeting are Payback, Risk adjusted discount rate and Certainty equivalent method
- The application of probability distribution approach in analysing risk in capital budgeting depends upon the behaviour of the cash flows whether the cash flows are independent or dependent.
- The statistical techniques to quantity the risk in more precise terms are Sensitivity Analysis, Probability assignment to expected cash flow and Standard Deviation and Co-efficient of variation

9.10 Keywords

Break-Even Time: It is the time taken from the start of the project till the period the Cumulative Present Value of cash inflows of a project equal to present values of the total cash outflows.

Capital Budgeting: It refers to planning and deployment of available capital for the purpose of maximizing long-term profitability of the firm.

Capital Rationing: The allocation of the limited funds available for financing the capital projects to only some of the profitable projects in such a manner that the long term returns are maximized.

Notes

Risk-free Rate: The rate at which the future cash flows of a project which is not subjected to risk are discounted.

Risky Investment: Risk in an investment refers to the variability that is likely to occur between the estimated returns and the actual returns.

9.11 Review Questions

1. Why is capital budgeting significant to the firm?
2. How should working capital and sunk costs be treated in analyzing investment opportunities? Explain with suitable examples.
3. Depreciation is a non-cash item and consequently does not affect the analysis of investment proposal using discounted cash flow method? Comment.
4. Contrast the IRR and the NPV methods. Under what circumstances may they lead to
   (a) Comparable recommendation
   (b) Conflicting recommendation in circumstances in which they given contradictory results which criteria should be used to select the project and why?
5. A project costing ₹ 5,60,000 is expected to produce annual net cash benefits of ₹ 80,000 over a period of 15 years. Estimate the internal rate of return. Also find out the payback period and obtain the IRR from it. How do you compare this IRR with one directly estimate?
6. How is risk assessed for a particular investment by using a probability distribution? Discuss the method with an example.
7. Why are cash flows estimated for distant years usually less reliable than for recent years? How can this factor be considered when evaluating the riskiness of a project?
8. What similarities and differences are there between risk adjusted discount rate method and the certainty equivalent method?
9. What is sensitivity analysis? What are its advantages and limitations?
10. KC company is considering two mutually exclusive projects. The initial cost of both projects is ₹ 5000 and each has an expected life of four years. Under three possible states of economy, their annual cash flows and associated probabilities are as follows:

		Net Cash flow (₹)	
Economic state	**Probability**	**Project A**	**Project B**
Good	0.3	6000	5000
Normal	0.4	4000	4000
Bad	0.3	2000	3000

Answers: Self Assessment

1.	Capital budgeting	2.	reversible	3.	two-sided
4.	incidental	5.	minimum	6.	Profitability index
7.	Internal rate of return	8.	negative	9.	capital rationing
10.	zero	11.	capital investment	12.	risk
13.	variability	14.	short	15.	discount rate
16.	decision tree	17.	Sensitivity	18.	standard deviation

9.12 Further Readings

Notes

Books

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Unit 10: Working Capital Management

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Objectives

After studying this unit, you will be able to:

- Recognize the meaning and significance of working capital
- Explain how to determine working capital requirements
- Describe the different aspects of Financing working capital needs
- Discuss the issue of banking finance facility for working capital

Introduction

In the first unit, we have explained the major task of financial management and procurement of funds and effective utilization of funds. Procurement of funds is firstly concurred for financing of working capital requirement of the firm and secondly for financing fixed assets.

Notes

Working capital management is the functional area of finance that covers all the current accounts of the firm. It is concurred with management of the level of the individual current assets as well as management of total working capital.

10.1 Meaning and Concept of Working Capital

Working capital refers to the funds invested in current assets, i.e., investment in sundry debtors, cash and other current assets. Current assets are essential to utilize facilities provided by plant and machinery, land and buildings. In case of the manufacturing organization, a machine cannot be used without raw material. The investment in the purchase of raw materials is identified as working capital. It is obvious that a certain amount of funds are tied up in raw material inventories, work in progress, finished goods, consumable stores, sundry debtors and day-to-day cash requirements. However, the organization also enjoys credit facilities from its suppliers by way of credit. Similarly, the organization need not pay immediately for various expenses, etc. the workers are paid only periodically. Therefore, a certain amount of funds automatically become available to finance the current assets requirement. However, the requirement of current assets is usually greater than the amount of funds provided through current liabilities. The goal of working capital management is to manage the firm's current assets and current liabilities in such a way that a satisfactory level of working capital is maintained.

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

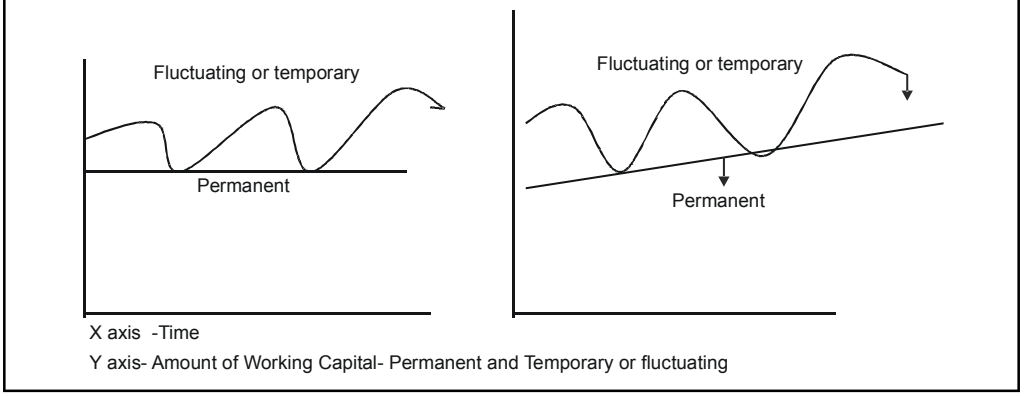
1. ***Gross working capital:*** The gross working capital refers to investment in all the current assets taken together. The total of investments in all current assets is known as gross working capital.
2. ***Net working capital:*** Net working capital refers to the excess of total current assets over total current liabilities. Current liabilities are those liabilities that are intended to be paid in the ordinary course of business within a year, out of the current assets or earnings of the concern

From the point of view of time, the term working capital can be divided into two categories:

1. ***Permanent:*** It is also referred as hard core working capital. It is the minimum level of investment in the current assets that is carried by the business at all times to carry out maximum level of its activities. It should be financed by long-term sources.
2. ***Temporary working capital:*** It refers to that part of working capital, which is required by the business over and above permanent working capital. It is also called variable working capital. Since the quantum of temporary working capital keeps on fluctuating from time-to-time depending on the business activities, at may be financed from short-term sources.

The following figure shows permanent and temporary or fluctuating or variable working capital:

Figure 10.1: Permanent and temporary Working capital



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10.1.1 Factors Affecting Working Capital

The important factors are:

1. ***General Nature of Business:*** In some organizations, the sales are mostly in cash basis and the operating cycle (explained) later is also short. In these concerns, the working capital requirement is comparatively low. Mostly, service companies come under this category. In manufacturing companies, usually the operating cycle is very long and a firm is also required to give credit to customers to boost sales. In such cases, working capital requirement is high. Similarly, a trading concern requires lower working capital than a manufacturing concern.

2. ***Production Policy:*** Working capital requirements also fluctuate according to production policy adopted by the company

   Example: In case of products having seasonal demand a steady production can be planned throughout the year in which case finished goods are to be kept for a longer period. The other alternative is to produce only during the season in which case raw materials have to be accumulated throughout the year.

3. ***Credit Policy:*** A company, which allows liberal credit to its customers, may have higher sales, but consequently will have larger amount of funds tied up in sundry debtors. Similarly a company, which has very efficient debt collection machinery and offers strict credit terms, may require lesser amount of working capital that the one where debt collection system is not so efficient where the credit terms are liberal.

   The creditability of a company in the market also has an effect on the working capital requirement. Reputed and established concern can purchase raw material on credit and enjoy many other services like door delivery after sales service, etc., This would mean that they could easily have large current liabilities.

4. ***Inventory Policy:*** The inventory policy of a company also has an impact on the working capital requirements. An efficient firm may stock raw material for a smaller period and may, therefore, require lesser amount of working capital.

5. ***Abnormal Factors:*** Abnormal factors like strikes and lockouts require additional working capital. Recessionary conditions necessitate a higher amount of stock of finished goods remaining in stock. Similarly, inflationary conditions necessitate more funds, to maintain the same amount of current assets.

6. ***Market Conditions:*** In case of competitive pressure, large inventory is essential, as delivery has to be off the shelf or credit has to be extended on liberal terms.

7. ***Conditions of Supply:*** If prompt and adequate supply of raw materials, spares, stores, etc., is available it is possible to manage with small investments in inventory or work on Just-In-Time (JIT) inventory principles. However, if supply is erratic, scant, seasonal, channelised through government agencies etc. it is essential to keep larger stocks increasing working capital requirements.

8. ***Business Cycle:*** Business fluctuations lead to cyclical and seasonal changes in the production and sales and affect the working capital requirements.

9. ***Growth and Expansion Activities:*** The working capital of the firm increases as it grows in terms of sale or fixed assets.

10. ***Level of Taxes:*** The amount of taxes to be paid is determined by the prevailing tax regulations. Very often taxes have to be paid in advance on the basis of the profit of the

Notes

preceding year. Management has no discretion in regard to payment of taxes; in some cases non-payment may invite penal action. There is, however, wide scope to reduce the tax liability through proper tax planning.

11. ***Dividend Policy:*** Payment of dividend utilizes cash while retaining profit acts as a source of working capital. Thus working capital gets affected by dividend policies.

12. ***Operating Efficiency:*** Efficient and co-ordinated utilization of capital reduces the amount required to be invested in working capital.

13. ***Price Level Charges:*** Inflationary trends in the economy necessitate more working capital to maintain the same level of activity.

14. ***Depreciation Policy:*** Depreciation charges do not involve any cash outflow. The effect of depreciation policy on working capital is, therefore, indirect. In the first place, depreciation affects the tax liability and retention of profits and on dividend.

15. ***Vagaries in the Availability of Raw Materials:*** The availability or otherwise of certain raw materials on a continuous basis without interruption would sometimes effect the requirement of working capital. There may be some materials, which cannot be procured easily either because their sources are few or they are irregular. To sustain smooth production, therefore, the form may be compelled to purchase and stock them far in excess of genuine production needs. This will result in an excessive inventory of such materials.

Self Assessment

Fill in the blanks:

1. The total of investments in all current assets is known as ……..working capital.
2. The effect of depreciation policy on working capital is ……..

10.2 Importance of Adequate Working Capital and Optimum Working Capital

A concern needs funds for its day-to-day running. Adequacy or inadequacy of these funds would determine the efficiency with which the daily business may be carried on. A large amount of working capital would mean that the company has idle funds. Such firms have a cost. The company has to pay large amount as interest on such funds. This results in over-capitalization. Over-capitalization implies that the 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.

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

A question may arise as to what is the amount of optimum working capital for a firm.

It cannot be overemphasized 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 rates may be lower than 2 and yet the firm may be sound. An optimum working capital ratio is dependent upon the business situation as such and the nature and composition of various current assets.

Notes

Example: in the case of vanaspati manufacturing company enjoying high reputation and credit terms in the market, a current ratio of 1.6 has been serving as ideal. On the other hand, a company engaged in manufacturing heavy electrical equipment and machinery and the business mostly being static electricity board might have to maintain a current ratio of more than 3.

The Trade-off between Profitability and Risk

The conversion of current assets for inventory to receivables to cash provides the sources of cash used to pay the current liabilities. The cash outlays for current liabilities are relatively preferable. When an obligation is incurred, the firm generally knows the corresponding payment will be due. What is difficult to predict are the cash inflows – the conversion of the current assets to more liquid term. The more predictable its cash inflows, the less net working capital a firm needs. Since most firms are unable to match cash inflows to cash outflows with certainty, current assets that more than cover outflows for current liabilities are usually necessary. In general, the greater the margin by which a firm's current assets cover its current liabilities, the better able it will be to pay its bills as they become due.

A trade-off exists between a firm's profitability and its risk probability. In this context, is the relationship between resources and costs generated by using the firm's assets – both current and fixed – in productive activities? A firm's profits can be increased by (1) increasing revenues or (2) reducing costs.. A firm that cannot pay its bills when due, is said to be technically insolvent.

Did u know? **What is risk in short term context?**

Risk, in the context of short-term financial management (working capital management) is the probability that a firm will be unable to pay its bills as they become due.

Changes in Current Assets

How changing the level of firm's current assets affects its profitability – risk trade-off can be demonstrated using the ratio of current assets to total assets. This ratio indicates the percentage of total assets that is current. (It is assured that the level of total assets remains unchanged). When the ratio increases, that is, when current assets increase – profitability decreases. Why? Because, current assets are less profitable than fixed assets. Fixed assets are more profitable because they add more value to the product than provided by current assets.

The risk effect, however, decreases, as the ratio of current assets to total assets increase. The increase in current assets increases net working capital, thereby reducing the risk of technical insolvency. The opposite effects on profits and risk result from a decrease in the ratio of current assets to total assets.

Changes in Current Liabilities

How changing the level of firm's current liabilities affects its profitability – risk trade-off can be demonstrated by using the ratio of current liabilities to total assets. This ratio indicates the percentage of total assets that has been financed with current liabilities. (Assume that the total assets remain unchanged.) Then ratio increases, profitability increases, because the form uses more of the less expensive current liabilities financing and less long term financing current liabilities are basically debts on which the firm pays no charge or interest. However, when the ratio of current liabilities to total assets increases, the risk of technical insolvency also increases, because the increase in current liabilities in turns decreases not working capital. The opposite effects on profit and risk result from a decrease in the ratio of current liabilities to total assets.

Notes

Table 10.1: The Effects of Changing Ratios in Profits and Risks

Ratio	Change in Ratio	Effect on Profits	Effect on Risk
Current Assets Total Assets	Increase Decrease	Decrease Increase	Decrease Increase
Current Liabilities Total Assets	Increase Decrease	Increase Decrease	Increase Decrease

Self Assessment

Fill in the blanks:

3. If the firm has inadequate working capital, it is said to be……...

4. ……..implies that the company has too large funds for its requirements, resulting in a low rate of return a situation

10.3 Managing Working Capital

This involves two processes:

1. ***Forecasting requirements of funds:*** Changes in firms operation can have almost immediate effects on the working capital.

   Example: if the suppliers increase the price of raw materials, more money will be tied up in inventory than earlier. Even if the firm can increase the price of its final product, additional working capital will be required to support its sales efforts.

   Did u know? A proactive manager with charges in operating activities will estimate the working capital requirement and take necessary action for funds.

2. ***Arranging funds:*** Once the requirement has been estimated, the manager will arrange the necessary funds from the best source, for the lowest cost and for the time period involved.

   The effective management of working capital is the primary means of achieving the firm's goal of adequate liquidity. It is after all, the working capital – cash, marketable securities, receivables and inventory – that will be available to pay bills and meet obligations. It is the net working capital i.e., difference of current assets over current liabilities – that gives the degree of protection against problems that might cause a shortage of funds.

Managing working capital requires a number of actions, including the following:

1. ***Monitoring levels of cash receivables and inventory:*** On a daily or weekly basis, the manager should know how much funds are tied up in each of the current asset accounts. Ratio analysis offers a quick and reasonable accurate method of doing this. By comparing ratios with previous periods and industry norms, the managers can identify the variation and investigate. The following ratios can be used:

   (a) Current assets/total assets

   (b) Current assets/current liabilities

   (c) Current assets – inventory/current liabilities

   (d) Cash and marketable securities/current assets

Notes

2. ***To have understanding of the percentage of funds in current accounts:*** Working capital represents a sizeable investment for most firms. Normally, 30 to 60% of the firm's total assets are tied up in current accounts.

3. ***Recording time spent managing current accounts:*** Financial Managers spend much of their time to the daily internal operations relating to current assets and current liabilities of the firms. Although estimates vary, managers spent somewhere between on third and two thirds of their time in managing the working capital.

Caution The manager should be aware of the relationship between current and fixed assets and any charges in the percentage of funds in current accounts.

10.3.1 How much Working Capital is Needed

A number of factors need to be included in the analysis, such as the following:

1. ***Size of the firm:*** It may be argued that a firm's size, either in assets or sales will affect its need for working capital. A small firm may have extra current assets as a cashier against cash flow disruptions. Small firms have cash inflows from fewer sources than larger firms and hence are more affected by the failures of a few customers to pay on time. Larger firms with many sources of funds may need less working capital as compared to total assets on sales.

2. ***Activities of firm:*** If the firm requires to stock large inventory or sell on relatively easy credit terms, it will have greater needs for working capital than firms providing services or only having cash sales.

3. ***Availability of credit:*** A firm with readily available credit from banks will be able to plan for less working capital than a firm without such credit.

4. ***Attitude towards profits:*** All funds have a cost; a relatively large amount of current assets tends to reduce a firm's profit. Some firms want extra working capital and are willing to suffer small costs. Other firms maintain an absolute minimum of working capital to gain the full profits from operation.

5. ***Attitude towards risk:*** The greater the amount of working capital particularly cash and marketable securities the lower the risk of liquidity problems. Firms that do not wish to incur even slight risks of liquidity problem may like to keep extra cash. Other firms accept the risks to earn profits and may not even keep adequate cash to pay bills always on time.

Did u know? Most firms seek to maintain sufficient working capital to meet their needs for liquidity without tying up unnecessary funds.

10.3.2 Forecasting Working Capital Needs

The following are some of the methods used in practice:

1. ***Current assets holding period:*** To estimate working capital requirements on the basis of average holding period of current assets and relating them to cost based on company experience in the previous year.

2. ***Ratio of sales:*** To estimate working capital requirements as a ratio of sales on the assumption that current assets charge with sales. This can be done through statistical

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techniques like linear regression. A formula is developed for the straight line that best fits the data and this formula can be used to express the relationship between two variables – say prior month's sales and working capital. The most widely used regression technique employs the method of least squares. Let us take the following figures extracted from the books:

Table 10.2: Ratio of Sales

Month	Prior Months Sales X (000)	Working Capital Level Y (000)	X^2 (000,000)	XY (000,000)
January	450	300	202500	135000
February	400	300	160000	120000
March	350	250	122500	87500
April	300	220	90000	66000
May	250	200	62500	50000
June	500	400	250000	200000
July	700	500	490000	350000
August	600	450	360000	270000
September	300	300	90000	90000
October	250	250	62500	62500
November	650	500	422500	325000
December	550	400	302500	220000
	5300	**4070**	**2615000**	**1976000**
	Σx = 5300(000)	**Σy= 4070(000)**	**Σx^2= 2615000 (000,000)**	**Σxy = 1976000**

$$Y = a + bx$$

$$\Sigma y = Na + b\Sigma x - 1$$

$$\Sigma xy = a\Sigma x + b\Sigma x^2$$

$$\text{From (1) - } 4070^{600} = 12\,a + 5300{,}000\,b$$

$$\text{From (2)} = 1976000\ (000{,}000) = 53{,}00{,}000$$

To get the line of best for Y = a + bx, we can use the following formula

$$\Sigma y = Na + b\Sigma x$$

$$\Sigma xy = a\Sigma x + b\Sigma x^2$$

Solving the above two equations, we get,

$$a = 35638 \text{ and } b = 0.687$$

Hence, the line of best fit Y = 35638 + 0.687

Suppose in October, the firm had sales of ₹ 1.25,000, the estimated working capital will be 35638 + 0.687 × 425000 = ₹ 327613

3. ***Ratio of fixed investment:*** To estimate working capital requirements as a percentage of fixed investment.

Notes

Self Assessment

Fill in the blanks:

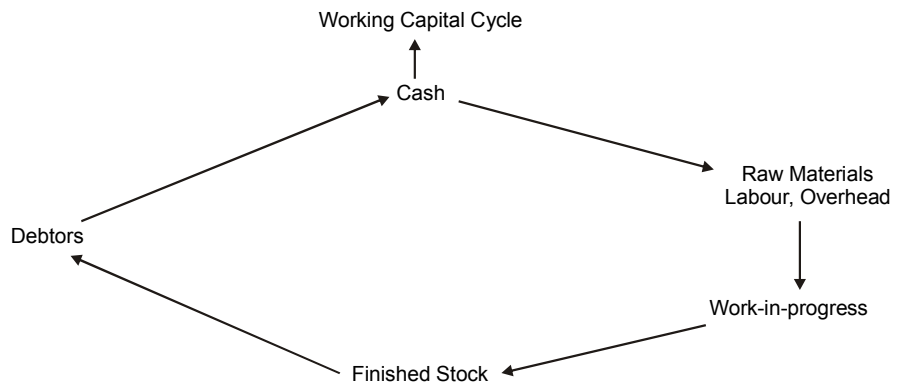
5. The greater the amount of working capital particularly cash and marketable securities the lower the risk of ……..problems.
6. A firm with readily available credit from banks will be able to plan for …….working capital.

10.4 Working Capital Cycle (Operating Cycle)

The working capital cycle refers to the length of time from purchase of production inputs (raw materials) entering the production process (work in progress when labour costs and factory overheads are incurred), work in progress get converted into finished products, finished products when sold on credit and get converted into Accounts Receivable and Debtors being realized in cash after the expiry of the credit period. Thus, there is a complete cycle from cash to cash wherein cash gets converted into raw materials, work in progress, finished goods, debtors and finally into cash again. Short-term funds are required to meet the requirement of funds during this time period. This time period is dependent upon the length of time within which the original cash gets converted into cash again. This cycle is also known as operating cycle or cash cycle.

The working capital cycle is depicted below:

Figure 10.2: Working Capital Cycle



Notes The determination of working capital cycle helps in the forecast, control and management of working capital. It indicates the total time lag and the relative significance of its constituent parts. The duration of working capital cycle may vary depending on the nature of the business. The duration of the operating cycle for the purpose of estimating working capital is equal to the sum of the duration of each of the above events less the credit period allowed by the suppliers.

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 of credit is extended to debtors. The total of all these days minus the credit days allowed by the supplier is the total working capital cycle, i.e., 60 + 15 + 30 + 30 – 15 days, i.e., 120 days.

Notes

In the form of an equation, the operating credit process can be expressed as follows:

$$\text{Operating cycle} = R + W + F + D - C$$

R = Raw material storage period

W = Work in progress holding period

F = Finished goods storage period

D = Debtors Collection period

C = Credit period allowed by the suppliers

The various components of operating cycle may be calculated as shown below:

1. $$\text{Raw material storage period} = \frac{\text{Average stock of raw material}}{\text{Avg. cost of raw material consumption per day}}$$

2. $$\text{Work in progress holding period} = \frac{\text{Average work in progress inventory}}{\text{Avg. cost of production per day}}$$

3. $$\text{Finished goods storage period} = \left\{\frac{\text{Est. production (in units)} \times \text{direct labour per unit}}{\text{12 months / 360 days}}\right\}$$

$$\frac{\text{Average stock of finished goods}}{\text{Avg. cost of goods sold per day}}$$

4. $$\text{Debtors collection period} = \frac{\text{Average book debts}}{\text{Avg. credit sales per day}}$$

5. $$\text{Credit period availed from the suppliers} = \frac{\text{Avg. trade creditors}}{\text{Avg. credit purchases per day}}$$

Example: From the following information of XYZ Ltd. Calculate:

1. Net operating cycle period
2. Number of operating cycles in a year

(a)	Raw material inventory consumed during the year	₹ 12,00,000
(b)	Average stock of raw material	1,00,000
(c)	Work in progress inventory (cost of production)	10,00,000
(d)	Average work in progress inventory	60,000
(e)	Finished goods inventory (cost of goods sold)	16,00,000
(f)	Average finished goods stock held	80,000

Notes

(g)	Average collection period for debtors	45 days
(h)	Average credit period availed from suppliers	30 days
(i)	No. of days in a year	360 days

Solution: Calculation of net operating cycle period of XYZ Ltd.

$$\text{Raw material storage period (a)} = \frac{\text{Avg. stock of RM}}{\text{Avg. cost of RM consumption/day}}$$

$$= \frac{100,000}{3333.33} = 30 \text{ days}$$

$$\text{WIP Holding period (b)} = \frac{\text{Avg. WIP inventory}}{\text{Avg. cost of production per day}}$$

$$= \frac{60,000}{10,00,000 \div 360} = \frac{60,000}{2777.77} = 22 \text{ days}$$

$$\text{Finished goods storage period (c)} = \frac{\text{Avg. F.G. inventory}}{\text{Avg. cost of goods sold/ day}}$$

$$\frac{80,000}{16,00,000 \div 360} = \frac{80,000}{4444.44} = 18 \text{ days}$$

Debtors Collection Period (d)	45 days
Total operating cycle (a) + (b) + (c) + (d)	115
Less. Avg. credit period availed	30
Net operating cycle period	85
No. of operating cycle in a year	$\frac{360}{85}$ = 4.2 times

10.4.1 Estimate of Future Working Capital based on Current Assets and Current Liabilities

The estimate of future working capital can be made if the amount of current assets and current liabilities can be estimated as follows:

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 operating 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:

1. ***Raw material inventory:*** If the funds to be invested in raw materials/inventory may be estimated on the basis of production budget, the estimated cost per unit and the average holding period of raw material inventory by using the following formula.

Notes

$$\frac{\text{Est. production (in units)} \times \text{Est. cost of raw materials per unit} \times \text{Avg. raw materials holding period (month/days)}}{\text{12 month/360 days}}$$

Note: 360 days in a year are generally assumed to facilitate calculation

2. ***Work in progress inventory:*** The funds to be invested in work in progress can be estimated by the following formula:

$$\frac{\text{Est. prodn. (in units)} \times \text{Est. work in process cost per unit} \times \text{Avg. holding period of WIP (month/days)}}{\text{12 month/360 days}}$$

3. ***Finished goods:*** The funds to be invested in finished goods inventory can be estimated with the help of the following formula:

$$\frac{\text{Est. prodn. (in units)} \times \text{cost of prodn. (per unit excl. dept.)} \times \text{Avg. holding period of Finished goods (month/days)}}{\text{12 month/360 days}}$$

4. ***Debtors:*** Funds to be invested in trade debtors may be estimated with the help of the following formula:

$$\frac{\text{Est. credit sales (in units)} \times \text{cost of sales (per unit excl. dept.)} \times \text{Avg. debtor collection Period (month/days)}}{\text{12 month/360 days}}$$

5. Minimum desired cash and bank balance, to be maintained by the firm have to be added in the current assets for calculation of working capital.

Estimation of Current Liabilities

Current liabilities generally affect computation of 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 creditors, wage and overheads can be estimated as follows:

1. ***Trade creditors:***

$$\left\{\frac{\text{Est. yearly prod.} \times \text{Raw material req. per unit}}{\text{12 months/36 days}}\right\} \times \text{Credit period granted by supplier (months/days)}$$

2. ***Direct wages:***

$$\left\{\frac{\text{Est. production (in units)} \times \text{Direct labour per unit}}{\text{12 months/360 days}}\right\} \times \text{Avg. time lag in payment of wages (months/days)}$$

3. ***Overheads (other than depreciation and amortization)***

$$C = \sqrt{\frac{2\,U \times P}{S}} \times \text{Avg. time lag in payment of overhead (months/days)}$$

Notes

Caution The amount of overheads may be separately calculated for different types of overheads. In the case of settling overheads, the relevant claim should be sales volume instead of production volume.

Example: XYZ Co. Ltd. is a pipe manufacturing company. Its production cycle indicates that materials are introduced in the beginning of the production cycle; wages and overhead accrue evenly throughout the period of this cycle. Wages are paid in the next month following the month of accrual, work in process includes full units of raw material used in the beginning of the production process and 50% of wages and overheads are supported to be conversion costs. Details of production process and the components of working capital are as follows:

Production of pipes per annum	12,00,000 units
Duration of the production cycle	One month
Raw materials inventory held	One-month consumption
Finished goods inventory held for	Two months
Credit allowed by creditors	One month
Credit given to debtors	Two months
Cost price of raw materials	₹ 60 per unit
Direct wages	₹ 10 per unit
Overheads	₹ 20 per unit
Selling price of finished pipes	₹ 100 per unit

Required to calculate: the amount of working capital required for the company.

Solution:

Statement showing determination of working capital

1. ***Current Assets:***

(a)	Raw material inventory (1 month) = $\frac{1200,000 \times ₹\ 60}{12}$		60,00,000
(b)	Work in progress – Production cycle 1 month		
	Raw materials (materials added at the beginning) 60,00,000		
	Wages and overheads (avg. 50% complete)		
	(10 + 20) × 50% × 12,00,000/12	15,00,000	75,00,000
(c)	Finished goods inventory (hold for 2 mths)		
	Total cost (60+10+20) × 12,00,000 × 2/12		1,80,00,000
(d)	Debtors – 2 months credit (Total cost ₹ 90)		
	Hence, 90 × 12,00,000 × 2/12		1,80,00,000
		Total Current Assets	5,55,00,000

Notes

2. *Current Liabilities:*

(a)	Creditors for raw materials (1 month credit period on purchases)		
	60 × 12,00,000 × 1/12	60,00,000	
(b)	Creditors for wages – one month		
	10 × 12,00,000 × 1/12	10,00,000	70,00,000
	Net Working Capital		4,25,00,000

10.4.2 Working Capital Requirement based on Cash Cost

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.

Many experts, therefore, calculate the working capital requirements by working out cash cost 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.

10.4.3 Effect of Double Shift Working on Working Capital Requirements

The increase in the number of hours of production has an effect on the working capital requirements. The economy of introducing double shift is the greater use of fixed assets with little or marginal requirement of additional assets. In double shift working, an increase in stocks will be required but with double shift working, the increase in stocks will not be proportionate to the rise of production. Hence the minimum level of stocks may not be very much higher.

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 workers are paid at a higher rate. Fixed overheads will remain fixed, whereas variable overheads will increase in proportion to the increased production. Semi-variable overheads will increase according to the variable element in them.

Self Assessment

Fill in the blanks:

7. The various constituents of current assets and current liabilities have a direct bearing on the computation of working capital and the…….

8. ……the operating cycle period, lower will be the requirement of working capital

10.5 Working Capital Policy

Two important issues in formulating the working capital policy are:

1. What should be the ratio of current assets to sales?

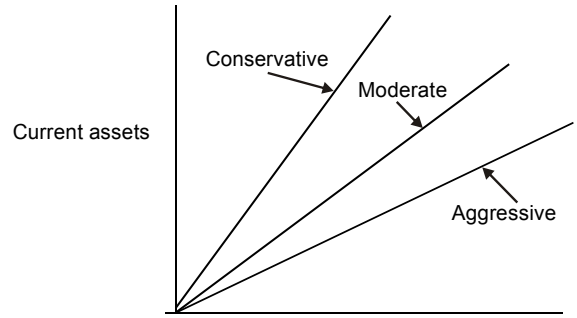
2. What should be the ratio of short term financing to long-term financing?

Notes

10.5.1 Current Assets in Relation to Sales

If the firm can free cash accurately its level and pattern of sales, inventory procurement time, inventory usage rates, level and pattern of production, production cycle time, split between cash sales and credit sales, collection period and other factors which imprenge on working capital components. The investment in current assets can be defined uniquely. When uncertainty characterizes the above factors, as it usually does, the investment in current assets cannot be specified uniquely. In face of uncertainty, the outlay on current asset would consist of a base component meant to meet normal requirements and safety component meant to cope with unusual demands and requirements. The safety component depends on how conservative or aggressive is the current asset policy of the firm. If the firm pursues a very conservative current asset policy, it should carry a high level of current assets in relation to sales. (This happens because the safety components are substantial). If the firm adopts a moderate current asset policy, it should carry a moderate level of current assets in relation to sales. The relationship between current assets and sales under these current asset policies is shown in Figure

Figure 10.3: Various current assets policies



A conservative current asset policy tends to reduce risk. The surplus current assets under this policy enable the firm to cope rather easily with variations in sales, production plans and procurement time. Further the higher liquidity associated with this policy diminishes the chances of technical insolvency. The reduction of risk is also accompanied by lower expected profitability.

An aggressive current asset policy, seeking to maximize the investment in current assets, exposes the firm to greater risk. The firm may be unable to cope with anticipated changes in the market place and operating conditions. Further, the risk of technical insolvency becomes greater. The compensation for higher risk, of course, is the higher expected profitability.

10.5.2 Ratio of Short-term Financing to Long-term Financing

Working capital requirements should be met from short term as well as long-term sources of funds. It may be proper to meet at least 2/3rd of the permanent working capital from long-term sources.

Long-term funds reduce the risk but are costly. On the other hand, short-term funds have relatively lower cost but need to be repaid in the near future. Hence the finance manager has to make judicious use of both long-term and short-term sources. In this context, there are three basic approaches:

Marketing Approach (Hedging Approach)

When a firm uses long-term sources to finance fixed assets and permanent current assets and short term financing to finance temporary current assets.

Notes

Conservative Approach

Under this approach, a firm finances its permanent assets and also a part of temporary current assets with long-term financing and is less risky so far as insolvency is concerned, however the funds may be invested in such investments which fetch small returns to build up liquidity.

Aggressive Approach

The firm uses mere short-term financing than is warranted. In this approach, the firm finances a part of its permanent current assets with short-term financing. This is more risky, but may add to the return on assets.

Task How do changes in the ratio of current liabilities to total assets affect profitability and risk?

Self Assessment

Fill in the blanks:

9. A ……current asset policy tends to reduce risk.
10. The ……..component depends on how conservative or aggressive is the current asset policy of the firm.

10.6 Financing of Working Capital

Following are the different short-term and long-term sources of finance available for working capital:

1. ***Long-term sources:*** For example, Share capital (equity and preference), Retained earnings, and debentures/bonds of different types, loans from bank and financial institutions, venture capital financing.
2. ***Short-term sources:***
   (a) *Bank credit:* cash credit, bills finance, overdraft facility, working capital demand loan, commercial paper.
   (b) *Transaction credit:* trade allowed by creditors, outstanding labour and other expenses.

   Some of the short-term sources of finance are given below as a reference:

   (a) *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 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 as a going concern keeps on rotating.
   (b) *Advance from customers:* Manufacturers and contractors engaged in producing and constructing costly goods involving considerable length of manufacturing or constructions usually demand advance mainly from their customers at the time of accepting the orders for executing the contracts or supplying the goods.
   (c) *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 firm revenues out of which costs such as interest on deposits, administrative costs are met and a reasonable profit is made.

Notes

(d) *Loans:* In a loan account, the entire advance is disbursed at one time either in cash or by transfers to the current account of the borrower.

(e) *Overdraft:* Under this facility, customers are allowed to withdraw in excess of credit advance standing to their current deposit account. A fixed amount is therefore granted to the borrower within which the borrower is allowed to overdraw his account.

(f) *Clean overdrafts:* Request for clean advances is 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.

(g) *Cash credits:* Cash credit is an arrangement under which a customer is allowed to draw advance up to a certain limit against credit granted by bank. Generally, the limits are sanctioned against the security of goods by way of pledge or hypothecation. Though these accounts are repayable on demand, banks usually do not recall.

(h) *Bills purchased/discounted:* 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.

(i) *Advance against documents of title to goods:* A document becomes a document of title to goods when its possession is recognized by law or business custom as possession of the goods. These documents include a bill of lading, dock warehouse keeper's certificate, railway receipt, etc.,

(j) *Term loan by banks:* Term loan is an installment credit repayable over a period of time in monthly/quarterly/half yearly or yearly installment. Banks grant term loans for small projects falling under priority sector, small-scale sector and big units.

(k) *Commercial paper:* It is a form of financing that consists of short-term, unsecured promissory notes issued by firms with a high credit standing. Most commercial papers have maturity ranging from 3 months to 6 months and denomination of minimum ₹ 5 lakhs.

Notes The companies satisfying the following conditions are eligible to issue commercial paper:

(a) The tangible worth of the company is ₹ 5 crores or more as per audited balance sheet of the company.

(b) The fund base working capital limit is not less than ₹ 5 crores.

(c) The company is required to obtain the necessary credit rating from the rating agencies such as CRISIL, ICRA, etc., and the rating should not be more than 2 months old at the time of applying to the RBI.

(d) The minimum current assets ratio should be 1.33:1 based on classification of current assets and liabilities.

(e) For public sector companies there are no listing requirements, but for companies other than public sector, the same to be listed or one or more stock exchanges.

(l) *Public deposits:* A company can accept public deposits subject to the stipulation 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 and are used for financing working capital requirements.

Self Assessment

Notes

Fill in the blanks:

11. …….represents credit granted by suppliers of goods

12. …….is an arrangement under which a customer is allowed to draw advance up to a certain limit against credit granted by bank.

10.7 Regulation of Bank Finance

Traditionally banks credit has been an easily accessible source of meeting the working capital needs of business firms. Indian banks have not been concerning themselves about the soundness or otherwise of the business carried out or about the actual end use of the loan. In other words, they have been extending credit to industry and trade on the basis of security. This resulted in a number of distortions in financing of working capital by banks. Consequently, bank credit has been subjected to various rules, regulations and controls. The Reserve Bank of India had appointed various committees to ensure equitable distribution of bank resources to various sectors of economy. These committees suggest ways and means to make the bank credit an effective instrument of industrialization. Now we shall discuss the recommendations of various committees.

10.7.1 The Dehejia Committee

In September 1969, Dehejia Committee of the RBI pointed out in its reports that in the financing practice of banks, there was no relationship between the optimum requirements for production and the bank loan. The general tendency with business was to take short-term credit from banks and use it for purposes other than production. The Committee also pointed out that bank to not give proper attention to the financing pattern of their clients. Further, the clients resort to double financing or multiple financing of stocks.

The Dehejia Committee suggested that the banks should make an appraisal of credit applications with reference to the total financial situations of the client. It also suggested that all cash credit account with banks should be bifurcated in the following two categories:

1. The hard core which would represent the minimum level of raw material, finished goods and stores, which any industrial concern is required to hold for maintaining certain level of production.
2. The strictly short-term components, which should be the fluctuating part of the account. This part would represent the short-term increases in inventories, tax, dividends and bonus payments.

The Committee also recommended that to determine the hard-core element of cash credit account, norms for inventory levels should be worked out by the Chambers of Industry or by the Indian Bank Association.

It can, thus, be seen that the orientation towards project oriented and need based lending was first given by the Dehejia Committee. However, in practice the recommendations of the Committee did not have more than a marginal effect on the pattern of bank financing.

10.7.2 Tandon Committee

In July 1974, the Reserve Bank constituted a Study Group under the Chairmanship of Mr. P.L. Tandon. This study group was asked to give its recommendations on the following matters:

1. What constitutes the working capital requirements of the industry and what is the end use of credit?

Notes

2. How is the quantum of bank advance to be determined?
3. Can norms be evolved of current assets and for debt equity ratio to ensure minimal dependence on bank finance?
4. Can the current manner and state of lending be improved?
5. Can an adequate planning, assessment and information system be evolved to ensure a disciplined flow of credit to meet genuine production needs and its proper supervision?

The final recommendations of this Committee regarding the approach of the banks towards the assessment of the working capital requirements of industrial units are very significant. The major recommendations have been discussed as below:

1. ***Banks' finance essentially for meeting working capital needs:*** Banks' credit is essentially intended to finance working capital requirements only; for other requirements, other sources have to be found. Even for working capital requirements, some portion of the contribution must come from source other than bank finance, viz. from owner's own funds, plough back of surpluses and long term borrowed funds. With increased scale of operation and production, the owner's own stake in the business should keep on rising. While it is not practicable to lay down absolute standards of debt equity ratio, each borrower should take appropriate steps to strengthen his equity base.
2. ***Working capital gap:*** The study group has emphasized the concept of 'the working capital gap', which represented the excess of current assets over current liabilities other than bank borrowing. The maximum permissible bank finance shall be limited to 75% of this working capital gap. In other words, the balance of 25% will have to be provided by the borrower from equity and long-term borrowings. For the purpose of arriving at the working capital gap, the current assets and the current liabilities will have to be estimated on the basis of the production plan submitted by the borrower. The level of inventories under raw materials, work-in-process, finished goods, consumable stores and also the level of receivables shall be projected on the norms prescribed by the study group.
3. ***Norms:*** The borrowing requirements of any industrial unit basically depend on the length of the working capital cycle, from building inventories of raw material to getting the sale proceeds. If norms of inventory and other current assets are laid down for different industries, the bank can easily work out the standard working capital required by a unit and sanction the advance accordingly. The study group has, therefore, prescribed norms for inventory and receivables for fifteen industries. The industries covered by the report are cotton and synthetic textiles, manmade fibres, jute, textiles, rubber products, fertilizers, pharmaceuticals, dyes and dyestuffs, basic industrial chemicals, vegetable and hydrogenated oils, paper, cement, consumer durables, automobiles and ancillaries, engineering ancillaries and components supplies and machinery manufacturers. The study group has not suggested any norms for the heavy engineering industry because each unit in this industry has certain special characteristics.

   The norms for the various items are described below:

(a)	Raw materials	Consumption in terms of months
(b)	Stock-in-process	Cost of production in terms of months
(c)	Finished goods	Cost of sales in terms of months
(d)	Receivables	Sales in terms of months

4. ***Three different methods of calculating the borrowing limit to finance the working capital requirements:*** The group views the role of banker only to "supplement the borrower's resources in carrying a reasonable level of current assets in relation to his production

Notes

requirement". It proposed three progressive stages by which the banks may finance the working capital requirements of their industrial borrowers. In the first stage, the current assets may be worked out as per norms and the current liabilities (excepting bank borrowing) may be deducted there from. This amount would represent the working capital gap, 25% of which must be financed by the borrowers out of long-term funds. The maximum permissible bank borrowings would, therefore, be only 75% of the working capital requirements calculated as per the norms laid down regarding inventories and receivables. The Committee suggests, that as a first step, the banks may adopt this method of sanctioning advances. In cases where the banks have already sanctioned advances higher than the requirements as calculated above, the excess should be converted into a term loan to be phased out gradually. Thus, the Committee does not support that the banks should finance excessive inventory build up by industrial enterprises.

In the second stage, the borrower will have to provide a minimum of 25% of total current assets from term funds (as against his providing 25% of working capital gap from long term funds in the first alternative.)

In the third stage and the 'ideal' method of calculating the borrowing limits, the group makes a distinction between core current assets and the other current assets. Accordingly, the total current assets need to be divided into these two categories. The borrower should finance the entire core current assets plus a minimum of 25% of the other current assets. The group feels that the classification of current assets and current liabilities be as per the accepted approach of the bankers.

The recommendations of the Committee aim at reducing the reliance of the borrowers on the bank finance. Implementation of these recommendations would result in a better current ratio for the industrial borrowers. This would avoid unfortunate stringencies on account of lack of working capital as those faced by the industrial units. There can be no two opinions that the industrial units must maintain a sound current ratio–something which can be achieved only if a good part of working capital is financed through long-term funds.

5. ***Style of credit:*** The group also recommends a change in 'style of credit' i.e., the manner in which bank finance is extended to the borrower. Further, the total credit limit of borrower should be bifurcated into two components; the minimum level of borrowing which the borrower expects to use throughout the year (loan) and a demand cash credit, which would take care of his fluctuating requirements. Both these limits should be reviewed annually. It is recommended that the demand for cash credit should be charged a slightly higher interest rate than the loan component, so that the borrower is motivated to take higher level of fixed component and a smaller limit of cash credit. This would enable the bankers to forecast the demand for credit more accurately.

6. ***Information system for banks:*** The following points may be noted in this regard:

   (a) To ensure that the customers do not use the new credit facility in an unplanned manner, the financing should be placed on a quarterly budgeting reporting system for operational purposes in the prescribed forms.

   (b) Actual drawings within the sanctioned limit will be determined by the customer's inflow and outflow of funds as reflected in the quarterly funds flow statements and the permissible level of drawings will be the level as at the end of the previous quarter plus or minus the deficit or surplus shown in the funds flow statements.

   (c) Variances are bound to arise in any budget or plan. The variances to the extent of say 10% should be permissible and beyond this, the banker and the customer should discuss the reason.

Notes

(d) Since projected funds flow statements would form the basis for determining the line of credit, the banker would be justified in laying down a condition that any material change, say beyond 10% of the figure projected earlier, would require his prior approval.

(e) From the quarterly forms the bankers will verify whether the operational results conform to earlier expectations and whether there is any divergence showing red signals.

(f) In addition to quarterly data, the large borrower should submit a half yearly pro forma balance sheet and profit and loss account within two months from the end of the half-year.

(g) Stock statements will be continued to be submitted but they will be improved. The basis of valuation in the stock statements and the balance sheet should be uniform. The stock should be reconciled in the stock statements, showing the opening and closing stock, quantitywise and valuewise.

(h) Stock inspection poses problems especially in large industries. In such cases, there is no alternative to depending on financial follow up. Where a banker feels that detailed stock verification is called for a regular stock audit may have to be arranged with the assistance of outside consultants.

Table 10.3: Worked out Solution of Different Methods

Current Liabilities	₹	Current Assets	₹
Creditors for purchases	100	Raw materials	200
Other current liabilities	50	Stock-in-process	20
	150		
Bank borrowings, including bills discounted with bankers	**200**	Finished goods	90
		Receivables, including bills discounted with bankers	50
		Other current assets	10
	350		**370**

Table 10.4: Table Showing Maximum Borrowings Permissible under Different Methods of Tandon Committee Norms

1st method	₹	2nd Method	₹	3rd Method	₹
Total current assets	370	Total current assets	370	Total current assets	370
Less: current liabilities other than bank borrowings	150	25% of above from long-term sources	92	Less: Core current assets (illustrative figure) from long term sources	95
Working capital	220		278		275
		Less: Current liabilities other than bank borrowings	150	Real current assets 25% of above from long term sources	69
		Maximum bank borrowings permissible	128		206

Contd...

Notes

25% of above from long term sources	55			Less: Current liabilities other than bank borrowings	150
Maximum bank borrowings permissible	165			Maximum bank borrowings permissible	56
Excess borrowings (200 – 165)	35	Excess borrowings (200 – 128)	72	Excess borrowings (200 – 56)	144
Current ratio $\frac{370}{315}$	1.17:1	Current ratio $\frac{370}{278}$	1.33:1	Current ratio $\frac{370}{206}$	1.79:1

The amount of maximum permissible bank finance as per the recommendations of Tandon Committee, based on three methods is calculated as follows with the help of another example.

Example: Following is the balance sheet of XYZ Ltd. Calculate the amount of maximum permissible bank finance by all the three methods for working capital as per Tandon Committee norms. You are required to assume the level of core current assets to be ₹ 30 lakhs.

You are also required to calculate the current ratios under each method and compare the same with the current ratios as recommended by the Committee, assuming that the bank has granted MPBF.

Balance Sheet of XYZ Ltd.

As on 31st March 2000

(₹In lakhs)

Liabilities	₹	Assets		₹
Equity shares Rs. 10 each	200	Fixed assets		500
Retained earnings	200	**Current assets**		
11% debentures	300	Inventory:		
Public deposits	100	Raw materials	100	
Trade creditors	80	W.I.P.	150	
Bills payable	100	Finished goods	**75** 225	
		Debtors	100	
		Cash / Bank	55	480
	980			**980**

Solution:

1. The amount of maximum permissible bank finance (MPBF) by the different methods of Tandon Committee norms can be calculated as follows:

1st Method = 75% (current assets – current liabilities)

= 75% (₹ 480 – ₹ 180) lakhs

= 75% (₹ 300) lakhs

= ₹ 225 lakhs

2nd Method = 75% of current assets – current liabilities

Notes

= 75% of ₹ 480 – ₹ 180 lakhs

= ₹ 360 lakhs – ₹ 180 lakhs

= ₹ 180 lakhs

3rd Method = 75% (current assets – core current assets) – current liabilities

= 75% (₹ 480 lakhs – 30 lakhs) – ₹ 180 lakhs

= 75% (₹ 450 lakhs) – ₹ 180 lakhs

= ₹ 337.5 lakhs – ₹ 180 lakhs

= ₹ 157.5 lakhs

2. Calculation of current Ratios after MPBF limits from the bank under the different methods:

$$\text{1st Method} = \frac{\text{Current Assets}}{\text{Current Liabilities including cash credit limits}}$$

$$= \frac{₹\ 705\ (₹\ 480 + ₹\ 225)\ \text{lakhs}}{₹\ 405\ (₹\ 180 + ₹\ 225)}$$

= 1.74: 1

$$\text{2nd Method} = \frac{₹\ 660\ (₹\ 480 + ₹\ 180)\ \text{lakhs}}{₹\ 360\ (₹\ 180 + ₹\ 180)}$$

= 1.83: 1

$$\text{3rd Method} = \frac{₹\ 637.5\ (₹\ 480 + ₹\ 157.5)\ \text{lakhs}}{₹\ 337.5\ (₹\ 180 + ₹\ 157.5)}$$

= 1.89: 1

Comment: In all the three instances, the position of current ratio is, therefore, satisfactory and more than the minimum limits as prescribed by the Committee.

10.7.3 Recent Changes in Maximum Permissible Bank Finance (MPBF)

Banks have always been important providers of funds in Indian scenario. Two important changes in credit policy have been effected in beginning of 1997.

First, the RBI scrapped the concept of MPBF and the Indian Banks' Association (IBA) group proposed a new system. The MPBF was scrapped in order to facilitate need-based working capital without sticking to age-old policies, which might have outlived their utility. The salient features of new system are:

- For borrowers with requirements of up to ₹ 25 lakhs, credit limits will be computed after detailed discussions with borrower, without going into detailed evaluation.
- For borrowers with requirements above ₹ 25 lakhs, but up to ₹ 5 crores, credit limit can be offered up to 20% of the projected gross sales of the borrower.
- For large borrowers not selling in the above categories, the cash budget system may be used to identify the working capital needs.

Notes

However, RBI permits banks to follow Tandon/Chore Committee guidelines and retain MPBF concept with necessary modifications.

The cash budget approach has been widely criticized for its shortcoming like:

It does not disclose the extent of changes in various current assets or current liabilities of profit. It does not keep track the movement of assets and liabilities. Secondly, earlier the RBI has prescribed overturn arrangements for financing working capital beyond ₹ 50 crores. Now it is not essential to have consortium arrangements. However, banks may lend from consortium so as to spread the risks.

Task Why does an increase in the ratio of current to total assets decrease both profits and risk as measured by net working capital?

Self Assessment

Fill in the blanks:

13. The Dehejia Committee suggested that the banks should make an appraisal of credit applications with reference to the ……...financial situations of the client.
14. The …….had appointed various committees to ensure equitable distribution of bank resources to various sectors of economy.
15. The ……..was scrapped in order to facilitate need-based working capital without sticking to age-old policies

Case Study

Case: Management

Mr. Bhatt is a young man of bright ideas. Although he is employed as an engineer in one of the large engineering concerns in Lahore (Pakistan), he spends all his spare time developing new products in his private laboratory at home. Currently, he has commercially provided a domestic appliance called Lavex, which would be a great convenience kitchen to help housewives. He is not interest in manufacturing and selling his new products; his only interest in developing new products is to make money by way of selling patent rights to some established concerns. However, he releases that till he succeeds in selling the patent rights at the price he expects, he has to manufacture and sell the new products on ad hoc basis so as to demonstrate the commercial superiority of his products and thereby, to induce the parties to buy the patents from him. With this objective, he is currently thinking of manufacturing and selling 'Lavex'. He will not give up his full-time job; he will supervise and guide 'Lavex' production and sales during his spare time.

Bhatt has already spent ₹ 30,000 in developing the product. He proposes to buy the component from other parties and keep the production activity to a minimum. The minimum equipment required would cost ₹ 11,000. He would need to rent a small place for ₹ 1,200 per month for production. He proposes to use his residence as office for sales activity.

Contd...

Notes

Bhatt proposes to introduce the product in Chennai city only. His sales projections are as follows:

January	60
February	40
March	110
April	140
May	220
June	180

He is not interested in pushing sales beyond 220 units per month as he cannot cope with the production. He has budgeted ₹ 20,000 for sales promotion, which will be spent mostly for demonstration in leading department stores in the city. The promotion budget is scheduled as follows :

	₹
January	7,000
February	7,000
March	3,000
April	3,000

This selling price per units will be ₹ 280 and the dealers will be given 15 percent trade discount. He calculates that about 50 unit will be needed for "demonstration and display" in the leading sores at his cost. Although the sales to dealers will be made on one month's credit, he knows that the actual collections will be realized in about 4 weeks time. He rules out cash sales.

Assembling is one of the activity in the production process. Components and materials, which will be purchased from outside parties strictly on 30 days credit will cost ₹ 160 per unit. Wages per month will be ₹ 6000. The production capacity per month will be 220 units. Wages will be paid weekly. Overhead expenses are estimated at₹ 2800 per month. Materials and components need to be ordered at least one month in advance. There will be inventory of finished goods or goods in process as the production will be strictly against firm orders. Bhatt proposes to employ a full-time production, sales supervisor for ₹ 880 per month.

Mr. Bhatt wants to know how much finance will be needed for his first six months of operation and when, so that he may plan accordingly.

Questions

1. Discuss the nature of the financial problem involved.
2. Prepare the monthly cash budget for the first six months period of the proposed venture.
3. How can the above-mentioned problem be sorted out?

10.8 Summary

- Working capital refers to the funds invested in current assets i.e., investment in sundry debtors, cash and other current assets.
- The total of investments in all current assets is known as gross working capital.

Notes

- Net working capital refers to the excess of total current assets over total current liabilities.
- The important factors Affecting Working Capital are General Nature of Business, Production Policy, Credit Policy, Inventory Policy, Abnormal Factors and Market Conditions.
- An optimum working capital ratio is dependent upon the business situation as such and the nature and composition of various current assets.
- The methods used for in Forecasting Working Capital Needs are: Current assets holding period, Ratio of sales and Ratio of fixed investment
- Two important issues in formulating the working capital policy are: What should be the ratio of current assets to sales and what should be the ratio of short term financing to long-term financing?
- The different short-term sources available for working capital are *Bank credit*, *Transaction credit,* etc.
- long-term sources of working capital finance are Retained earnings, debentures/bonds of different types, loans from financial institutions, venture capital financing etc.
- Banks have always been important providers of funds in Indian scenario.

10.9 Keywords

Gross Working Capital: The total current assets are termed as the gross working capital.

Net Working Capital: The excess of current assets over current liabilities represents net working capital.

Permanent Working Capital: It is the minimum investment kept in the form of inventory of raw materials, work in progress, finished goods, stores and spares, and book debts to facilitate uninterrupted operation in a firm.

Temporary Working Capital: Any additional working capital apart from permanent working capital required to support the changing production and sales activities is referred to as temporary working capital.

Working Capital: It refers to short-term funds to meet operating expenses.

10.10 Review Questions

1. Why do we distinguish between permanent and variable working capital?
2. Why is the volume of sales the most important factor affecting working capital? Besides sales, what other factors affect working capital? Why?
3. What two processes are accomplished in the management of working capital?
4. Why should the manager know the percentage of funds in current accounts?
5. What are the two kinds of fluctuations in working capital levels? How should they be viewed?
6. What technique is used for identifying relationship between working capital levels and other variables such as sales level? What does this technique do?
7. At least three sets of guidelines for the sources of working capital are available. How are the three similar? How are they different?

Notes

8. Explain the rationale of the Tandon Committees' recommendations. Describe the important features of the Tandon Committee recommendation.
9. "Expenses reduce working capital, whereas charging of depreciation does not". Do you agree?
10. Can a company show a net loss in its profit and loss account and an increase in the working capital?

Answers: Self Assessment

1. gross	2. indirect.	3. under-capitalized
4. Over-capitalization	5. liquidity	6. less
7. operating cycle	8. Shorter	9. conservative
10. safety	11. Trade credit	12. Cash credit
13. total	14. Reserve Bank of India	15. MPBF

10.11 Further Readings

Books

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Van Horne, J.C. and Wachowicz, Jr, J.M., *Fundamentals of Financial Management*, New Delhi, Prentice Hall of India Pvt. Ltd., 1996, p. 2.

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Unit 11: Inventory Management

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Objectives

After studying this unit, you will be able to:

- Recognize the meaning of inventory
- Describe the role of inventory in working capital

Notes

- Explain the various techniques of inventory management
- Discuss the valuation of materials and inventories

Introduction

The term 'inventory' refers to the stockpile of the product a firm is offering for sale and the components that make up the product. In other words, inventory is composed of assets that will be sold in the future in the normal course of business operations. The assets which firms store as inventory in anticipation of needs are: (1) raw materials (2) work in process (semi-finished goods) and (3) finished goods. The raw material inventories certain items that are purchased by the firm from others and are converted into finished product through manufacturing (production) process. They are an important impact of the final product. The work in progress is normally, partially or semi-finished goods, at the various stages of production in a multi-stage production process. Finished goods represent final or completed products, which are available for sale. The inventory of such goods consists of items that have been produced but are yet to be sold.

Inventory, as a current asset, differs from other current assets because it is not finance managers who alone are involved here. Rather, all the functional areas in finance, marketing, production and purchasing are involved.

11.1 The Role of Inventory in Working Capital

Inventories are components of the firm's working capital and as such represent current asset. Some characteristics that are important in the broad context of working capital management include:

1. ***Current asset:*** It is assumed that inventories will be converted into cash in the current accounting cycle, which is usually one year. There are exceptions to this, e.g., wine may be kept in casks or bottles for many years for the proper formation of the product. A manufacturer of fine pianos may have a production process that exceeds one year.

2. ***Level of liquidity:*** Inventories are considered as a source of near cash for more of the products. Some firms at some time may hold some slow moving items that may not be sold for a long time. With chronic slowdown or changes in the markets for goods the prospects for sale of entire product lines may be diminished. In these cases, the liquidity aspects of the inventories become important to the manager of working capital. Firms must keep a reasonable margin for uncertain operating environments, the analysis must discount the liquidity value of the inventories significantly.

3. ***Liquidity lag:*** Inventories are tied to the firm's pool of working capital through three specific lags, namely:

   (a) *Creation lag:* In majority of cases, inventories are purchased on credit, creating an account payable, when the raw materials are processed in the factory, cash is paid for production expenses for the requirement during the period, labour is paid on pay day, utility bill for electricity is paid after the bill is submitted, Or

   for goods purchased for resale, the firm may have 30 or more days to hold the goods before payment is due.

   (b) *Storage lag:* Once goods are available for sale, they will not be immediately converted into cash by sealing even when sales are moving fast, the firm will hold inventory as a back up. Thus the firm will usually pay suppliers, workers, utility and other overhead expenses before the goods are actually sold. This lag represents a cost to the firm.

Notes

(c) *Sale lag:* Once goods have been sold, they normally do not create cash immediately. Most sales occur in credit and accounts receivable is created. The firm has to wait to collect receivables. This lag also represents a cost to the firm.

4. ***Circulating activity:*** Inventories get rotated with other current assets. They get converted into cash and then invested again in inventory to continue the operating cycle.

11.1.1 The Purpose of Inventories

The specific benefit that accrue from holding inventories can be identified as follows:

1. ***Avoiding lost sales:*** In most cases, a firm must be prepared to deliver goods on demand without goods on hand which are ready to be sold, most firms would lose business. Shelf stock refers to items that are stored by the firm and sold with little or no modifications to custome ₹ An automobile is an item of shelf stock even though customers may specify minor variations, the basic item leaves a factory and is sold as a standard item. The same situation exists for many items of heavy machinery, consumer products and high industrial goods.

2. ***Getting quantity discounts:*** Due to bulk purchases many suppliers will reduce the price of suppliers and component parts or may offer discounts.

3. ***Reducing orders costs:*** By reducing the number of orders, the administration costs for raising purchase orders, acceptance and inspection note gets reduced.

4. ***Achieving efficient production runs:*** Frequent setups produce high start up costs, longer runs involve lower costs.

   Inventories provide a 'buffer' between purchasing, producing and marketing goods. Raw materials and other inventory items can be purchased at appropriate times and in proper amounts to take advantage of economic conditions and price incentives. The manufacturing process can occur in sufficiently long production runs and with pre-planned schedules to achieve efficiency and economies.

5. ***Reducing risk of production shortages:*** Manufacturing from produced goods with hundred or even thousands of components. One of them, however, small it may be, is to be in stock if the production is to be continued for a longer spell.

6. In-process inventory provides flexibility in production scheduling so that an efficient schedule and high utilization of capacity may be attained within in process inventory; a bottleneck at any stage in the production process renders idle the machines and facilities at subsequent stages.

7. Finished goods inventory enables a firm to double its production programme and marketing activities so that desirable results can be achieved on both the fronts. If finished goods inventory is available, the marketing department can meet the needs of customer promptly, irrespective of the quantity and composition of goods flowing out of the production time currently.

11.1.2 Types of Inventory

Four types of inventories may be identified:

1. ***Raw material inventory:*** This consists of basic materials that have not been committed to production in a manufacturing firm. Raw materials that are purchased from time-to-time

Notes

to be used in the firm's production operation range from iron ore awaiting processing into steel to electronic components to be incorporated into stereo amplifiers. The purpose of maintaining raw material inventory is that material is taken up for production immediately so as to avoid delays in shipment of raw materials and thereby avoid production delays.

2. ***Stores and spares:*** These are materials/accessories which are incidental to the consumption of Indian products and can be purchased at bulk quantity.

   Example: bolts, nuts, clamps, screws, etc.,

   These spare parts are usually bought from outside or sometimes they are manufactured within the company too. This category also includes those products, which are produced in addition of the main products for the purpose of sale.

3. ***Work-in-process inventory:*** This category includes these materials that have been committed to the production process but have not been completed. The more complex and lengthy the production process, the larger will be the investment in work-in-process inventory.

4. ***Finished goods inventory:*** These are completed products awaiting sale. The purpose of a finished goods inventory is to couple the products and sales functions so that it no longer is necessary to produce the goods before a sale can occur.

The Nature of Inventory Planning and Control

Inventory must be sold in order to generate revenue. In a manufacturing firm, raw materials must first be converted into finished goods before products can be sold. Money invested in inventory cannot be invested in other earning as sets such as production or sales facilities. Therefore, it is necessary to ensure that excessive amounts of resources are not invested in inventories.

The purpose of inventory management is to minimize the cost of inventory without impairing the efficient flow of production and sales activities. Inventory decisions are affected by the cost of ordering inventory and the cost of carrying inventory as well as by the costs of not having enough inventories in hand. Below are common types of inventory costs that are not incurred in relation to the actual cost of the inventory itself:

Inventory ordering costs: Inventory ordering costs include:

- Cost of acquiring recent price quotations
- Costs of preparing and approving a purchase order
- Cost of receiving shipments and checking against purchase orders
- Cost of recording to purchase and moving the new inventory into storage.

Inventory carrying costs: Included under this category are:

- Cost of money invested in inventory
- Heat, length, power and depreciation costs for inventory storage facilities.
- Inventory handling costs
- Inventory insurance costs
- Cost of taxes in inventory
- Costs of spoilage, obsolescence and deterioration.

Notes

Inventory storage costs: The following are included in these costs:

- Cost of lost sales
- Cost of inefficient production runs
- Cost of substituting more expensive raw materials
- Penalty costs for late completion of contracts.

Inventory ordering costs and inventory carrying costs are used to compute the optimum size inventory. Inventory shortage costs are included in determining the optimum re-order point for inventory items.

Re-order point: The economic order quantity provides a manager with information about the optimum order size for a particular item of inventory but it does not provide information about when the order should be placed. The re-order point is the inventory level of which the order is placed. If a firm has the ability to buy and receive inventory items instantly, a new order is placed when there are no more units on hand.

Unfortunately, few firms are able to get instant deliveries. Sometime is required between placing an order and receipt of the goods. This time period is called lead-time. If the lead-time is known and daily demand is known, the reorder point is easy to find.

Example: SWT Company has a lead-time of 8 days for tyre orders. The daily demand is 50 tyres. The lead-time demand or demand during lead-time is 8 × 50 = 400 tyres. If the company plans to receive a new tyre shipment just as the inventory reaches zero, it should place an order when the inventory level reaches 400 tyres. A new order is placed at an inventory level of 400 tyres, 8 days before inventory reaches zero.

11.1.3 Inventory under Uncertainty and Safety Stock

The use of lead-time and lead-time demand in the analysis of reorder point assumes a known constant demand and lead-time often one or both of these fluctuate and are not known. Demand in particular is difficult to predict, because it can change from day-to-day. Delivery of inventory is affected by the suppliers inventory levels and operating efficiency, as well as, by variations in delivery schedules of common carriers.

When lead-time or demand is uncertain, the analysis of the inventory reorder point is complicated. There may be a situation of possibility of remaining out of inventory, which is known as stockout. Running out of stock involves cost by way of lost profit in potential sales, customers ill will, or the loss of the customer altogether. Raw materials inventory stockouts may cause expensive start up costs, production inefficiencies, a switch to more expensive raw materials or penalty costs for late delivery of contracted goods. Often, it is difficult to estimate stockout costs.

In order to avoid stockout costs, firms sometimes carry a safety stock, which is additional inventory above what is needed. Safe stock is a cushion that the management uses to avoid on interruption of normal activities due to stockouts.

The optimum inventory strategy is to increase safety stock as long as cost of carrying the additional inventory is less than the expected cost of stockouts. The expected stockout cost is the cost of the stock out multiplied by its probability of occurring.

Example: gross margin is ₹ 35 per unit. Expected demand of 50 units per day means that a 1-day stock-out results in a stock out cost of ₹ 35 × 50 or ₹ 1,750. Management estimates that with the safety stock, there is a 30 per cent chance of stock out. The expected cost of a stockout is:

$$\text{Expected stockout} = \text{stock out cost} \times \text{probability of stockout}$$

$$= ₹\,1750 \times 0.30 = ₹\,525$$

Notes

The optimum strategy is to carry enough safety stocks that the cost of carrying the safety stock equals the expected cost of a stock out with a carrying cost of ₹ 12 per unit; the optimum safety stock is (525/12) i.e., 44 tyres. With a 30 per cent chance of a stockout, the arbitrary 100-unit safety stock is excessively sophisticated-Statistical models may be developed to address the issue of optimum safety stocks and reorder points.

Self Assessment

Fill in the blanks:

1. Inventory ordering costs and inventory carrying costs are used to compute the …… inventory.
2. Inventories are tied to the firm's pool of working capital through three specific lags, namely Creation lag Storage lag and ……..
3. In order to avoid stockout costs, firms sometimes carry a……., which is additional inventory above what is needed.

11.2 Inventory Management

The main objective of inventory management is to achieve maximum efficiency in production and sales with the minimum investment in inventory.

Inventory consists of stock of materials, components, work-in-progress, finished products and stores and spares. The techniques commonly used for inventory management are as follows:

1. Setting of various stock levels
2. ABC analysis
3. Establishment of system of budgets
4. Use of perpetual inventory records and continuous stock verification
5. Determination of economic order quantity
6. Review of slow and non-moving items
7. Use of control ratios
8. Just-in-time (JIT) System
9. Material Requirement Planning (MRP) system

Self Assessment

Fill in the blanks:

4. Inventory consists of stock of materials, components, work-in-progress, finished products and……...
5. The objective of inventory management is to achieve maximum efficiency in production and sales with the ……investment in inventory

11.3 Various Techniques of Inventory Management

11.3.1 Setting of Various Stock Levels

Minimum Level

It indicates the lowest figure of inventory balance which must be maintained in hand at all times, so that there is no stoppage of production due to non-availability of inventory.

Notes

Main consideration for fixation of minimum level of inventory:

1. Information about maximum consumption and maximum delivery period in respect of each item to determine its reorder level.
2. Average rate of consumption for each inventory item.
3. Average delivery period for each item. Average delivery period = ½ (maximum period + minimum period)

Formula:

Minimum level of inventory = Re-order level – (Average rate of consumption × Average time of inventory delivery)

Maximum level = It indicates figure of inventory quantity held in stock at any time.

The following are the considerations that govern the fixation of maximum level for various inventory items:

1. It's reorder level. The reorder itself depends on the maximum rate of consumption and maximum delivery period.
2. The knowledge about minimum consumption and minimum delivery period for each inventory item.
3. The figure of economic order quantity.
4. The availability of funds, storage space, nature of item and their price per unit are also important.
5. For imported material since of their irregular supply, the maximum level should be high.

Formula used for calculation of maximum level of inventory

= Reorder level × Reorder quantity – (Minimum Consumption × Minimum reorder period)

Reorder level

This level is between minimum and maximum levels, such that before the material ordered is received into stores, there is sufficient quantity on hand to cover with normal and abnormal consumption situations. It is the level at what order for replenishment of stock should be placed.

The formula used for its calculation is as follows:

Reorder level = Maximum reorder period × Maximum Usage (or)

= Minimum level + (Avg. rate of consumption × Avg. time to obtain fresh supplies)

Now, Avg. inventory level = Maximum level + ½ Reorder quantity

OR $= \dfrac{\text{Maximum level + Minimum level}}{2}$

Did u know? **What is Danger Level?**

It is the level at which normal issues of raw material inventory are stopped and emergency issues are only made.

Notes

Danger Level = Avg. Consumption × Lead time for emergency Purchases

Example: Two components, A and B, are used as follows:

Normal usage	100 units/week
Maximum usage	150 units/week
Minimum usage	50 units/week
Reorder quantity	A 600, B 1000
Reorder period	A 4 to 6 weeks
	B 2 to 4 weeks

Calculate for cash component:

1. Reorder level
2. Minimum level
3. Maximum level
4. Average Stock level

Solution:

1. Reorder level = Maximum usage/week × Maximum delivery period

Reorder level for A = 150 units × 6 = 900 units

Reorder level for B = 150 units × 4 = 600 units

2. Minimum level = Reorder level – (Normal usage × Avg. period)

Minimum level for A = 900 units – 50 units × $\frac{(4+6)}{2}$

= 900 units – 250 units = 650 units

Minimum level for B = 600 units – 50 units × $\frac{(2+4)}{2}$ = 450 units

3. Maximum level

= Reorder level + Reorder Qty – (Min. consumption × Min. reorder period)

Maximum level for A = (900+600) – (50 units × 4 weeks)

= 1500 – 200 = 1300 units

Maximum level for B = (600+1000) – (50units × 2) = 1500 units

4. Average stock level = ½ (minimum + maximum stock level) Average stock for component A = ½ (650 + 1300) = 975

Average stock for component

B = ½ (450 + 1500) = 975

11.3.2 ABC Analysis (called Always Better Control)

It is a system of inventory control where discriminating control is exercised over different items of stores classified on the basis of investment involved. Usually, the items are divided into three

Notes

categories according to their importance, namely their value and frequency of replenishment during a period.

1. 'A' category of items consists of only a small percentage i.e., about 10% of the total items handled by the stores but require heavy investment (in rupee value) about 70% of the total inventory value.
2. 'B' category of items (relatively less important) constitutes 20% of the total items handled by stores, having an investment (in rupee value) of about 20% of the total inventory value.
3. 'C' category consists of large number of items handled by stores say 70%, having relatively small investment say 10% of the total inventory value.

'A' category of items is controlled effectively by using a regular system, which ensures neither over-stocking nor shortage of materials for production. The stocks of materials are controlled by fixing certain levels like maximum level, minimum level and reorder level. Reduction in inventory management costs is achieved by determining economic order quantity. To avoid shortage and to minimize heavy investment in inventories, the techniques of value analyses, variety reduction, standardization etc., are used.

In case of 'B' category of items, less degree of control as applicable to 'A' category items are warranted. The orders for the items, belonging to this category, may be placed after reviewing the situation periodically.

For 'C' category of items, there is no need of exercising constant control. Orders for these items are placed either at 6 months interval or yearly interval, depending on the consumption pattern. In this case, the objective is to economize an ordering and handling costs.

Example:

Category	Cost Range (₹)	Total No. of Items	Total Cost (₹)
C	1-500	12,000	10,00,000
B	501-2000	2,000	15,00,000
A	2001 – 100,000	1,000	100,00,000
		15,000	125,00,000

Percentage of total items and costs

Category	% of total Items	Cumulative % of Total Items	Percentage of Total Cost	Cumulative % of the Total Cost
A	7	7	80	80
B	13	20	12	92
C	80	100	8	100

11.4 Establishment of System of Budget

To control investment in inventories, it is necessary to know in advance about the inventories requirements during a specific period, usually a year. The exact quantity of various types of inventories and the time when they would be required can be known by studying carefully production plans and production schedules. Based on this, inventories requirement budget can be prepared. Such a budget will discourage the unnecessary investment in inventories.

Notes

11.4.1 Use of Perpetual Inventory Records and Continuous Stock Verification

Perpetual inventory represents a system of records maintained by the stores department. It comprises Bin Cards and Stores Ledger.

Bin cards maintain quantitative records of receipts, issues and closing balances of each item of stores. Separate bin cards are maintained for each item. Each card is filled up with the physical movement of goods i.e., on its receipt and issue.

Like bin cards, the stores ledger is maintained to record all receipts and issue transaction in respect of materials. It is filled up with the help of goods received note and material issue requisitions.

A perpetual inventory is usually checked by a programme of continuous stock taking. Continuous stocktaking means the physical checking of these records (which are maintained under perpetual inventory) with actual stock. Perpetual inventory is essential for material control. It helps continuous stocktaking.

Stock verification may be periodical or continuous. Annual stock taking has certain inherent shortcomings e.g., all the items have to be covered in a given number of days, either the production dept. has to be shut down during these days to enable thorough checking of stock, or else the verification has to be of limited character. On the other hand, the system of continuous stocktaking consists of counting and verifying the number of items daily throughout the year, so that during the year all the items of stores are covered three or four time. The stock verifiers are independent of stores and stores staff has no knowledge as to the particular items that are being checked on a particular date.

11.4.2 Determining Economic Order Quantity

Economic Order Quantity (EOQ) is the order size for some particular inventory item that results in lowest total inventory cost for the period. Total inventory cost consists of inventory ordering cost and investment carrying cost. An EOQ may be computed for each inventory item.

EOQ assumes that the relevant costs of inventory can be divided into order costs and carrying costs (the model excludes the actual cost of the inventory). Each of them has certain key components and characteristics. Order costs include the fixed costs of placing and receiving orders, the cost of writing, a purchase order, of processing the resulting paper work, and of receiving an order and checking it against the invoice. Order costs are stated in rupees per order. Carrying costs are the variable costs per unit of holding an item of inventory for a specific period of time. Carrying costs including storage costs, insurance costs, the cost of deterioration and obsolescence, and the opportunity or financial costs of having funds invested in inventory these costs are stated in Rupees per unit per period.

Order costs decrease as the size of the order increases. Carrying costs, however, increase with increases in order size. The EOQ model analyzes the trade-off between order costs and carrying costs to determine the order quantity that minimizes the total inventory cost.

Several methods for finding EOQ are available. One is trial and error, which requires computing the total inventory cost at various order sizes. Eventually, the EOQ can be found or closely approximated by repeating the computation enough time. Another approach is to graph the cost. Although both methods can be used, the first is time-consuming and the second lacks precision.

Notes

A third approach is to calculate the optimum order size mathematically using a method called the Economic Order Quantity (EOQ) model, which yields the optimum order quantity with a single set of calculations. The model is:

$$EOQ = \sqrt{\frac{2AS}{C}}$$

Where, A = Annual usage units

S = Ordering cost per order

C = Inventory carrying cost per unit per annum

Notes The EOQ model rests on the several important assumptions:

1. There is a known constant demand.
2. Ordering costs are known and remain constant.
3. Carrying costs are known and remain constant.
4. Production and inventory capacity is unlimited.

Example: SWT Company, which is open Monday through Friday except for a 2-week vacation period and 10 holidays. The firm operates a total of 240 business days a year. Below is given the demand and cost data for its most expensive steel belted radial tyre.

Avg. daily demand	50;	Selling price	₹ 95/tyre
Cost	₹ 60/tyre;	Ordering cost	₹ 500/order
Carrying cost	20 per cent of unit cost		

A = 50 tyres a day × 240 business days = 12000

S = Cost of ordering is ₹ 500 per order,

C = 20% × ₹ 60 i.e., ₹ 12 per unit

$$\text{Hence EOQ} = \sqrt{\frac{2 \times 1200 \times 500}{60 \times 0.2}}$$

$$\sqrt{1000,000} = 1000 \text{ tyres}$$

Hence, Economic Ordering Size is 1000 tyres

$$\text{Number of order } \frac{A}{EOQ} = \frac{12000 \text{ units}}{1000 \text{ units/order}} = 12 \text{ orders}$$

$$\text{Ordering Cost} = \frac{A}{EOQ} \times S = \frac{12000 \times 500 \text{ per oder}}{1000 \text{ units per order}} = ₹\ 6000$$

Carrying cost is function of average amount of inventory on hand multiplied by the carrying cost rate. The average inventory on hand is the order size divided by 2.

$$\text{Average inventory} = \frac{EOQ}{2} = \frac{1000 \text{ units}}{2} = 500 \text{ units}$$

Notes

$$\text{Carrying Cost} = \frac{EOQ}{2} \times C = \frac{1000}{2} \times 60 \times 0.2 = ₹\ 6000$$

At the EOQ, the cost of ordering for the period (₹ 6000) equals the carrying cost for the period (₹ 6000).

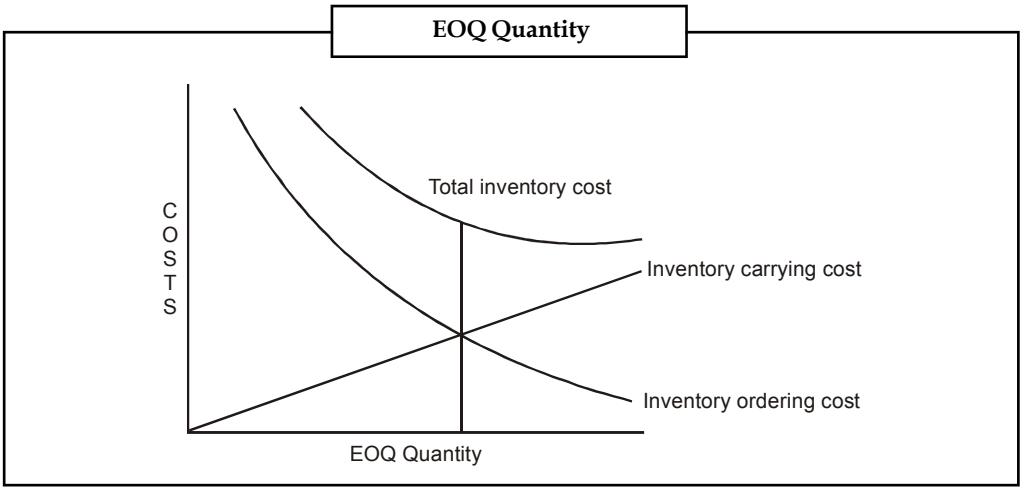
Statement showing total inventory cost at different order size is given below:

SWT Company

Schedule of Inventory Costs at Various Order Sizes

Order Size	400	600	800	1000	1200	1400	1600
Avg Inventory Size	200	300	400	500	600	700	800
No. of Inventory Orders	30	20	15	12	10	8.6	7.5
Ordering Cost	₹ 15000	₹ 10000	₹ 7500	₹ 6000	₹ 5000	₹ 4300	₹ 3750
Carrying Cost	2400	3600	4800	6000	7200	8400	9600
Total Inventory Cost	17400	13600	12300	12000	12200	12700	13350

The above statement also shows that total inventory cost is least at order size of 1000. Any order sizes other than EOQ level yields a higher total inventory cost.



The above diagram gives the inventory ordering and carrying cost. As the order size is increased the inventory order cost decreases and the total inventory carrying cost increases. Minimum total is reached at the order size for which ordering costs equal carrying cost i.e., the intersection of inventory ordering cost curve and inventory carrying cost curve.

11.4.3 Review of Stores and Non-moving Items

Sometimes, due to high value of slow moving and non-moving raw materials it appears that the concern has blocked huge sum of money unnecessarily in raw materials. To overcome this problem, it is necessary to dispose off as easily as possible, the non-moving items, till the existing stock is exhausted. Computation of inventory turnover ratio may help in identifying slow moving items.

Notes

11.4.4 Use of Control Ratios

1. ***Input-output ratio:*** Inventory control can also be exercised by the use of input-output ratio. Input Output ratio is the ratio of the quantity of input of material to production and the standard material content of the actual output. This ratio enables comparison of actual consumption and standard consumption, thus indicating the usage of material is favourable or adverse.

2. ***Inventory Turnover ratio:*** It is computed as follows:

$$\text{Inventory turnover ratio} = \frac{\text{Cost of materials consumed during the period}}{\text{Cost of average stock held during the period}}$$

$$\text{Average Stock} = \tfrac{1}{2}\,(\text{Opening Stock} + \text{Closing Stock})$$

Computation of turnover ratios for different items of materials and comparison of the turnover ratio provides a useful guidance for measuring inventory performance. Therefore, it is possible to know which is fast moving and which is slow moving. On this basis, attempt should be made to reduce the amount of capital locked up and prevent over-stocking of the slow moving items.

11.4.5 Just-in-Time (JIT) System

The Just-in-Time (JIT) system is used to minimize inventory investment. The philosophy is that materials should arrive exactly the time they are needed for production. Ideally the firm should have work-in-process inventory. Because its objective is to minimize inventory investment, a JIT system uses no (or little) safety stock. Close coordination among the firm's employees, its suppliers and transporters must exist to ensure that material inputs arrive on time. Failure of the materials to arrive on time results in a shutdown of the production line until the material arrives. Further, JIT system should ensure quality parts from the suppliers to ensure uninterrupted production.

11.4.6 Material Requirement Planning (MRP) system

Many companies used a Material Requirement Planning (MRP) system to determine what materials to order and when to order. MRP applies EOQ concepts to determine how much to order. By means of a computer, it stimulates each products bill of materials, inventory status and manufacturing process. The bill of materials is simply a list of all the parts and materials that go into making the finished product. For a given production plan, the computer stimulates materials requirements by comparing production needs to available inventory balances. On the basis of the time it takes for a product that is in process to move through the various production stages and the lead time required to get materials, the MRP system determines when orders should be placed for the various item on the bill of materials.

The advantage of an MRP system is that it forces the firm to consider its inventory needs more carefully. The objective is to lower the firm's inventory investment without impairing production.

Self Assessment

Fill in the blanks:

6. ……..indicates the lowest figure of inventory balance which must be maintained in hand at all times.

7. ……is the ratio of the quantity of input of material to production and the standard material content of the actual output.

Notes

8. ……assumes that the relevant costs of inventory can be divided into order costs and carrying costs.

9. In ABC Analysis ……category of items consists of only a small percentage of the total items

11.5 Valuation of Material Issues and Inventory

11.5.1 Management Issues

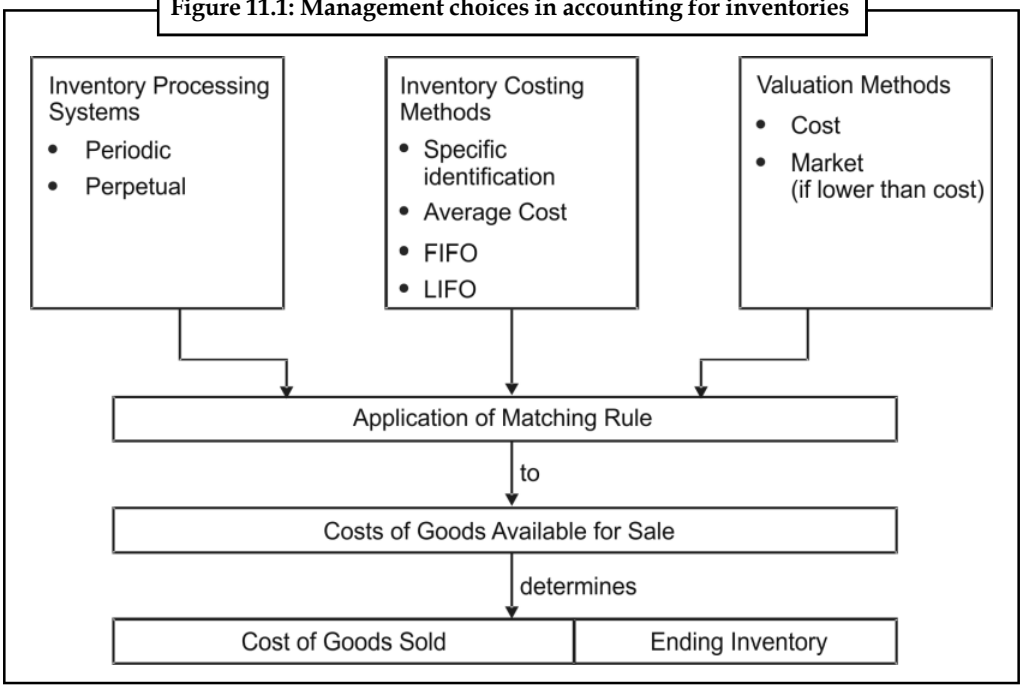
1. ***Concept of current asset:*** Inventory is considered as current asset because it will normally be sold within a year's time or within a company's operating cycle. For example, trading inventory consists of all goods that are owned and held for sale in the regular course of business. In case of manufacturing companies since they are engaged in the actual making of the products, they have three kinds of inventory – raw materials to be used in the production of goods, partially completed products (often called work-in-progress) and finished goods ready for sale.

2. ***Matching of costs and revenues:*** Objective of accounting for inventories is the proper determination of income through the matching of costs and revenues.

3. ***Physical flow of inventories and cost flow of materials:*** Physical flow of inventories has to be differentiated with cost flow of materials.

Physical value of business materials may occur in a variety of ways. Some businesses find it necessary to rotate their stock of inventory so that fresh goods are always available. For example, in a paint store, the oldest cans of paint are placed at the front of the selections so that they will sell first, preventing inventory for spoiling or deterioration with age. The methods used for moving the inventory is first in first out (FIFO), last in, first out (LIFO) system.

Figure 11.1: Management choices in accounting for inventories



Inventory cost flows affect the value of end inventories and the amount charged to cost of goods sold. Consequently, both the balance sheet and the income statement are affected directly by

Notes

inventory cost flows. The valuation inventory cost flows is more relevant, rather than physical flow of inventory. A number of costing alternatives are used. First In, First Out (FIFO) assigns the most recent cost to inventory and the oldest costs to cost of goods sold. Last In First Out (LIFO) assigns the most recent costs to cost of goods sold and oldest costs to inventory. A third alternative is to assign an average cost to inventory and cost of goods sold. The inventory cost flow does not have to follow the physical movement of inventory. Inventory valuation using FIFO, LIFO or average cost should satisfy the matching concept. The management choices in Accounting for Inventories are given in Figure

11.5.2 Valuation of Periodic Inventories

In periodic inventory systems, used primarily by trading organizations, purchases of inventory are recorded in a purchases account rather than directly in the inventory account. When merchandise is sold, the sales revenue is recorded but entry is made in cost of goods sold. Cost of goods sold is computed at the end of the accounting period, when financial statements are prepared.

In a trading organization, the beginning inventory balance and the purchases account balances represent the cost of goods available for sale. In order to calculate the cost of goods sold, a physical count is made of the merchandise remaining on hand. The next step is to value the inventory in hand by assigning to each unit a cost based on some cost flow assumption such as FIFO, LIFO or weighted average. The value of ending inventory is deducted from the cost of goods available for sale to compute cost of goods sold.

Example: In case of B Ltd., the opening balance as on 1st July consist of 18 units costing ₹ 10 each. During July, the company purchased 32 additional units as follows:

July 1	Beginning balance	18 units @ ₹ 10	₹ 180
July 11	Purchases	10 units @ ₹ 10.50	₹ 105
July 25	Purchases	12 units @ ₹ 11	₹ 132
July 30	Purchases	10 units @ ₹ 12	₹ 120
		Total **50 units**	**₹ 537**

During July, the company sold 30 of the 50 units available for sale leaving an end inventory of 20 units. Sales were as follows:

July 3	Sale	8 units
July 17	Sale	5 units
July 28	Sale	17 units
		Total **30 units**

In order to prepare financial statements, B Co. Ltd. must assign value to the 20 units, end of the period inventory and 30 units, which were sold. The value depends on the inventory method used by the company and on the cost flow assumption adopted. First, let us consider *periodic inventories* followed by *perpetual inventory systems*.

FIFO (First In First Out)

As the name suggest, the materials are issued in the order in which they are received in stores. Thus, each issue of material recovers the purchase price, which does not reflect the current market price (if the prices do not remain same). This method is considered suitable in time of falling prices because the material cost charged to production will be high while the replacement

Notes

cost of materials will be low. But in the case of rising prices, if this method is adopted, the charge to production will be low as compared to the replacement cost of materials. Consequently, it would be difficult to purchase the same quantity of materials (as in the current period) in future without having additional capital resources.

In the above illustration, with a beginning inventory of ₹ 180 and total purchases of ₹ 357 during July, total cost of goods available for sale is ₹ 537. The physical inventory shows 20 units remaining on hand. With FIFO valuation we consider 20 units consist of the latest units acquired.

The ending inventory will be as follows:

10 units from July 30 purchases (last purchases) @₹ 12	₹ 120
10 units from July 25 purchases (2nd last purchases) @₹ 11	₹ 110
	₹ 230

Cost of goods sold of ₹ 307 will be computed as follows:

Goods available for sale	₹ 537
Less end inventory	₹ 230
Cost of goods sold	₹ 307

LIFO (Last In, First Out)

Under this method (as the name suggests), the assumption is that the items of the last batch (lot) purchased are the first to be issued. Therefore, under this method, the price of the last batch (lot) is used for pricing the issues, until it is exhausted and so on. If, however, the quantity of the issue is more than the quantity of the latest lot than earlier (lot) and its price will be taken into consideration. For valuation of month end inventory, 20 units are assumed to be the earliest units acquired. It will consist of the balance at the beginning and the part of the 1st units purchased during the month as below:

18 units from the beginning balance @ ₹ 10 units	₹ 180
2 units from July 11 purchases @ ₹ 10.50	₹ 21
	₹ 201

Cost of goods sold is ₹ 336 in this case

Goods available for sale	₹ 537
Less end inventory	₹ 201
Cost of goods sold	₹ 336

Weighted Average

The weighted average cost of the inventory available in July is obtained by dividing the total cost of inventory, including the beginning balance and July purchase, by the total units available for sale.

$$\frac{\text{Cost of goods available for sale}}{\text{No. of units available for sale}} = ₹\ 10.74$$

Cost of ending inventory is ₹ 214.80 calculated as:

$$20 \text{ units} \times ₹\ 10.74 = ₹\ 214.80$$

Notes

Cost of goods sold is ₹ 322.20 calculated as:

30 units × ₹ 10.74 = ₹ 322.20

11.5.3 Valuation of Perpetual Inventories

In a perpetual inventory system, the inventory account contains a current record of all inventory transactions. Such a system is particularly useful in a manufacturing firm, where a current purchase cost data are vital. A perpetual inventory system allows the firm to charge inventory costs to production as soon as inventory is used. Each receipt of raw materials and issue to production (work in-progress) is recorded in the inventory account as the transactions occur. The Inventory account is current, hence the name 'perpetual'.

As in periodic system, purchases in a perpetual system are recorded at their cost. When raw materials inventory is issued to production, its cost is transferred from the raw materials inventory account to work-in-progress account. If the cost of raw materials change over time, some cost flow assumption must be made. Perpetual system may be maintained using specific identification FIFO, LIFO or moving average. The illustration given below, deals with merchandise inventory, but the same principle can be followed for transfer of raw material to WIP, transfer of WIP to finished goods and sale of finished goods.

Notes **Specific Identification**

Special identification requires an ability to follow the physical flow of each inventory item and its cost from acquisition through use or sale. The method is appropriate when each item of inventory can be separately identified and therefore has a cost that applies only to that item. Specific identification is used with unique and costly items such as jewelry, automobiles or custom made products (i.e., products as per customers' specifications).

First In First Out (FIFO)

Inventory cost flow with perpetual FIFO is illustrated as below. The units remaining in inventory are always assumed to be those purchased most recently. After the July 17 sale of five units, the 15 units remaining on hand consist of the most recent 10 units acquired on July 11 and five units from the beginning balance. Similarly, the sale of 17 units on July 28 first exhausts five units from the beginning balance, then 10 units acquired next on July 11, and finally two units purchased most recently on July 25.

If one compares the perpetual FIFO ending inventory balance with the periodic FIFO ending inventory balance, one can observe that two are identical. With FIFO valuation, periodic and perpetual system both produces the same ending inventory cost.

FIFO Perpetual Inventory Record of B Comapny Ltd.

Date	Explanation	Purchases			Sales			Balance	
		Units	Units Cost	Total Cost	Units	Units Cost	Total Cost	Units	Total Cost
July			Rs	Rs		Rs	Rs		Rs
1	Balance	18	10.00	180				18	180
3	Sold 8 units	-	-	-	8	10.00	80	10	100

Contd...

Notes

11	Bought 10 units	10	10.50	105	-	-	-	20	205
17	Sold 5 units	-	-		5	10.00	50	15	155
25	Bought 12 units	12	11.00	132	-	-	-	27	287
28	Sold 17 units	-	-	-	5	10.00	50	-	-
				0	10	10.50	105	-	-
				0	2	11.00	22	10	110
30	Bought 10 units	10	12.00	120	-	-	-	20	230

Caution FIFO cost flow closely approximates the physical flow of many inventory items. In a perpetual system each inflow and outflow of inventory is recorded at the time of transfer.

Last In First Out (FIFO)

With perpetual LIFO, when a sale takes place the cost of latest acquisition is transferred from inventory to cost of goods sold. Perpetual LIFO system is illustrated below:

LIFO Perpetual Inventory Record of B Comapny Ltd.

Date	Explanation	Purchases			Sales			Balance	
		Units	Units Cost	Total Cost	Units	Units Cost	Total Cost	Units	Total Cost
July			(₹)	(₹)		(₹)	(₹)		(₹)
1	Balance	18	10.00	180				18	180
3	Sold 8 units	-	-	-	8	10.00	80	10	100
11	Bought 10 units	10	10.50	105	-	-	-	20	205
17	Sold 5 units	-	-		5	10.5 0	52.50	15	152.50
25	Bought 12 units	12	11.00	132	-	-	-	27	284.60
28	Sold 17 units	-	-	-	12	11.00	132	-	-
				0	5	10.50	52.50	-	-
				0				10	100
30	Bought 10 units	10	12.00	120	-	-	-	20	220

The first sale of 8 units reduces the initial balances to 10 units but subsequent sales all consists of the units purchased more recently. Therefore the sale of 17 units on July 28 consists of the 12 units obtained in July 25 plus 5 units obtained on July 11, of the original 18, 10 units at a cost of ₹ 10 each still remain in inventory at the end of the period.

Notice the difference in ending inventory under the perpetual and periodic inventory system when LIFO valuation is used. The cost of ending inventory with the periodic system the cost is ₹ 201. With the perpetual inventory the cost is ₹ 220 because some of the units on hand are valued at the most recent purchase cost. Perpetual LIFO and periodic LIFO often produce different inventory valuation.

Notes

Did u know? The primary advantage of LIFO is that current costs are matched with current revenues. Consequently LIFO has definite tax advantage during periods of rising prices.

Average Cost/Moving Average

An average cost perpetual inventory system requires computing a new average cost each time additional inventory is purchased. This moving average is a weighted average of the units in hand after each acquisition. This is illustrated below. For example, the average cost of the units in hand after the July 11 purchase included 10 units at ₹ 10 each and 10 units at ₹ 10.50 each. The average cost is ₹ 10.25, calculated by dividing the total cost of ₹ 205 by 20 units.

The units removed from inventory are valued at the average cost at the time of sale or use. With costs increasing over time the moving average cost also increases, but it always lags somewhat behind the current cost of inventory. As usual, the average cost valuation falls somewhere between FIFO and LIFO valuation.

Moving Average Perpetual Inventory Record of B Comapny Ltd.

Date	Particulars	Purchases			Sales			Balance		
		Units	Unit Cost	Total Cost	Units	Unit Cost	Total Cost	Units	Unit Cost	Total Cost
July			₹	₹		₹	₹		₹	₹
1	Balance	18	10.00	180				18	10	180.00
3	Sold 8 units	-	-	-	8	10.00	80.00	10	10	100.00
11	Bought 10 units	10	10.50	105	-	-	-	20	10.25	205.00
17	Sold 5 units	-	-		5	10.25	51.25	15	10.25	153.75
25	Bought 12 units	12	11.00	132	-	-	-	27	10.5833	285.75
28	Sold 17 units	-	-	-	17	10.5833	179.92	10	10.5833	105.83
30	Bought 10 units	10	12.00	120	-	-	-	20	11.2915	225.83

Caution The moving average inventory costs are between FIFO and LIFO cost. In a perpetual inventory system, a new average cost is computed every time, units are added to the inventory, units transferred out of inventory are costed at the recent computed average cost.

Self Assessment

Fill in the blanks:

10. ……..assigns the most recent cost to inventory and the oldest costs to cost of goods sold.

11. ……assigns the most recent costs to cost of goods sold and oldest costs to inventory.

12. ……..inventory system requires computing a new average cost each time additional inventory is purchased.

Notes

11.6 Comparison of Inventory Valuation Methods

The six inventory values obtained in the illustration are shown below. Assuming total sales of ₹ 500, gross margin varies from ₹ 164 to 193 depending on the inventory system and cost flow assumptions applied in valuing the ending inventory.

Perpetual Inventory System of B Comapny Ltd.

	FIFO	Moving /Weighted Average	LIFO
	(₹)	(₹)	(₹)
Sales	500.00	500.00	500.00
Beginning inventory	180.00	180.00	180.00
Purchases	357.00	357.00	357.00
Goods available for sales	537.00	537.00	537.00
Less: ending inventory	230.00	225.83	220.00
Cost of goods sold	307.00	311.17	317.00
Gross margin	193.00	188.83	183.00
Perpetual Inventory System			
	FIFO	**Moving Average**	**LIFO**
	(₹)	(₹)	(₹)
Sales	500.00	500.00	500.00
Beginning inventory	180.00	180.00	180.00
Purchases	357.00	357.00	357.00
Goods available for sales	537.00	537.00	537.00
Less: ending inventory	230.00	214.80	201.00
Cost of goods sold	307.00	322.20	336.00
Gross margin	193.00	177.80	164.00

Clearly the selection of an inventory valuation method has significant effect on inventory values, product costs and determination of net income. If managers could select an inventory valuation method at will and change methods whenever they wished, they could easily manipulate reported income, but the consistency principle, which requires the consistent application of accounting principles and methods over time, prevents such manipulation. But one should be aware of the strengths and weaknesses of each of the inventory valuation methods.

11.6.1 Specific Identification

The advantage of specific identification is that it provides good matching of products costs and revenues. Managers, in some situations, can adjust gross profit by selecting which units of an inventory are delivered to customer. Anyway, the method cannot be used where there are many types of inventory and inventory is received at frequent intervals.

First In First Out

Advantages

1. It is simple to understand and easy to operate.
2. It tends to conform to the physical movement of inventory and results in reporting inventories on the balance sheet at a cost that is close to the current purchase price.
3. In case of falling prices, the use of this method gives better results.

Notes

Disadvantages

1. When prices are rising, the higher net income results in a higher income tax expense.
2. In case of rising prices, the real inputs of the concern being low, they may be inadequate to meet the concern's demand to purchase raw materials at the ruling price.

Last In First Out

Advantages

1. Lower tax expense during period of rising prices, since net income tends to be stated more nearly in current terms, because revenues are matched with current rather than old product costs. The lower tax expense results in improved cash flows.

Disadvantages

1. If used for a number of years, balance sheet inventory values tend to become grossly understated, because inventories are reported at costs that existed several years ago.
2. If the company has to reduce its inventory below the amount normally at hand, product costs calculated with old values appear abnormally low.
3. This method of valuation is not acceptable to income tax authorities.

Average Cost Methods

Inventory valuations at average cost are among the least popular methods. They seem to have all the disadvantages of LIFO and FIFO and few advantages. Neither net income nor ending inventories are shown at current values.

Notes Selection of Pricing Method

No hard and fast rules of procedure have been laid down to select a method of pricing issues of materials. However, the ultimate choice of a method may be based on the following considerations:

1. The method of costing used and the policy of management.
2. The frequency of purchases and issues.
3. The extent of price fluctuations.
4. The extent of work involved in recording, issuing and pricing materials.
5. Whether cost of materials used should reflect current or historical conditions.

Self Assessment

Fill in the blanks:

13. The selection of an inventory valuation method has significant effect on inventory values, …… costs and determination of net income.
14. The advantage of ……..is that it provides good matching of products costs and revenues.
15. ……..method of valuation is not acceptable to income tax authorities.

Notes

Case Study

Case: Inventory Levels

The Storage Corporation currently carries ₹ 25 million of inventory. The finance manager is considering whether to recommend a reduction in inventory costs at the following information about inventory costs at various levels. The company's after-tax discount rate that is used to evaluate current asset policies is 6%. The company earns a contribution margin of 20% on sales.

	Rs 25 million	Rs 23 million	Rs 21 million
Storage costs	7,50,000	7,25,000	7,10,000
Spoilage costs	4,00,000	3,75,000	3,67,000
Daily sales	1,20,000	1,19,000	1,14,500

1 Would it be profitable for the company to reduce its inventory from ₹ 25 million to ₹ 23 million? (Calculate the change in after-tax income).

2 Would it be profitable for the company to reduce its inventory to ₹ 21 million? (Calculate the change in after-tax income.)

1 Reducing inventory from ₹ 25 to ₹ 23 million causes net income to:

DStorage cost = (₹ 7,50,000 – ₹ 7,25,000)(0.60) = ₹ 15,000

DSpoilage cost = (₹ 4,00,000 – ₹ 3,75,000)(0.60) = 15,000

DFinancing cost = (₹ 20,00,000)(0.06) = 1,20,000

DProfit on sales = (₹ 1,20,000 – 1,19,000)(365)(0.20)(0.60) = (43,800)

DNet Profit = ₹ 1,06,200

2 To determine if it is profitable to reduce inventory to ₹ 21 million, determine the change in profits associated with reducing from ₹ 23 million. That is, you know that ₹ 23 million is better than ₹ 25 million and the decision is now whether to reduce it further to ₹ 21 million. Remember that decisions depend on incremental costs and benefits.

Reducing inventory from ₹ 23 to ₹ 21 million causes net income to:

DStorage cost = (₹ 7,25,000 – ₹ 7,10,000)(0.60) = ₹ 9,000

DSpoilage cost = (₹ 3,75,000 – ₹ 3,67,000)(0.60) = 4,800

DFinancing cost = (₹ 20,00,000)(0.06) = 1,20,000

DProfit on sales = (₹ 1,19,000 – 1,14,500)(365)(0.20)(0.60) = (1,97,100)

DNet Profit = (₹ 63,300)

Given the choices, ₹ 23 million is the most profitable level of inventory.

Question

Fabrication Company requires steel for its fabrication work. The probability distributions of the daily usage rate and the lead time for procurement are given below:

These distributions are independent

Contd...

Notes

Daily usage rate in tonnes	Probability	Lead time in days	Probability
4	0.3	5	.6
6	0.5	10	.2
8	0.2	15	.2

The stockout cost is estimated to be ₹4,000 per tonne. The carrying cost is ₹1,000 per tonne per year.

Required

1. What is the optimal level of safety stock?
2. What is the probability of stockout?

Source: Nitin Balwani, Accounting and Finance for Managers, Excel Books, New Delhi.

11.7 Summary

- Inventory is composed of assets that will be sold in the future in the normal course of business operations.
- Inventories provide a 'buffer' between purchasing, producing and marketing goods
- Four types of inventories may be identified which are Raw material inventory, Stores and spares, Work-in-process inventory and Finished goods inventory.
- The main objective of inventory management is to achieve maximum efficiency in production and sales with the minimum investment in inventory.
- Minimum level indicates the lowest figure of inventory balance which must be maintained in hand at all times, so that there is no stoppage of production
- In ABC Analysis (called Always Better Control)ABC Analysis (called Always Better Control) the items are divided into three categories according to their importance, value and frequency of replenishment during a period.
- Economic Order Quantity (EOQ) is the order size for some particular inventory item that results in lowest total inventory cost for the period.
- The Just-in-Time (JIT) system philosophy is that materials should arrive exactly the time they are needed for production.
- Many companies used a Material Requirement Planning (MRP) system to determine what materials to order and when to order.
- The methods used for moving the inventory is first in first out (FIFO), last in, first out (LIFO) system.

11.8 Keywords

Economic Order Quantity (EOQ): It refers to that level of inventory at which the total cost of inventory is minimum

Inventory: The stockpile of the products a firm is offering for sales and the components that make up the product.

Optimum Level of Inventory: It is the level where the total costs of inventory is less.

Notes

Raw materials: It is the input that is converted into finished goods through a manufacturing or conversion process.

Work-in-progress: It is the stage of stocks between raw materials & finished goods.

11.9 Review Questions

1. Why is inventory management important?
2. Describe briefly three types of inventory costs associated with economic order quantity and reorder point compensation.
3. What is meant by a reorder point? What factors affect the inventory reorder point?
4. How does uncertainty affect inventory management?
5. Describe perpetual inventory and periodic inventory system.
6. Do FIFO perpetual and FIFO periodic always yield the same inventory valuation? Do LIFO perpetual and LIFO periodic always yield the same inventory valuation?
7. Compare the effect of LIFO and FIFO inventory valuation on the income statement and balance sheet in periods of rising and falling prices.
8. What is meant by the ABC Inventory Control System? On what key promise is this system based? What are its limitations?
9. What are likely to be the new points of each of the following managers about the levels of the various types of inventories: field, marketing, manufacturing, purchasing? What is inventory investment?
10. What factors make managing inventory more vital for companies regarding the issue of effective working capital management?

Answers: Self Assessment

1.	optimum size	2.	Sale lag.	3.	safety stock
4.	stores and spares	5.	minimum	6.	Minimum level
7.	Input Output ratio	8.	EOQ	9.	A
10.	FIFO	11.	Last In First Out (LIFO)	12.	Average cost perpetual
13.	product	14.	specific identification	15.	LIFO

11.10 Further Readings

Books

Dr Pradeep Kumar Sinha, *Financial Management*, New Delhi, Excel Books, 2009.

Van Horne, J.C. and Wachowicz, Jr, J.M., *Fundamentals of Financial Management*, New Delhi, Prentice Hall of India Pvt. Ltd., 1996, p. 2.

Chandra, P., *Financial Management – Theory and Practice,* New Delhi, Tata McGraw Hill Publishing Company Ltd., 2002, p. 3.

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Unit 12: Receivables Management

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Objectives

After studying this unit, you will be able to:

- Identify the cost benefit analysis of receivables.
- Describe the crucial decision areas in receivable management
- Explain the Factoring and credit control
- Discuss the management of international credit

Introduction

The term 'receivable' is defined as "debt owed to the firm by customers arising sale of goods or services in the ordinary course of business". When a firm makes an ordinary sale of goods or renders services and does not receive payment it means that the firm has granted trade credit and the amount appears as receivables in the books of the seller, which will be collected in future. Thus, accounts receivable represent an extension of credit to customers, allowing them a reasonable period of time to pay for the goods or services which they have received.

Notes

12.1 Costs and Benefits of Receivables

In modern competitive economic systems, sale of goods in credit is an essential part. In fact, credit sales and the receivables are treated as marketing tools to aid the sale of goods.

12.1.1 Costs

Costs associated are collection cost, capital cost, delinquency cost, and default cost. Costs associated with extension of credit and accounts receivable

1. ***Collection cost:*** These are administrative costs incurred in collecting the receivables from the customers to whom credit sales are made. Included in the costs are (a) additional expenses in the creation and maintenance of credit department with staff, accounting records, stationery, postage and other related items, (b) expenses in acquiring credit information either through outside specialist agencies or by the staff of the firm itself. These expenses are incurred only if the firm does sell on credit. These costs are likely to be semi-variable since up to a certain point, the existing staff will be able to carry on the increased workload, but beyond that, additional staff will be required. Some costs are variable, e.g., getting credit information from outside agencies in respect of new customers added.
2. ***Capital cost:*** Accounts receivable is an investment in assets, and hence have to be financed thereby involving a cost. The cost on the use of additional capital to support credit sales, which alternatively could be profitably employed elsewhere is therefore a part of the cost of extending credit or otherwise.
3. ***Delinquency cost:*** This arises when the customers fail to meet their obligations on due date after the expiry of the credit period. Such costs are called delinquency costs. The important components of this cost are: (a) blocking of funds for an extended period, (b) cost associated with the steps to be initiated to the over dues, such as reminders and the collection efforts, legal charges, where necessary, etc.
4. ***Default cost:*** If the firm is not able to recover the over dues because of the inability of the customers, such debts are treated as bad debts and have to be written off. Such costs are known as default costs associated with credit sales and accounts receivable.

Did u know? With relaxation of credit standards, default expenses (i.e., bad debt expenses) go up. If credit standards are made more restrictive, bad debt expenses go down.

12.1.2 Benefits

Benefits from credit sales and receivables management are increased sales and increased profits. The impact of a liberal policy of trade credit is likely to have two forms. First, it is oriented to sales expansion i.e., to increase sales to existing customers or attract new customers. Secondly, the firm may extend credit to protect its current sales against emerging competition. Here the motive is sales retention. As a result of increased sales, profitability also increases since the firm's fixed costs get distributed on a larger volume i.e., fixed cost per unit to be absorbed gets reduced, increasing the profits of the firm.

12.1.3 Cost/Benefit Analysis

From the above discussion, it is clear that investments in receivables involve both benefits and costs. The extension of trade credit has a major impact on sales, costs and profitability other

things being equal, a relatively liberal policy and therefore higher investments in receivable, will produce larger sales. However, costs will be higher with liberal policies than with stringent measures. Therefore, accounts receivable management should aim at trade off between profit (benefit) and risk (cost). That is to say, decision to loosen funds to receivables (or the decision to grant credit) will be based on a comparison of the benefits and costs involved. While determining the optimum level of receivables, the costs and benefits to be compared are marginal costs and benefits i.e., the firm should only consider the incremental benefits and costs that result from a change in the receivables or trade policy. Obviously, it can go on extending credit facility till the incremental benefits are more than the incremental costs.

Notes Credit sales are generally made on open account that means, there is no formal acknowledgement of debt obligation through any financial instrument. However, extension of credit involves risk and cost. The benefits as well as cost to determine the goal of receivable management.

Self Assessment

Fill in the blanks:

1. …….cost arises when the customers fail to meet their obligations on due date after the expiry of the credit period.
2. …….are administrative costs incurred in collecting the receivables from the customers to whom credit sales are made.
3. Costs will be higher with liberal policies than with …….measures.
4. While determining the optimum level of receivables, the costs and benefits to be compared are ……..costs and benefits

12.2 Three Crucial Decision Areas in Receivables Management

The three crucial decision areas in receivable management are (a) credit policies (b) credit terms and (c) collection policies.

12.2.1 Credit Policies

It involves a trade-off between profits on additional sales that arise due to credit being extended on the one hand and cost of carrying the receivables and bad debt losses on the other. The credit policy of a firm provides the framework to determine (1) whether or not to extend credit to a customer and (2) how much credit to extend. The credit policy decision has two dimensions (1) credit standards and (2) credit analysis.

Credit Standards

The term 'credit standards' represents the basic criteria for the extension of credit to customers. The quantitative bases of establishing credit standards are factors such as credit ratings, credit references, average payment period, and certain financial ratio. We are interested in illustrating the trade-off between benefit and cost to the firm as a whole and therefore not considering the individual components of credit standards. The trade-off with reference to credit standards covers the collection cost, the average collection period, level of bad debt losses, and level of sales. These factors should be considered while considering whether to relax credit standards or not.

Notes

The implication of relaxed credit standards is more credit, a larger credit department to service accounts and related matters and increase in collection costs.

A relaxation in credit standard implies an increase in sales, which in turn, leads to higher average accounts receivables. Further, relaxed standards would enable credit to get extended to even less creditworthy customers, resulting in longer period to pay over dues. The reverse will happen if credit standards are tightened.

Further, changing credit standards can also be expected to change the volume of sales. As standards are relaxed, sales are expected to increase; conversely a tightening is expected to cause a decline in sales.

Caution It must be kept in mind that with relaxation in credit standards, bad expenses will go up.

The effect of alternative credit standards is illustrated in the following example:

Example: A firm is currently selling a product at ₹ 10 per unit. The most recent sales (all credit) were 60,000 units. The variable cost per unit is ₹ 6 and the average cost per unit given a sales volume of 60,000 units is ₹ 8. The firm's total fixed cost is ₹ 120,000. The average collection period may be assumed to be 30 days.

The firm is contemplating a relaxation of credit standards that is expected to result in a 15 per cent increase in rupee sales. The average collection would increase to 45 days with no change in bad debt expenses. The increase in collection expenses may be assessed to be negligible. The firms required return on investment is 15 per cent.

Should the firm relax the credit standard?

Solution:

Current Plan:

Sales Revenue	60,000 × ₹ 10/-	600,000
Less Cost:		
Variable 60,000 × 6	360,000	
Fixed	120,000	480,000
Profit on Sales		120,000
Less: Interest @ 15% on average receivables		
1 month credit period hence avg. receivables		
Cost of sales $\left(\frac{8 \times 60,000 + 6 \times 9000}{360}\right)$ = 40,000 × 0.15		6,000
Net Profit		**114,000**
Proposed Plan		
Sales Revenue	60000 × 1.15 × ₹ 10	690,000
Less cost:		

Notes

Variable 60,000 × 6 × 1.15	414,000	
Fixed	120,000	534,000
Profit on sales		156,000
Less Interest @ 15% on average receivables		10,013
i.e., $15\% \times \frac{534000 \times 1.5}{12}$		
Net Profit		**145,987**
Hence, increase in profits of the firm and the firm should relax the credit standard		31,987

Credit Analysis

Besides establishing credit standards, a firm should develop procedures for evaluating credit applicants. Two basic steps are involved in the credit investigation process – obtaining credit information and analysis of credit information.

Did u know? On the basis of credit analysis the decision to grant credit to a customer as well as the quantum of credit is taken.

Sources of credit information are internal and external. Internal means various forms filled in by the customers giving details of financial operation, trade references of firms with whom the customer has business, behaviour of the customer in terms of historical payment pattern in respect of existing credit customer. External sources include copy of the published financial statements, trade references and bank references. Finally, specialist credit bureau reports from organizations specializing in supplying credit information can also be utilized.

Once the credit information has been collected from different sources, the next step is to determine credit worthiness of the applicant. There are no established procedures to analyze the information. The analysis should cover two aspects – quantitative and qualitative.

The assessment of the quantitative aspect is based on factual information available from the financial statements, the past records of the firm and so on. Another step may be through a ratio analysis of the liquidity, profitability and financial capacity of the applicant and comparison with the industry average. Again trend analysis over a period of time will reveal the financial strength of the customer. Another approach may be to prepare an ageing schedule of the accounts payable of the applicant. This will give an insight into the past payment pattern of the customer.

The quantitative assessment should be supplemented by qualitative interpretation of the applicants credit worthiness. For example, quality of management, references from other suppliers, bank references and specialist bureau reports.

12.2.2 Credit Terms

Credit terms have three components:

1. Credit period in terms of time for which credit is extended, during this period the overdue amount must be paid by the customer;
2. Cash discount, if any, which the customer can take advantage of i.e., overdue amount will be reduced by this amount; and
3. Cash discount period, which refers to the duration during which the discount can be availed of.

Notes

These terms are usually written as 2/10 net 30. The abbreviation 2/10 net 30 means that the customer is entitled to 2% cash discount if he pays within 10 days (discount period) after the beginning of the credit period of 30 days). If, however, he does not want to take advantage of the discount he may pay within 30 days. If not made within a maximum period of 30 days, the customer would be deemed to have defaulted.

The credit terms such as the credit standards, affect the profitability as well as the cost of this firm. The three components of credit terms, namely, the rate of discount, period of discount and the credit period affect the trade-off. Here the analysis is restricted from the point of suppliers of trade credit.

The cash discount has implications for the sales volume, average collection period, bad debt expenses and profit per unit. The sales volume will increase. The grant of discount implies reduced prices. If the demand for the products is elastic, reduction in prices will result in higher sales volume.

Caution A firm should determine the credit terms on the basis of cost benefit trade-off.

Since the customers would like to take advantage of the discount and pay within the discount period, the average collection period would be reduced. The reduction in the collection period would lead to a reduction in the investment in receivables and also the cost. The decrease in the average collection period would also cause a fall in bad debt expenses. As a result, profits will increase. The discount would have a negative effect in the profits. This is because the decrease in prices would affect the profit margin per unit of sale. Increase in credit period will increase the sales volume, average collection period and bad debt expenses. A reduction in credit period is likely to have an opposite effect.

Example: In our example, assume that the firm is contemplating to allow 2% discount for payment prior to the 10th day after a credit sale. It would be recalled that the current average collection period is 30 days, credit sales are 60,000 units. The variable cost per unit is ₹ 6 as the average cost per unit is ₹8.

It is expected that if discounts are offered, sales will increase by 15% i.e., to 69000 units and the average collection period will drop to 15 days. Assume, bad debt expenses will not be affected, return on investment expected by the firm is 15%, 60% of the total sales will be on discount. Should the firm implement the proposal?

Solution:

Benefit:

Profit on sales = Additional units × (sales price – variable cost)

= 9000 × (10 – 6) ₹ 36,000

Saving on avg. collection period

Present: Average investment in receivable at cost

$$\frac{60{,}000 \times 8}{12} \qquad ₹\ 40{,}000$$

Proposed: Average investment in receivables

$$\frac{(60{,}000 \times 8) + (9000 \times 6)}{24} \qquad ₹\ 22{,}250$$

Notes

	Reduction	₹ 17,750	
	Int. @ 15% on saving 17750 × 0.15		₹ 2,663
			₹ 38,663
Cost,	2% on 60% of 69000 × ₹ 10		₹ 8,280
	Net benefit		₹ 30,383

Example: Suppose the firm is contemplating an increase in the credit period from 30 – 60 days. The average collection period, which is at 45 days, is expected to increase to 75 days. It is also likely that the bad debt or expenses will increase from the current level of 1% to 3% of sales. Total credit sales are expected to increase from the current levels of 60,000 units to 69,000 units. The present average cost per unit is ₹ 8; the variable cost sales per unit are ₹ 6 and ₹ 10 per unit respectively. Assume the firm expects a return of 15%. Should the firm extend the credit period?

Solution: The decision should be taken on the basis of comparison of benefits and costs associated with the decision. The benefits arising from additional profits from additional sales, while the costs include the cost of additional investments in receivables and additional bad debt expenses:

1. Profit on additional sales ₹ 4 × 9000 ₹ 36,000
2. Cost of additional investment in receivables

$$\text{Proposed investment} = \left(\frac{8 \times 60,000 + 6 \times 9000}{360}\right) \times 75 = 111,250$$

$$\text{Present investment} = \frac{\text{Accounts Receivable at time chosen}}{\text{Average daily sales}} \times 45$$

	60,000
Additional investment proposed	51,250
Cost of additional investment at 15%	7,688

3. Additional bad debt expense

Bad debt with proposed credit period 3% on ₹ 690,000	20,700
Bad debts with present plan 1% × ₹ 600,000	6000
Hence additional bad debt expenses	14,700

Thus, the total cost associated with the extension of credit period is ₹ 7688 + 14700 i.e., ₹ 22,388. As against this, the benefit comes to ₹ 36,000. There is therefore a net gain of ₹ 13,612. The firm must be advised to extend the credit period from 30 to 60 days.

Example: 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 receivable. The company's variable costs are 70% of the selling price. Given the following further information, which is a better option?

Notes

	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	₹ 300,000	₹ 4,50,000

Solution: XYZ Corporation

Decision-making (liberalization of credit terms)

	Present Policy (₹)	Policy Option 1 (₹)	Policy Option II (₹)
Sales revenue	₹ 50,00,000	₹ 60,00,000	₹ 67,50,000
Less variable cost	– 35,00,000	– 42,00,000	– 47,25,000
contribution	15,00,000	18,00,000	20,25,000
Less other relevant costs			
Bad debt losses	1,50,000	300,000	4,50,000
Investment cost (Notes)	218,750	3,50,000	4,92,187.50
Contribution margin-final	11,31,250	11,50,000	10,82,812.50.

Policy option I is the better option.

Notes: Present policy: 35,00,000/4times = ₹ 875,000. Its cost @ 25% =₹ 218,750

Option 1 : 42,00,000/3times = ₹ 14,00,000. Its cost @ 25% =₹ 3,50,000

Option 2 : 47,25, 000/2.4times = ₹ 19,68,750.Its cost @ 25% =₹ 4,92,187.50

12.2.3 Collection Policies

Efficient and timely collection of debtors ensure that bad debt losses are reduced to the minimum and the average collection period is shorter. If the firm spends more resources, on utilization 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 levels of expenditure on the one hand and decreases in bad debt losses and appropriate investment in debtors on the other.

The collection cost of the 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 outstanding payments in check. Hence, it has to work in a very smooth manner and diplomatically too.

It is important that clear-cut procedures regarding credit collection are set up. Such procedures must answer questions like the following:

1. How long a is debtor balance allowed to exist before collection process is started?
2. What should be the procedure of follow up with defaulting customer? How are reminders are to be sent and how should each successive reminder be drafted?
3. Should there be collection machinery whereby personal calls by company's representatives are made?
4. What should be the procedure for dealing with doubtful accounts? Is legal action to be initiated? How should account be handled?

Monitoring of Receivables

Notes

1. ***Computation of average age of receivables:*** It involves computation of average collection period as follows: $\frac{\text{Accounts Receivable at time chosen}}{\text{Average daily sales}}$

2. ***Ageing schedule:*** An important insight into the collection pattern of the preparation of their ageing schedule. In this, receivables are classified according to their age, say 1-30 days, 31-60 days, 61-90 days, 91-120 days and 121 days and above. This classification helps the firm in its collection efforts and enables the management to have a closer control over the quality of individual accounts. The agency schedule provides an effective method of comparing the liquidity of receivables with the liquidity of receivables in the past as well as that of another firm in the same industry. This comparison can be made periodically. The ageing schedule provides a useful supplement to average collection period receivables/ sales analysis.

3. ***Collection programme:***

   (a) Monitoring the state of receivables

   (b) Intimating to customers when due date approaches

   (c) Telegraphic and telephone advice to customers on the due dates

   (d) Threat of legal action on overdue accounts

   (e) Legal action on overdue accounts.

4. ***Collection matrix:*** In order to correctly study the changes in the payment behaviour of customer, it is helpful to look at the pattern of collections associated with credit sales. The following table shows an illustrative collection matrix.

Example: The credit sales during the month of January are collected as follows:

10% in January (the month of sales), 42% in February (the first following month), 36% in March (the second following month) and 12% in April (the third following month).

From the collection pattern, one can judge whether the collection is improving, stable or deteriorating. A secondary benefit of such an analysis is that it provides a historical record of collection percentage. That could be useful in projecting monthly receipts for each budgeting period.

Collection Matrix

Percentage of receivables colleted during the	Jan Sales	Feb Sales	March Sales	April Sales	May Sales
Month of sales	10	14	13	15	9
First following month	42	35	38	40	35
Second following month	36	40	26	21	26
Third following month	12	11	23	19	25
Fourth following month				5	5

Notes

Task ABC Company's existing sales are ₹ 180 lakhs. It is currently extending a credit period of 'net 30 days' to its customers. The company's contribution to sales ratio is 20 per cent and the cost of funds is 15 per cent. The company is contemplating to increase its sales by ₹ 16 lakhs to be achieved by means of lengthening the existing period to 'net 45 days'. The bad debt losses on additional sales is expected to be 5 per cent. Should the company go in for a policy change or not.

Self Assessment

Fill in the blanks:

5. The ……represents the basic criteria for the extension of credit to customers.
6. Efficient and timely collection of debtors ensures that ……losses are reduced to the minimum and the average collection period is shorter.
7. Credit terms have three components which are……; Cash discount and Cash discount period.
8. If the demand for the products is elastic, reduction in prices will result in ……....sales volume.

12.3 Factoring and Credit Control

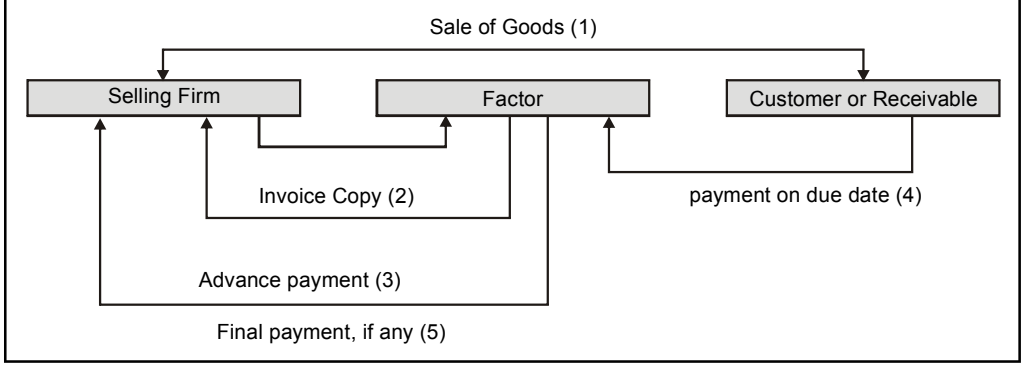
A large firm has some advantages, in managing its accounts receivable. First, it may be possible for divisions to pool information on the creditworthiness of its customers. Second, there are potential companies of scale in record keeping, billing, etc., especially if the process can be computerized. Third, debt collection is a specialized business that calls for experience and judgement. The small firm may not be able to hire or train a specialized credit manager. However, it may be able to obtain some of the economies by parking part of the job out to a factor and the arrangement is known as factoring.

Factoring is a collection and finance service designed to improve the cash flow position of the sellers by converting sales invoices into ready cash. It is a continuing arrangement between the factor and the seller client, the factor purchases the client's debtors and in relation thereto controls the credit extended to the customers and administer the sales ledger.

1. Under an agreement between the seller and selling firm, the latter makes an appraisal of the creditworthiness of the potential customers and may also set the credit limit and terms of credit for different customers.
2. The sales documents will contain the instructions to make the payment directly to the factory that is responsible for the collection.
3. When the payment is received by the factor on the date, the factor shall deduct its fees, charges, etc., (as agreed) and credit the balance to the firm's accounts.
4. In some cases, if agreed, the factor firm may also provide advance finance to the selling firm for which it may charge from the selling firm. In a way, this tantamount to bill discounting by the factor firm. However, factoring is something more than mere bill discounting, as the former includes analysis of the credit worthiness of the customer too. The factor may pay whole or a substantial portion of the sales value to the selling firm immediately on sales being affected. The balance, if any, may be paid on the normal due date. The mechanism of factoring has been presented in following figure:

Notes

Figure 12.1



In addition to purchasing of receivables, the factor firm may provide the following additional services:

1. Raising funds on the security of the receivables
2. Receivables collection management, and,
3. Protection against defaults by the receivables.
4. It may be noted that a firm need not avail all these services from the factor and the agreement between the selling firm and the factor firm may be tailor made to suit the specific needs of the selling firm. In a nutshell, the functions of a factor may be described as credit investigation, credit administration; credit monitoring, credit collection, credit protection and credit financing.

Benefits and Costs of Factoring

The factoring is nothing but a substitute for in-house management of receivables. Factoring offers a very flexible mode of cash generation against the receivables. Once a line of credit is established, factoring helps availability of cash at an earliest opportunity after sales. Factoring tends to increase the number of rotations by converting credit sales into cash. A firm availing factoring services may have the following benefits:

1. ***Better cash flows:*** The seller can offer credit to the customers, within the terms approved by the factor and can receive prompt payments shortly after invoicing. This may be cheaper than financing and therefore, can be availed if the firm expects a liquidity problem on a regular basis. In fact, the factoring ensures a definite pattern of cash inflows from the credit sales.
2. ***Better assets management:*** The security for such financial assistance is the receivable itself and therefore, the other assets will remain available as security for other borrowings.
3. ***Better working capital management:*** Since, finance available from factoring moves directly with the level of the receivables, the necessity of additional working capital to match the sales growth does not arise.
4. ***Better administration:*** The debt management services which factors provide relieve the seller of the burden of administration and saves on the cost of staff and office space. In other words, it enables the seller to concentrate on developing his business.
5. ***Better evaluation:*** The debt management service may include formal or informal advice on credit standing. Factors hold large amounts of information about the trading histories

Notes

of firms. This can be valuable to those who are using factoring services and can thereby avoid doing business with customers having poor track record.

6. ***Better risk management:*** In case of non-recourse factoring, the seller will have the advantage of repositioning the risk of customers not paying their due bills. This will cost more than recourse factoring and thereby allows the seller to escape the consequences of customer's default.

However, the factoring involves some monetary and non-monetary costs as follows:

1. ***Monetary costs:***
   (a) The factor firm usually charges substantial fees and commission for the collection of receivables.
   (b) The advance finance provided by the factor firm would be available at a higher interest costs than the usual rate of interest.
2. ***Non-monetary costs:***
   (a) The factor firm doing the evaluation of the creditworthiness of the customer will be primarily concerned with the minimization of risk of delays and defaults. In the process, it may tend to ignore possible sale prospect.
   (b) A factor is a third party to the customer and the latter not feel comfortable while dealing with it.
   (c) The factoring of receivables may be considered as a symptom of financial weakness. Thus, while evaluation the use of factoring services, the firm must analyze the costs and benefits associated with the factoring. It may be noted that though factoring is a costly service, yet some firms may find it to be more economical than to establish their own collection department.

Self Assessment

Fill in the blanks:

9. Factoring is a collection and finance service designed to improve the cash flow position of the sellers by converting ……..into ready cash.
10. The ……is a substitute for in-house management of receivables.
11. The advance finance provided by the factor firm would be available at a …….....interest costs than the usual rate of interest
12. The factoring of receivables may be considered as a symptom of financial ……

12.4 Managing International Credit

Credit management is difficult task for managers of purely domestic companies, and these tasks, become much more complex for companies that operate internationally. This is partly because international operations typically expose a firm to exchange rate risk. It is also due to the perils involved in shipping goods to long distance and to cross at least two international boundaries.

Exports of finished goods are usually priced in the currency of the importers' local market. Therefore, a US company that sells a product in Japan, would have to price that product in Japanese yen and extend credit to Japanese wholesale in local currency (yen). If yen depreciates against the dollar before the US exporter collects its account receivable, the US company experience

Notes

an exchange rate loss, the yen collected are worth fewer dollars than expected at the time when the sale was made. The exchange rate variation can happen the other way yielding an exchange rate gain to the US exporter.

For a major currency such as the Japanese Yen, the exporter can bridge against this risk by using currency, forward or option markets, but it is costly to do, particularly for relatively small amounts.

This risk may be further magnified because credit standards may be different and acceptable collection techniques much different.

Notes The exporter cannot take the "not to bother" approach and concede foreign markets to international rivals. Those export sales, if carefully monitored and (where possible) effectively hedged against exchange rate risk, often prove to be very profitable.

Self Assessment

Fill in the blanks:

13. International operations typically expose a firm to ……risk.
14. For a major currency, the exporter can bridge against the risk by using currency, forward or …….markets.
15. This risk in international credit may be further magnified because credit standards may be different and ……techniques much different.

Case Study

Case: Agarwal Cast Company Inc.

On August 30, 2006, Agarwal Cast Company Inc., applied for a $200,000 loan from the main office of the National bank of New York. The application was forwarded to the bank's commercial loan department.

Gupta, the President and Principal Stockholder of Agarwal cast, applied for the loan in person. He told the loan officer that he had been in business since February 1976, but that he had considerable prior experience in flooring and carpets since he had worked as an individual contractor for the past 20 year. Most of this time, he had worked in Frankfert and Michigan. He finally decided to "work for himself" and he formed the company with Berry Hook, a former co-worker. This information seemed to be consistent with the Dun and Bradstreet report obtained by the bank.

According to Gupta, the purpose of the loan was to assist him in carrying his receivables until they could be collected. He explained that the flooring business required him to spend considerable cash to purchase materials but his customers would not pay until the job was done. Since he was relatively new in the business, he did not feel that he could compete if he had to require a sizeable deposit or payment in advance. Instead, he could quote for higher profits, if he was willing to wait until completion of the job for payment. To show that his operation was sound, he included a list of customers and projects with his loan application. He also included a list of current receivables.

Contd...

Notes

Gupta told the loan officer that he had monitored his firm's financial status closely and that he had financial reports prepared every six months. He said that the would send a copy to the bank. In addition, he was willing to file a personal financial statement with the bank.

Question

Prepare your recommendation on Agarwal Cast Company.

12.5 Summary

- Receivable is defined as debt owed to the firm by customers arising sale of goods or services in the ordinary course of business.
- The three crucial decision areas in receivable management are (a) credit policies (b) credit terms and (c) collection policies.Credit Policies involves a trade-off between profits on additional sales that arise due to credit being extended on the one hand and cost of carrying the receivables and bad debt losses on the other.
- Credit terms have three components which are Credit period, Cash discount and Cash discount period.
- The collection cost of the firm has to work in a manner that it does not create too much resentment amongst the customer
- Factoring is a collection and finance service designed to improve the cash flow position of the sellers by converting sales invoices into ready cash.
- Factoring offers a very flexible mode of cash generation against the receivables.
- Credit management is difficult task for managers that operate internationally because international operations typically expose a firm to exchange rate risk.

12.6 Keywords

Collection Policy: It is the procedures passed to collect amount receivables, when they become due.

Credit Standards: It refers to the minimum criteria for the extension of credit to a customer.

Credit Terms: It means the stipulations under which goods or services are sold on credit.

Receivables: It is defined as debt owed to the firm by customers arising from sale of goods or services in the ordinary course of business.

Receivables Management: It involves decision areas: credit standards, credit period, cash discounts and collection procedures.

12.7 Review Questions

1. Explain the objectives of credit polity of/or firm. What are the elements of a credit policy?
2. What are the techniques of control of receivables? Explain the "Ageing Schedule".
3. Who do you mean by factoring? Explain the benefits of factoring.
4. Why are a firm's regular credit terms typically conform to those of its industry?
5. What are the basic trade-offs in a tightening of credit standards?

Notes

6. Why are the risks involved in international credit management more complex than those associated are true or false with purely domestic credit sales?
7. Analyse the benefit of the receivables management to the corporates.
8. Elucidate the consequences of liberal versus stiff credit standards.
9. Examine the different sources of credit information to the corporates & to the agencies.
10. Examine the factors that influence the size of investment in receivables.

Answers: Self Assessment

1.	Delinquency	2.	Collection cost	3.	stringent
4.	marginal	5.	credit standards	6.	bad debt
7.	Credit period	8.	higher	9.	sales invoices
10.	factoring	11.	higher	12.	weakness.
13.	exchange rate	14.	option	15.	acceptable collection

12.8 Further Readings

Books

Dr Pradeep Kumar Sinha, *Financial Management*, New Delhi, Excel Books, 2009.

Van Horne, J.C. and Wachowicz, Jr, J.M., *Fundamentals of Financial Management*, New Delhi, Prentice Hall of India Pvt. Ltd., 1996, p. 2.

Chandra, P., *Financial Management - Theory and Practice,* New Delhi, Tata McGraw Hill Publishing Company Ltd., 2002, p. 3.

Notes

Unit 13: Management of Cash

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Objectives

After studying this unit, you will be able to:

- Describe the management of cash
- Discuss cash management planning and control aspects
- Explain the different cash management models
- Recognize the cash conversion cycle

Introduction

Management of cash is an important function of the finance manager. The modern day business comprises of numerous units spread over vast geographical areas. It is the duty of the finance manager to provide adequate cash to each of the units. For the survival of the business, it is absolutely essential that there should be adequate cash. It is the duty of finance manager to maintain liquidity at all parts of the organization while managing cash. On the other hand, he has also to ensure that there are no funds blocked in idle cash. Idle cash resources entail a great deal of cost in terms of interest charges and in terms of opportunities costs. Hence, the question of costs of idle cash must also be kept in mind by the finance manager. A cash management scheme, therefore, is a delicate balance between the twin objectives of liquidity and costs.

Notes

13.1 Cash Management

Need for Cash

The following are four motives for holding cash:

1. ***Transaction need:*** Cash facilitates the meeting of the day-to-day expenses and other payments on the debts. Normally, inflows of cash from operations should be sufficient for this purpose. But sometimes this 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.
2. ***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.
3. ***Precautionary needs:*** Cash may be held to act as for providing safety against unexpected events. Safety as is typified by the saying that a man has only three friends – an old wife, an old dog and money at bank.
4. ***Compensation motive:*** Another motive to hold cash balances is to compensate banks for providing certain services and loans.

Nature of Cash Management

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

Self Assessment

Fill in the blanks:

1. Cash held in order to take advantage of profitable opportunities comes under the motive of ……needs.
2. The exact nature of a cash management system would depend upon the …….. of an enterprise.

13.1.1 Cash Management—Planning Aspects

The first step in cash management is to estimate the requirements of cash. For this purpose, cash flow statements and cash budgets are required to be prepared.

Did u know? What is Cash budget?

Cash budget is the plan of receipts and payments of cash during the budget period.

Notes

Cash budget represents cash requirements of business during the budget period. Cash budget can be prepared for either short or for long periods.

1. ***Cash budgets for short period:*** Preparation of cash budget month by month would involve making the following estimates:
   (a) As regards receipts:
      (i) Receipts from debtors;
      (ii) Cash sales; and
      (iii) Any other sources of receipt of cash (say, dividend from a subsidiary company).
   (b) As regards payments:
      (i) Payments to be made for purchases;
      (ii) Payments to be made for expenses;
      (iii) Payments that are made periodically but not every month;
         - Debenture interest; ■ Income tax paid in advance ■ Sales tax etc.
      (iv) Special payments to be made in a particular months, for example dividends to shareholders, redemption of debentures, repayments of loan, payment for assets acquired, etc.,
2. ***Cash budget for long period:*** Long-range cash forecast often resembles the projected source and application of funds statement. The following procedures may be adopted to prepare long-range cash forecasts:
   (a) Take the cash at bank and in the beginning of the year;
   (b) Add:
      (i) Trading profit (before tax) expected to be earned;
      (ii) Depreciation and other development expenses incurred to be written off;
      (iii) Sale proceeds of assets;
      (iv) Proceeds of fresh issue of shares or debentures; and
      (v) Reduction in working capital that is current assets (except cash) less current liabilities.
   3. *Deduct:*
      (i) Dividends to be paid
      (ii) Cost of assets to be purchased
      (iii) Taxes to be paid
      (iv) Debentures or shares to be redeemed
      (v) Increase in working capital.

Self Assessment

Fill in the blanks:

3. ……...is the plan of receipts and payments of cash during the budget period.
4. To estimate the requirements of cash, …… statements and cash budgets are required to be prepared.

Notes

13.1.2 Cash Management—Control Aspects

We have already seen that the finance manager must control the levels of cash balance at various points in the organization. This task assumes special importance on account of the fact that there is generally a tendency amongst divisional managers to keep cash balance in excess of their needs.

Notes The financial managers must devise a system whereby each division of an organization retains enough cash to meet its day-to-day requirements without having surplus balances on hand. For this, methods have to be employed to:

1. Speed up the mailing time of payments from customers,
2. Reduce the time of payments received by the firm remain uncollected and speed up the movement funds to be disbursement banks.

Two very important methods to speed up collection process are:

1. Concentrating banking and
2. Lock-box system

1. ***Concentration banking:*** In concentration banking, the company establishes a number of strategic collection centers in different regions instead of a single collection center at the head office. This system reduces the period between the time a customer mails in his remittances and the time when they become spend able 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 the 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.
2. ***Lock-box system:*** Another means to accelerate the flow of funds is a lock box system. With 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 receipt of remittances by the company and the deposit in the bank. A lock box arrangement usually is on regional basis, which a company chooses according to its billing patterns. Before determining the regions to be used, a feasibility study is made of the possibility of cheques that would be deposited under alternative plans. In this regard, operations research techniques have proved useful in the location of lock box sites. For example, if a company divides the country into five zones on the basis of feasibility studies, it might pick up New Delhi for the North, Bombay for the West, Calcutta for the East, Madras for the South and Nagpur for the centre.

   Under this arrangement, the company rents the local post-office box and authorize 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 microfilmed 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. Thus, the 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 the cheques and requires compensation for them. Since the cost is directly proportional if average remitted is small.

Notes

Caution 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 guaranteed from the released funds. If costs are less than income, the system is profitable, if not, the system is not a probable undertaking.

Self Assessment

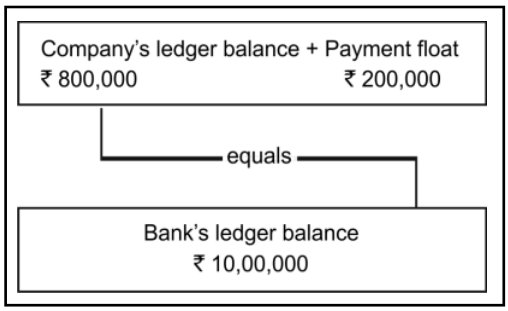
Fill in the blanks:

5. Two very important methods to speed up collection process are Concentrating banking and …….system
6. In……, the company establishes a number of strategic collection centers in different regions instead of a single collection center at the head office.

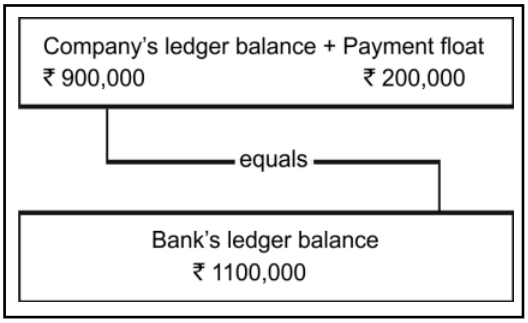
13.2 Cash Collection and Disbursement Systems

13.2.1 Concept of Float

Suppose U Co. Ltd., has ₹10 lakhs on demand deposit with its bank. It pays one of its suppliers by writing a cheque for ₹ 200,000. The company's ledgers are immediately adjusted to show cash balance of ₹ 80,000. But the company's bank should not know about the cheque till the supplier receives the cheque and present to the company's bank for payment. During that period, the bank continues to show in its ledger that a company has a balance of ₹10 lakhs. The company obtains the benefit of an extra ₹ 200,000 in the bank while the cheque is getting cleared. This sum is often called payment or disbursement float.

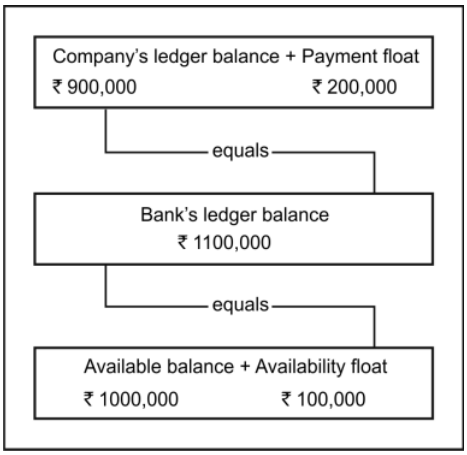


The float can also work in reverse. Suppose U Co. Ltd. receives a cheque for ₹100,000 from a customer. It deposits the cheque and both the company and the bank increases the ledger balance by ₹100,000.



Notes

But this money isn't available immediately to the company. The bank doesn't have the money till it has sent the cheque and received payment from the customer's bank. Since the bank has to wait, it makes U Co. Ltd. wait too – usually 1 or 2 business days. In the meantime, bank will show that U Co. Ltd. has an available balance of ₹10 lakhs and availability float of ₹100,000.



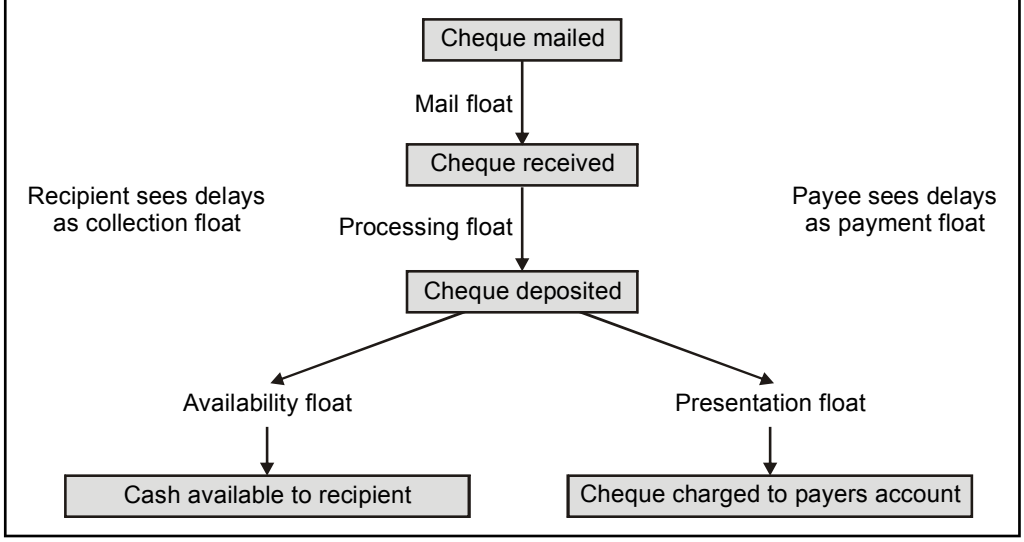
It may be noted that the company gains as a result of payment float and loses as a result of the availability float. The difference is often termed the net float. In our example, the net float is ₹100,000. The company's available balance is therefore ₹100,000 greater than the balance shown in its ledger.

The financial manager's concern is with the available balance and not with the company's ledger balance. If it is known that it may take a week or two before some of the cheques are presented for payment, one may be able to get by with a smaller cash balance. This game is often called playing the float. One can increase the available cash balance by increasing the net float.

13.2.2 Managing Float

There are several kinds of delay and so people in the cash management refer to several kinds of float.

Figure 13.1: Several Kinds of Fleat



Notes

Self Assessment

Fill in the blanks:

7. The financial manager's concern is with the available balance and not with the company's ……balance

8. One can increase the available cash balance by increasing the……...

13.3 Cash Management Models

In recent years, several types of mathematics models have been developed that help to determine optimum cash balance to be carried by a business organization. All these models can be put into 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 the firm. However, in a situation where EOQ Model is not applicable, the stochastic model of cash management helps in determining optimum level of cash balance. It happens when the demand for cash is stochastic and is not known in advance.

13.3.1 William J Baumol's Economic Order Quantity Model

According to this model, optimum cash level is that level of cash where the carrying costs and transaction costs are the maximum. The carrying costs refer to the cost of holding cash, namely the interest foregone in marketable securities. The transaction costs refer to the cost involved in setting 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 will be that point where these two costs are equal. The formula for determining optimum cash balance is:

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

Where,

C = Optimum cash balance

U = Annual (or monthly) cash disbursement

P = Fixed cost for transaction

S = Opportunity cost of one rupee p.a.

Example: A firm maintains a separate account for cash disbursement. Total disbursement is ₹ 105,000 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% p.a. Determine the optimum cash balance as per J. Baumal's Model

Solution: The optimum cash balance

$$C = \sqrt{\frac{2 \times 12{,}60{,}000 \times 20}{0.8}}$$

$$= ₹\ 25{,}100$$

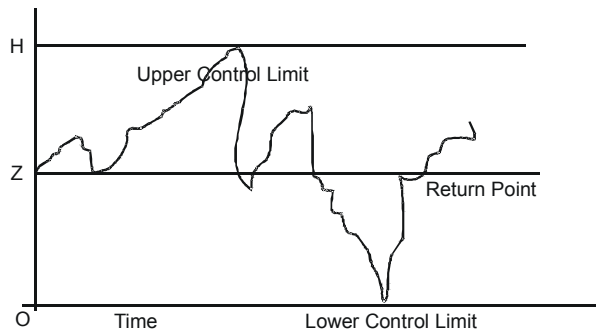
13.3.2 Miller–Orr Cash Management Model

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 –

Notes

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, 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* 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*,*o*) i.e., 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.

Figure 13.2: Miller-orr Cash Management Model



Self Assessment

Fill in the blanks:

9. The ……..costs refer to the cost of holding cash.
10. The ……..costs refer to the cost involved in setting the marketable securities converted into cash.

13.4 Treasury Management

Treasury management once viewed as a peripheral activity conducted by back-office, today plays a very vital role in corporate management. Treasury management can be defined in many ways. The Association of Corporate Treasure defines "Treasury management as the efficient management of liquidity and financial risk in business." All firms, to some degree, are involved in treasury management, although in smaller companies, it may not be a separately defined job.

Notes Treasury management is responsible for:

1. Management of cash while obtaining the optimum return from any surplus funds.
2. Management of exchange rate risks in accordance with group policy.
3. Providing both long-term and short-term funds for the business at minimum cost.
4. Maintaining good relationships with banks and other providers of finance including shareholders.
5. Advising on aspects of corporate finance including capital structure, mergers and acquisitions.

Notes

Functions of Treasury Department

1. ***Cash management:*** The efficient collection and payment of cash both inside the group and to third parties is the function of the treasury department. The involvement of the department with the details of receivables and payables will be a matter of policy. There may be complete centralization within a group treasury or the treasury may simply advise subsidiaries and divisions on policy (collection/payment periods, discounts, etc.,). Any position between these two extremes would be possible. Treasury will normally manage surplus funds in an investment portfolio. Investment policy will consider future heads 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 set off intragroup 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. ***Funding management:*** The treasury department is responsible for planning and sourcing the company's short, medium and long-term cash needs. The 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 carries out negotiations with bankers and acts 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:*** The treasury department is involved in 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, the lender it vulnerable to a hostile bid.

Self Assessment

Fill in the blanks:

11. Treasury will normally manage ……funds in an investment portfolio.
12. Treasury advise on the ……to be used when invoicing overseas sales.

13.5 The Cash Conversion Cycle

Central to short-term financial management is an understanding of the term 'Cash Conversion Cycle'.

We have discussed in the earlier unit that operating cycle encompasses two major short-term asset categories: inventory and accounts receivable. It is measured by summing the average age of inventories and average collection period.

However, the process of producing and selling a product also includes purchase of production inputs (raw materials) an account, which results in accounts payables. Accounts payable reduce the number of days a firm's resources are tied up in operating cycle. The time it takes to pay the accounts payable, measured in days is the average payment period.

Notes

Did u know? What is cash conversion cycle?

The operating cycle less the average payment period is referred as the Cash Conversion Cycle. It represents the amount of time the firms' resources are tied up.

Example: MAX Company, a producer of paper has annual sale of ₹ 10 lakhs, a cost of goods sold of 75% of sales, and purchases are 65% of cost of goods sold. MAX has an average age of inventory of 60 days, an average collection period of 40 days and an average payment period of 35 days. Thus, the cash conversion cycle for MAX is 65 days (60 + 40 – 35).

Funding Requirements of the Cash Conversion Cycle

Permanent versus seasonal funding needs: If the firm's sales are constant, then its investment in operating assets should also be constant, and the firm will have only a permanent funding requirement. If the firms' sales are cyclic, then its investment in operating assets will vary over time with its sales cycles and the firm will have seasonal funding requirements in addition to the permanent funding required for its minimum investment in operating assets.

Aggressive versus Conservative Seasonal Funding Strategies

- Short-term funds are typically less expensive than long-term funds. Long-term funds allow the firm to lock in the funds over a period of time and thus avoid the risk of increases in short-term interest.
- Long-term funding ensures that the required funds are available to the firm when needed.

Caution Short-term funding exposes the firm to the risk that it may not be able to obtain the funds need to cover its seasonal peaks.

Under the aggressive funding strategy, the firm funds its seasonal requirements with short-term debt and its permanent requirements with the long-term debt. Under a conservative funding strategy, the firm funds both its seasonal and its permanent requirement with long-term debt.

Clearly, the aggressive strategy's heavy reliance on the short-term financing makes it riskier than the conservative strategy because of interest rate swings and possible difficulties in obtaining needed short-term financing quickly when seasonal peaks occur. The conservative strategy avoids these risks through the locked-in interest rate and long-term financing, but it is more costly because of the negative spread between the earnings rate on surplus fund, and the cost of the long-term funds that create the surplus. Where the firm operates between the extremes of the aggressive and conservative seasonal funding strategies depends on management's response towards risk and the strength of its banking relationships.

Task In respect of a firm, on an average, accounts receivable are collected after 80 days, inventories have an average of 100 days and accounts payable are paid approximately 60 days after they arise. Calculate the firm's cash cycle and cash turnover assuming a 360-day year.

Notes

Strategies for managing the cash conversion cycle:

1. Turnover inventory as quickly as possible without stockouts that will result in lost sales.
2. Collect accounts receivable as quickly as possible without losing sales from high-pressure collection techniques.
3. Manage mail, processing and clearing time to reduce them when collecting from customers and to increase them when paying suppliers.
4. Pay accounts payable as slowly as possible without damaging the firm's credit rating.

Self Assessment

Fill in the blanks:

13. Accounts payable reduce the number of days a firm's resources are tied up in …… cycle.
14. Under a ……..funding strategy, the firm funds both its seasonal and its permanent requirement with long-term debt.

13.6 Management of Marketable Securities

Management of marketable securities is an integral part of investment in 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 same short-term securities, which can be liquidated when need for cash is felt. The selection of securities should be guided by three principles:

- ***Safety:*** Returns and risks go hand in hand. As the objective of this investment is ensuring liquidity, minimum risk is the criterion for selection.
- ***Maturity:*** Matching of maturing 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 paper of corporates are other attractive means of parking surplus funds for companies along with deposits with sister concerns or associate companies.

Example: (On cash budget)

1. The following results are expected by XYZ Ltd. By quarter next year in thousands of rupees:

	Quarter			
	1	**2**	**3**	**4**
Sales	7,500	10,500	18,000	10,500
Cash Payments				
Production Costs	7,000	10,000	8,000	8,500
Selling, administration and other costs	1,000	2,000	2,900	1,600
Purchase of plant and other fixed assets	100	1100	2100	2100

Notes

Debtors at the end of the quarter are one-third of sales of the quarter. The opening balance of debtors is ₹ 30,00,000. Cash on hand at the beginning of the year is ₹ 650,000 and the desired maximum balance is ₹ 500,000. Borrowings are made at the beginning of the quarters in which the need will occur in multiples of ₹ 10,000 and are repaid at the end of quarters. Interest charges may be ignored. You are required to prepare:

(a) A cash budget by quarters – for the year and

(b) State the amount of loan outstanding at the end of the year

Solution: Cash budget next year (quarter wise) ₹ (000)

	Quarter				
	1	**2**	**3**	**4**	**Total**
(A) Cash inflows					
Collection from debtors					
1. From prior quarter (1/3 of sales)	3000	2500	3500	6000	15000
2. From current quarter (2/3 of sales)	5000	7000	12000	7000	31000
	8000	9500	15500	13000	46000
(B) Cash outflows					
1. Production costs	7000	10000	8000	8500	33500
2. Selling, admn. and other costs	1000	2000	2900	1600	7500
3. Plant and other fixed assets purchased	100	1100	2100	2100	5400
Total cash payments	8100	13100	13000	12200	46400
(C) Surplus/(deficiency)	**(100)**	**(3600)**	**2500**	**800**	**(400)**
1. Beginning balance	650	550	500	500	650
2. Ending balance (indicated)	550	(3050)	3000	1300	250
Borrowing required (deficiency + min. cash reqd.)		3550			3550

	Quarter				
	1	**2**	**3**	**4**	**Total**
Repayment mode (balance – min. cash reqd.)			(2500)	(800)	(3300)
Ending balance	550	500	500	500	500

Loan outstanding is ₹ 35,50,000 – ₹ 33,00,000 = ₹ 250,000

Example: A firm uses a continuous billing system that results in an average daily receipt of ₹ 40,00,000. It is contemplating the institution of concentration banking, instead of the current system of centralized billing and collection. It is estimated that such a system would reduce the collection period of accounts receivable by 2 days.

Concentration banking would cost ₹ 75,000 annually and 8% can be earned by the firm or its investments. It is also found that a lock-box system can reduce its overall collection time by four days and could cost annually ₹ 120,000.

Notes

1. How much cash would be released with the concentration banking system?
2. How much money can be saved due to reduction in the collection period by 2 days? Should the firm institute the concentration banking system?
3. How much cash would be freed by lock-box system?
4. Between concentration banking and lock-box system, which is better?

Solution:

1. Cash released by the concentration banking system = ₹ 40,00,000 × 2 days = ₹ 80,00,000
2. Savings = 8% × ₹ 80,00,000 = ₹ 640,000. The firm should institute the concentration banking system. It costs only ₹ 75,000 while the savings expected are ₹ 640,000.
3. Cash released by the lock-box system = ₹ 40,00,000 × 4 days = ₹ 160,00,000
4. Savings in lock box system 8% × ₹ 160,00,000 = ₹ 12,80,000
5. Lock-box system is better. Its net savings ₹ 11,60,000

   (₹ 1280,000 – ₹ 120,000) are higher than that of concentration banking.

Example: Assume, a firm which purchases raw materials on credit is required by the credit terms to make payments within 60 days. The firm's experience has been that it takes on an average, 35 days to pay its accounts payable and 70 days to collect its accounts receivable. Moreover, 85 days elapse between the purchase of raw materials and the sale of finished goods, that is to say, the average age of a firm's inventory is 85 days. What is the firm's cash cycle? Also estimate the cash turnover.

Solution: The cash cycle of the firm can be calculated by finding the average number of days that elapses between the cash outflows associated with paying accounts payable and the cash inflows associated with collecting accounts receivable, i.e.,

1. Cash cycle =85 days +70 days – 35 days =120 days
2. Cash Turnover = the assumed number of days in a year divided by the cash cycle =365/120=3.04

Example: The under mentioned facts are available:

1. Cash turnover rate 4.5
2. Annual cash outflow ₹175,000
3. Accounts payable can be stretched by 20 days

What would be the effect of stretching accounts payable on the minimum operating cash requirement?

Assuming the firm can earn 8% on its investments, what would be the saving on cost?

Solution: Cash turnover 4.5 i.e., 360/4.5 i.e., 80 days and annual cash outflow ₹175,000 hence cash requirement= 175000/4.5 =₹38,889.

With accounts payable stretching by 20 days, cash cycle will be 80+20 days i.e., 100 days, cash turnover 360/60 =6 times, hence cash requirement will change to ₹175,000/6 = ₹29,167.

Cash requirement will reduce by ₹38,889 – ₹29,167 =9,722 and savings in cost will be 8% on 9722 = ₹ 778.

Self Assessment

Notes

Fill in the blanks:

15. The selection of securities should be guided by three principles which are……., Maturity and Marketability.

16. ……refers to the convenience, speed and cost at which a security can be converted into cash.

Case Study

Case: Bajaj Electronics – Cash Forecasting

This case tests the reader's ability to develop a basic cash forecast for a firm and prepare a recommendation for backup financing over a period of 12 months.

A leading producer of telecommunications components and a major contender in shorter antennas is Bajaj Electronics Company. Bajaj's business has grown tremendously in recent years despite increased competition. The primary reasons for increased growth are technological advancement that have expanded production capacity, an aggressive marketing effort, and a reputation for quality products and excellent service.

Loofer the financial analyst for the company, has been assigned the task of preparing a quarterly cash forecast for the next fiscal year. After checking with marketing, he was given a monthly breakdown of actual sales for last month and the current month and the current month and a forecast for the next 12 months. These are given in Table 1 and reflect the somewhat seasonal nature of the firm's marketing activities.

Table 1: Actual and Forecast Sales from Marketing

Month	Actual Credit Sales	Forecast Sales
November	$ 4,338,000	
December	5,204,000	
January		$ 4,600,000
February		4,500,000
March		4,500,000
April		52,00, 000
May		5, 000, 000
June		4,700, 000
July		6, 000, 000
August		6,000,000
September		5,800,000
October		4,500,000
November		4,600,000
December		4,600,000

From the accounting department, Loofer obtained information on the historical mix of sales and collection information. During the first half of the year, credit sales generally made up about 80 per cent of all sales. In the second half, this dropped to 75 per cent. With

Contd...

Notes

respect to the credit sales, collection patterns varied seasonally. This information is contained in Table 2. Once again, the collection pattern is also seasonal Note, however, that the collections do not total to 100 per cent of credit sales. This is the case because the firm allows a margin for bad debts and unexpected collection costs.

The firm follows a unique and highly controlled system for its trade payables. Each month during the first half of the year, the accounts payable section pays suppliers cash equal to 50 per cent of the monthly sales. During the second half of the year, this rises to 55 per cent. Over a full year, this pattern of payment seems to be adequate to pay all bills. At times, suppliers are pressing for more payments and some maneuvering is needed. Still, this policy assists the firm's cash management during the busy third quarter and will be followed next year.

Cash operating expenses are paid as they occur. During the first and fourth quarters, they are estimated at 50 per cent of sales. During the second and third quarters, they rise to 55 per cent of sales.

Loofer knows that the firm includes the impact of interest and taxes in its operating cash flow forecasts. The levels of such debt, along with the forecasted average interest rate for each month, are given in Table 3. Interest will be calculated to reflect changes in debt levels.

The firm pays estimated tax payments monthly at a 35 per cent rate. It uses a cost of goods sold estimate at 50 per cent of sales, not including depreciation. Loofer assumes that monthly depreciation for the next year will be $ 185,000.

Table 2: Collection Pattern of Receivables

Months	Percent of Credit Sales		
	Collected in Same Month	Collected One Month Later	Collected Two Months Later
November	0.20		
December	0.60	0.15	
January	0.20	0.60	0.15
February	0.30	0.60	0.50
March	0.25	0.60	0.10
April	0.25	0.60	0.10
May	0.15	0.60	0.20
June	0.20	0.60	0.15
July	0.10	0.60	0.25
August	0.20	0.60	0.15
September	0.15	0.60	0.20
October	0.20	0.60	0.15
November	0.15	0.60	
December	0.10		

Contd...

Notes

Table 3: Debt Forecast, Last Day of Each Month, and Average Monthly Interest Rates

Months	Interest-Bearing Debt (,000s)	Interest Rate
December	1600	
January	1800	0.120
February	1500	0.100
March	1600	0.110
April	1500	0.100
May	1600	0.110
June	1500	0.100
July	1500	0.090
August	1400	0.080
September	1300	0.090
October	1400	0.080
November	1200	0.095
December	1600	0.095

The final information for the forecast involves establishing a safety level. The firm requires cash or equivalents equal to 20 per cent of the monthly cash operating expenses. The firm began the year with $6,10,000 in the form of cash and equivalents.

Question

Prepare a statement showing cash forecast for the next 12 months, and in case where firm needs additional cash, draw the recommendation with the tune of credit that must be arranged from bank.

13.7 Summary

- The four motives for holding cash are Transaction need, Speculative needs, Precautionary needs and Compensation motive.
- The exact nature of a cash management system would depend upon the organizational structure of an enterprise.
- Cash budget represents cash requirements of business during the budget period.
- Two very important methods to speed up collection process are Concentrating banking and Lock-box system.
- The financial manager's concern is with the available balance and not with the company's ledger balance.
- According to William J Baumol's Economic Order Quantity model, optimum cash level is that level of cash where the carrying costs and transaction costs are the maximum.
- According to Miller–Orr Cash Management model, the net cash flow is completely stochastic.
- Treasury management is the efficient management of liquidity and financial risk in business.
- The operating cycle less the average payment period is referred as the Cash Conversion Cycle. It represents the amount of time the firms' resources are tied up.

Notes

- Management of marketable securities is an integral part of investment in cash. The selection of securities should be guided by three principles which are Safety, Maturity and Marketability.

13.8 Keywords

Cash: It is one of the components of current assets and a medium of exchange for the purpose of transactions.

Cash Budget: It is a statement showing the estimated cash inflows and cash outflows over a planning period.

Conversion Costs: It is the costs that are associated with the sales of marketable security.

Float: It is the amount of the money tied up in cheques that have been written but not yet collected.

Optimal Cash Balance: It is that cash balance where the firm's opportunity cost equals transactions cost and the total cost is minimum.

13.9 Review Questions

1. Explain the Baumol's Model of Cash Management.
2. Write short notes on Lock box system and Concentration banking.
3. What is the difference between the firm's operating cycle and its cash conversion cycle?
4. Why it is helpful to divide the funding needs of a seasonal business into its permanent and seasonal funding requirements when developing a funding strategy?
5. What are the benefits, costs and risks of an aggressive funding strategy and of a conservative funding strategy? Under which strategy is the borrowing often in excess of the actual need?
6. "Cash budgeting or short-term cash forecasting (budgeting) is the principal tool of cash management." Discuss.
7. "Efficient cash management will aim at maximizing the cash inflows and slowing cash outflows". Discuss.
8. Briefly discuss the various avenues or opportunities available to the companies to park their surplus funds for a short-term.
9. Analyse the importance of the preparation of the cash budget for the corporates.
10. "Management of cash flows plays a very important role in cash management". Discuss.

Answers: Self Assessment

1.	Speculative	2.	organizational structure	3.	Cash budget
4.	cash flow	5.	Lock-box	6.	concentration banking
7.	ledger	8.	net float	9.	carrying
10.	transaction	11.	surplus	12.	currency
13.	operating	14.	conservative	15.	Safety
16.	Marketability				

13.10 Further Readings

Notes

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Unit 14: Management of Surplus & Dividend Policy

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Objectives

After studying this unit, you will be able to:

- Discuss the connotation of management of profits
- Describe the various aspects of dividend policy
- Explain the theories of dividend
- Recognize the corporate dividend behaviour

Introduction

Finance is the life-blood of business, without which a firm cannot promote, maintain and expand and achieve its predetermined objective. Whether it is big, medium or small it needs finance.

Notes

Profit is the primary motivating force for any economic activity, a business enterprise essentially being an economic organization, it has to maximise the welfare of its stakeholders. To this end, the business undertaking has to earn profit from its operations. Profit is the excess of revenue over expenses on conducting operations. In fact, profits are useful intermediate beacon towards which a firm's capital should be directed. In this connection McAlpine rightly remarked that profit cannot be ignored since it is both, a measure of the success of business and the means of its survival and growth. To quote Bradly, "if an enterprise fails to make profit, capital invested is eroded and if this situations, prolongs the enterprise ultimately ceases to exist." A well organised profit planning programme will help towards maintaining a level of profit, which will ensure the concentration of the business and fulfillment of other responsibilities. Certainly, profit growth coupled with high level of profit and the ability to maintain reasonable profit will help towards:

1. Ensuring that shareholders receive an adequate dividend;
2. Preserving the assets worth of the business;
3. Generating a sufficient cash flow out of profits to provide capital for expansion; and
4. Providing funds for research, and development of new and improved products to replace the existing products before they decline.

14.1 Management of Profits

From the point of view of dividend decision it is better to call management of profits as management of earnings. Earnings mean net earnings available to equity shareholders from where a firm actually declares dividends or retain profits for financing of investment opportunities.

Net earnings = Operating Profit – (Interest + Tax + Preference Dividend)

Management of earnings means, how the earnings of a firm are determined and how they are utilised or appropriated or allocated or distributed. In other words, how the business firm apportions their earnings is between dividends and retentions for financing of investment opportunities. Retention of earning's also known as plough back of profits. Management of earnings is an important finance activity of a business undertaking. Since proper management of earnings helps to maximise shareholder's wealth. Particularly in Joint Stock companies where owners are different from the management team, who are selected/appointed by owners. Usually management team or Board of Directors (BoDs) does not distribute the total net earnings to the shareholders as dividends. They may retain a part of it for financing of investment opportunities or expansion programmes by keeping future growth of the firm in mind. Management of earnings policy must maximise value of the firm, thereby maximise benefits to its owners. On the other hand improper retained earnings and absence of financial control measures are the indicators of inefficient management of earnings that may not help to maximise value of the firm, but they may lead to the liquidation of the company.

When a corporation makes a profit, it can spend that profit in two ways:

1. Return the profits to stockholders by way of dividends, share buy-backs or bonus issues;
2. Use the money to increase the profitability of the company

Example: A company makes a profit of ₹100. It can pay this entire amount to stockholders who can then use that money as they think fit—spend on consumer items, make further investments, whatever. Or the company can use all that profit to invest in the business with a view to increasing profits in future years. Or the company can do a bit of both.

Notes

Did u know? **What is surplus?**

Surplus is the amount of profit remaining after tax and distribution to stockholders that is retained in a business and used as a reserve or as a means of financing expansion or investment.

When sizing up a company's fundamentals, investors need to look at how much capital is kept from shareholders. Making profits for shareholders ought to be the main objective for a listed company and, as such, investors tend to pay most attention to reported profits. Sure, profits are important. But what the company does with that money is equally important.

Typically, a portion of the profit is distributed to shareholders in the form of a dividend. What gets left over is called retained earnings or retained capital. Savvy investors should look closely at how a company puts retained capital to use and generates a return on it.

It is sometimes rather loosely stated in management texts and business journals that 'retained profits are reinvested in the assets of the company' or that 'profits are ploughed back', thus giving management a reasonably cheap and easily accessible source of funds to finance growth. These 'internally generated funds' are easily accessible provided a company makes good profits, because directors can, within limits, choose dividend levels. They can choose to retain and use (reinvest) the resulting increase in company assets. The funds are also cheap because there are no costs involved in issuing more shares and no borrowing costs. What this really means is that the managers of profitable businesses have more assets to use in productive activities.

Sometimes companies will convert part of retained profits into permanent share capital by issuing bonus shares to existing shareholders, free of any cash contribution (because the increase in assets from profit making has already been received). From a company viewpoint bonus shares have no effect on financing or investing activities

The ability to use retained earnings wisely is a sign of good company management. If the company management cannot do any better with earnings than he can, then he is better off if the company pays him the full amount in dividends.

In broad terms, capital retained is used to maintain existing operations or to increase sales and profits by growing the business.

Some companies need large amounts of new capital just to keep running. Others, however, can use the capital to grow. When you invest in a company, you should make it your priority to know how much capital the company appears to need and whether management has a track record of providing shareholders with a good return on that capital.

Fortunately, for companies with at least several years of historical performance, there is a fairly simple way to gauge how well management employs retained capital. Simply compare the total amount of profit per share retained by a company over a given period of time against the change in profit per share over that same period of time.

Caution When evaluating the return on retained earnings, you need to determine whether it's worth it for a company to keep its profits. If a company reinvests retained capital and doesn't enjoy significant growth, investors would probably be better served if the board of directors declared a dividend.

Another way to evaluate the effectiveness of management in its use of retained capital is to measure how much market value has been added by the company's retention of capital. Suppose shares of Company A were trading at ₹10 in 1993, and in 2003 they traded at ₹20. Thus,

Notes

₹5.50 per share of retained capital produced ₹10 per share of increased market value. In other words, for every ₹1 retained by management, ₹1.82 (₹10 divided by ₹5.50) of market value was created. Impressive market value gains mean that investors can trust management to extract value from capital retained by the business.

Managing and improving your cash flow should result in a cash surplus for your business. A cash surplus is the cash that exceeds the cash required for day-to-day operations. How you handle your cash surplus is just as important as the management of money into and out of your cash flow cycle.

Notes Two of the most common uses of extra cash are:

1. Paying down your debt
2. Investing the cash surplus

Like so many other things you do for your business, deciding where to use your cash surplus requires some planning and your better judgment.

1. ***Paying Down Debt:*** Paying down any debt you may have is generally the first option considered when deciding what to do with a cash surplus. Rightfully so because a short-term investment of your cash surplus is not likely to yield a return equal to or greater than the rate of interest on any of your debt. It doesn't make any sense to invest a cash surplus at 5 percent when you can pay down a bank loan that is charging interest at 12 percent. However, the decision to automatically pay down debt may not be correct in all cases.

   One of the key advantages of managing your cash flow is the ability to predict the future cash requirements for your business. That is, it should help you determine when your business may need to rely on external financing as a source of cash. The need for external financing may be the result of expanding your business, purchasing new property or equipment, or just getting you through a normal seasonal down period.

   Whatever the reason, preparing a cash flow budget is the best way of predicting these future needs for cash. With at least some indication of your future cash needs, you can then make some decisions regarding the best way to finance those needs.

   Example: You may feel that interest rates are relatively low at this time and that you look for them to rise in the near future. Therefore, instead of using your cash surplus to pay off a two-year loan at 10.5 percent, it may be beneficial to invest the surplus temporarily, and avoid a much higher interest rate on a bank loan one year from now.

2. ***Investing the Cash Surplus:*** When investing a cash surplus, it's only natural to seek the highest rate of return for your investment. Four factors must be considered when making your investment decisions:

   (a) Risk

   (b) Liquidity

   (c) Maturity

   (d) Yield

   Each factor plays an important role in determining the rate of return you receive on your invested cash surplus. These factors can also help you determine how much to invest and when to invest your surplus.

Notes

There are many investment opportunities available for your cash surplus. You must consider the advantages and disadvantages as well as the levels of risk, maturity, liquidity, and the yields of each of your investment opportunities. The following are just a few of the investment opportunities you may have:

(a) Checking accounts with interest

(b) Sweep accounts

(c) Treasury bills and notes

(d) Certificates of deposit (CDs) and money market funds

Risk in Investing Surplus

The investment of your cash surplus should never be speculative - that is, high risk. As in most businesses, your cash surplus may only be a temporary surplus of cash inflows over your cash outflows. Any permanent losses resulting from a high risk investment could be devastating, even to the point of making you unable to continue your business.

The level of risk you are willing to accept ultimately determines the yield of your investment. A higher level of risk will generally provide you with a higher yield. On the other hand, a low level of risk will result in a lower yield on your investment. In some cases, you choose to invest in an investment with a higher level of risk to gain a higher yield. But as a rule, a conservative approach to the level of risk is recommended when investing your cash surplus.

Self Assessment

Fill in the blanks:

1. ……...is the amount of profit remaining after tax and distribution to stockholders that is retained in a business.
2. The ability to use retained earnings wisely is a sign of …….company management.
3. ……mean net earnings available to equity shareholders from where a firm actually declares dividends.

14.2 Dividend Policy

Since, management of earnings means allocation of earnings among dividends and plough of profits. The term 'dividend' refers to that portion of company's net earnings that is paid out to the equity shareholders (not for preference shareholders, since they are entitled to have a fixed rate of dividend). Dividend policy of a firm decides the portion of earnings is to be paid as dividends to ordinary shareholders and the portion that is ploughed back in the firm for investment purpose. The total net earnings of equity may be paid as dividends (100% dividend payout ratio), which may consequently result in slower growth and lower market price or a part of net earnings may be paid as dividends, higher capital gains and higher market price. When a company uses a part of its net earnings for dividend payments then, the remaining earnings are retained. Thus, there is an inverse relationship between retained earnings and payment of cash dividend-the larger the cash dividends and lesser the retention, smaller the cash dividends and larger retentions. Hence, the alternative use of net earnings or net profit dividends and retained earnings are competitive and conflicting.

Dividend decision affects the value of the firm. The cash available for the payment of dividends is affected by the firm's investment decision, and financing decision. A decision, which is related

Notes

to investment leads to less cash available for payment of dividends. Thus, there is a relation between investment decision and financing decision. Distribution of net earnings between dividends and retention would obviously affect owners' wealth. Now the company is in dilemma which alternative is consistent to maximise shareholders wealth. The firm has to pay dividends to shareholders if dividends lead to the maximisation of wealth for them, otherwise the company should retain them for financing profitable investment opportunities.

14.2.1 Types of Dividend Policies

The firm's dividend policy is formulated with two basic objectives in mind – providing for sufficient financing and maximizing the wealth of the firm's shareholders. Three of the more commonly used dividend policies are:

1. Constant Payout Ratio Dividend Policy
2. Regular Dividend Policy
3. Low Regular and Extra-dividend Policy

Constant Payout Ratio Dividend Policy

With constant target payout ratio, a firm pays a constant percentage of net earnings as dividend to the shareholders. In other words, a stable dividend payout ratio implies that the percentage of earnings paid out each year is fixed. Accordingly, dividends would fluctuate proportionately with earnings and are likely to be highly volatile in the wake of wide fluctuations in the earnings of the company. As a result, when earnings of the firm decline substantially, or there are a loss in a given period, the dividends according to the target payout ratio, would be low or nil.

Example: If a firm has a policy of 50% target payout, its dividends will range between ₹ 5 and zero per share, if the earnings per share are ₹ 10 per share and zero (or less) per share respectively.

Did u know? **What is payout?**

The term payout refers to the ratio of dividend to earnings or the percentage of share of earnings used to pay dividend.

Regular Dividend Policy

The regular dividend policy is based on the concept of a fixed rupee dividend in each period. This policy provides the owners with positive information thereby minimizing the uncertainty. Another variant of this policy is to increase the regular dividend once a proven increase in earnings has occurred.

Often, a regular dividend policy is built around a target dividend payout ratio but without letting the dividends fluctuate, it pays a stated rupee dividend and adjusts that dividend towards the target payout as proven earnings happen.

Low Regular and Extra Dividend Policy

Some firms have the policy of low regular and extra dividend, meaning the firms keep the regular earnings as low as possible which is supplemented by additional dividend when earnings

Notes

are higher than normal in a given period. By terming the additional dividend as extra dividend, the firms avoid giving shareholders false hopes. This policy is especially common among companies that experience cyclical shifts in earnings.

14.2.2 Factors affecting Dividend Decisions

Most investors have two forms of return from the purchase of common shares. These are:

1. ***Capital gains:*** The investor expects an increase in the market value of the common shares over a period of time.

   Example: If the stock is purchased at ₹ 40 and sold for ₹ 60, the investor will realize a capital gain of ₹ 20. Capital gain may be defined as the profit resulting from the sale of capital investments, in this case common shares.

2. ***Dividends:*** The investor expects at some point, a distribution of the firm's earnings. From mature and stable organizations, most investors expect regular dividends to be declared and paid on the common shares. This expectation takes priority over the desire to retain earnings to finance expansion and growth.

The three major factors explain the investor's priority of dividends over capital gains:

1. ***Reduction of uncertainty:*** The promise of future capital gains or a future distribution of earnings, involves more uncertainty than a distribution of current earnings.
2. ***Indication of strength:*** The declaration and payment of cash dividend carries some sort of confidence that the firm is reasonably strong and healthy.
3. ***Need for current income:*** Many shareholders require a regular flow of income through their investments, for their day-to-day expenses.

Constraints on paying dividends from the firm's point of view: Though most firms recognize the investors demand for dividends, several factors may restrict the firm's ability to declare and pay dividends. These are:

1. ***Insufficient cash:*** Although a firm may have earned enough income to declare dividends but may not have sufficient cash to pay the dividends. The firm's liquid funds may have been tied up in receivables or inventory or may be short on liquid funds because of commitment to fixed assets.
2. ***Contractual restriction:*** Like a bond indenture that restricts the dividend pay out to 20% of earnings during the tenure of the bond or the firm, agreeing as a part of a contract with a creditor to restrict dividend payments.
3. ***Legal restrictions:*** Occasionally, a firm will be legally restricted from declaring and paying dividends unless a certain portion of current profits is ploughed back into business by way of retained earnings. Companies (Declaration of Dividend out of Reserves) Rules 1975 provides for such restrictions. Further dividends can be paid only out of the profits earned during the financial year after providing for depreciation (Sec. 205 of the Companies Act, 1956).

Importance of Stability of Dividends

A number of arguments can be given to underline the importance of steady dividend payments including:

1. ***Perception of stability:*** When a firm pays regular dividend it is considered as a sign of continued normal operations. On the other hand, a reduction in dividend payment will be

Notes

treated as a sign of impending trouble for the company. Many investors will sell their shares, without checking further and this set up pressure will result in the loss of sentiment in the market and decline in the market price.

2. ***Preference of investors:*** The common shareholders of mature firms generally prefer to receive steady dividends.

3. ***Dividend decisions as a routine:*** By establishing a stable dividend policy, the board of directors avoids a lengthy discussion on dividend levels.

4. ***Flexibility of the extra dividend:*** With a steady dividend policy, the firm can flexibly handle period temporarily high earnings, by giving a slightly large distribution of earnings without raising the expectation of investors.

5. ***Desire for current income by the shareholders:*** Desire for current income by some investors, such as, retired persons and widows. Obviously, such group of investors may be willing to pay a higher share price to avoid the inconvenience of erratic dividend payment, which disrupts their budgeting. They would place positive utility on stable dividends.

Self Assessment

Fill in the blanks:

4. The regular dividend policy is based on the concept of a ……..dividend in each period.

5. A ……ratio implies that the percentage of earnings paid out each year is fixed.

6. When a firm pays regular dividend it is considered as a sign of continued ……. operations.

14.3 Theories of Dividend Decisions

A few models, which studied the relationship between the dividend policy and the equity returns, are given below:

14.3.1 Traditional Approach

The traditional approach to the dividend policy was given by Mr. B Graham and D.L. Dodd and it lays clear relationship between dividends and the stock market prices. According to this approach, the stock value responds positively to higher dividends and negatively with low dividends.

The following expression expresses the relationship by using a multiplier:

$$P = m (D + E/3)$$

Where, P = Market Price M = Multiplier

D = Dividend per share E = Earnings per share

The traditional approach, further states that the P/E ratio (Price/Earnings Ratio) are directly related to the dividend payout ratio i.e., a high dividend payout ratio will increase the P/E ratio and vice versa.

Notes

Limitations

A firm's share price may rise even in case of low pay out ratio if its earnings are increasing. Here the capital gains for the investor will be higher than the cash dividends. Similarly, for a firm having a high dividend payout ratio with a slow growth rate, there will be a negative impact on the market price (because of lower earnings). In addition, some investors may prefer cash dividends to the uncertain capital gains that may arise in future.

14.3.2 Walter's Model

Walter's Model supports the doctrine that dividends are relevant. The investment policy of a firm cannot be separated from its dividend policy and both are, according to Walter, interlinked. The choice of an appropriate dividend policy affects the value of an enterprise.

The relationship between dividend and share price on the basis of Walter's formula is shown below:

$$V_c = \frac{D + R_a / R_c (E - D)}{R_c}$$

Where,

V_c = Market value of the ordinary shares of the company

R_a = Actual capitalization rate

R_c = Normal capitalization rate expected by the investors

E = Earnings per share

D = Dividend per share

Analyzing the Walter Formula:

We know that the value of share =

$$\frac{\text{EPS (Earning per share)}}{\text{Capitalization rate}} = \frac{\text{Divident} + \text{Retained Earnings}}{R_a}$$

The Walter formula gives an added weight to the retained earning portion of the earnings formula. The factor $\frac{R_a}{R_c}$ is placed in front of retained earnings to change its weighted value under three different situations as follows:

1. If R_a/R_c is greater than I i.e., the firms earnings are more than the norm. In this situation we want the firm to retain its earnings since other alternative investment offer a lower return than the firm is about to secure.

   Example: A firm has EPS ₹ 5 and pay dividend of ₹ 2. Its actual capitalization rate is 15% and normal capitalization rate is 10%. What is the value of the firm using capitalization earnings and Walter formula?

   Capitalization earnings = Value = ₹ 5/10 % = ₹ 50

   Walter formula value = $2 + 2 + \frac{15}{10} \times (5 - 2) = \frac{6.5}{10\%}$ = ₹ 65

Notes

2. R_a/R_c is equal to I, when the actual and normal capitalization rates are identical. In this case, the retained earnings have the same weighted value as dividends and the Walter Formula gives the same value as the Capitalization Earnings formula.

3. R_a/R_c is less than I i.e., retained earnings have a lower weight than dividends. Thus less the firm retain, the higher its value. In the above example, if the capitalization (actual) is 5%.

Value of the firm Capitalization of earnings 5/10% = ₹ 50

$$\text{Value of the Firm Walter formula} = 2 + 5/10 \times \frac{(5-2)}{10\%} = \frac{3.5}{10\%} = ₹\ 35$$

Assumption of the Walter Model

1. Retained earnings are the only source of finance available to the firm, with no outside debt or additional equity used.

2. R_a and R_c are assumed to be constant and thus additional investments made by the firm will not change its risk and return.

Profiles

1. Firm has an indefinite life.

2. For a given value of the firm, the dividend per share and the earnings per share remain constant.

Limitations of the Walter Model

1. Exclusive financing by retained earnings make the model suitable only for all equity firms.

2. The assumption that the return on investment remains constant will not be true for firms making high investments.

3. It ignores the business risk of the firm, which has a direct impact on the value of the firm.

Example: To illustrate approaches to dividend decisions using Walter Model

Let us consider a firm with ₹ 4 earnings per share and ₹ 3 current dividend. The firm is currently selling for ₹ 22 per share and thus has an actual capitalization rate of 4/22 or 18%. The normal capitalization rate for the industry is 12 per cent. The firm has a need for cash and is considering lowering the dividend to ₹ 2 per share. What effect would this have on the value of common share by using Walter Model?

₹ 3 dividend $\quad \dfrac{3 + 18/12 \times 1}{.12} = \dfrac{4.5}{.12} = ₹\ 37.5$

₹ 2 dividend $\quad \dfrac{2 + 18/12 \times 2}{.12} = \dfrac{5}{.12} = ₹\ 41.67$

14.3.3 Gordon's Dividend Capitalization Model

Another model that has given importance to dividend policy of the firm is the Gordon Model. Gordon Model assumes that future dividends are the sole determinant of the intrinsic value of the common shares.

Notes

The model may be written:

$$\text{Value of the share} = \frac{\text{Div. Curr.}}{CR_{norm} - (CR_{act})(\%RE)}$$

Where Div. Curr = Current Dividend in rupees (annual basis)

CR_{norm} = Capitalization rate demanded by the market for the stock of the type.

CR_{act} = Actual capitalization rate based on the firms current earnings (provided they are relatively normal) and current market price.

%RE = Percentage of Future earnings, the firm is likely to retain.

The dividend growth model shows the value of a share as the shares current dividend divided by the amount that the demanded profit exceeded the rate of growth in the dividend, stated graphically. The model shows value as:

$$\text{Value of the share} = \frac{\text{Current dividend}}{\text{Demanded after tax profit} > \text{dividend growth}}$$

Example: If a firm has a 10% actual capitalization rate, a dividend payout of 40% and declares a ₹ 1 dividend in 2005. What is the growth rate? What is the likely stream of dividends through 2009? If the firm is in industry with a 12% normal capitalization rate, what is the intrinsic value using the dividend growth model?

Solution: Multiplying the actual capitalization rate by the percentage of retained earnings gives the growth rate in dividend per share, assuming no change in dividend payout.

The firm retains a 60% share of the 10% post-tax profits for a 6% growth rate. The stream of dividend payments at a 6% growth rate is as follows:

Year	2005	2006	2007	2008	2009
Dividend factor		1.06	$(1.06)^2$	$(1.06)^3$	$(1.06)^4$
Dividend	₹ 1	₹ 1.06	1.12	1.19	1.26

$$\text{Value of the share} = \frac{1}{12\% - (10\%)(60\%)} = \frac{1}{0.06} = ₹\ 16.67$$

Factors Incorporated in the Dividend Growth Model

1. ***Restriction of the shareholders' return to a single variable:*** In this model the income factor is limited to the current dividend earnings retained in the firm are part of the growth factor that will operate to increase the current dividend, but only the dividend and its expected increases are considered as a return.

2. ***Inclusion of two capitalization rates:***

   (a) *Normal Capitalization Rate (CRnorm) i.e., reciprocal of PE ratio:* If the firm is not able to achieve such a return at the existing market price, shareholders will sell their shares, thus depressing the market price and raising the rate of return.

   (b) *Actual Capitalization Rate:* The firm's actual capitalization rate is the relationship of its actual EPS to the market price of its stock. This is an important factor influencing growth. A firm with higher profits will have more funds to retain and hence more money to finance growth, as compared with firms with lower profits.

Notes

3. ***Inclusion of a growth factor:*** In common shares valuation, we are primarily concerned with firm's growth financed from retained earnings. We eliminate the sources of funds for growth:

   (a) Use of debt or other fixed return securities.

   (b) Issuing additional common shares.

Analyzing the Dividend Growth Model

There are three possible situations. To do this, let us consider a company with EPS of ₹ 2 and actual capitalization of 10%.

1. ***Normal capitalization rate less than actual capitalization rate:*** The shareholder in this case will gain more by investing in the company. For example, he may be expecting an 8% rate and the firm is actually achieving 10%. The shareholders want the firm to retain the earnings and achieve 10% return on them from similar investments. Thus, he would expect that raising the growth rate of a highly profitable firm. The intrinsic value at different payout ratios are worked out as below:

$$30\% \text{ Div. Payout} = \frac{.6}{8\% - (10\% \times 70\%)} = \frac{.6}{1\%} = ₹\ 60$$

$$50\% \text{ Div. Payout} = \frac{1}{8\% - (10\% \times 50\%)} = \frac{1}{3\%} = ₹\ 33.33$$

$$70\% \text{ Div. Payout} = \frac{1.4}{8\% - (10\% \times 30\%)} = \frac{1.4}{5\%} = ₹\ 28$$

$$100\% \text{ Div. Payout} = \frac{2}{8\% - (10\% \times 0\%)} = \frac{2}{8\%} = ₹\ 25$$

   The intrinsic value drops from ₹ 60 at a 30% dividend payout to ₹ 25 at 100% payout.

2. ***Normal capitalization rate equal to capitalisation rate:*** In this case, the firm is doing about as well as expected and the shareholder probably does not care about the level of dividends. Intrinsic value will be ₹ 20 at all payout levels.

3. ***Normal capitalisation rate more than actual capitalization rate:*** In this situation, the firm is not doing as well as expected. It is expected that the intrinsic value to rise if the firm increased its dividend payout. Since the shareholders would like to have cash to invest at higher return elsewhere. The intrinsic value at different payout ratios are worked out as below:

$$30\% \text{ Div. Payout} = \frac{.6}{12\% - (10\% \times 70\%)} = \frac{.6}{5\%} = ₹\ 12$$

$$50\% \text{ Div. Payout} = \frac{1}{12\% - (10\% \times 50\%)} = \frac{1}{7\%} = ₹\ 14.3$$

$$70\% \text{ Div. Payout} = \frac{1.4}{12\% - (10\% \times 30\%)} = \frac{1.4}{9\%} = ₹\ 15.55$$

$$100\% \text{ Div. Payout} = \frac{2}{12\% - (10\% \times 0\%)} = \frac{2}{12\%} = ₹\ 16.67$$

Notes

The intrinsic value increases from ₹ 12 to ₹ 16.67 when the payout ratio is raised from 30% to 100%.

14.3.4 Miller and Modigliani Model

The irrelevance of dividends is provided by the MM Hypothesis. MM maintains that dividend policy has no effect on the share prices of the firm. What matters, according to them, is the investment policy through which the firm can increase its earnings and thereby the value of the firm given the investment decision of the firm, the dividend decision – splitting the earnings into packages of retentions and dividends – is a matter of detail and does not matter.

Under conditions of perfect capital markets, rational investors, absence of tax discrimination between dividend income and capital appreciation, given the firm's investment policy, its dividend policy may have no influence on the market price of shares.

Assumptions

MM Hypothesis is based on the following critical assumptions:

1. Perfect capital markets, in which all investors are rational. Information is available to all free of cost, there are no transaction costs, securities are infinitely divisible; no investor is large enough to influence the market price of securities, there are no floatation costs.
2. There are no taxes. Alternatively, there are no differences in tax rate applicable to capital gains and dividends.
3. A firm has a given investment policy which does not change. The operational implication of this assumption is that financing of new investment out of retained earnings will not change the business risk complexion of the firm and therefore, no change in the required rate of return.
4. There is a perfect certainty by every investor as to future investments and profits of the firm. In other words, investors are able to forecast future prices and dividends with certainty. This assumption is dropped by MM later.

MM Hypothesis: The Crux of the Argument

The crux of the MM position on the irrelevance of dividend is the arbitrage argument. Arbitrage refers to entering simultaneously into two transactions, which balance each other. The two transactions involve the payment of dividend on one side and raising external funds either through the sale of new shares or to raise loans – to finance investment programmers. Suppose a firm has some investment opportunity, it has two alternatives (1) it can retain its earnings to finance the investment or (2) distribute the dividend to the shareholders and raise an equal amount externally through sale of new shares. In case, the firm selects the second alternative, arbitrage process is involved in that the payment of dividends is associated with raising of funds through other means of financing. The effect of dividend payment on the shareholders wealth will be exactly offset by the effect of raising additional shares.

When dividends are paid, the market price of the shares will increase. But the issue of additional shares will cause a decline in the terminal value of the shares. What is gained by investors through increase dividends will be offset by the reduction in terminal value of the shares. The market price before and after payment of dividend would be same. The investors according to MM, is indifferent between dividend and retention of earnings. Since the shareholders are indifferent, the wealth would not be affected by current and future dividend decisions of the firm. It would depend entirely upon the expected future earnings of the firm.

Notes

Notes There would be no difference as per MM, if external funds are raised in the form of debt instead of equity. This is because of their indifference between debt and equity with respect of leverage. The cost of capital is independent of leverage and the real cost of debt is the same as the real cost of equity.

The arbitrage process also implies that the total market value plus current dividends of two firms, which are alike in all respects except Dividend Payout Ratio, will be identical. The individual shareholder can retain and invest his own earnings and do this, as well as the firm.

With dividends being irrelevant, a firm's cost of capital would be independent of its Dividend Payout Ratio.

Finally, the arbitrage process will ensure that under conditions of uncertainty also the dividend policy is irrelevant.

When two firms are similar in respect of business risk, the prospective future earnings and investment policies, the market price of their shares must be the same. This MM considers, due to the rational behaviour of the investors who prefer more wealth to less wealth. Differences in current and future dividend policies cannot affect the market value of the two firms, as the present value of prospective dividends plus terminal value are the same.

MM Hypothesis Proof

MM provides the proof in support of their argument in the following way:

In the first step, the market value of a share in the beginning of the period is equal to the present value of dividend paid at the end of the period plus the market price of the share at the end of the period. Symbolically:

$$P_0 = \frac{1}{(1+K_e)}(D_1 + P_1) \qquad \ldots\ldots(1)$$

where,

P_0 = The prevailing market price of a share

K_e = The cost of equity capital

D_1 = the dividend to be paid at the end of the period one

P_1 = The market price of a share at the end of period one with no external financing the total value of the firm will be as follows:

$$nP_0 = \frac{1}{(1+K_e)}(nD_1 + nP_1) \qquad \ldots(2)$$

where, n = No. of shares outstanding

Now, if the firm finances its investment decisions by raising additional capital issuing n1 new shares at the end of the period (t = 1), then the capitalized value of the firm will be the sum of the dividends received at the end of the period and the value of the total outstanding shares at the end of the period less the value of the new shares. Since this adjustment is actually adding and reducing the value of the new shares. Thus we have:

$$nP_0 = \frac{1}{(1+K_e)}[nD_1 + (n+n_1)P_1 - n_1\ P_1] \qquad \ldots.(3)$$

Notes

Firms will have to revise additional capital to fund its investment requirement, if its investment requirement is more than its retained earnings, additional equity capital (n_1P_1) after utilizing its retained earnings will be as follows:

$$n_1P_1 = I - (E - nD_1) \quad \text{.... (4)}$$

where, I = Total investment required

nD_1 = Total dividends paid

E = Earnings during the period

And $(E\text{-}nD_1)$ = retained earnings

Simplifying the above equation we get,

$$N_1P_1 = I - E + nD_1 \quad \text{.... (5)}$$

Substitute the value of the new shares in equation (3) we get

$$nP_0 = \frac{1}{(1+K_e)}[nD_1 + (n+n_1)P_1 - 1 + E - nD_1]$$

$$= \frac{nD_1 + (n+n_1)P_1 - 1 + E - nD_1}{1+k_e}$$

$$= \frac{(n+n_1)P_1 - 1 + E}{(1+k_e)} \quad \text{.... (6)}$$

[Since the positive nD_1, and negative nD_1 cancels]

Since dividends (D) are not found in equation (6), MM concludes that dividends do not count and that dividend policy has no effect on share price.

Let us take an example to explain MM theory:

Example: The capitalization rate of A Ltd. is 12%. The company has outstanding shares to the extent of 25,000 shares selling @ ₹ 100 each. Assume, the net income anticipated for the current financial year of ₹ 3,50,000. A Ltd. plans to declare a dividend of ₹ 3 per share. The company has investment plans for new project of ₹ 500,000. Show that under the MM Model, the dividend payment does not affect the value of the firm.

Solution: To prove that MM model holds good, we have to show that the value of the firm remains the same whether dividends are paid or not.

1. The value of the firm, when dividends are paid:

   Step 1: Price per share at the end of year I

$$P_0 = \frac{1}{(1+k_e)}(d_1 + P_1)$$

$$100 = \frac{1}{1.12}(3 + P_1)$$

$$P_1 = ₹\,109$$

Notes

Step 2: Amounts to be raised by the issue of new shares to finance investment requirement:

$$N_1P_1 = I - (E - nD_1)$$
$$= 500,000 - (350,000 - 25000 \times 3)$$
$$= 225,000$$

Step 3: No. of shares to be raised

$$n_1 = \frac{225000}{109} \text{ Nos.}$$

Step 4: Value of the firm

$$nP_0 = \frac{(n+n_1)P_1 - I + E}{(1+k_e)}$$

$$= \frac{(25,000 + 225,000/109) \times 109 - (500,000) + 350,000)}{1.12}$$

Value of the firm nP_o = ₹ 25,00,000

2. Value of the firm when dividends are not paid:

Step 1: Price per share at the end of year I

$$P_0 = \frac{1}{(1+k_e)}(D_1 + P_1)$$

$$100 = \frac{P_1}{1.12} \text{Or}$$

$$P_1 = ₹\ 112$$

Step 2: Amount to be raised from the issue of shares

$$500,000 - 350,000 = 150,000$$

Step 3: No. of shares to be raised = 150,000/1.12

Step 4: Value of the firm

$$nP_0 = \frac{(n+n_1)P_1 - I + E}{(1+k_e)}$$

$$= \frac{(25,000 + 150,000/1.12) \times 1.12 - (500,000) + 350,000}{1.12}$$

Value of the firm nP_o = ₹ 25,00,000

Thus the value of the firm in both the cases remains the same.

Critical Analysis of the Assumptions

1. ***Tax effect:*** The assumption cannot be true since the tax rate for the dividend and capital gains are different.
2. ***Floatation costs:*** The proceeds that the firm gets from the issue of securities are net off. the issue expenses – the total issue expenses include underwriting expenses, brokerage and other marketing costs, of the tune of 10 – 15% of the total issues in India. These high costs cannot be ignored.

Notes

3. ***Transaction costs:*** It is an unrealistic assumption that investors do not have to incur transaction costs like brokerage when disposing off the shares. Further, the inconvenience and the uncertainty involved in the share price movements make the investors prefer current income by way of dividend to plough back of profits by the company.

4. ***Market conditions:*** Sometimes, market conditions do effect the investment decisions of the firm. For instance, though a firm has profitable investment opportunities, the bad market condition may not allow it to mobilize the funds. In such cases, firm will have to depend on the retained earnings and will have a low dividend payout ratio.

14.3.5 Rational Expectations Model

According to rational expectation model, there would be no impact of the dividend declaration on the market price of the share so long as it is at the expected rate. If the dividend declared is higher or lower than the expected level it may show some adjustments. For example, in case the firm declares dividend higher than what was expected, it would result in an upward movement of the share price, as there would be expectations of higher earnings in future. Similarly, low dividends would be taken as a fall in future earnings and hence market price will fall.

Example: The Agro Chemicals Company belongs to a risk class for which the appropriate capitalization rate is 10%. It currently has 100,000 shares selling at ₹ 100 each. The firm has proposed to declare ₹ 5 as dividend at the end of the current financial year, which has just begun. What will be the price of the share at the end of the year, if a dividend is not declared? What will be the price if one is? Answer on the basis of Modigliani and Miller model and assume no taxes.

Solution:

1. According to Walter's formula, the optimum dividend payout ratio would be 0% as $R_a > R_c$

$$V = \frac{D + R_a / R_c (E - D)}{R_c}$$

$$= \frac{0 + 12/10 \text{ ₹ } 5}{10\%} = \text{₹ } 60$$

2. (a) Price of the shares, when dividends are declared (MM)

$$P = \frac{1}{(1 + k_e)} = (D_1 + P_1)$$

$$100 = \frac{1}{1.10}(\text{₹ } 5 + P_1),$$

Hence P_1 = ₹ 105

(b) Price of the shares when dividends are not declared

$$\text{₹ } 100 = \frac{1}{1.10} P_1,$$

Hence P_1 = ₹ 110

Self Assessment

Notes

Fill in the blanks:

7. Walter's Model supports the doctrine that dividends are ……..
8. Gordon Model assumes that future dividends are the sole determinant of the ……..value of the common shares.
9. According to …….model, there would be no impact of the dividend declaration on the market price of the share so long as it is at the expected rate.

14.4 Forms of Dividends

In addition to cash dividends, the firm has other options for distributing profits to shareholders. These options are:

1. Bonus shares (stock dividend)
2. Stock (share) split
3. Stock repurchase

14.4.1 Bonus Shares (Stock Dividend)

Bonus shares occur when new shares are issued on a pro rata basis to the current shareholders while the firm's assets, its earnings, the risk being assured and the investor's percentage ownership in the company remain uncharged.

Example: If a shareholder owns 100 shares of common stock at a time when the firm distributes bonus shares in the ratio of 1:20 (1 share for every 20 shares held), the shareholder will receive 5 additional shares.

There are several favourable aspects of a bonus issue:

1. ***Conserves cash:*** The stock dividend (bonus shares) allows the firms to declare a dividend without using up cash that may be needed for operations or expansion.
2. ***Indicates higher future profits:*** Normally a bonus share is an indication of higher future profits.
3. ***Raises future dividends for investors:*** If the regular cash dividend is continued after the bonus issue, the individual shareholder will receive higher total dividends.
4. ***Has high psychological value:*** Because of the positive aspects of bonus shares, issue of bonus shares receives positive response by the market.
5. ***Retains proportional ownership for shareholders:*** It helps the majority shareholders in retaining the proportional ownership as compared to rights issue of shares where the shareholders are expected to pay for the shares including the premium as per issue criteria.

14.4.2 Stock (Share) Split

A stock split is a change in the number of outstanding shares through a proportional reduction or increase in the par value of the shares. Only the face value (par value) and number of outstanding shares are affected. The market price of the stock will adjust immediately to reflect the stock split. Example: a firm may have 20,00,000 outstanding shares selling for ₹ 20 per share.

Notes

The firm declares a 2–for–1 stock split. After the split, the outstanding share will go up to 40,00,000 and will sell for approximately ₹ 10 per share. A shareholder with 100 shares worth ₹ 2000 before the split will hold 200 shares worth ₹ 2000.

Notes Why firms go for stock splits?

1. ***Reduction of market price of stock:*** The major objective behind most stock split is to reduce the per share price of a firm's common shares. A lower price per share makes the stock more affordable in marketable lots (usually 100 shares) to more investors.
2. ***Indication of future growth:*** The announcement of the stock split is perceived as a favourable news by the investors in that with growing earnings, the company has bright prospects and the investors can reasonably look for increase in future dividends.
3. ***Reverse split:*** An indication of trouble. In case of reverse split, the firm reduces the number of outstanding shares. The declaration of reverse split is an indication that the firm does not have good prospects.

14.4.3 Stock Repurchase

This occurs when a firm brings back outstanding shares of its own common shares. Firms repurchase stock for three major reasons:

1. ***For stock option:*** A stock option is the right to purchase a specified number of shares of common shares during a stated time period and a stipulated price. Stock options are frequently given to senior officers of a company as an incentive to work to raise the value of the firm. As for example, a firm's stock is currently selling for ₹ 20 per share when the president is given the option to buy 1000 shares for ₹ 22 at anytime in the next three years. If the stock value rises to ₹ 40 the president can exercise the option, purchase the stock for ₹ 22,000 (1000 shares @ ₹ 22) and sell it for ₹ 40,000 immediately. The capital gain arising on the sale will be a profit for the president as a direct result of the success of the firm.
2. ***To have shares for acquisition:*** When a firm is seeking control of another firm, it may be willing to offer its own common shares for the shares of the other firm. In this exchange of shares, the firm can repurchase stock to make the acquisition. This allows take over without increasing the number of outstanding shares and avoids a dilution of earnings.
3. ***To retire the stock, thus increasing earnings per share:*** When a firm retires a portion of its shares or buys back its own shares (as per procedure laid down by statute), the repurchase increases the firm's earnings per share.

Stock Repurchase Viewed as Cash Dividend

When common shares are repurchased for cancellation, the motive is to distribute excess cash to the owners. Generally, as long as earnings remain constant, the repurchase reduces the number of outstanding shares raising the earnings per share and therefore the market price per share. Besides, the advantage of an increase in per share earnings, certain tax benefits to owner also result. In case of cash dividend, the owner is required to pay income taxes on it, whereas, the increase in market value of the shares, that resulted from repurchase would not be taxed till the owner sells the shares. Of course, when the stock is sold, the capital gain is taxed at a favourable rate than one applied to ordinary income.

Self Assessment

Notes

Fill in the blanks:

10. A stock split is a change in the number of ……shares through a proportional reduction
11. The ……..shares allows the firms to declare a dividend without using up cash that may be needed for operations or expansion.
12. A ……is the right to purchase a specified number of shares of common shares during a stated time period and a stipulated price.

14.5 Corporate Dividend Behaviour

A firm's dividend policies consider division of the firms after tax income into two categories:

1. ***Funds to finance long-term growth:*** These are represented in the Balance Sheet as Retained Earnings, also known as ploughing back of profits in the firm.
2. ***Funds to be distributed to shareholders:*** These are cash dividends declared by the Board of Directors and paid to common shareholders.

Two possible approaches to dividend decisions

1. As a long-term financing decision: In this approach, all the firms after tax profits can be considered as source of long-term financing. Thus, the payment of cash dividends reduces the funds available to finance growth and either restricts growth or forces the firm to find out other financing sources. Thus, the firm might accept a guideline to retain earnings as long as either of the conditions exists.
   (a) *Sufficient profitable projects are available:* Acceptances of highly profitable projects represents a growth goal for most of the firms. As long as such projects are available, the firm can retain earnings to finance them.
   (b) *Capital structure needs equity funds:* Among a variety of sources of long-term funds and to avoid, the high risk associated with excessive debt, the firm must have a balance of debt and equity financing. Because of the costs of floating common shares, retained earnings are profitable as equity financing.

   With either of the guidelines, cash dividends are viewed as a remainder.
2. ***As maximization of wealth:*** With this approach, the firm recognizes that the payment of dividends has a strong influence on the market price of the common shares.

14.5.1 Legal and Procedural Aspects in Connection with Payment of Dividend

Legal Aspects

The amount of dividend that can be legally distributed is governed by the company law, judicial pronouncements in leading cases and contractual restrictions. The important provisions of company law pertaining to dividends are given below:

1. Company can pay only cash dividends (with the exception of bonus shares)
2. Dividends can be paid only out of the profits earned during the financial year after providing for depreciation and after transferring to reserves, such percentage of profits as prescribed by law.

Notes

Caution The Companies (transfer to Reserves) Rules, 1975 provide that before dividend declaration a certain percentage of profits as specified below should be transferred to the reserves of the company:

(i) Where the divident exceeds 10% but not 12.5% of the paid up capital - Not less than 2.5% of the current profits

(ii) Where dividend exceeds 12.5% but not 15% - Not less than 5% of the current profits

(iii) Where dividend exceeds 15% but not 20% - Not less than 7.5% of the current profits

(iv) Where dividend exceeds 20% - Not less than 10% of the current profits

3. Due to inadequacy or absence of profits in any year, dividend may be paid out of the accumulated profits of previous year provided conditions as stipulated by the Companies (Declaration of Dividend out of Reserves) Rules, 1975 are satisfied:

   (a) The rate of dividend should not exceed the average of the rates at which the dividend was declared by it in 5 years immediately preceding that year or 10% of its paid up capital whichever is less.

   (b) The total amount to be drawn from the accumulated profits carried in previous years and transferred to reserves shall not exceed an amount equal to 1/10th of the sum of its paid up capital and free reserves and the amount so drawn shall first be utilized to set off the losses incurred in the financial year before any dividend in respect of preference or equity shares is declared and

   (c) The balance of reserves after such drawl shall not fall below 15% of its paid up capital.

   (d) Dividend cannot be declared for past years for which accounts have been closed.

Procedural Aspects

The important events and dates are given below:

1. ***Board resolution:*** Dividend is the prerogative of the Board of Directors. Hence the Board of Directors should in a formal meeting resolve to pay the dividend.

2. ***Shareholder's approval:*** The resolution of the Board of Directors to pay the dividend has to be approved by the shareholders in the Annual General Meeting.

3. ***Record date:*** The dividend is payable to members whose names appear in the Register of Members as on the record date.

4. ***Dividend Payment:*** Dividend warrants must be posted within 30 days of the declaration date.

Task Do you think payment of dividends is an obligation for the corporate. Justify.

Self Assessment

Notes

Fill in the blanks:

13. The amount of dividend that can be legally distributed is governed by the …….law.
14. With ……approach, the firm recognizes that the payment of dividends has a strong influence on the market price of the common shares.
15. Dividend warrants must be posted within …… days of the declaration date.

Case Study

Case: Ramesh Products

This case allows the reader to apply the concept of future EPS in evaluating a course of action in terms of its effect on the market value of the firm's common stock.

Ramesh Products (RKP) is a medium-sized producer of chemicals and vinyl coating used in a variety of industrial processes. The company's main facilities are located in an industrial park in East Baltimost, a central site by a rail line that is linking the firm with its major customers on the east coast.

Last year the firm recorded over $200 million in sales, showed a net income of $53 million and concluded a very successful year. For the coming year, the firm expects a 15 per cent improvement in sales and operating income figures.

The firm's management committee, consisting of the president and the vice-presidents of production, marketing, and finance, will be meeting with in a week to discuss a major new activity for the next year. Products has been invited to bid on a long-term contract to produce a line of plastics for a large chemical company in Wilmington, Delaware. It appears that the firm can easily get the $50 million contract which should yield an additional $14 million in operating income. These figures are for next year only, and the firm estimates even higher sales and profits in the future.

Chowdhary vice-president of finance, has been studying the financial data related to the new line of plastics. The production manager knows of a small plastic company located about three miles from RKP's facilities. The plastics company has all the equipment needed to produce the new line of plastics; the company is for sale for $104 million. This price represents largely the value of the assets, since the company has lost its only large contracts. Chowdhary Prasad has discussed the purchase of this plastics company with a local real estate agent and has confirmed that it is available for $100 million.

Chowdhary Prasad figures that RKP has sufficient working capital to add the new plastics line but does not have the cash to buy the 100 million of machinery and equipment needed to begin the production. Discussion with a representative of a large Baltimore bank reveals that RKP can borrow $39 million through a 12 per cent mortgage on its main facilities. A mortgage company has indicated that it would help finance the plastic machinery with a $51 million, 13.6 per cent mortgage. Chowdhary Prasad is considering these choices but knows that RKP has traditionally kept its debt-asset ratio below 41 per cent. He does not want to borrow if the additional debt causes the ratio to exceed 41 per cent.

Chowdhary Prasad discussed equity financing with RKP's investment banker on a recent trip to New Jersy City.He learned that the firm could probably issue upto $150 million in 15 per cent preferred stock or class A common stock. If the common stock were offered, it

Contd...

Notes

could net $20 per share to RKP. Chowdhary Prasad called new Jersy and confirmed that these options were still open to the firm.

In making decision on new investments, Chowdhary Prasad believes in the validity of the future-earnings per share technique. He knows that RKP has traditionally traded at a 6/1 price-earning multiple and he expects that this will hold. Thus, if a new project increases future earnings per share, it will increase the value of the firm for its shareholders.

Question

According to the future earning share approach and after detailed analysis what do you feel about the plastic project. Is it worth while to accept.

14.6 Summary

- Management of earnings means, how the earnings of a firm are determined and how they are utilised or appropriated or allocated or distributed.
- The firm's dividend policy is formulated with two basic objectives in mind – providing for sufficient financing and maximizing the wealth of the firm's shareholders.
- Three of the more commonly used dividend policies are Constant Payout Ratio Dividend Policy, Regular Dividend Policy and; Low Regular and Extra-dividend Policy
- According to traditional approach of dividend policy the stock value responds positively to higher dividends and negatively with low dividends.
- According to Walter model, the investment policy of a firm cannot be separated from its dividend policy and both are interlinked.
- Gordon Model assumes that future dividends are the sole determinant of the intrinsic value of the common shares.
- The irrelevance of dividends is provided by the Miller and Modigliani Hypothesis
- According to rational expectation model, there would be no impact of the dividend declaration on the market price of the share so long as it is at the expected rate.
- In addition to cash dividends, the firm has other options for distributing profits to shareholders. These options are Bonus shares (stock dividend), Stock (share) split and Stock repurchase
- The amount of dividend that can be legally distributed is governed by the company law, judicial pronouncements in leading cases and contractual restrictions.

14.7 Keywords

Dividends: It refers to that portion of company's net earnings that is paid out to the equity shareholders.

Dividend Policy: It decides the portion of earnings to be paid as dividends to ordinary shareholders and what portion is ploughed back in the firm for investment purpose.

Payout Ratio: The ratio of dividend to earnings is known as payout ratio.

Profit: It is the excess of the revenue over the expenses on conducting the operations.

Stability: it refers to the consistency or lack of variability in the stream of dividend payments.

Notes

14.8 Review Questions

1. What do you think are the determinants of the dividend policy of corporate enterprise?
2. Explain the terms bonus shares and share splits. What is their rationale?
3. What factors determine the dividend policy of a company? Do you believe it will be justifiable for a company to obtain a short-term loan from a bank to allow payment of a dividend?
4. To what extent are firms able to establish definite long run dividend policies? What factors would affect these policies? To what extent might these policies affect market value of firms' securities? Explain.
5. What is stable dividend policy? Why should a firm follow such a policy?
6. In a world of no taxes and no transaction costs, a firm cannot be made more valuable by manipulating the dividend payout ratio. Explain the validity of the statement.
7. What assumptions and arguments are used by Modigliani and Miller in support of the irrelevance of dividends? Are dividends really irrelevant? If not, what are the arguments for relevance of dividend policy?
8. (a) Explain the following formula given by Walter for determining dividend policy:

$$V = \frac{D + R_a / R_c (E - D)}{R_c}$$

where, V = value of ordinary shares

R_a = Internal productivity of retained earnings

R_c = Market capitalization rate

E = Earnings per shares

D = Dividends per share

(b) What are the merits and limitations of the formula in designing the dividend policy for a company?

9. How far do you agree with the proposition that dividends are irrelevant?
10. 'Payment of dividend involves legal considerations'. Discuss.

Answers: Self Assessment

1.	Surplus	2.	good	3.	Earnings
4.	fixed rupee	5.	stable dividend payout	6.	normal
7.	relevant.	8.	intrinsic	9.	rational expectation
10.	outstanding	11.	bonus	12.	stock option
13.	company	14.	maximization of wealth	15.	30

14.9 Further Readings

Books

Dr Pradeep Kumar Sinha, *Financial Management*, New Delhi, Excel Books, 2009.

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